Ecology comments embedded in the Public Review Draft Remedial Investigation/ Feasibility Study Report, Port of Longview Maintenance Facility Area, Longview, Washington

PUBLIC REVIEW DRAFT

REMEDIAL INVESTIGATION / FEASIBILITY STUDY REPORT

Port of Longview
Maintenance Facility Area
Longview, Washington

Prepared for

INTERNATIONAL PAPER

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Tables

Figures

Appendices

AAFS	additional action feasibility study
AECOM	AECOM Technical Services Incorporated
AOC	area of contamination
ARARs	applicable or relevant and appropriate requirements
bgs	below ground surface
CAMU	corrective action management unit
CAP	cleanup action plan
CCC	Cowlitz County Code
CFR	Code of Federal Regulations
CLARC	Cleanup Levels and Risk Calculation
COC	chemical of concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
DRO	diesel-range organics
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
ERH	electrical resistance heating
EVS	Environmental Visualization System
FID	flame ionization detector
FS	feasibility study
GP	gravelly sands
HDPE	high-density polyethylene
International Paper	International Paper Company
IRIS	Integrated Risk Information System
JE model	Johnson & Ettinger model
LDR	land disposal restriction
LMC	Longview Municipal Code
LNAPL	light non-aqueous phase liquid
MCL	maximum contaminant level
MFA	Maintenance Facility Area
mg/kg	milligrams per kilogram

mg/kg-day	milligrams per kilogram-day
mg/L	milligrams per liter
ML	silt
MNA	monitored natural attenuation
msl	mean sea level
MTCA	Model Toxics Control Act
NAPL	non-aqueous phase liquid
O&M	operation and maintenance
ORC	oxygen release compound
PAH	polycyclic aromatic hydrocarbon
PCMP	performance and compliance monitoring plan
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PEL	permissible exposure limit
PID	photoionization detector
POC	point of compliance
POTW	publicly-owned treatment works
ppm	parts per million
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RfD	reference dose
RI	remedial investigation
RRO	residual-range organics
SF	slope factor
SM	sandy silt
SP	sand
SWCAA	Southwest Clean Air Agency
TEF	toxicity equivalency factor
TSDF	treatment, storage, and disposal facility
TTEC	total toxic equivalent concentration
TPH	total petroleum hydrocarbons

TWP	treated wood products
μg/L	micrograms per liter
μg/m^3	micrograms per cubic meter
URS	URS Corporation
UTS	Universal Treatment Standards
VOC	volatile organic compound
WAC	Washington Administrative Code

INTRODUCTION

This final revised remedial investigation/feasibility study (RI/FS) report summarizes the investigation and evaluation efforts conducted by International Paper Company (International Paper) for the Maintenance Facility Area (MFA) at the former International Paper facility located in Longview, Washington, now owned by the Port of Longview. These efforts were conducted in accordance with the corrective action requirements of the Washington State Dangerous Waste (DW) Regulations (Chapter 173-303 Washington Administrative Code [WAC]) and the specific cleanup action requirements of the Model Toxics Control Act (MTCA) Cleanup Regulation (Chapter 173-340 WAC). Historic site activities summarized in this document have been conducted under both Agreed Order DEHS-S437 (1997) and Consent Decree 97-2-01088-9 (1997) between International Paper and the Washington State Department of Ecology (Ecology). The primary objective of this report is to present results of investigations conducted in the MFA and the subsequent evaluations performed to identify cleanup action alternatives for that area.

Between 1937 and 1982, wood treatment operations were conducted in the Treated Wood Products (TWP) Area, adjacent to the MFA. Between 1947 and 1953, these operations included discharges of liquid wastes via a lineament that was formerly located in the area now called the MFA to the northwest of the TWP Area. Operational changes were made in 1953 that included the discontinuation of the discharge of liquid wastes outside of the TWP Area, with those wastes rather being discharged to ponds within the TWP Area (Pond 1 and Pond 2). Operations at the TWP Area were discontinued in 1982. In 1985, the most affected surface soils were excavated. In 1989, the remaining affected soils were capped with a low permeability cover system. Additional cleanup actions were conducted in the TWP Area in 1997 and 1998. These actions included constructing a subsurface barrier wall around the area formerly occupied by treatment operations, capping the area with an additional low permeability cover system, and *in situ* treatment of contaminants within the subsurface barrier wall using biosparging and bioventing wells.

During installation of the subsurface barrier wall, impacted soils were observed outside the wall alignment. Investigations of additional regions within the area of contamination (AOC) outside the barrier wall were conducted between 1998 and 2000, as reported in the following five documents:

- *Investigation of Areas of Soil Impact Outside the Containment Area* (URS 1998)
- *Soil and Groundwater Investigation of Western Area* (URS 2000a)
- *Soil and Groundwater Investigation of Eastern Area* (URS 2000b)
- *Additional Perimeter Boring investigation Report and Maintenance Facility Work Plan* (URS 2000c)
- *Offsite Investigation Report and Additional Action Feasibility Study* (AAFS) (URS 2000d)

The offsite investigation report and AAFS identified affected soil and groundwater in an area described as the MFA and evaluated possible remedial alternatives for the area. In 2002, additional cleanup actions were implemented in the MFA with the installation of a biosparging/bioventing treatment system, which operated until June 2008. Monitoring of the MFA is ongoing.

URS Corporation (URS) submitted a draft RI/FS report to Ecology that summarized the above investigation activities and then evaluated potential cleanup action alternatives and recommended preferred cleanup action alternatives on January 19, 2007. Ecology provided comments on this draft RI/FS report on March 19, 2007 that included a request for additional investigation to further delineate the nature and extent of contamination at specific locations within the MFA. An additional investigation work plan was prepared and approved by Ecology. This additional investigation was conducted in September 2008, and the results of this investigation were initially reported in the draft revised RI/FS report dated May 2011. URS performed treatability studies and an additional investigation and evaluation of cleanup action alternatives in response to comments on the May 2011 draft revised RI/FS report.

Supplemental soil sampling was conducted in the vicinity of the Mechanics Shop and the results were presented in the Mechanics Shop investigation report. Treatability studies were conducted to evaluate the effectiveness of *in situ* soil solidification and thermal remediation technologies. Draft final revised RI sections of this report were previously submitted to Ecology in August of 2013, and draft final revised FS sections of this report were previously submitted to Ecology in February of 2014. Comments on the FS sections were received from Ecology in September of 2014. URS was acquired by AECOM Technical Services Incorporated (AECOM) in October 2014. Based upon comments received from Ecology in September of 2014 and subsequent communications with the Port of Longview, specific preferred cleanup action alternative details were revised and resubmitted to Ecology in May of 2015. Additional clarifications regarding revisions to the FS sections of this report were submitted to Ecology in June of 2015, and a complete draft final revised RI/FS report was submitted to Ecology on October 8, 2015. This final revised RI/FS report addresses comments received from Ecology on previous submittals.

HYDROGEOLOGIC SETTING

Site geological and hydrogeological conditions have been developed based upon multiple investigations conducted at the site and its vicinity. The site is situated on a reclaimed floodplain of the Columbia River and the surficial soils consist of gravelly sandy fill and hydraulic/dredged sand fill. The thickness of the fill layer varies in the site vicinity and ranges from 1 foot to approximately 10 feet. Native alluvium underlies the fill and consists of interbedded sands and silts, which vary laterally because of the constantly changing nature of the depositional environment associated with rivers. The fill layer at the former International Paper Longview facility contains a seasonally-saturated perched water zone that is not present across the entire site. Groundwater occurs within the alluvial deposits below the fill layer and is a major aquifer in the county with yield up to 3,000 gallons per minute. Groundwater elevations in the alluvium generally range between zero and 12 feet above mean sea level (msl) in the site vicinity. Groundwater elevations vary in response to the stage of the adjacent Columbia River, which fluctuates in response to tidal effects as well as flow quantity variations. Four general stratigraphic units are evident at the site: the Upper Sand (Gravelly Sand/Sand Fill), the Upper

Silt, the Lower Sand and the Lower Silt unit. The top of the Upper Silt unit is generally encountered in the MFA at depths ranging from approximately 5 to 12 feet below ground surface (bgs).

Groundwater is present within the Upper Sand and the Lower Sand units. Within the Upper Sand, groundwater occurs as a shallow perched zone located immediately above the Upper Silt. The perched groundwater zone appears to be intermittent and was evident in the southeastern portion of the MFA. The perched groundwater zone saturated thickness appears to be limited where present. The Lower Sand is divided into two units (Aquifer A and Aquifer B) that are separated by the Intermediate Silt. The base of Aquifer B is bounded by the Lower Silt. The Upper and Intermediate Silt units underlie the MFA and are considered to be confining layers, based on the fine-grained nature of these units. Groundwater within Aquifer A is semi-confined to confined and Aquifer B is under confined conditions. The depths to groundwater in the Upper Sand range from approximately 10 to 15 feet bgs. The Intermediate Silt appears to act as a confining layer, and as a result, Aquifers A and B behave as distinct aquifers at the site.

REMEDIAL INVESTIGATION ACTIVITIES

Sheen and dense non-aqueous phase liquid (DNAPL) occurrence has been delineated laterally in the vicinity of the historic lineament in the Upper Sand unit soils above the Upper Silt. The volume of soil containing concentrations of diesel-range organics (DRO) and polycyclic aromatic hydrocarbons (PAHs) exceeding MTCA Method C soil cleanup levels for protection of groundwater is estimated at approximately 6,470 cubic yards. Impacted groundwater has been delineated within Aquifer A (at depths of approximately 10 to 45 feet bgs) over an area that approximates the footprint of delineated impacted soil. Potentially complete exposure pathways include the direct contact pathway and the vapor intrusion pathway for current and potential industrial workers and construction workers.

Preliminary cleanup levels for the MFA have been developed for the chemicals of concern (COCs), which include seven carcinogenic PAH compounds (cPAHs), 2-methylnaphthalene, naphthalene, and DRO, as well as the rarely detected compounds dibenzofuran and pentachlorophenol (PCP). The MFA meets the criteria for an industrial property under WAC 173-340-745. Because it is reasonable to assume maximum exposures at the MFA are consistent with industrial land use, MTCA Method C industrial cleanup levels (WAC 173-340-745[5][b][iii]) are appropriate for soil throughout the MFA, and MTCA Method C cleanup levels (WAC 137-340-720[5][b][iii]) are appropriate for groundwater within the boundaries of the proposed deed-restricted area defining the existing COC plume in groundwater. MTCA also requires consideration of potential human-health based values for groundwater protection (i.e., soil to groundwater pathway) under WAC 173-340-745(5)(b)(iii)(A). MTCA Method C soil cleanup levels for protection of groundwater are applicable at the site, rather than MTCA Method B soil cleanup levels for protection of groundwater, because MTCA Method C groundwater cleanup levels would apply in the area within the conditional point of compliance (POC) for groundwater. Because groundwater containing COCs has the potential to migrate beyond the property boundaries, MTCA Standard Method B groundwater cleanup levels (WAC 173-340-720[4][b][iii]) are appropriate beyond the proposed deed-restricted area defining the existing COC plume boundary. In accordance with WAC 173-340-440, institutional controls memorialized through an environmental covenant on the MFA property that limits the property to industrial use and prohibits the use of groundwater would be required in order to use MTCA Method C cleanup levels. Preliminary cleanup levels developed for the MFA are shown in Table ES-1 below.

Table ES-1
Maintenance Facility Area Preliminary Cleanup Levels

Chemicals of Concern	Groundwater (µg/L) MTCA Method B	Groundwater (µg/L) MTCA Method C	Soil (mg/kg) MTCA Method C Direct Contact	Soil (mg/kg) MTCA Method C Protection of Groundwater
Polycyclic Aromatic Hydrocarbons (PAHs)				
cPAHs	0.012	0.12	18	2.3
2-Methylnaphthalene	32	70	14,000	3.8
Naphthalene	160	350	70,000	9.7
Petroleum Compounds				
Total Petroleum Hydrocarbons–Diesel/Oil	500	500	2,000	2,000
Semivolatile Compounds				
Dibenzofuran	16	35	3,500	6.6
Pentachlorophenol	0.22	2.2	330	0.035

Note:
Refer to Table 6-1 for more detail

DEVELOPMENT AND EVALUATION OF CLEANUP ACTION ALTERNATIVES

Some cleanup alternatives developed and evaluated during the RI/FS include remediation levels developed consistent with WAC 173-340-355 to identify the concentrations or other criteria at which different cleanup action components would be implemented. Remediation levels are used at sites when more than one cleanup action component is used to achieve the cleanup levels. Treatment or removal of DNAPL as a source at the MFA is a primary consideration, as a means of addressing the highest concentrations of hazardous substances per WAC 173-340-360(2)(c)(ii)(A). On this basis, a preliminary remediation level for soil containing DNAPL is established as:

> *"Physically treat or remove as a source, to the extent practicable, all soil containing field indications of DNAPL"*

The development and evaluation of cleanup action alternatives was conducted utilizing a four step process:

- Screening of cleanup action alternative components
- Development of cleanup action alternatives
- Evaluation of cleanup action alternatives using MTCA criteria
- Comparative evaluation of cleanup action alternatives

Based on the selected cleanup action alternative components for soil and groundwater, ten cleanup action alternatives were developed for soil and four cleanup action alternatives were developed for groundwater. The soil cleanup action alternatives include:

Alternative S1 –	Comprehensive Excavation (Baseline Alternative)
Alternative S2 –	Comprehensive Excavation Outside Building Footprint
Alternative S3 –	DNAPL Excavation Outside Building Footprint
Alternative S4 –	DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
Alternative S5 –	Solidification Outside Building Footprint
Alternative S5A –	Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
Alternative S5B –	Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
Alternative S5C –	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
Alternative S6 –	DNAPL Treatment by Electrical Resistance Heating
Alternative S7 –	DNAPL Excavation and Electrical Resistance Heating

The groundwater cleanup action alternatives include:

Alternative GW1 –	Electrical Resistance Heating and Enhanced Biodegradation (Baseline Alternative)
Alternative GW2 –	Chemical Oxidation and Monitored Natural Attenuation
Alternative GW3 –	Active Biosparging
Alternative GW4 –	Monitored Natural Attenuation

Each of the soil and groundwater alternatives was then evaluated individually, using the criteria established by MTCA. WAC 173-340-360 requires first that all cleanup action alternatives evaluated meet the following four threshold requirements:

1. Protect human health and the environment

2. Comply with cleanup standards (WAC 173-340-700 through 760)

3. Comply with applicable state and federal laws (WAC 173-340-710)

4. Provide for compliance monitoring (WAC 173-340-410 and 720 through 760)

MTCA then requires that cleanup action alternatives that fulfill the threshold requirements also be evaluated against the following “other requirements” (WAC 173-340-360[2][b]):

5. Use permanent solutions to the maximum extent practicable by evaluating specific elements described in WAC 173-340-360(3)

6. Provide for a reasonable restoration time frame (WAC 173-340-360[4])

7. Consider public concerns (WAC 173-340-600)

Following the individual analysis of cleanup action alternatives, a comparative evaluation of cleanup action alternatives was performed by assessing their relative degree of permanence. MTCA requires that the cleanup action alternative for a site use permanent solutions to the maximum extent practicable, as evaluated by performing a disproportionate cost analysis (WAC 173-340-360[3][e][ii][A]). In the comparative analysis, the cleanup action alternatives are ranked from most to least permanent, based on the evaluation of the alternatives using the following specific criteria (WAC 173-340-360[3][f]):

1. Protectiveness
2. Permanence
3. Cost
4. Effectiveness over the long term
5. Management of short-term risks
6. Technical and administrative implementability
7. Consideration of public concerns

The results of the disproportionate cost analysis are summarized in Table ES-2 below.

Table ES-2
Disproportionate Cost Analysis Summary

Alternative Name - Description		**Quantity/Rate of Removal/Treatment**		**Cost ($)**		**Benefit/ Cost**
		Soil COCs (LB) Groundwater (CF/YR)	**Relative Benefit**	**Total Estimated Project Cost**	**Relative Cost**	**Relative Rank**
SOIL						
S1	Comprehensive Excavation (Baseline)	**176,000**	**1.00**	$6,440,000	0.95	8
S2	Comprehensive Excavation Outside Building Footprint	167,000	0.86	$5,740,000	0.72	6
S3	DNAPL Excavation Outside Building Footprint	152,000	0.62	$5,090,000	0.51	5
S4	DNAPL Excavation Outside Building Footprint, Limited Excavation Inside	156,000	0.68	$5,310,000	0.58	7
S5	Solidification Outside Building Footprint	167,000	0.86	**$3,480,000**	**0.00**	2
S5A	Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop	167,000	0.86	$3,880,000	0.13	3
S5B	Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks	**176,000**	**1.00**	$3,930,000	0.14	**1**
S5C	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop	165,000	0.83	$4,500,000	0.33	4

Table ES-2
Disproportionate Cost Analysis Summary

Alternative Name - Description		Quantity/Rate of Removal/Treatment		Cost ($)		Benefit/ Cost
		Soil COCs (LB) Groundwater (CF/YR)	**Relative Benefit**	**Total Estimated Project Cost**	**Relative Cost**	**Relative Rank**
S6	DNAPL Treatment by ERH	113,000	0.00	$5,460,000	0.63	10
S7	DNAPL Excavation and ERH	157,000	0.70	$6,610,000	1.00	9
GROUNDWATER						
GW1	ERH and Enhanced Biodegradation	**96,300**	**1.00**	$11,200,000	1.00	3
GW2	Chemical Oxidation and Monitored Natural Attenuation	72,200	0.69	$4,560,000	0.32	**1**
GW3	Active Biosparging	28,900	0.12	$2,000,000	0.06	2
GW4	Monitored Natural Attenuation	19,300	0.00	**$1,410,000**	**0.00**	4

Notes:
Refer to Table 9-2 and Table 9-5 for more detail.
Bolded valued represent maximum relative benefit and minimum relative cost

SELECTION OF PREFERRED CLEANUP ACTION ALTERNATIVES

Based on the evaluation of cleanup action alternatives and the associated disproportionate cost analysis (above), the selected preferred cleanup action alternative for affected MFA soils is Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks. The disproportionate cost analysis ranked Alternative GW2 – Chemical Oxidation and MNA as the most favorable groundwater cleanup action alternative. However, this analysis does not consider the improvements in groundwater quality that are expected to result from the implementation of the soil cleanup action. Alternative GW4 – Monitored Natural Attenuation has the highest combined rank when considering all seven MTCA criteria as shown in Table ES-3 below and is expected to be an appropriate alternative when considered in combination with the soil cleanup action.

Table ES-3
MTCA Criteria Rankings Summary for Groundwater Alternatives

Alternative	Protec-tiveness Rank	Perma-nence Rank	Cost (PW) Rank	Long-Term Effective-ness Rank	Short-Term Risk Rank	Implement-ability Rank	Public Concerns Rank	Sum of Indi-vidual Ranks	Com-bined Rank
GW1	1	2	4	2	4	4	2	19	3
GW2	2	2	3	2	3	3	2	17	2
GW3	3	3	2	3	2	2	4	19	3
GW4	4	3	1	3	1	1	3	16	1

Note:
Refer to Table 9-7 for more detail

Therefore, Alternative GW4 – Monitored Natural Attenuation is selected as the preferred cleanup action alternative for affected MFA groundwater based upon its most favorable ranking when considering all seven MTCA criteria and when evaluated in conjunction with the preferred soil cleanup action alternative. MNA is expected to result in significant improvements in groundwater quality following soil solidification. However, Alternative GW4 includes a provision for implementation of the Alternative GW2 – Chemical Oxidation and MNA if those improvements are not realized within a reasonable restoration timeframe. Details related to the future implementation and monitoring of the preferred cleanup action alternatives will be presented separately in a Cleanup Action Plan (CAP) for the MFA. The CAP will be an attachment to an Agreed Order between Ecology, International Paper, and the Port of Longview. Ecology will issue a permit for corrective action and post closure to both International Paper and the Port of Longview.

This final revised remedial investigation/feasibility study (RI/FS) report summarizes the investigation and evaluation efforts conducted for the Maintenance Facility Area (MFA) at the former International Paper Company (International Paper) facility located in Longview, Washington, on property now owned by the Port of Longview. The investigation and evaluation efforts were conducted in accordance with the corrective action requirements of the Washington State Dangerous Waste (DW) Regulations (Chapter 173-303 Washington Administrative Code [WAC]) and the specific cleanup action requirements of the Model Toxics Control Act (MTCA) Cleanup Regulation (Chapter 173-340 WAC). Historic site activities summarized in this document have been conducted under both Agreed Order DEHS-S437 (1997) and Consent Decree 97-2-01088-9 (1997) between International Paper and the Washington State Department of Ecology (Ecology). The primary objective of this report is to present results of investigations conducted in the MFA and the subsequent evaluations performed to identify cleanup action alternatives for that area.

1.1 SITE LOCATION AND DESCRIPTION

The former International Paper site is located in Longview, Washington in Sections 8.0 and 9.0, Township 7 North, Range 2 West, of Cowlitz County. The site is located on the north side of the Columbia River, approximately 66 miles upstream (east) from the Pacific Ocean and less than 2 miles downstream (west) of the confluence of the Columbia and Cowlitz Rivers (Figure 1-1). The site area is relatively level and ranges in elevation from 10 to 15 feet above mean sea level (msl) within a 100-year floodplain that is protected by flood control levees.

International Paper once owned approximately 900 acres in the vicinity of the site, prior to selling the property to the Port of Longview, Pacific Fibre, and Longview Fibre. The Port of Longview purchased a property parcel measuring approximately 20 acres that included the former Treated Wood Products (TWP) Area in 1999. Additional Port of Longview property borders the TWP Area on all sides. Port of Longview vehicle maintenance currently takes place in the Mechanics Shop located northwest of the former TWP Area in the MFA (Figure 1-2).

The MFA (Figure 1-2) measures approximately 5 acres. The area north of the MFA is paved and currently is used to store steel products. The area east of the MFA (and immediately north of the TWP Area) is currently unpaved and vacant. Additional Port of Longview facilities are located south and west of the MFA, including terminals along the shore of the Columbia River. The Columbia River is located approximately 700 feet south of the southern boundary of the MFA. General facility information is presented in Appendix A.

1.2 SITE BACKGROUND

The former International Paper Longview site and the surrounding area were undeveloped in 1919 (USGS 1919). Long Bell operated a saw mill at the site from the early 1920s until International Paper purchased Long Bell in 1956. The former TWP operation was active from 1937 to 1982.

The TWP operation included a treatment building; wastewater plant; boiler house; a pentachlorophenol (PCP) mix tank; two PCP work tanks; four creosote and carrier oil tanks; and two unlined surface impoundments (Ponds 1 and 2) (Figure 1-3).

Two 8-foot diameter retorts were housed inside the treatment building, which included a basement that extended to approximately 10 feet below ground surface (bgs). One retort was 142 feet long and the other retort was 82 feet long. PCP in carrier oil, creosote, and a 50/50 creosote solution (50 percent coal-tar-derived creosote and 50 percent low-grade petroleum) were used in both retorts.

The operation had two tank storage areas: one for creosote and the 50/50 creosote solution and one for PCP and the carrier oil. The tanks ranged in size from 20,000 gallons to 800,000 gallons. The creosote tank farm was near Pond 2 and was located in the southernmost part of the wood treatment plant. Product was piped to these tanks from the Port of Longview area along the Columbia River adjacent to the former TWP Area.

Between 1947 and 1953, wastewater from the wood-treating process that utilized a creosote/diesel mixture was reportedly routed to a nearby municipal impoundment. Historical aerial photographs indicate a northwest-trending lineament extending from the TWP Area through the MFA to the impoundment. After 1953, process wastewater was discharged to Pond 1 (located west of the treatment building), which was approximately 10 feet-wide by 25 feet long, 5 feet deep, and unlined. Pond 2, located south of the wastewater plant, was previously part of the perimeter ditch. A portion of the perimeter ditch was closed off at both ends to prevent discharge of the wastewater. Pond 2 was approximately 5 to 20 feet wide, 800 feet long, 2 feet deep, and unlined.

The TWP Area became inactive in 1982. International Paper dismantled the TWP operation, with the exception of the boiler house and the treatment building foundation, and then submitted a closure plan to the US Environmental Protection Agency (EPA) and Ecology in 1985 (International Paper Company 1985). As part of the Resource Conservation and Recovery Act (RCRA) corrective action and closure activities, affected soil was removed from several locations within the former TWP Area in 1985, specifically from Ponds 1 and 2, the PCP storage tank area, and in the vicinity of the treatment building. The excavated soil was disposed of at a permitted treatment, storage, and disposal facility (TSDF). In 1989, the former ponds and process areas were capped with an engineered cover including a high-density polyethylene (HDPE) geomembrane (J.L. Grant 1990). Nearly all TWP Area structures (buildings, tanks, and related hardware) were removed or capped as part of closure activities. The treatment building foundation remains beneath an engineered cover installed in 1998.

Following closure activities in 1989, the former TWP Area was surrounded by a 6-foot high metal chain-link fence, and access was controlled by a locking gate. In 1997, Ecology requested additional corrective action at the TWP Area to further ensure long-term protection of human health and the environment. These cleanup actions were implemented during 1997 and 1998 and are described in the engineering design report (Woodward-Clyde 1997a) and cleanup action plan (CAP) prepared for the former TWP Area (Woodward-Clyde 1997b). Specific cleanup actions included the physical containment of chemicals of concern (COCs) by construction of a subsurface barrier wall and an additional engineered cover system; removal of light non-aqueous phase liquid (LNAPL) within the contained area; and *in situ* treatment of contaminants within the contained area using a combined system of active biosparging wells and passive bioventing wells.

URS Corporation (URS) conducted active LNAPL recovery at well AV-06 from March to August 1999. The LNAPL recovery system was removed on March 4, 2003, after a period of more than 2 years with no observed recoverable product within the TWP Area. The TWP biosparging/bioventing treatment system operated from October 1998 to October 2001. In October 2001, active biosparging was discontinued within the TWP Area (with Ecology approval) when concentrations of COCs had decreased to an asymptotic minimum.

Performance and compliance groundwater monitoring has been ongoing in the TWP Area since cleanup actions were implemented in 1998, in accordance with the Performance and Compliance Monitoring Plan (PCMP) (Woodward-Clyde 1997c). Performance monitoring includes monitoring wells both inside and outside the subsurface barrier wall to ensure its effectiveness. Compliance monitoring includes monitoring groundwater quality at the point of compliance (POC), which is defined in Consent Decree 97-2-01088-9 to be the deed restriction boundary for the TWP Area. Following a statistical evaluation of 5 years of groundwater monitoring in the TWP Area, International Paper decommissioned eleven PCMP wells in accordance with Ecology’s approval of the October 28, 2004 request by International Paper to abandon those wells (Petersen 2004). These wells were abandoned in place on April 5 and 6, 2005. URS observed damage to PCMP well 97-6A during a groundwater sampling event in March 2004. The damage was reported to Ecology and approval to replace the well was received April 15, 2004. Well 97-6A was closed in place and replaced with adjacent well 04-6A on May 11, 2004. The remaining six PCMP wells are 04-6A, 97-6B, 97-1A, 97-3A, 97-5A, and LL-01.15.

During the construction of the subsurface barrier wall in 1997, potentially impacted soil was observed in three areas outside the wall alignment. Subsequently, additional investigations were conducted in these areas to delimit the extent of contamination outside the barrier wall. Those investigations and the associated evaluation of possible cleanup action alternatives for the MFA are presented in this document.

1.3 CURRENT LAND USE

The MFA is currently zoned and used as an industrial area, and its most reasonable future use is continued industrial activity. The MFA contains the Port of Longview’s Mechanics Shop and a paved storage yard (Figure 1-4). Vehicles operated by the Port of Longview are serviced and washed in the Mechanics Shop building. The Mechanics Shop was constructed in 1992 and is an approximately 15,000-square-foot single-story L-shaped building. The Mechanics Shop was constructed on a slab-on-grade with an approximately 1-foot thick concrete foundation. The building consists of the main work room, lubrication room, tire room, compressor room, welding room, electrical room, battery room, parts storage room, fuel and work truck storage room, wash bay, filtration equipment room, restrooms, two offices, and the employee lunch room. There are roll-up bay/garage doors on the east and southwest sides of the building. According to Port of Longview personnel, no underground storage tanks are present beneath or in the vicinity of the building. A security fence surrounds the building, parking lot, and the immediately surrounding area.

Historically, the Port of Longview’s tenants have used the area northeast of the Mechanics Shop for log storage. This storage area has relatively flat topography and is paved with asphalt. A permeable geotextile fabric is present over a large portion of the storage yard at a depth of about

3 feet bgs, separating overlying coarser gravel fill material from underlying finer fill and native materials. Details of the existing asphalt paving are shown on Figure 4 of Appendix L. The MFA and surrounding properties have a history of industrial use. The Port of Longview and their tenants indicate that these areas will continue to be used for industrial purposes, consistent with the Cowlitz County Master Plan for future development.

Currently, the leased buildings (located about 1,200 feet north of the Mechanics Shop) are used for the storage and distribution of steel products. To service this operation, a railroad line and separate rail spur was constructed north of the Mechanics Shop (Figure 1-4) in late 2001 and early 2002. The area immediately north of the rail spur is used as an active area for loading and unloading steel products (Figure 1-4), and the area south of the spur is used intermittently. Installation of the railroad spur required cutting the asphalt north of the Mechanics Shop, and this area was not repaved following installation of the rail spur. An additional rail loop was constructed south of this spur and connected to it on each end during 2013. Following the completion of this construction, the area adjacent to both rail alignments was paved.

1.4 PURPOSE OF DOCUMENT

During a conference call on October 24, 2006, Ecology requested that a RI/FS report be produced for the MFA to document the historical investigation and evaluation efforts conducted in accordance with the requirements of both the Washington State DW Regulations (Chapter 173-303 WAC) and the MTCA Cleanup Regulation (Chapter 173-340 WAC) (WDOE 2006). In January 2007, a draft MFA RI/FS report was submitted to Ecology to summarize historic site activities conducted under both Agreed Order DEHS-S437 (1997) and Consent Decree 97-2-01088-9 (1997). As requested by Ecology, that report presented the results of previous investigations and evaluation efforts conducted for the MFA area, and a table (Table 1-1) was included to cross-reference between MTCA regulatory requirements and those previous historical site actions that were conducted to satisfy those requirements.

Comments received from Ecology on the January 2007 draft RI/FS report were subsequently received and incorporated into a revised document that was submitted to Ecology in May 2007. International Paper received comments from Ecology in March 2008 that requested additional investigation in the MFA to further delineate affected site media, and to further quantify affected media for evaluation of cleanup action alternatives (Petersen 2008). URS prepared an additional investigation work plan (URS 2008b) and the results of this investigation as well as an evaluation of future cleanup action alternatives for the MFA were initially reported in the draft revised RI/FS report (URS 2011b). Based on previous investigation results and the evaluation of cleanup action alternatives, the selected preferred cleanup action alternative for affected MFA soil was *in situ* solidification outside the footprint of the Port's Mechanics Shop. Institutional controls and monitored natural attenuation (MNA) were also recommended as the long-term cleanup action alternative for affected groundwater in the MFA following solidification of source soil. During a conference call between International Paper, the Port, and Ecology on September 29, 2011, Ecology and the Port requested that additional sampling be conducted within the boundaries of the Mechanics Shop to supplement the previous additional investigation performed outside the boundaries of the Mechanics Shop in September 2008 (Petersen 2011b). Subsequently, supplemental soil sampling was conducted and the results were presented in the Mechanics Shop investigation report (URS 2012b). Treatability studies were also conducted in

2012 to evaluate the effectiveness of *in situ* soil remediation technologies which were identified as the preferred cleanup action alternatives. The findings of this assessment were presented in the final *in situ* soil remediation treatability study report (URS 2013b).

Draft final revised RI sections of this report were previously submitted to Ecology in August of 2013, and draft final revised FS sections of this report were previously submitted to Ecology in February of 2014. Comments on the FS sections were received from Ecology in September of 2014. URS was acquired by AECOM Technical Services Incorporated (AECOM) in October 2014. Based upon comments received from Ecology in September of 2014 and subsequent communications with the Port of Longview, specific preferred cleanup action alternative details were revised and resubmitted to Ecology in May of 2015. Additional clarifications regarding revisions to the FS sections of this report were submitted to Ecology in June of 2015, and a complete draft final revised RI/FS report was submitted to Ecology on October 8, 2015. This final revised RI/FS report addresses comments received from Ecology on previous submittals.

Details related to the future implementation and monitoring of the preferred cleanup action alternatives will be presented separately in a CAP for the MFA. The CAP will be an attachment to an Agreed Order between Ecology, International Paper, and the Port of Longview. Ecology will issue a permit for corrective action and post closure to both International Paper and the Port of Longview.

2.1 REGIONAL GEOLOGY AND GROUNDWATER OCCURENCE

From youngest to oldest, soils underlying the former International Paper Longview facility are composed of fill material, unconsolidated alluvium, Pliocene age consolidated alluvium and Eocene age basalt. The site is situated on a reclaimed floodplain of the Columbia River and the surficial soil consists of gravelly sandy fill and hydraulic/dredged sand fill (SAIC 1991). The thickness of the hydraulic fill layer varies in the site vicinity and ranges from 1 foot to approximately 10 feet. Native alluvium underlies the hydraulic fill and consists of interbedded sands and silts, which vary laterally because of the constantly changing nature of the depositional environment associated with rivers (Dames & Moore 1993). A volcanic ash layer is present in the site vicinity at about 70 to 80 feet bgs and is generally only a few feet in thickness. This volcanic ash layer is present in the Columbia River alluvium and is commonly attributed to the eruption of Mount Mazama (now Crater Lake) about 6,700 years ago. Stiffer clayey silts extend below the ash layer to about 140 feet, and below that are poorly-graded and silty sands present to approximately 200 to 220 feet. Consolidated sands and gravels of the Pliocene Troutdale Formation underlie the sands. Bedrock in the area consists of the Eocene Cowlitz Formation basalt (Dames & Moore 1993).

The upper fill layer at the former International Paper Longview facility contains a seasonally-saturated perched water zone that is not present across the entire site. Groundwater occurs within the alluvial deposits and is a major aquifer in the county with yield up to 3,000 gallons per minute (WDOE 1970). Groundwater elevations in the alluvium generally range between zero and 12 feet above msl in the site vicinity. Groundwater elevations can be expected to vary in response to the stage of the adjacent Columbia River and to surface water infiltration. The river stage in this section of the Columbia River fluctuates in response to tidal effects as well as flow quantity variations. During a tidal study conducted at the former International Paper facility in 1995 and 1996, the Columbia River stage elevation was found to vary between 1.0 foot and 13.1 feet above msl, which is representative of the range of Columbia River stage elevations historically recorded (Woodward-Clyde 1996). Effects of the river on local groundwater elevations can be expected to decrease with distance from the river and in areas where low permeability soils (silts and clays) predominate.

2.2 SITE GEOLOGY

Soil borings and monitoring well locations representing multiple phases of investigation within the MFA are shown on Figure 2-1. The corresponding boring logs and monitoring well as-built diagrams are presented in Appendix B. Based on the findings of these investigations, a geologic cross section has been prepared depicting the stratigraphic relationship between the fill and native alluvial soils beneath the MFA (Figure 2-2). Four general stratigraphic units are evident: the Upper Sand (Gravelly Sand/Sand Fill), the Upper Silt, the Lower Sand and the Lower Silt unit. The general characteristics of these units are described below:

- ***Upper Sand (Fill).*** Surficial soil beneath the MFA consists primarily of fill material characterized by a layer of gravelly sands (GP) which grade to sand (SP). The fill ranges in thickness from approximately 3 to 8 feet. The fill appears to vary in composition, with some siltier zones and some predominantly sandy zones. The surficial gravelly sands were not evident in some of the southern boreholes in the MFA. Lenses of fine to medium sand are often interbedded with the Upper Silt, forming a thin transition zone from the Upper Sand into the Upper Silt. Based on the geologic cross section depicted on Figure 2-2, the fill layer is generally consistent along the central portion of the MFA with a slight thickening to the south. The fill is underlain by native alluvial deposits.

- ***Upper Silt.*** The Upper Silt consists of fine-grained relatively low-permeability material characterized by silt (ML) and sandy silt (SM) interbeds. The top of the Upper Silt unit was encountered at depths ranging from approximately 5 to 12 feet bgs. The Upper Silt is generally continuous beneath the MFA and ranges from approximately 2 to 9 feet in thickness. The thickest extent of the silt was noted in the northwestern portion of the MFA. The top of the Upper Silt appears to undulating with a general dip towards the south in the MFA. This unit generally acts as an aquitard.
- ***Lower Sand.*** The Lower Sand is an extensive water-bearing unit beneath the MFA and the entire former International Paper facility. This unit directly underlies the Upper Silt. The Lower Sand is a medium-dense to dense, medium-coarse grained sand. The Lower Sand is divided into two aquifers: the upper aquifer (Aquifer A) is approximately 25 to 30 feet thick and the lower aquifer (Aquifer B) is at least 40 feet thick. Aquifer A was encountered at approximately 10 feet bgs and is separated from Aquifer B by a distinct silt to silty sand layer referred to as the Intermediate Silt. The Intermediate Silt was encountered at a depth of approximately 51 feet bgs (38 feet below msl) and was approximately 5 feet thick. In the southern portion of the adjacent TWP Area, the Intermediate Silt was less distinct and was distinguished from the overlying sand by a subtle increase in silt content.
- ***Lower Silt.*** A Lower Silt unit was encountered at depths ranging from approximately 77 to 103 feet bgs in the deeper borings completed adjacent to the MFA. The Lower Silt was measured to be up to 32.5 feet thick and serves as a locally extensive aquitard.

2.3 SITE HYDROGEOLOGY

Groundwater is present within the Upper Sand and the Lower Sand units. Within the Upper Sand, groundwater occurs as a shallow perched zone identified above the contact between the sand fill material and the Upper Silt. The perched groundwater zone appears to be intermittent and was evident in the southeastern portion of the MFA. The perched groundwater zone saturated thickness appears to be limited where present. Perched groundwater flow is inferred to be northeasterly based on shallow bioventing wells (BV-12, BV-13, and BV-15) screened within perched groundwater (Figure 2-3). Perched groundwater in these wells was noted at depths ranging from approximately 3.3 to 6 feet bgs (Table 2-1).

The Lower Sand is divided into two units (Aquifer A and Aquifer B) that are separated by the Intermediate Silt. The base of Aquifer B is bounded by the Lower Silt. The Upper and Intermediate Silt units underlie the MFA and are considered to be confining layers, based on the fine-grained nature of these units. Although not encountered in the MFA, deeper borings conducted in adjacent areas have confirmed the presence of the Lower Silt in this part of the former International Paper facility.

Groundwater within Aquifer A is semi-confined to confined and within Aquifer B is under confined conditions. The depths to groundwater in the Upper Sand range from approximately 8 to 13 feet bgs in the MFA (Table 2-1). Figure 2-2 illustrates approximate water table elevations in cross section for fall and spring groundwater monitoring events on September 22, 2008 and March 19, 2009, respectively.

The tidal study performed in 1995 and 1996 indicated that groundwater elevations in specific wells responded differentially to tidal stages of the Columbia River (Woodward-Clyde 1996). Although the net direction of shallow groundwater flow was towards the north-northeast, the groundwater flow direction and hydraulic gradient at the site was observed to vary both seasonally and within daily tidal cycles. The study indicated that there is a lag in the response of groundwater elevations at site wells due to changes in river stage. The response of groundwater elevations to the change in river stage amplitude indicates a dampening (i.e., attenuating) effect proportional to the distance from the river. The lag observed at TWP Area wells appears to be generally less than at MFA wells since TWP Area wells are generally closer to the river than MFA wells.

A summary of groundwater elevation data for selected years (2008/2009) is provided in Table 2-1, and groundwater elevation contour maps for September 2008 and March 2009 are depicted on Figure 2-4 and Figure 2-5, respectively. Groundwater elevations recorded during these two events are also illustrated in cross section on Figure 2-2. The average direction of groundwater flow in the MFA and adjacent areas has consistently been northerly to northeasterly, with a relatively flat gradient of about 0.001 feet per foot in both aquifers. Horizontal groundwater velocities vary across the site but were generally low as a result of the flat gradients (e.g., 0.1 to 1.6 feet/day).

The vertical groundwater flow between Aquifers A and B oscillates up and down in response to the tidal cycles. The vertical hydraulic gradient between the two aquifers was found to increase with distance from the river. Based on the prior tidal study, the Intermediate Silt appears to act as a confining layer, and as a result, Aquifers A and B behave as distinct aquifers at the site.

3.1 REMEDIAL INVESTIGATION ACTIVITY SUMMARY

This section summarizes the previous investigations and evaluations conducted in the MFA following the implementation of cleanup actions in the TWP Area pursuant to Consent Decree No. 97-2-01088-9, and the CAP and the PCMP (Woodward-Clyde 1997b and 1997c, respectively). The Consent Decree required International Paper to implement the CAP and PCMP. The PCMP included provisions for an additional action feasibility study (AAFS) that prescribed an evaluation of future cleanup action activities in the case that visually impacted soil was encountered beyond the TWP Area POC during construction of the barrier wall or during installation of PCMP wells. The AAFS would focus first on evaluating the nature of the potential impact and possible receptors, if present, and second on potential action alternatives.

The steps in the AAFS process are as follows:

1. Identify and assess potential impacts and receptors using a risk-based approach using various types of existing data and, if necessary, collecting additional data
2. If appropriate, evaluating potential cleanup action alternatives in terms of:
    a. Technical performance, reliability, implementability, and safety
    b. Environmental concerns, including site conditions, migration pathway(s) addressed, short- and long-term effectiveness, adverse impacts, and the need for mitigation of any impacts due to the alternative
    c. Human health effects, including migration of short- or long-term exposure and protectiveness during and following implementation
    d. Institutional needs, including required compliance with local, state, or federal jurisdictions for design, installation of the alternatives, and operation of the alternatives
    e. Costs, both capital costs (including direct construction and indirect construction and overhead costs), and operation and maintenance (O&M) costs (including all post-construction costs needed for effective O&M of the system for the cleanup action period)
3. Selecting and justifying a preferred cleanup action alternative, if appropriate
4. Reporting to Ecology in the form of an AAFS report

3.2 SUMMARY OF PREVIOUS INVESTIGATIONS

Following the observation of impacted soil during the construction of the subsurface barrier wall in the TWP Area, the following additional investigation and evaluation efforts were conducted:

- Barrier wall area investigation – Phase I, as reported in the *Investigation of Areas of Soil Impact Outside the Containment Area* (URS 1998)
- Western Area investigation, as reported in the *Soil and Groundwater Investigation of Western Area* (URS 2000a)

- Eastern Area investigation, as reported in the *Soil and Groundwater Investigation of Eastern Area* (URS 2000b)
- MFA investigation – Phase II, as reported in the *Additional Perimeter Boring Investigation Report and Maintenance Facility Work Plan* (URS 2000c)
- MFA investigation – Phase III, as reported in the *Offsite Investigation Report and Additional Action Feasibility Study* (URS 2000d)
- MFA additional action, as evaluated in the *Additional Action Work Plan for Port of Longview Maintenance Facility Area* (URS 2002)
- MFA additional investigation, as presented in the *Draft Revised RI/FS Report* (URS 2011b)
- MFA supplemental subsurface soil investigation in the vicinity of the Mechanics Shop as reported in the *Mechanics Shop Investigation Report* (URS 2012b)
- Test pit excavation and collection of treatability study samples within the MFA, as reported in the *Final In Situ Soil Remediation Treatability Study Report* (URS 2013b)

These investigation and evaluation efforts are further described below. MTCA cleanup levels and evaluation criteria have changed during the course of these efforts. Current RI/FS screening levels are identified in Table 3-1 and are based on values obtained from Ecology’s Cleanup Levels and Risk Calculation (CLARC) database (WDOE 2015). Changes in the screening levels compared to the draft final revised RI dated August 2013 are the result of the following:

- Rounding to two significant figures instead of three (according to Ecology, cleanup levels should only include two significant figures)

- Using EPA chemical-specific properties in the migration to groundwater calculations (naphthalene, 2-methylnaphthalene, 1,3,5-trimethylbenzene, 2-butanone, isopropylbenzene, and dibenzofuran)

- Making corrections to values reported incorrectly in the CLARC tables based on incorrect toxicity equivalency factors (TEF) (benzo(k)fluoranthene, chrysene, and dibenzo(a,h)anthracene)

- New groundwater screening levels (cadmium)

In addition, PCP was added to this table. Soil analytical results for the efforts described below are summarized in Table 3-2. Boring and monitoring well locations are identified on Figure 2-1.

3.2.1 Barrier Wall Area Investigation – Phase I

During the construction of the subsurface barrier wall in the TWP Area, non-aqueous phase liquid (NAPL) was observed at the northwest boundary in the vicinity of currently existing PCMP wells 04-6A and 97-6B. Two other areas of interest were identified along the barrier wall alignment. In a letter dated November 7, 1997, Ecology requested that additional investigation activities be conducted in three areas outside the barrier wall. In response to this request, Woodward-Clyde prepared the offsite investigation work plan (Woodward-Clyde 1998) for performing subsurface investigations in the following three areas of interest in the barrier wall area (Figure 1-2):

- An area along the west side of the barrier wall in the vicinity of the former lineament (Area 1 in the 1997 Ecology letter)
- The southwest corner of the barrier wall, near the location where a 24-inch-diameter fire control line was encountered during construction (Areas 2 and 3 in the 1997 Ecology letter)
- An area along the south side of the barrier wall, near the location of well PW-3 (Area 3 in the 1997 Ecology letter)

Fourteen borings (PB-01 through PB-14) were advanced in these three areas of interest during this investigation. Results are presented in the Investigation of Areas of Soil Impact Outside the Containment Area (URS 1998). The investigation concluded that the area along the west side of the barrier wall (Area 1) had been affected by total petroleum hydrocarbons (TPH), and that the impacts could extend across the roadway towards the Mechanics Shop. No significant impacts were identified near the 24-inch fire control line (Areas 2 and 3) or the area south of the barrier wall near former well PW-3 (Area 4).

To better understand the source of this contamination, historical aerial photographs were re-examined to identify potential sources of the TPH and polycyclic aromatic hydrocarbons (PAHs), as well as potential migration pathways. Aerial photographs from between 1947 and 1968 revealed a linear feature that Ecology interpreted to be a ditch (“lineament”) leading from the TWP Area northwesterly to a low-lying area on the western part of the Port of Longview property (designated the Western Area). In about 1957, photographs show the lineament location changed and connected the TWP Area with a rectangular impoundment on the eastern part of the Port of Longview property (designated the Eastern Area). The impoundment was a former municipal disposal area. Ecology requested an investigation of both of these potential impoundment areas based on concerns that the lineaments may have transported COCs associated with the former TWP Area to the impoundment areas. Ecology believed that these impoundment areas may possibly have been associated with wood treatment operations in the former TWP Area, as well as other operations at nearby sites. Based on Ecology’s concerns and in accordance with Consent Decree 97-2-01088-9 between International Paper and Ecology, International Paper agreed to perform environmental investigations in both the Western and Eastern Areas.

Woodward-Clyde prepared a work plan outlining the proposed investigation of these areas (Woodward-Clyde 1998). While the Western and Eastern Areas were being investigated in early 1999, the work plan was revised to include an additional perimeter boring investigation along the noted linear feature on the Port of Longview’s property (URS 1999).

Field work in the Western Area and Eastern Area began in January 1999. The results of these investigations are included in the soil and groundwater investigation of Eastern Area and soil and groundwater investigation Western Area reports, and are summarized in Sections 3.2.2 and 3.2.3, respectively (URS 2000a and 2000b).

3.2.2 Western Area Investigation

Long Bell Lumber owned the area referred to as the Western Area (Figure 1-2) in the early 1900s. Review of aerial photographs showed that the Western Area apparently included two wet sub-areas: a larger one to the south and a smaller one to the north. Aerial photographs from 1947 through 1980, along with chain of title information, indicated that a sludge disposal area owned by the City of Longview operated on the larger, southern wet sub-area. The sludge disposal area was part of a City of Longview municipal treatment facility and the construction details are unknown; however, the area was likely unlined. The municipal treatment facility could have received influent from many different sources containing various chemicals including solvents, petroleum hydrocarbons, metals, and polychlorinated biphenyls (PCBs), as well as wood product wastes that could include creosote and PCP. The Port of Longview purchased the parcel that includes the Western Area from the City of Longview in 1980.

Seven Geoprobe borings were advanced in the Western Area during this investigation and the results are presented in the soil and groundwater investigation of Western Area (URS 2000a).

PCP was not detected in soil samples from this area. Petroleum hydrocarbons and PAHs were detected in some shallow soil samples. Total carcinogenic PAHs (cPAHs) were detected at a concentration above MTCA Method B criteria in one soil sample, but concentrations in all samples were below MTCA Method C criteria. TPH and total non-carcinogenic PAHs were detected at concentrations below Interim TPH/MTCA Method B cleanup criteria.

PCP was not detected in any groundwater samples. No exceedances of MTCA Method B criteria for TWP constituents were detected in groundwater samples. In addition, the hydraulic gradient beneath the TWP Area (and most likely nearby areas, including the Western Area) is nearly flat, further minimizing the potential for migration of COCs in groundwater.

The constituents detected in Western Area soil were not found in multiple borings or at multiple vertical intervals within a single boring. In addition, the chromatograms for the detected hydrocarbons did not resemble the chromatograms for petroleum hydrocarbons normally associated with the former TWP Area. Historic operations at the nearby Chevron facility and also at a municipal treatment facility within the Western Area may have resulted in adverse impacts to soil and groundwater in both the southwestern and northwestern sub-areas. The report concluded that impacts to soil in this area appear to be minor and localized in extent, and no further investigation or evaluation was necessary (URS 2000a). Soil and groundwater analytical results and selected figures from the Western Area investigation are provided in Appendix C.

3.2.3 Eastern Area Investigation

A review of historical documents and aerial photographs of the Eastern Area (Figure 1-2) indicates that it was owned by Long Bell Lumber and International Paper until 1965, when it was purchased by the Port of Longview. Aerial photographs indicate the Port of Longview filled and closed the impoundment, a former municipal disposal area, in 1968. The former impoundment was located underneath the Port of Longview's paved storage area, which has a foundation that consists of a gravel fill layer approximately 5 feet thick overlain by 6 inches of asphalt.

Three borings were advanced within the area of the former Eastern Area impoundment during this investigation. Three groundwater monitoring wells were installed outside the northern, western, and eastern corners of the former impoundment area. Results are presented in soil and groundwater investigation of Eastern Area (URS 2000b).

PCP was not detected in soil samples from this area. Petroleum hydrocarbons and PAHs were detected in some soil samples collected from below the engineered fill at depths from 5 to 7 feet bgs. Concentrations of cPAHs were detected above MTCA Method B criteria but below MTCA Method C criteria in one soil sample. TPH and non-carcinogenic PAHs were detected at concentrations below MTCA A and MTCA B cleanup criteria, respectively.

PCP was not detected in any groundwater samples. No exceedances of MTCA Method B criteria for TWP constituents were detected in groundwater samples. Total arsenic was detected at concentrations exceeding MTCA Method B criteria, but dissolved arsenic was not detected in any of the groundwater samples. The detection of total arsenic is most likely attributable to naturally-occurring arsenic sorbed to colloids or particulates. Heptachlor was detected in one sample at a concentration equal to the MTCA Method B criterion, but was not detected in a duplicate sample collected from the same well. The detection of heptachlor near the method detection limit in one sample, coupled with its non-detection in a duplicate sample, suggests that either the detection of the compound may be attributable to laboratory bias, or that the compound was not present above the MTCA Method B criterion. The heptachlor, if present, was determined to likely be related to historical pesticide application in this area. Chloroform was detected in groundwater in one well at a concentration slightly greater than the MTCA Method B criterion. Chloroform is a common constituent resulting from routine disinfection (i.e., chlorination) of drinking water. The detected concentration was well below the US Primary Drinking Water Standard of 100 micrograms per liter (µg/L).

The Eastern Area investigation results identified some low-level localized impacts to soil, but no significant contamination of groundwater. Based on the low levels of detections within and surrounding the Eastern Area, impacts to soil in this area appear to be minor and localized in extent. The detected constituents were not found in multiple borings or at multiple vertical intervals within a single boring. In addition, the Eastern Area is effectively capped by the constructed engineered storage area in that location. Analytical results for a comprehensive suite of constituents also indicated that groundwater had not been affected significantly by the former impoundment. The low concentrations of detected constituents in soil and their localized distribution and low mobility, coupled with the lack of direct routes of exposure for the detected constituents, indicate that the detected constituents did not pose a significant risk to human health or groundwater quality. Therefore, the report concluded that further investigation or evaluation of the Eastern Area was not necessary (URS 2000b). Selected figures from the Eastern Area investigation are included in Appendix C.

3.2.4 Maintenance Facility Area Investigation – Phase II

After completion of field investigations in the Western and Eastern Areas, International Paper prepared a work plan for investigation along the linear feature noted on historical aerial photographs (URS 1999). The investigation occurred in July 1999. This investigation of the area north and west of the TWP Area represented a logical continuation of the July 1998 investigation. A total of 29 Geoprobe borings were advanced and sampled (PB-15 through PB-43) in the MFA (Figure 2-1). Soil samples were collected from each boring and screened in the field for volatiles and petroleum hydrocarbons. Based on the field screening results, 31 soil samples were analyzed for TPH, PCP, and PAHs. Groundwater samples were selected from nine Geoprobe borings for analysis.

The results of this investigation were summarized in the additional perimeter boring investigation report and MFA work plan (URS 2000c). Select figures from this report are included in Appendix C. Soil and groundwater affected by TPH and PAHs were identified generally along the linear feature interpreted to be a former wood-treating wastewater conveyance ditch. The report recommended performing a third phase of work to delineate the boundaries of impacted soil and groundwater in this area. A pilot test of oxygen release compound (ORC) injection was recommended to evaluate the feasibility and effectiveness of ORC as a remedial alternative for site groundwater.

3.2.5 Maintenance Facility Area Investigation – Phase III

In February 2000, a third phase of investigation was performed to further delineate the extent of affected soil and groundwater in the MFA. Fifteen Geoprobe borings were advanced (PB-44 through PB-58) and 17 soil samples were analyzed for TPH, PCP, and PAHs. Groundwater samples were collected from ten Geoprobe borings for laboratory analysis. The sampling locations and analytical data summary tables were provided to Ecology and the Port of Longview on April 19, 2000. The results of this investigation (with the exception of the ORC results) were presented in the offsite investigation report and AAFS (URS 2000d). Select figures presenting the analytical results are included in Appendix C. The extent of affected soil and groundwater in the MFA was generally defined based on the findings of this investigation, although some additional investigation was warranted to confirm the lateral extent of the plume and soil contamination.

The ORC pilot test consisted of installation of a 2-inch polyvinyl chloride (PVC) monitoring well (MW-ORC-1A) located approximately 10 feet downgradient of historic abandoned monitoring well 97-6A and injection of approximately 50 pounds of ORC into Aquifer A near MW-ORC-1A. Groundwater samples from MW-ORC-1A were collected every two weeks for a period of 2 months. In addition, oxygen levels in adjacent monitoring wells were monitored. The results of the ORC pilot test were presented in a meeting with the Port of Longview, Ecology, and International Paper in October 2000. The analytical data summary table is included in Appendix C. The ORC pilot study was deemed unsuccessful both in reducing concentrations of monitored constituents and in increasing concentrations of dissolved oxygen (DO) in site groundwater during the test.

3.2.6 Maintenance Facility Area – Additional Action

After completion of the AAFS, International Paper submitted a work plan for installing a biosparging/bioventing system in the MFA in February 2002 (URS 2002), and the work plan was approved by Ecology on March 26, 2002. The primary objectives of the additional actions undertaken within the MFA were to:

- Treat affected groundwater to the extent practicable, to reduce the mobility, toxicity, and potential downgradient migration of COCs in groundwater
- Treat affected vadose zone soil to reduce mobility and toxicity and reduce potential future contributions to groundwater

In accordance with the work plan, a biosparging/bioventing system was installed within the MFA and began operating in June 2002. Monitoring of site groundwater in the MFA has been ongoing since system start-up.

3.2.6.1 Biosparging/Bioventing Treatment System Design

The MFA biosparging/bioventing remediation system consists of:

- Three horizontal biosparging wells screened within the Lower Sand – Aquifer A (AS-09 through AS-11) which are 140 feet, 150 feet, and 100 feet in length, respectively
- Four vertical bioventing wells screened within the Upper Sand (BV-12 through BV-15) completed to depths of 8, 7.6, 6.9 and 8 feet bgs, respectively
- One horizontal bioventing well screened within the Upper Sand (BV-16) which is 200 feet in length
- Five groundwater monitoring/venting wells screened with the Lower Sand (AV-09 through AV-13)

The boring logs and well construction as-built drawings are provided in Appendix B (vertical wells) and Appendix D (horizontal wells). The locations of the system wells are shown on Figure 3-1. The biosparging wells were placed in the vicinity of the primary areas of impacted groundwater and are screened in Aquifer A. The groundwater monitoring/venting wells were screened in the upper portion of Aquifer A and were completed to approximately 5 feet below the bottom of the Upper Silt layer. The purpose of the biosparging wells was to provide oxygen to areas of impacted groundwater. The purpose of the groundwater monitoring/venting wells was to monitor the performance of the biosparging wells and relieve any excess pressure in the subsurface.

The vertical bioventing wells are 4-inch-diameter wells screened above the Upper Silt layer. The horizontal bioventing well consists of a 3-inch-diameter HDPE well with a 200-foot screened interval above the Upper Silt layer (Appendix D). The initial purpose of these wells was to provide oxygen to the shallow soil via soil-vapor extraction. As a result of higher perched groundwater elevations above historical norms, the bioventing system also was configured to allow operation as a second biosparging system. The bioventing system has been operating in a biosparging mode, since perched groundwater elevations in the MFA have generally remained above the well screen intervals in portions of the site.

The wells were completed below grade in flush-mounted vaults and were connected to 2-inch-diameter HDPE piping, with the exception of the 3-inch-diameter HDPE horizontal bioventing well piping. Air was delivered to the MFA system wells from a biosparging compressor (AS system) and a reconfigured bioventing blower (BV system) via buried header and lateral piping.

The groundwater monitoring/venting wells allowed venting of Aquifer A during biosparging operations, and continue to allow monitoring of MFA groundwater conditions.

The biosparging compressor and bioventing blower systems are skid-mounted. The biosparging system consists primarily of an air injection compressor, a heat exchanger, and associated valving (Appendix D). The biosparging compressor provides oxygen to the groundwater in Aquifer A. The bioventing blower provides oxygen to the perched groundwater situated above the Upper Silt.

3.2.6.2 Summary of Biosparging/Bioventing Treatment Systems Operation and Performance Monitoring Results

System Operation

The MFA biosparging/bioventing system was started in June 2002. O&M activities during the first year included monthly site visits, quarterly monitoring events, and semi-annual groundwater performance monitoring events that coincided with O&M activities in the TWP Area in accordance with the PCMP (Woodward-Clyde 1997c). The O&M activities in subsequent years have included monthly site visits and semi-annual groundwater performance monitoring for both the MFA and TWP Area. Monitoring wells sampled semi-annually within the MFA in this monitoring program include: AV-09 through AV-13; 99EA-3A; 97-6A (abandoned and replaced on May 11, 2004 by 04-6A), and 97-6B. In addition, PCMP well 97-5A (located in the southern corner of the MFA) is currently sampled every 5 years in accordance with the current PCMP schedule. Based on observations of PAH concentrations that exceeded cleanup levels in some site wells, the frequency of groundwater performance monitoring was increased to quarterly in 2007 in specific MFA and TWP Area wells, as determined by discussion with Ecology. Semi-annual monitoring resumed during 2008.

The MFA biosparging/bioventing system operated as designed for approximately 6 years. In November 2007, a bioventing system blower failure was discovered and this system has not operated since that time with Ecology’s concurrence (December 17, 2007). The biosparging system compressor failed in June 2008 and that system also has remained off with the concurrence of Ecology (July 2, 2008). The monthly remediation system equipment operations and maintenance and monitoring data has been documented annually in the annual remedial operations and groundwater monitoring reports prepared by URS/AECOM (URS 2003a and b, 2004, 2005, 2007a, 2008a, 2009, 2010a, 2011a, 2012a, 2013a, and 2014, and AECOM 2015). The performance monitoring results and significant findings are summarized below.

Performance Monitoring Results

Dense Non-Aqueous Phase Liquid Measurements. Dense non-aqueous phase liquid (DNAPL) thickness measurement and product recovery has been conducted within the MFA well network since remedial activities began in 2002. Section 3.3.1 provides a comprehensive discussion of product occurrence and recovery. DNAPL recovery rates are depicted on Figure E-1 in Appendix E. Both DNAPL recovery and DNAPL thickness have declined significantly with time. Based on the most recent monitoring events conducted from 2004 through 2014, only one well (BV-13) had a measurable thickness of DNAPL after 2004.

Biosparging/Bioventing Monitoring Data. The historical system operation and groundwater field parameter measurements are presented in Tables E-1 and E-2 in Appendix E. DO concentrations and redox potentials monitored in groundwater were generally indicative of aerobic conditions (greater than 2 milligrams per liter [mg/L] DO and positive redox potentials) in the monitoring well and biosparge well network during and immediately after active biosparging had been terminated. DO concentrations generally increased in the MFA wells during the sparging operations. The consistently highest levels of DO (e.g., exceeding 10 mg/L) were evident in well AV-09, located adjacent to horizontal biosparging well AS-09 (Figure 2-1). The groundwater temperature in the wells screened within the Lower Sand – Aquifer A prior to sparging ranged from approximately 13 to 14 degrees Celsius. During active sparging, groundwater temperatures generally rose a few degrees in all of the AV wells (Table E-1 in Appendix E). Groundwater pH values did not exhibit any clear trends and ranged from approximately four to eight standard units.

Well vapor monitoring data (Tables E-3 and E-4 in Appendix E) indicated that during active sparging, positive pressures were measured in all of the wells screened within the Upper Sand and in Lower Sand – Aquifer A. Volatile organic vapor screening conducted in the wells using a photoionization detector (PID) and a flame ionization detector (FID) indicated that only monitoring well AV-10 had elevated readings prior to and during air sparging operations (Table E-3 in Appendix E). Vapor monitoring of the MFA well network indicated that all of the wells had increased oxygen levels during sparging operations.

Groundwater Monitoring Results. Historically, groundwater monitoring in the MFA has been conducted semi-annually since the AV monitoring wells were installed in 2002. Earlier groundwater monitoring of selected wells within the MFA also was conducted. The newest MFA wells (TMW-1 through TMW-12) have been sampled twice since installation in 2008. With the exception of monitoring well 97-6B, all of the groundwater samples have been collected from monitoring wells screened within the Lower Sand – Aquifer A. Monitoring well 97-6B is screened within the deeper portion of the saturated zone in the Lower Sand – Aquifer B. The primary COCs identified in the groundwater include diesel-range organics (DRO), naphthalene, and cPAHs. The COC concentration data for monitoring wells within the area of affected groundwater is depicted on Figures E-2 (E-2A and E-2B) through E-6 in Appendix E. Table 3-3 summarizes the groundwater analytical data, along with MTCA cleanup levels.

The depth to groundwater measurements for the PMCP monitoring network collected in March and September from 2009 through 2014 are presented in Table E-5 in Appendix E. The wells were monitored within a short time interval (approximately 1 hour) in accordance with the PMCP groundwater monitoring program. Groundwater elevations fluctuate seasonally, with lower groundwater elevations evident during the September monitoring events. As shown on corresponding groundwater potentiometric contour maps, Figures E-7 through E-18 presented in Appendix E, the inferred groundwater flow direction during these monitoring events was generally northeasterly to northerly although, some northwesterly flow was periodically observed.

Biodegradation Parameters. Groundwater bacterial testing conducted during the monitoring program indicated that hydrocarbon degrading, as well as other groundwater bacterial populations, increased significantly in all of the wells during active sparging operations when compared to the baseline pre-sparging levels. Other evidence of increased biodegradation rates in the groundwater included increasing levels of sulfates in all of the MFA monitoring wells.

Diesel-Range Organics. Baseline groundwater quality data collected prior to startup of the biosparging remedial system indicated that elevated DRO concentrations were evident in monitoring wells AV 10 and 97-6A/04-6A (Table 3-3 and Figures E-2A and E-3 in Appendix E). DRO concentrations at AV-10 were initially 11.8 mg/L and following system startup increased to a high of 1,200 mg/L (September 2003) and then steadily declined during operation of the treatment system. Between 2009 and 2014, DRO concentrations in AV-10 have fluctuated between 4.1 mg/L and 11 mg/L.

DRO concentrations in AV-12 were initially 0.667 mg/L prior to system startup in 2002 and since then have typically not been detected or detected at low levels. During the site-wide sampling event in September 2014, DRO was detected at an estimated value of 0.13 mg/L. Since 2008, DRO concentrations at AV-09 have been below the detection limit or less than the cleanup level (Table 3-3 and Figure E-2B in Appendix E).

DRO concentrations in 97-6A ranged from 2.0 mg/L to 19 mg/L during the 4 years of monitoring prior to startup of the remedial system. In 2004, this well was replaced by well 04-6A and since 2008 DRO concentrations in this well have ranged from 0.49 mg/L to 8.1 mg/L (Table 3-3 and Figure E-3 in Appendix E). DRO concentrations in 97-6B ranged from 0.21 mg/L to 2.3 mg/L during sampling conducted from August 1998 through August 2001. Following startup of the remedial system, DRO concentrations in this well declined and no significant rebound in concentrations has occurred through 2014. DRO concentrations in this well have ranged from not detected to 0.43 mg/L since 2009.

Naphthalene. Baseline groundwater sampling identified elevated concentrations of naphthalene in monitoring wells 97-6A (2,060 µg/L to 11,300 µg/L) and AV-10 (1,150 µg/L) (Table 3-3 and Figures E-3 and E-4A in Appendix E). After startup of the remedial system, naphthalene concentrations in AV-10 fluctuated, but concentrations increased significantly from September 2003 to March 2004 (Table 3-3 and Figure E-4A in Appendix E). Naphthalene concentrations declined steadily following this transient spike and the site-wide sampling completed more recently between 2009 and 2014 identified naphthalene levels ranging from 1.5 µg/L to 14 µg/L. Monitoring well 97-6A (abandoned and replaced by monitoring well 04-6A in 2004) did not exhibit the same increase in concentrations as noted in AV-10. In general, naphthalene concentrations in this well declined following startup of the remedial system (Table 3-3 and Figure E-3 in Appendix E). Site-wide sampling conducted at 04-6A between 2009 and 2014 detected naphthalene at concentrations ranging from 0.18 µg/L to 930 µg/L. Naphthalene concentrations in wells AV-09 and AV-12 have been significantly below the MTCA Method B cleanup level (160 µg/L) since monitoring began in those wells in 2002 (Figure E-4B).

Carcinogenic Polycyclic Aromatic Hydrocarbons. The total toxic equivalent concentration (TTEC) value is calculated as the sum of seven carcinogenic PAHs (cPAHs) multiplied by a

TEF. The cPAH TTEC detected in the baseline groundwater samples collected from the MFA monitoring well network was less than 1 µg/L (Figures E-5A, E-5B, and E-6 in Appendix E). As noted with the other COCs, the cPAH concentrations in monitoring well AV-10 exhibited a significant increase following the startup of the system (Figure E-5A in Appendix E). The cPAH TTECs in this well were as high as 2,160 µg/L in March 2004 and have consistently decreased thereafter. cPAH TTECs in this well during sampling conducted in between 2009 and 2014 ranged from 0.056 µg/L to 0.275 µg/L. The cPAH TTECs in monitoring wells AV-09, AV-12, and 04-6A fluctuated during remedial system operation and the site-wide sampling of these wells in September 2014 detected cPAH TTECs of 0.028 µg/L, 0.000035 µg/L, and 0.064 µg/L, respectively (Figures E-5B and E-6 in Appendix E).

3.2.6.3 Conclusions

Based on the results of the performance monitoring conducted during the implementation of the MFA biosparging/bioventing remedial measures:

- Depth-to-groundwater monitoring conducted during previous investigations and the PMCP indicate that that groundwater potentiometric heads fluctuate due to tidal and seasonal influences, and groundwater predominantly flows northerly to northeasterly.
- Measurable DNAPL has historically been identified in the MFA primarily in three monitoring wells, one screened within the perched groundwater in the Upper Sand (BV-13) and two screened within the Lower Sand – Aquifer A (AV-10 and 04-6A). DNAPL has been noted in BV-13 from the initial monitoring events conducted in 2003 through the site-wide monitoring in 2014. However, the quantity of DNAPL recovered from BV-13 has declined significantly, with the majority of the 29 gallons of product recovery occurring over the first several years of product removal (Figure E-1 in Appendix E).
- In contrast, DNAPL was evident only in AV-10 and 04-6A during monitoring conducted in 2003 and 2004 and only lesser quantities (e.g., approximately 2.2 and 2.8 gallons, respectively) of product has been recovered from these wells. These data indicate that significant quantities of DNAPL do not appear to exist within the Upper Sand and only limited observations of DNAPL have been made beneath the Upper Silt within the Lower Sand aquifer. As previously suggested, the presence of product within the Lower Sand aquifer appears to be an artifact of the initial drilling process, in which product was smeared down during the advancement of the borehole.
- Dissolved phase DRO, naphthalene, and cPAH concentrations exceeding MTCA cleanup levels were evident in the central portion of the MFA prior to operation of the biosparging system. Following startup of the remedial system, concentrations of COCs declined with the exception of AV-10, which exhibited a spike in contaminant levels after approximately 1 ½ years of operation. COC concentrations in this well also decreased significantly over the next year of operation. The COC trend graphs (Figures E-2 through E-6 in Appendix E) support the conclusion that the biosparging system has reduced COC concentrations in groundwater.

- Sampling in the MFA has generally been conducted semi-annually since 2002. Results have indicated that concentrations of COCs generally remain below cleanup levels for all monitored wells within the MFA with the exception of DRO and PAH concentrations at some central interior MFA wells. Results from field filtering of site samples appears to indicate that PAH concentrations occasionally observed at these and other site wells may be associated with filterable particulates and are non-representative of dissolved-phase groundwater concentrations. Recent semi-annual groundwater monitoring through 2014 did not indicate any particular changes or trends relative to historical results.
- TPH concentrations have historically generally remained below cleanup levels with the exception of MFA wells AV-10 and 04-6A that are located near the former lineament interpreted to be a ditch that formerly conveyed liquids from the TWP Area. During more recent monitoring events in 2013 and 2014, a potential increase in concentrations has been observed in monitoring wells located in the vicinity of the TWP Area (e.g., AV-09 and 04-6A). Further evaluation of this observation will be conducted.
- Biosparging appears to have increased the hydrocarbon degrading bacteria population in the groundwater within the MFA significantly during the years in which the treatment system operated. COC concentrations in the monitoring wells decreased substantially within the first 2 years of system operation, which appears to coincide with the large increase of hydrocarbon-degrading bacteria populations. Elevated bacterial populations remained above baseline levels even after shutdown of biosparging operations.
- Groundwater quality at the MFA perimeter groundwater monitoring wells continues to be below MTCA Method B cleanup levels.

3.2.7 Maintenance Facility Area Additional Investigation

3.2.7.1 Purpose and Scope

In 2006, Ecology requested that an RI/FS be produced for the MFA to summarize and document the historical investigation and evaluation efforts conducted in accordance with the requirements of both the Washington State DW Regulations (Chapter 173-303 WAC) and the MTCA Cleanup Regulation (Chapter 173-340 WAC) that have been discussed in previous sections of this report (WDOE 2006). Historic site activities conducted under both Agreed Order DEHS-S437 (1997) and Consent Decree 97-2-01088-9 (1997) were summarized in a RI/FS report that was submitted to Ecology on January 19, 2007 (URS 2007b). Comments were subsequently received and incorporated into a revised document that was submitted to Ecology in May 2007. Ecology provided comments on the draft RI/FS report on March 19, 2008 (WDOE 2008) that included a request for additional investigation to further delineate the nature and extent of contamination at specific locations within the MFA. Subsequently, URS prepared an additional investigation work plan (URS 2008b), which was submitted to Ecology in June 2008. As presented in the work plan, the primary objectives of the additional investigation were to:

- Assess the full nature and extent of contamination
- Portray the nature and extent of contamination
- Describe the cleanup action alternatives being considered for the MFA

To achieve these objectives, URS implemented the following scope of work:

- Completed 15 soil borings (PB-59 through PB-73) to the top of the Upper Silt
- Installed 12 temporary monitoring wells (TMW-01 through TMW-12) within Aquifer A
- Collected selected soil samples from the new soil borings and monitoring wells for chemical analysis
- Collected groundwater samples from the existing and new monitoring wells located in the MFA
- Developed remedial action alternatives (presented in Section 7) based on the results of this investigation and prior site investigations

3.2.7.2 Field Methods and Procedures

Sampling Location Rationale and Procedures

A total of 15 soil borings (PB-59 through PB-73) and 12 temporary monitoring wells (TMW-01 through TMW-12) were advanced and installed in the MFA in September 2008 (Figure 2-1). The rationale for the various boring/monitoring well locations is summarized in Table 3-4.

Prior to implementing the investigation, a site-specific utility clearance within the property boundary was completed to clear the soil boring locations. The drilling program was completed by Cascade Drilling, Inc. of Woodinville, Washington on September 11 through 15, 2008. The borings were advanced using a Geoprobe push probe drilling rig. The details regarding the borehole sampling, groundwater monitoring well installation, groundwater sampling and management of the investigation-derived wastes were outlined in the sampling and analysis plan contained in the additional investigation work plan (URS 2008b). In general, soil samples were collected continuously and were screened using a PID. The PID readings were recorded on the boring logs provided in Appendix B. Generally, the soil samples with the highest PID readings were selected for analysis and were collected directly from acetate liners and placed into laboratory-supplied glassware. The sample glassware was placed into a cooler with ice and submitted to the laboratory under chain of custody protocol. All down-hole soil sampling equipment was decontaminated prior to use by washing with a dilute Alconox detergent solution and triple rinsed with tap water.

Temporary monitoring wells were installed using a larger diameter (3-inch) probe rod that was advanced into the Upper Silt unit. A smaller diameter (2-inch) probe rod was then advanced through the Upper Silt unit and into the Lower Sand – Aquifer A. Each well was constructed using 10 feet of 2-inch-diameter Schedule 40 PVC pre-pack well screen and blank Schedule 40 PVC riser. The monitoring well as-built details are provided on the boring logs presented in Appendix B.

The wells were developed following installation by surging and pumping methods to remove suspended solids and reduce the groundwater turbidity. The well development was performed in accordance with the sampling and analysis plan contained in the additional investigation work plan (URS 2008b). The quantity of water removed from each well ranged from approximately

24 to 36 gallons. No NAPL was observed or measured in any of the new wells prior to or following well purging. Gibbs & Olsen, a licensed land surveyor surveyed the temporary monitoring well top of casing elevations. Table 2-1 summarizes the well elevation data.

The temporary monitoring wells were sampled on September 23, 2008 and March 18, 2009 using low flow sampling methods in accordance with procedures outlined in the sampling and analysis plan (URS 2008b). Both filtered and unfiltered samples were collected for PAH analysis. The field water quality parameters measured at each well were recorded on Groundwater Sampling Data Sheets (Appendix F).

Analytical Methods

Soil and groundwater samples were submitted for analysis to Columbia Analytical Services, of Kelso, Washington, an Ecology-accredited laboratory. The quality assurance/quality control methods employed during the testing program were in general conformance with the Quality Assurance Project Plan contained in the additional investigation work plan (URS 2008b). Soil and groundwater samples were analyzed for DRO and residual-range organics (RRO) by Ecology Method NWTPH-Diesel extended and PAHs by EPA Method 8270D SIM. Soil samples from the monitoring well completed within the Mechanics Shop (TMW-02) also were analyzed for volatile organic compounds (VOCs) using EPA Method 8260B and metals by EPA Method 6010B. Table 3-3 summarizes groundwater analytical data for PAH and TPH analyses, and Tables 3-5 and 3-6 summarize additional investigation soil analytical data for VOCs/metals (TMW-02) and PAH/TPH, respectively. Data is compared to screening levels identified in Table 3-1. Cleanup levels for cPAHs are based on the TTEC of the mixture using the toxicity equivalency methodology in WAC 173-340-780 (8).

The laboratory analytical reports for soil data collected in September 2008 are provided in Appendix G. The analytical data was validated by a URS chemist and the data assessment reports are also presented in Appendix G. URS did not identify any data usability issues during their review of the laboratory reports. The laboratory analytical reports for groundwater data collected in September 2008 and March 2009 have been provided in annual reports.

3.2.7.3 Additional Investigation Results

Subsurface Conditions

Hydrogeology. The locations of cross sections developed to illustrate subsurface conditions are shown on Figure 3-2. Figures 3-3, 3-4, and 3-5 provide north to south (A-A’), and east to west (B-B’ and C-C’) geologic cross sections, respectively. The majority of the borings and temporary monitoring wells were completed north and south of the approximate centerline of the MFA to further assess the extent of soil and groundwater contamination. The principal geologic units present in the MFA exhibited only minor variability, such as variations in relative thickness and gradation into the underlying units. The Upper Silt unit was noted to have interbedded silty sands to sandy silts and also predominantly silts layers. At some locations, thin sand layers were noted in the Upper Silt Unit.

Perched groundwater was noted in the Upper Sand unit directly above the Upper Silt in the majority of the new borings and monitoring wells completed during this investigation. The perched groundwater was noted during drilling at depths ranging from approximately 6 to 13.5 feet bgs. Static perched depth-to-groundwater levels ranged from approximately 3 to 6 feet bgs (Table 2-1). The perched groundwater zone appears to have a limited saturated thickness (e.g., less than 5 feet).

Groundwater was generally encountered during drilling of the wells at the contact between the bottom of the Upper Silt unit and the Lower Sand – Aquifer A. The depth to groundwater at the time of drilling ranged from 9.5 to 17.5 feet bgs. Static groundwater elevation data for 2008 and 2009 are summarized in Table 2-1. Based on the depth to groundwater noted during drilling and the static depth-to-groundwater level measurements, groundwater in the temporary monitoring wells was under confined conditions.

The groundwater elevations for September 22, 2008 are shown on Figure 2-4, and the groundwater elevations for March 19, 2009 are shown on Figure 2-5. Consistent with previous monitoring conducted in the MFA and adjacent areas, the groundwater gradient was very flat with only a minor gradient change (approximately 0.0002 feet per foot) noted across the MFA. The general groundwater gradient was northerly to northeasterly, consistent with previous water level monitoring events.

Sheen and Dense Non-Aqueous Phase Liquid Occurrence. Table 3-7 summarizes the sheen and DNAPL observations for the existing borings and the borings completed during the additional investigation. Figure 3-6 shows the approximate extent of sheen noted in the Upper Sand, along with evidence of DNAPL occurrence. Sheen generally was evident in soil ranging from 3.5 to 10 feet bgs. Borings completed to better define the extent of DNAPL in soil (e.g., PB-59, PB-60, PB-61, PB-64, PB-66, PB-67, PB-70, PB-71, and TMW-09) did not encounter evidence of residual DNAPL, with the exception of PB-59. DNAPL was evident in PB-59 at depths from 7 to 10 feet bgs. Sheens were noted in soil samples at depths from 6 to 10 feet bgs in boring PB-61 and from 7 to 9 feet bgs in PB-67.

Soil Analytical Results

Table 3-6 summarizes the soil analytical results for samples collected from borings PB-59 through PB-73 and the temporary monitoring wells during the additional investigation conducted in September 2008. The DRO, naphthalene and cPAH TTEC soil sampling results from the 2008 additional investigation are depicted on Figure 3-7.

Diesel-Range Organics. Only four of the borings (PB-59, PB-60, PB-61, and PB-67) detected DRO concentrations exceeding the MTCA Method C cleanup level (2,000 mg/kg). DRO concentrations in these borings ranged from 2,700 milligrams per kilogram (mg/kg) (PB-67) to 14,000 mg/kg (PB-59). The deeper samples collected from these borings were well below the MTCA Method C cleanup level with the exception of PB-61. DRO was detected in PB-61 at 5,100 mg/kg at 8 feet bgs and 16 mg/kg at 6.5 feet bgs. DRO was not detected in any of the temporary monitoring well (TMW-01 through TMW-12) soil samples exceeding the MTCA Method C cleanup level.

Polycyclic Aromatic Hydrocarbons. PAHs were detected in the majority of the soil samples collected during this investigation. However, only a limited number of PAHs were detected in the soil samples collected from temporary monitoring wells TMW-01 through TMW-12. The highest levels of PAHs corresponded to the sample locations with the highest concentrations of DRO. None of the soil samples exceeded the TTEC for cPAHs. Naphthalene was detected at elevated concentrations in borings PB-59, PB-60, and PB-61 ranging from 140 mg/kg (PB-60) to 1,700 mg/kg (PB-59).

Volatile Organic Compounds and Metals. Low concentrations of aromatic hydrocarbons (e.g., toluene, ethylbenzene, and xylenes) and ketones (e.g., acetone and 2-butanone) were detected in the soil samples collected from TMW-02 (Table 3-5). In addition, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-isoproyltoluene and carbon disulfide were detected at low concentrations in the soil samples. The levels of these compounds that were detected were well below the MTCA Method B and C cleanup levels.

Arsenic, barium, cadmium, chromium, lead, and mercury were detected in both soil samples collected from TMW-02 at concentrations well below MTCA Method A/B cleanup levels (Table 3-5).

Groundwater Analytical Results

Groundwater analytical results for the samples collected in September 2008 and March 2009 from temporary monitoring wells TMW-01 through TMW-12 and existing monitoring wells AV-09 through AV-13, 04-6A, 97-6A (historic abandoned), 97-6B, and 99EA-3A are summarized in Table 3-3. Selected wells from areas adjacent to the MFA also were sampled during the monitoring events. The DRO, cPAH, and naphthalene concentrations for these sampling events are depicted on Figures 3-8, 3-9, and 3-10, respectively. Monitoring wells AV-09 through AV-13, 04-6A, 97-6B, and 99EA-3A, as well as selected wells from areas adjacent to the MFA, have continued to be sampled twice annually since March 2009 (see Table 3-3). The DRO, cPAH, and naphthalene concentrations in groundwater in September 2014 is depicted on Figure 3-11.

Diesel-Range Organics. DRO concentrations in groundwater during the September 2008 and the September 2014 sampling events are depicted on Figures 3-8 and 3-11, respectively. During the September 2008 sampling event, the highest concentrations were evident in existing monitoring wells AV-10 and 04-6A situated along the historic lineament. AV-10 (5.0 mg/L) and 04-6A (1.1 mg/L) were the only wells to exceed the DRO MTCA Method B cleanup level (0.5 mg/L). DRO was only detected in three of the temporary monitoring wells at concentrations ranging from 0.019 mg/L (TMW-04) to 0.16 mg/L (TMW-02) during the September 2008 sampling event. The highest concentrations of DRO continue to be observed in monitoring wells AV-10 and 04-6A, situated along the historic lineament, through the September 2014 sampling event. Concentrations of DRO exceeded the MTCA Method B cleanup level at monitoring wells AV-10 (11 mg/L), AV-13 (0.56 mg/L), 04-6A (8.1 mg/L), and 99EA-3A (0.86 mg/L) in September 2014.

Carcinogenic Polycyclic Aromatic Hydrocarbons. The concentrations of total cPAHs (as TTEC) during the March 2009 and the September 2014 sampling events are depicted on Figures 3-9 and 3-11, respectively. During the March 2009 sampling event, two monitoring wells in the northwestern portion of the MFA (AV-11 and 99EA3A) and two wells in the southeastern portion of the MFA (AV-09 and 04-6A) had detections of cPAH concentrations exceeding the MTCA Method B TTEC cleanup level (0.012 µg/L). Total cPAHs as TTEC at AV-11 and 99EA3A were 0.0415 µg/L and 0.924 µg/L, respectively. Total cPAH as TTEC concentrations at AV-09 and 04-6A were 0.0316 µg/L and 0.0495 µg/L, respectively. None of the temporary monitoring wells detected cPAH concentrations exceeding the cleanup level during the March 2009 sampling event. However, cPAH TTECs were detected above the cleanup level in two temporary monitoring wells (TMW-02 and TMW-11) during the September 2008 sampling round. During the September 2014 sampling event, one monitoring well in the northwestern portion of the MFA (AV-10) and three wells in the southeastern portion of the MFA (AV-09, 04-6A, and 97-6B) had detections of cPAH concentrations exceeding the MTCA Method B TTEC cleanup level. The concentration of cPAHs as TTEC at AV-10 was 0.072 µg/L. Total cPAH as TTEC concentrations at AV-09 04-6A, and 97-6B were 0.028 µg/L, 0.064 µg/L and 0.019 µg/L, respectively.

Naphthalene. Naphthalene concentrations for March 2009 and September 2014 are depicted on Figures 3-10 and 3-11, respectively. During the March 2009 sampling event, none of the existing or temporary monitoring wells sampled detected naphthalene exceeding the MTCA Method B cleanup level. Naphthalene concentrations ranged from 0.0091 µg/L (TMW-09) to 50 µg/L (04-6A). Naphthalene was not detected in any of the monitoring wells exceeding the MTCA Method B cleanup level (160 µg/L) during the September 2008 sampling round. During the September 2014 sampling event, one monitoring well (04-6A) had a detection of naphthalene exceeding the MTCA Method B cleanup level. The naphthalene concentration in that well was 930 µg/L.

3.2.7.4 Conclusions

A summary of findings based on the additional investigation conducted in the MFA is provided below for soil and groundwater.

Soil

Sheen and DNAPL occurrence appear to be parallel to the historic lineament and the additional borings completed north and south of this former feature generally delineated the lateral extent of sheen or DNAPL in the Upper Sand unit soil (Figure 3-6). No evidence of sheens or DNAPL was noted in the boreholes completed into the Lower Sand.

Elevated levels of DRO and naphthalene generally coincided with evidence of sheen and DNAPL observations in the borings. Borings PB-59, PB-60, and PB-61, adjacent to the northeast corner of the Mechanics Shop (Figure 3-7) had detections of DRO and naphthalene at 8 feet bgs at concentrations exceeding MTCA Method C cleanup levels. The deeper samples collected from these borings at 10 to 11 feet bgs did not exceed MTCA Method C cleanup levels. Borings completed west (TMW-3) and south (TMW-02 and TMW-01) of these borings detected

DRO and naphthalene at concentrations well below cleanup levels. As shown on Figures 3-6 and 3-7, contamination appears to extend beneath the northeastern portion of the building.

DRO and naphthalene concentrations exceeding MTCA Method C cleanup levels were detected in PB-67 at 7 feet bgs. The sample collected at 9 feet bgs in this boring did not exceed cleanup levels. The purpose of this boring was to define the extent of contamination north of boring PB-31. Based on these results, the northern extent of contamination was not defined at boring PB-67. However, borings completed north (TMW-09), northwest (PB-66), and northeast (TMW-10) of PB-67 did not detect elevated levels of these compounds and therefore, generally define the northern limit of contamination in this area.

The MTCA Method B soil cleanup level for protection of groundwater for 2-methylnaphthalene was lowered to 3.8 mg/kg in 2015, which resulted in an additional exceedance at location PB-70 (3.9 mg/kg). However, a duplicate sample collected at that location contained concentrations of 2-methylnaphthalene below that cleanup level (3.4 mg/kg).

The soil borings completed during the additional investigation achieved their primary objective of better defining the lateral and vertical extent of soil contamination in the Upper Sand unit within the MFA. A summary of MFA soil boring locations from that investigation with concentrations of DRO, cPAHs, and naphthalene exceeding MTCA cleanup levels is provided on Figure 3-7.

Groundwater

The groundwater investigation that was implemented as part of the additional investigations in 2008 included the installation and monitoring of 12 temporary monitoring wells and sampling of existing and new MFA monitoring wells to better define the lateral extent of contamination in the Lower Sand – Aquifer A. Wells TMW-01 through TMW-06 were installed on the southwestern side of the historic lineament, and TMW-07 through TMW-12 were located on the northeastern side of this feature. The new and existing wells were sampled in September 2008 and March 2009. The NAPL measurements made during these water sampling events did not detect the presence of LNAPL or DNAPL in Aquifer A.

In addition, monitoring wells AV-09 through AV-13, 04-6A, 97-6B, and 99EA-3A, as well as selected wells from areas adjacent to the MFA, were sampled twice annually since March 2009. Measureable thicknesses of LNAPL or DNAPL were not detected in Aquifer A. However, a trace of NAPL was detected in monitoring well AV-09 in March 2009, and sheens were detected in monitoring wells AV-10 and AV-13 in September 2012 and monitoring well 04-6A in March 2013.

Based on the sampling results for the temporary monitoring well network, the lateral extent of DRO in Aquifer A has been defined. DRO in groundwater samples from the temporary monitoring wells either was not detected or was present at concentrations well below the MTCA Method C cleanup level. Elevated DRO concentrations have been detected consistently only in monitoring wells AV-10 and 04-6A located adjacent to the central and eastern parts of the historic lineament (Table 3-3 and Figures 3-8 and 3-11). Elevated DRO concentrations have also been detected infrequently or sporadically at monitoring wells AV-11, AV-12, AV-13, and 99EA-3A (Table 3-3 and Figures 3-8 and 3-11). Monitoring wells AV-12 and AV-13 are located adjacent to northern part of the historic lineament, monitoring well AV-11 is located west of the historic lineament, and monitoring well 99EA-3A is located east of the historic lineament. The highest DRO concentrations in groundwater appear to coincide with the DNAPL occurrence within the Upper Sand unit.

Concentrations of total cPAH as TTEC detected in the temporary monitoring well network in 2008 and 2009 did not exceed MTCA Method B cleanup levels (0.012 µg/L), with the exception of TMW-02 (0.0282 µg/L) and TMW-11 (1.0325 µg/L). Based on these findings, the general extent of cPAH concentrations in groundwater was defined (Figure 3-9). Monitoring wells AV-09, AV-10, 04-6A, and 97-6.B have had cPAH values exceeding the MTCA Method B cleanup level of 0.012 µg/L (Table 3-3 and Figures 3-9 and 3-11). All except AV-09 are located adjacent to the historic lineament. In addition, monitoring wells AV-11, AV-12 and 99EA-3A have had cPAH values occasionally exceeding the MTCA Method B cleanup level (Table 3-3 and Figures 3-9 and 3-11). Monitoring well AV-12 is located adjacent to the historic lineament, monitoring well AV-11 is located west of the historic lineament, and monitoring well 99EA-3A is located east of the historic lineament. The highest levels of cPAHs in the groundwater appear to generally coincide with the areas of DNAPL occurrence in the Upper Sand.

Naphthalene detections in the existing and temporary monitoring well network were well below the MTCA Method B cleanup level (160 µg/L) (Figure 3-10). The highest levels of naphthalene also coincided with the area of NAPL occurrence and elevated DRO concentrations (Table 3-3 and Figures 3-10 and 3-11).

3.2.8 Mechanics Shop Investigation

3.2.8.1 Purpose and Scope

The MFA additional investigation conducted in 2008 identified elevated concentrations of DRO and PAHs associated with creosote contamination adjacent to the northeastern portion of the Mechanics Shop. Ecology requested that additional sampling be conducted inside the Mechanics Shop to supplement the previous investigations performed outside the Mechanics Shop (Petersen 2011a). The supplemental investigation was conducted in accordance with the Mechanics Shop Investigation Work Plan (URS 2012b) and the primary objective was to evaluate the subsurface conditions within the footprint of the Mechanics Shop.

In December 2011, a total of 14 shallow borings were completed (PB-74 to PB-87). Four borings were advanced within the fuel and work truck storage room; three borings were advanced within the parts storage room; two borings were advanced within the employee lunch room; three borings were advanced outside the east wall of the Mechanics Shop; and two contingency ‘step-out’ borings were also advanced further to the west (PB-86 and PB-87 (Figure 3-12). All of the borings were advanced to the top of the Upper Silt unit with the exception of PB-74, PB-75, and PB-86 which met refusal at approximately 6 feet bgs likely due to woody debris encountered at that elevation. Those three borings are indicated by magenta highlighting on Figure 3-12. The results of this investigation were provided in the Mechanic Shop investigation report dated March 12, 2012 and are summarized below.

3.2.8.2 Investigation Results

Field screening information for the fourteen borings completed during the supplemental Mechanics Shop Investigation (PB-74 through PB-87), as well as previous investigation locations are summarized in Table 3-7. During this investigation, five borings exhibited field indications of DNAPL (either as direct observation of DNAPL or as a sheen) at depths ranging from 7 to 10.5 feet bgs. Those five borings, as well as two borings from the previous September 2008 investigation, are indicated by blue highlighting on Figure 3-12.

The soil analytical results from the supplemental investigation (PB-74 through PB-87) and previous sampling (PB-59, PB-60, PB-61, TMW-01, TMW-02, and TMW-03) locations within or adjacent to the Mechanics Shop are summarized in Table 3-6. Soil, DRO, naphthalene, and TTEC cPAH data are shown on Figure 3-12. DRO concentrations ranged from 2.1 mg/kg (PB-85) to 14,000 mg/kg (PB-59). DRO concentrations exceeding the MTCA Method A cleanup level (2,000 mg/kg) were detected in borings PB-59, PB-60, PB-61, PB-78 and PB-83. Naphthalene concentrations ranged from 6.0 mg/kg (TMW-01) to 1,700,000 mg/kg (PB-59) and exceeded the MTCA Method C cleanup level (9,700 µg/kg) at PB-59, PB-60, and PB-61, PB-78, PB-79, and PB-80. Total cPAHs as TTEC concentrations ranged from 0.082 mg/kg (TMW-03) to 15,880 mg/kg (PB-59). TTEC values were compared to the MTCA Method C cleanup levels for benzo(a)pyrene. TTEC concentrations exceeding the MTCA Method C cleanup level (2,300 µg/kg) were detected at PB-59, PB-60, PB-61, PB-78, and PB-83.

Soil samples collected at PB-74 and PB-82 were also analyzed for PCP, and no detectable levels of this compound were identified at these locations.

3.2.8.3 Conclusions

DNAPL was identified beneath the Mechanics Shop along the northern wall and in the northeastern corner of the building (Figure 3-12). Borings noted with heavy staining, sheen and strong odor consistent with DNAPL occurrence were identified beneath the building in borings PB-78 and PB-83 and outside the building in PB-79, PB-80, and PB-87. DNAPL occurrence was also observed in previous borings PB-59 and PB-61 located outside the building. The extent of DNAPL beneath and adjacent to the Mechanic Shop building is depicted in Figure 3-12. Evidence of DNAPL was noted in the soil from approximately 7.5 to 10.5 bgs.

DNAPL; DRO; naphthalene; and PAH impacted soil appears to be associated with the same source and are typically co-located. In addition, DRO, naphthalene and PAHs are assumed to exist at concentrations exceeding cleanup levels where DNAPL exists. The data obtained from this supplemental investigation generally supports the extent of DNAPL estimated by the previous Environmental Visualization System (EVS) modeling in the northeast corner of the Mechanics Shop. DNAPL was generally observed in the new locations where it was predicted to be present by the model in the vicinity of location PB-59 (locations PB-78, PB-79, PB-80, and PB-83) along the eastern wall of the Mechanics Shop. The additional data acquired during the supplemental investigation was subsequently used to revise the areal and volume estimates related to impacted site media and is further discussed in Section 7.

3.2.9 *In Situ* Soil Remediation Treatability Study

3.2.9.1 Purpose and Scope

The final *in situ* soil remediation treatability study report summarizes the treatability testing of the primary technologies being considered in the RI/FS (URS 2013b). Two test pits were excavated within the MFA (Figure 2-1); test pit TP-01 was located north of the Mechanics Shop in an area previously characterized as less impacted and TP-02 was located east of the Mechanics Shop in an area previously characterized as more impacted (e.g., within the DNAPL affected area). Two treatability studies were preformed; an *in situ* solidification (ISS) treatability study and *in situ* thermal remediation (ISTR) treatability study. The results of this evaluation have been incorporated into this report and are further discussed in Section 7. The field observations and soil testing results related to the nature of the contamination encountered in the test pits is summarized below.

3.2.9.2 Treatability Study Soil Analytical Results

Field observations made during test pit excavation indicated that DNAPL was present at test pit TP-02 (6 feet bgs) and was not observed in TP-01. TP-02 had strong creosote odor, with PID readings ranging from 70 to 170 parts per million (ppm) from 3.5 to 6.5 feet bgs. Both test pits generally encountered a 7 to 9 inches thick asphalt surface overlaying a gray, coarse gravel fill to approximately 2 feet bgs. A geotextile fabric was noted below the gravel layer and this layer marks the top of the Upper Sand layer. The Upper Sand unit consisted of a light to dark brown and gray fine to medium sand with some silty sands at TP-01 that was underlain by the Upper Silt unit. Two soil samples were collected from each test pit and the analytical results are summarized in Table 3-6. Low concentrations of DRO (45 mg/kg), RRO (390 mg/kg) PAHs were detected in the soil sample from 2 feet to 7.5 feet bgs at TP-01. TP-02 had significantly higher concentrations of DRO (9,000 mg/kg), RRO (1,800 mg/kg) and PAHs in the soil sample collected from 2 feet to 6.5 feet bgs. These results are consistent with the observation of DNAPL and strong creosote odors noted in TP-02. The findings at TP-01 confirmed that the area in the vicinity of this test pit was considerably less impacted than the area of observed DNAPL occurrence that was evaluated at the location of TP-02.

3.3 NATURE AND EXTENT OF CHEMICALS OF CONCERN

As summarized above, 87 borings, 26 monitoring wells and two test pits have been advanced during the multiple phases of investigations conducted within the MFA from 1997 to 2011 (Figure 2-1). A figure illustrating soil sample results for indicator analytes for these sampling locations is included in Appendix B as Figure B-1. Remedial actions have been implemented in this area, including installation of a network of biosparging and bioventing wells. The biosparging/bioventing remedial system operated from June 2002 through June 2008. Groundwater contaminant levels improved in response to the remedial action undertaken in the MFA. The extent of soil and groundwater contamination in the MFA has been adequately defined and the following section presents a comprehensive summary of the nature and extent of the COCs and the conceptual site model defining the contaminant distribution with respect to the site hydrogeology.

3.3.1 Extent of Dense Non-Aqueous Phase Liquid

Indications of DNAPL within the MFA have included:

- Residual DNAPL (sheen/staining/high PID readings) observed in soil samples collected within the Upper Sand and the Upper Silt and Lower Sand (Aquifer A)
- Pooled DNAPL observed both in perched groundwater measured at bioventing well BV-13 and historic abandoned well 97-6A and in small excavations (test pit TP-02 and the treatment system horizontal well exit pit) located along the eastern boundary of the MFA

Table 3-7 summarizes DNAPL occurrence in borings and monitoring wells completed within the MFA, and Figure 3-6 shows the extent of soil exhibiting evidence of residual and/or pooled DNAPL. The area depicted with observed sheen on soil generally runs parallel with the former lineament. DNAPL occurrence is also localized along the alignment of the former lineament between the TWP barrier wall and approximately 280 feet to the north-northwest. DNAPL within this area was generally noted within the lower portion of the Upper Sand near the contact with the Upper Silt (Figures 3-3 and 3-4). The generally lower permeability Upper Silt unit appears to be a confining layer minimizing the vertical migration of DNAPL into the Lower Sand.

Evidence of sheen and DNAPL was noted beneath the Upper Silt within the Lower Sand in the MFA only in monitoring wells 97-6A (historic abandoned) and AV-10. Only a minimal quantity of DNAPL (e.g., less than 3 gallons per well) has been recovered from these wells and DNAPL has not been evident since September 2004 (Table 3-8). The distribution and thickness of DNAPL appears to correlate to the distance from the TWP Area, with the greatest accumulations noted nearest to the TWP Area—for example, the greatest thickness of DNAPL has been measured historically at BV-13 (1.0 foot) and 97-6A (1.2 feet) located adjacent to the TWP Area. Table 3-8 summarizes DNAPL thickness and quantities of recovered product from wells BV-13, AV-10, and historic abandoned well 97-6A. A total of 28.4 gallons, 2.2 gallons and 2.8 gallons of product have been recovered from BV-13, AV-10, and 97-6A, respectively, from 2002 through 2012. No appreciable product recovery has been made at AV-10 and 97-6A (or replacement well 04-6A) since the middle of 2004.

The analytical results of soil samples collected from selected borings located within areas of residual and/or pooled DNAPL are summarized in Table 3-9. These samples are considered to be representative of the chemical composition of creosote DNAPL. It is apparent that the DNAPL is characterized by elevated concentrations of DRO (ranging from 1,700 mg/kg to 26,000 mg/kg), and naphthalene (ranging from 140 mg/kg to 4,580 mg/kg), as well as ppm levels of a number of other PAHs, such as acenaphthene; phenanthrene; fluoranthene; pyrene; 2-methylnaphthalene; and dibenzofuran. These findings are consistent with the typical composition of creosote, which may contain up to 50 percent of a carrier fluid (diesel fuel) and many other hydrocarbons, primarily PAHs and phenolic compounds (Environment Agency 2003).

3.3.2 Extent of Affected Soil

A summary of the previous soil sampling analytical results for borings and wells completed in the MFA is presented in Table 3-2 (initial RI data from 1997 to 2000) and Table 3-6 (supplemental investigation data from 2008 to 2011). Figure 3-13 shows the area having soil DRO, cPAH, and naphthalene concentrations exceeding MTCA cleanup levels. The soil sampling analytical results provided in Table 3-2 and Table 3-6 and shown on Figure 3-13 were screened against the MTCA Method A soil cleanup level for DRO and the MTCA Method C standard (default values) soil cleanup level for protection of groundwater for PAHs as identified in Table 3-1. Cleanup levels are further discussed in Section 6. Elevated concentrations of these constituents generally coincide with the occurrence of DNAPL in soil and are concentrated in the southeastern portion of the MFA. Other PAHs exceeding MTCA cleanup levels have been detected in the soil noted with elevated DRO and naphthalene. In almost all instances, high levels of these PAHs were found to co-exist with naphthalene and DRO. Thus, naphthalene was selected as an indicator constituent. However, 2-methylnaphthalene and dibenzofuran exceeded the MTCA cleanup levels at PB-68. Additionally, 2-methylnaphthalene slightly exceeded the cleanup level in one environmental sample collected from PB-70, but not in the field duplicate sample collected at the same location. Concentrations of DRO, cPAH, and naphthalene did not exceed the MTCA cleanup levels at these two locations. Impacted soil is primarily situated along a linear trend parallel to the lineament. Apparently limited areas of contamination were noted around PB-46 and PB-67.

Contamination exists within the Upper Sand and to a lesser degree within the upper portion of the Upper Silt. The Upper Silt appears to act as a barrier to downward migration of contaminants, although contamination has migrated through the Upper Silt into the Lower Sand-Aquifer A. The vertical distribution of DRO and naphthalene within the MFA is depicted on Figures 3-3, 3-4, and 3-5. The COCs are primarily located in the vicinity of the former lineament, but limited migration away from that alignment has occurred in regions where depressions in the Upper Silt surface were noted.

3.3.3 Extent of Affected Groundwater

The results of historic groundwater monitoring conducted in the MFA are summarized in Table 3-3. The groundwater analytical results provided in Table 3-3 were screened against the MTCA Method A groundwater cleanup level for DRO and both the MTCA Method B and C groundwater cleanup levels for PAHs as identified in Table 3-1. Cleanup levels are further discussed in Section 6. Groundwater has been identified in Aquifer A beneath the MFA containing DRO, naphthalene, and cPAH concentrations exceeding MTCA cleanup levels. The levels of these constituents declined in response to the remedial system operation in 2002 through 2008. The highest DRO, naphthalene, and cPAH concentrations are generally located in the central portion of the MFA, oriented northwest-southeast along the alignment of the former lineament (Figures 3-8, 3-9, 3-10, and 3-11). The nearly flat groundwater gradient has likely been a major factor contributing to limiting the lateral extent of affected groundwater noted in the MFA.

3.4 PHYSIOCHEMICAL CONCEPTUAL SITE MODEL

The source of the DNAPL and the associated sorbed and dissolved phase COC within the MFA appears to be from historic operations within the TWP Area. A lineament observed on historical photographs has been interpreted to be an unlined ditch that once conveyed liquid discharges northwesterly from the TWP Area wastewater ponds toward the MFA. The historic ditch appears to bifurcate to the northeast toward the Eastern Area. Operations in the TWP Area reportedly occurred over a 45-year period from approximately 1937 to 1982. The former lineament and receiving impoundments do not appear to have existed after approximately 1968. The width of the ditch appeared to vary from 5 to 10 feet. Filling activities in the MFA buried this former feature and its relative depth below the fill layer and are depicted on a physiochemical conceptual site model figure (Figure 3-14). The bottom of the former ditch may have ranged from approximately 2 to 5 feet above the top of the Upper Silt unit through the MFA.

The primary factors contributing to the distribution of DNAPL and associated chemical constituents identified in the Upper Sand in the MFA appear to include:

- The former lineament and historic topography along this feature
- Distance from the source area (TWP Area)
- The topography of the Upper Silt surface (e.g., troughs or depressions in the Upper Silt surface)
- Perched groundwater flow

Residual DNAPL is concentrated in the southeastern portion of the MFA, and the alignment of the historic lineament and distance from the source area (TWP Area) appear to have the most significant effect on its distribution. Discharges of product to the historic ditch appear to have accumulated directly northwest of the TWP Area. Free product accumulating at the bottom of the ditch likely permeated the sandy soil underlying the ditch and migrated both vertically and laterally until it encountered lower permeability soil within the Upper Silt unit. Residual DNAPL within the Upper Sand likely exists as discrete/disconnected globules of liquid sorbed to the soil matrix. Some of the creosote compounds are very hydrophobic and tend to strongly sorb to soil (Environment Agency 2003). DNAPL pools apparently occurred within topographic depressions or lower-lying areas at the interface with the Upper Silt. Perched groundwater in contact with the residual DNAPL contributed to the transport and distribution of contaminants.

Figure 3-15 shows the surface contours of the Upper Silt unit. The overlay of the area of free product occurrence on Figure 3-15 shows a clear relationship between the presence of product and the elevation of the silt surface. Product accumulation was almost exclusively in lower-elevation areas. This is demonstrated at borings PB-16 and PB-60, which are situated in the central portion of DNAPL occurrence; yet no DNAPL or sheen was evident in these borings. The top of the Upper Silt in these borings was encountered at a higher elevation than in surrounding borings, apparently isolating these areas from the surrounding pooled DNAPL.

The slope of the silt surface and the presence of a depression generally parallel with the former ditch also likely had a significant effect on the perched groundwater flow and the transport of contaminants within the MFA. The areas of sheen and elevated concentrations of DRO, naphthalene, and cPAHs in soil are likely the result of migration (e.g., dissolved phase contamination and NAPL) within the perched groundwater zone. Figures 3-3 and 3-4 show cross sections parallel and perpendicular to the lineament. These cross sections depict the historic lineament location with both DNAPL observations and soil analytical results, and clearly demonstrate the relationship between the contaminant distribution within the soil and the ditch location and the Upper Silt surface contours.

The primary factors affecting the distribution of dissolved phase contamination identified in the groundwater (Lower Sand – Aquifer A) appear to include:

- The location and thickness of DNAPL accumulation above the Lower Sand – Aquifer A
- The presence of residual DNAPL
- Thickness and silt content/permeability of the Upper Silt unit
- Groundwater flow characteristics

The highest concentrations of DRO, naphthalene, and cPAHs noted in the groundwater (Figures 3-8, 3-9, 3-10, and 3-11) are generally situated in areas overlying DNAPL occurrence and are parallel to the lineament. The relative thickness of the Upper Silt and silt content also affected the degree of contaminant migration through the silt into the underlying Lower Sand – Aquifer A. The northern and southern extent of the dissolved phase groundwater contaminant plume appears to be controlled primarily by the very flat groundwater gradient and resulting low groundwater flow velocities. The groundwater gradient has been measured to vary in response to the tidal cycle/river elevation changes. However, the mean flow direction has been inferred to be northerly to northeasterly away from the river. Although groundwater impacts have been identified in Aquifer A, the extent of contamination exceeding MTCA cleanup levels are generally localized within the MFA. The contamination is confined to the upper portion of the Lower Sand, as historic monitoring within the deeper portion of the Lower Sand – Aquifer B has not detected elevated levels of the COCs.

MTCA requires that an RI/FS include information to determine the impact or potential impact of contaminants at a facility on natural resources and ecological receptors (WAC 173-340-350 [7][c][iii][F]). The information in this physiochemical conceptual site model is used in Sections 5.2.2 of this document to assess ecological exposure pathways. A requires that an RI/FS include information to determine the impact or potential impact of contaminants at a facility on natural resources and ecological receptors (WAC 173-340-350 [7][c][iii][F]). The information in this physiochemical conceptual site model is used in Sections 5.2.2 of this document to assess ecological exposure pathways.

This section summarizes the initial AAFS that was conducted in 2000. Based on the investigation results summarized in the previous section, an AAFS was conducted pursuant to Consent Decree No. 97-2-01088-9, the CAP (Woodward-Clyde 1997b), and the PCMP (Woodward-Clyde 1997c). The PCMP established the requirements and process for conducting the AAFS. The offsite investigation report and AAFS (URS 2000d) describes the MFA investigation results and identifies and evaluates cleanup action alternatives. This section presents the cleanup action alternatives developed and evaluated by the AAFS, the cleanup action alternative initially selected, and information regarding cleanup action performance since 2002.

4.1 ADDITIONAL ACTION FEASIBILITY STUDY CLEANUP ACTION ALTERNATIVES EVALUATED FOR SOIL IN UPPER SAND UNIT

The following cleanup action alternatives were developed and evaluated in the AAFS to address impacted soil in the Upper Sand unit:

- Alternative 1: Excavation and on-site disposal (within the existing engineered containment system in the TWP Area)
- Alternative 2: Excavation and off-site disposal (incineration)
- Alternative 3: Excavation and off-site disposal (hazardous waste landfill and incineration)
- Alternative 4: *In situ* solidification
- Alternative 5: *In situ* thermal treatment (using six-phase heating)
- Alternative 6: Passive venting
- Alternative 7: Active venting
- Alternative 8: Existing cover system (asphalt pavement, fill, and geotextile fabric), institutional controls, and no further action

4.2 ADDITIONAL ACTION FEASIBILITY STUDY CLEANUP ACTION ALTERNATIVES EVALUATED FOR GROUNDWATER IN LOWER SAND UNIT

The following cleanup action alternatives were developed and evaluated in the AAFS to address affected groundwater in the Lower Sand unit:

- Alternative 9: *In situ* thermal treatment (using six-phase heating)
- Alternative 10: Passive venting and ORC injection
- Alternative 11: Passive venting and air sparging

- Alternative 12: Active venting and air sparging
- Alternative 13: Institutional controls and no further action

4.2.1 Initial Evaluation of Cleanup Action Alternatives

4.2.1.1 Initial Evaluation Criteria

Following identification of the cleanup action alternatives listed in Section 4.1, each cleanup action alternative was initially evaluated in the AAFS according to criteria established in the Ecology-approved PCMP. Table 4-1 summarizes the initial comparative evaluation of each cleanup action alternative.

The PCMP criteria used to evaluate each cleanup action alternative were:

- Technical performance, reliability, implementability, and safety
- Environmental concerns, including site conditions, migration pathways addressed, short- and long-term effectiveness, adverse impacts, and the need for mitigation of any impacts due to the cleanup action alternative
- Human health effects, including mitigation of short- or long-term exposure and protectiveness during and following implementation
- Institutional needs, including required compliance with local, state, or federal jurisdictions for design, installation, and operation of the cleanup action alternatives

4.2.1.2 Initial Evaluation of Soil Cleanup Action Alternatives

The AAFS eliminated excavation soil alternatives (Alternatives 1 through 3) based on implementability, installation, and operational factors, as well as institutional needs. Affected soil and groundwater have been observed in the vicinity of the Port of Longview’s active Mechanics Shop, and excavation in this area was determined to be infeasible without detrimental effects on Port of Longview operations.

In situ solidification, Alternative 4, also required excavating, mixing, and replacing excavated soil. The AAFS also eliminated this soil alternative from consideration based on the same reasons as Alternatives 1 through 3.

Alternative 5, *in situ* thermal treatment, was determined to be infeasible due to the presence of an active facility above affected soil requiring treatment, resulting in difficult implementability and likely low effectiveness.

Both Alternatives 6 and 7, passive and active venting, initially were retained for further analysis as appropriate soil alternatives to consider for the Upper Sand.

Alternative 8, maintaining the existing asphalt paving, institutional controls, and no further action also was retained for further analysis as an appropriate soil alternative for site COCs in soil in the Upper Sand. Soil impacts have remained along the alignment of the former linear feature that transported wastewater from the TWP Area since they were introduced over 30 years ago. This soil is effectively contained at the site surface above by the existing cover system (asphalt, fill, and geotextile fabric) and by the Upper Silt below. In addition, the COCs detected in this soil have limited mobility, as discussed in the Focused Feasibility Study (Woodward-Clyde 1997d), and as demonstrated by the lack of migration in the past 30 years. Institutional controls (e.g., a restrictive covenant) could mitigate risks to future construction and remediation workers.

4.2.1.3 Initial Evaluation of Groundwater Cleanup Action Alternatives

Alternative 9, *in situ* thermal treatment (six-phase heating) of groundwater, was eliminated due to demonstrated poor technical performance for high boiling point COCs. Six-phase heating relies on steam created from groundwater and soil-pore water and is most effective with COCs that have boiling points close to that of water. The COCs identified in the Lower Sand have higher boiling points than water and, therefore, this technology was previously eliminated as likely to be ineffective.

Alternative 10, passive venting and ORC injection, was eliminated based on the results of the unsuccessful ORC pilot test summarized in Section 3.2.5.

Alternatives 11 and 12, passive or active venting with air sparging, were retained for more detailed evaluation in the AAFS. These groundwater alternatives both involve venting and air sparging technologies, which have been used successfully to reduce COC concentrations at other wood preserving sites, as well as in the former TWP Area at this site.

Alternative 13, institutional controls with no further action, was retained for more detailed evaluation. Regulatory guidance such as *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (USEPA 1988) typically recommends retaining this groundwater alternative throughout the evaluation process. Soil impacts have not migrated from along the alignment of the former linear feature that transported wastewater from the TWP Area since they were introduced over 30 years ago. Institutional controls (e.g., a restrictive covenant) could mitigate risks to future industrial workers.

4.2.2 Initial Selection and Implementation of Cleanup Action Alternatives

Based on the initial evaluation in the AAFS, Alternative 8 (existing cover system with institutional controls) was selected as the preferred cleanup action alternative for soil in the Upper Sand. The existing cover system was already in place when this cleanup action alternative was selected and was expected to remain in the long term.

Also based on the initial evaluation in the AAFS, Alternative 11 (passive venting and air sparging) was selected as the preferred cleanup action alternative for groundwater in the Lower Sand. Horizontal wells and equipment were installed in 2002 in order to conduct a pilot test of this technology. Installation details are presented in the *As-Built Report/Operation and*

Maintenance Manual – Biosparging/Bioventing System (URS 2003c). Monitoring results have been evaluated annually by collecting and analyzing groundwater samples from MFA wells since system start-up, as recently reported in the *2007 Annual Remedial Operations and Groundwater Monitoring Report* (URS 2008a). There are five groundwater monitoring/venting wells (AV-09 through AV-13) screened in the upper portion of Aquifer A and completed to approximately 5 feet below the bottom of the Upper Silt. The MFA biosparging/bioventing system operated with:

- Three horizontal biosparging wells (AS-09 through AS-11) screened in Aquifer A and completed to approximately 15 feet below the Upper Silt at a depth of approximately 25 feet bgs
- One horizontal bioventing well (BV-16) screened above the Upper Silt at a depth of approximately 8 feet bgs
- Four vertical bioventing wells (BV-12 through BV-15) screened above the Upper Silt to approximately 8 feet bgs

As a result of saturated soil conditions in the Upper Sand in vicinity of the bioventing well screens, these wells were converted to biosparging wells that have introduced pressurized air into the subsurface since system start-up. Vaults installed at all well connection points have allowed access to the wells to monitor process parameters (e.g., pressure) and verify proper operation of those wells. All wells are connected via horizontal piping to the biosparging equipment (Appendix D). Further discussion of the biosparging/bioventing system operation and monitoring data is presented in Section 3.2.6.

The efficacy of the biosparging system can be evaluated by assessing COC concentration trends in monitoring wells that are most strongly influenced by the system. As shown on Figures E-2, E-4, and E-5 in Appendix E, the COC concentrations over time in wells AV-09, AV-10, and AV-12 indicate decreasing to stabilized contaminant levels, with the exception of DRO concentrations in AV-09 and AV-10. These monitoring wells are located immediately adjacent to the three horizontal biosparging wells. Overall, the COC concentrations that initially exceeded the cleanup levels in these wells (e.g., naphthalene in wells AV-09 and AV-12) decreased substantially within the first 18 months of system operation. At AV-10, COC concentrations initially increased after system startup, but decreased substantially within the first 2 years of system operation. The initial sharp decrease in concentrations of COCs exhibiting the highest initial concentrations corresponds to a large population increase of hydrocarbon-degrading bacteria soon after system startup (Figures E-2, E-4, and E-5).

The COCs that already exhibited relatively low concentrations at the time of system startup (e.g., diesel and oil in AV-09) show relatively flat concentration trends over the life of system operation. This is typical performance for a system of this type—relatively low concentration, residual COCs respond less favorably to treatment. The concentration trend graphs for these three monitoring wells show that only modest COC reduction occurred since the first 2 years of operation. The point of diminishing returns for the system appears to have been reached, with the ratio of system operation energy expenditure to unit of COC mass reduction being much less favorable after the initial 2 years of operation. The trend graphs support the conclusion that the biosparging system has reduced COC concentrations in groundwater to the extent practicable during its operation. The biosparging system has not been operational since June 2008, and site-wide groundwater monitoring has continued from September 2008 through September 2014.

5.1 CONCEPTUAL SITE MODEL

The TWP Area is believed to be the source of the COCs within the MFA. A former lineament observed on historical photographs has been interpreted to be a ditch that once transported liquids from the TWP Area toward the areas identified as the MFA, the Western Area, and the Eastern Area. Figure 3-3 identifies the former lineament alignment in cross section, from the source area (TWP Area – designated A') through all sample locations along that alignment to the easternmost sample location (AV-13, designated A). The lineament alignment and cross-section references are also shown on Figure 3-2 in plan view. Previous investigations determined that soil and groundwater impacts outside the TWP Area are generally localized in the area near the former lineament within the MFA, through which wastewater from the TWP Area was reportedly routed to nearby municipal impoundments. Process wastewater was discharged to TWP Area ponds (Pond 1 and Pond 2) after 1953, and the lineament was no longer utilized for transport of wastewater through the MFA. Historical photographs indicate that the former lineament and receiving impoundments no longer existed after approximately 1968. The results of the investigations summarized above indicate that impacts have not migrated from this area for more than 40 years.

The inferred groundwater flow direction for the site (Aquifer A and Aquifer B) is to the north-northeast, as determined by a tidal study conducted in 1995 and 1996 (Woodward-Clyde 1996). This study concluded that groundwater elevations at the site were strongly influenced by the water surface elevation in the adjacent Columbia River. Groundwater gradients were observed to be greater in the spring, and the resulting inferred groundwater flow direction was consistently to the north-northeast. Groundwater gradients were observed to be lesser in the fall, and the resulting inferred groundwater flow directions and velocities varied throughout a tidal cycle in response to river elevation changes. However, the mean flow direction calculated for a period greater than a tidal cycle remained to the north-northeast.

5.2 EXPOSURE PATHWAYS

Exposure pathways involve four necessary elements. These are: (1) a source and mechanism of chemical release to the environment, (2) an environmental transport medium, (3) a point of potential receptor contact with the medium containing the site-related chemical, and (4) a receptor intake route at the contact point. Whenever one or more of these elements are missing in an exposure pathway, the pathway is incomplete and there is no exposure and therefore no risk.

5.2.1 Human Exposure Pathways

Figure 5-1 shows the potential exposure pathways at the site. For the COCs (PCP, TPH, and PAHs) present in the MFA (URS 2000d) and the former TWP Area (Woodward-Clyde 1997d) the following potential human receptors and pathways were considered:

- Future construction and remediation workers, from potential exposure to dust or volatile emissions (inhalation) and direct contact (incidental ingestion and dermal absorption) with affected subsurface soil during construction or remediation

- Future construction and remediation workers, from potential exposure via dermal contact or inhalation of volatile compounds in affected shallow groundwater in Aquifer A during construction or remediation

- Future industrial workers, from potential exposure to vapors emitted to the outdoor air from affected subsurface soil during daily work activities

- Future industrial workers, from potential exposure to groundwater in Aquifer A in the event that affected groundwater is used in the future for water supply

- Future industrial workers, from potential inhalation exposures to volatile chemicals in vapors migrating into indoor air

Construction worker and industrial worker exposures to COCs in soil and groundwater through direct contact (ingestion, dermal, and inhalation of fugitive dust emissions) are currently incomplete due to:

- The existing asphalted paved area limits ingestion, dermal contact, and particulate inhalation exposure routes to impacted subsurface soil

- The lack of groundwater supply wells in the vicinity of the lineament alignment

Because subsurface contamination exists beneath the existing asphalt paved area, current and potential future construction projects have to follow existing institutional controls at the site. As part of the CAP for the MFA, a soil management plan will be developed which will describe the existing institutional controls at the site, as well as the procedures to be used when excavating, handling, and disposing of contaminated soil. Site industrial workers are expected to follow all applicable worker health regulations.

The currently complete pathway of exposure at the MFA is through the inhalation of vapors migrating to indoor and outdoor air through the vapor migration pathway. While volatile chemicals can migrate through the subsurface into both indoor and outdoor air, exposures to vapors in outdoor air are generally considered to be insignificant relative to inhalation of vapors in indoor air (ITRC 2007). Therefore, inhalation of vapors in outdoor air, while complete, is considered to be insignificant for construction workers and industrial workers and this pathway is not considered further.

Industrial workers occupying the building located in the MFA could be exposed to volatile chemicals in vapor migrating through the subsurface into the indoor air of the building. Concentrations of vapors in indoor air resulting from the vapor intrusion pathway can result in significant inhalation exposures. Therefore, the vapor intrusion pathway is the only currently potentially complete and significant pathway of exposure at this site.

Section 5.3 evaluates the vapor intrusion pathway to determine the significance of the pathway.

5.2.2 Ecological Exposure Pathways

Pathways to ecological receptors also are considered to be incomplete because groundwater impacts are localized beneath the paved area, and those impacts do not migrate to surface water bodies. Under WAC 173-340-7491(1)(b), no further terrestrial ecological evaluation is required because all soil contaminated with hazardous substances is covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed to the soil contamination.

5.3 HUMAN HEALTH SCREENING EVALUATION OF VAPOR INTRUSION PATHWAY

As discussed in Section 5.2, the vapor intrusion pathway to indoor air is the only currently complete pathway of exposure at this site. Vapor intrusion is the migration of chemicals from the subsurface into overlying buildings (USEPA 2002). Chemicals volatilize from affected soil and/or groundwater beneath a site and diffuse toward regions of lower chemical concentration (ITRC 2007). VOCs present in the subsurface migrate upward preferentially through the coarsest and driest material (USEPA 2002). The vapor intrusion pathway is potentially complete only for VOCs. As discussed in previous sections, elevated concentrations of COCs have been detected in soil and groundwater beneath the MFA. In addition, occasional observations of a sheen on soil samples collected from site borings, observation of free product within intact soil samples collected from site borings, and observations of DNAPL in groundwater samples collected from site groundwater monitoring wells indicate the presence of DNAPL within the MFA near the building (Figure 3-6). As shown on Table 3-6, PB-59 (located adjacent to the south-eastern wall of the Mechanics Shop) contains the highest measured concentrations of several PAHs nearest to potential receptors in the Mechanics Shop. Of the PAHs exceeding the MTCA C soil cleanup levels in PB-59, the following meet the EPA definition of a volatile chemical (USEPA 2002) of having a Henry's Law constant (atmosphere – cubic meters per mole) greater than 10^{-5} and a molecular weight less than 200 grams per mole:

- Naphthalene
- Acenapthene
- Fluorene
- Pyrene
- 2-Methylnaphthalene

Therefore, the vapor intrusion pathway is only potentially complete for these five chemicals. This section presents a quantitative screening evaluation of the vapor intrusion pathway to determine whether the pathway is significant for workers in the east-northeast corner of the Mechanics Shop in the vicinity of sample location PB-59. The screening evaluation consists of estimating indoor air concentrations and comparing the indoor air concentrations to MTCA Method C Air Cleanup Levels for protection of industrial workers.

5.3.1 Estimation of Indoor Air Concentrations

The EPA (USEPA 2002 and 2004) suggests using the methodology of Johnson and Ettinger to predict the intrusion rate of vapors into a building (Johnson and Ettinger 1991). The Johnson and Ettinger model (JE Model) simulates the transport of soil vapors in the subsurface by both diffusion and advection into indoor air. The model uses conservative assumptions that are likely to overestimate the amount of soil vapors that reach the indoor air of an enclosed building. Because of the presence of DNAPL in the area of the building, the NAPL version of the JE Model was used to evaluate the vapor intrusion pathway. The NAPL model is specifically designed to handle NAPLs or solids in soil. A residual phase mixture occurs when the sorbed phase, aqueous phase, and vapor phase of each chemical have reached saturation in soil (USEPA 2004). Concentrations above this saturation limit for all specified chemicals of a mixture will result in a fourth or residual phase (i.e., NAPL or solid), as is evidenced in the MFA. The JE Model uses the following conservative assumptions:

- Contaminant vapors enter buildings through the cracks and openings in the walls and foundation
- Vapor-phase diffusion is the dominant mechanism for transporting vapors between the source and the building zone of influence (convection is the dominant mechanism directly beneath the building, the building “zone”)
- All contaminant vapors originating from directly below the floor will enter the building, unless the floors and walls serve as perfect barriers
- The chemicals are distributed evenly under the entire building

When a residual phase is present, the vapor concentration is independent of the soil concentration but proportional to the mole fraction of the individual component of the residual phase mixture. The user may specify up to 10 soil contaminants in the JE Model, the concentrations of which form a residual phase mixture. For this evaluation, the five VOCs listed above were used to represent the residual phase mixture. As described by the EPA (2004), the equilibrium vapor concentration is calculated numerically for a series of time-steps. For each time-step, the mass of each constituent that is volatilized is calculated using Raoult’s law and the appropriate mole fraction. At the end of each time-step, the total mass lost is subtracted from the initial mass and the mole fractions are recomputed for the next time-step.

The model predicts an air concentration inside the building when the chemical concentration in the affected media and site-specific information is entered into the model. The building in the MFA is very large and much of the building is open warehouse. The lunch room of the building in the MFA was selected for evaluation, because this part of the building is located over the DNAPL. In addition, the lunch room is regularly occupied, and is an enclosed space within the larger structure. The site-specific information entered into the advanced NAPL model is presented in Table 5-1. All other parameters used in the model for this assessment were model defaults and chemical-specific physical parameter information. The initial soil concentrations used in the model and the estimated concentrations in indoor air produced by the model are summarized in Table 5-2.

5.3.2 MTCA Method C Industrial Air Cleanup Levels

Table 5-2 summarizes the indoor air concentrations estimated by the JE Model for the VOCs present in the DNAPL beneath the building in the MFA. The indoor air concentrations are evaluated as to whether they exceed various risk-based levels under MTCA. The modeled indoor air concentrations were compared to the MTCA Method C industrial cleanup levels for air to determine whether the air pathway is a potential concern for industrial workers in the MFA. This section discusses derivation of the MTCA Method C industrial cleanup levels.

Because the site is classified as an industrial facility, cleanup levels protective of industrial exposures are appropriate for assessing potential risks to on-site workers and MTCA Method C air cleanup levels were calculated consistent with WAC 173-340-750. MTCA Method C air cleanup levels are considered to be protective of industrial exposures, and assume 24 hours of exposure per day for 30 years for an adult industrial worker. MTCA Method C industrial cleanup levels for air were calculated using the equations and default exposure parameters for industrial exposures specified in MTCA (WAC 173-340-750). The MTCA Method C industrial cleanup levels for non-carcinogenic and carcinogenic chemicals in air are calculated as shown on Table 5-3.

All inputs to calculating MTCA Method C air cleanup levels are specified in the MTCA regulation with the exception of each chemical’s toxicity criteria. Toxicity criteria describe the quantitative relationship between the dose of a chemical and the type and incidence of the toxic effect. This relationship is referred to as the dose-response. From this quantitative dose-response relationship, toxicity criteria are derived that can be used to estimate the potential for adverse health effects as a function of exposure to the chemical. Exposure to chemicals can result in cancer or no-cancer effects, which are characterized separately. Essential dose-response criteria are the EPA slope factor (SF) values for assessing cancer risks and the EPA-verified reference dose (RfD) values for evaluating non-cancer effects. Recent toxicity criteria available for each chemical were used to calculate the MTCA Method C industrial cleanup levels for air. In general, these criteria were obtained from Ecology’s CLARC database (WDOE 2015), accessed on August 7, 2015. The following bullets summarize the toxicity criteria used to calculate the MTCA Method C air cleanup levels:

- **Naphthalene.** MTCA currently recommends an inhalation RfD for naphthalene of 0.00086 milligrams per kilogram-day (mg/kg-day). This value is consistent with the inhalation reference concentration (RfC) of 0.003 milligrams per cubic meter (mg/m^3) recommended by EPA in their on-line database, Integrated Risk Information System (IRIS), and is based on a study reporting hyperplasia and metaplasia in respiratory and olfactory epithelium, respectively, in mice exposed to naphthalene concentrations as low as 9.3 mg/m^3 (USEPA 2013). This inhalation RfD was used to calculate a non-cancer-based MTCA Method C air cleanup level of 3.0 micrograms per cubic meter (µg/m^3) for naphthalene.

  Ecology’s CLARC database currently lists an inhalation SF for naphthalene of 0.12 (mg/kg-day)$^{-1}$ from California EPA. This value is based on data for incidence of nasal respiratory epithelial adenoma and nasal olfactory epithelial neuroblastoma (tumors) in male rats (OEHHA 2004). This SF was used to calculate a cancer-based MTCA Method C air cleanup level of 0.74 µg/m^3 for naphthalene.

- **2-methylnaphthalene.** No inhalation toxicity criteria are currently available for 2-methylnaphthalene. However, the MTCA Workbook for Calculating Cleanup

Levels for TPH compounds (available at: http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) uses the non-cancer inhalation toxicity criteria for naphthalene as a surrogate for 2-methylnaphthalene. Therefore, the inhalation RfD for naphthalene of 0.00086 mg/kg-day was used to calculate a non-cancer-based MTCA Method C air cleanup level of 3.0 µg/m^3 for 2-methylnaphthalene. There is no evidence to suggest that 2-methylnaphthalene is carcinogenic through the inhalation pathway. Therefore, a cancer-based cleanup level was not calculated for 2-methylnaphthalene.

- **Flourene, pyrene, and acenaphthene**. No inhalation toxicity criteria are currently available for any of these chemicals. While oral toxicity criteria are available, EPA’s National Center for Environmental Assessment, Superfund Technical Support Center does not recommend route-to-route extrapolation for evaluation of these chemicals. Therefore, no MTCA Method C air cleanup level can be calculated for these chemicals. See further discussion in the following sections.

Table 5-4 summarizes the MTCA Method C industrial air cleanup levels calculated for this site and compares them to the modeled indoor air concentrations. Section 5.3.3 summarizes the results of the comparison.

5.3.3 Results of the Screening Evaluation

Table 5-4 shows that modeled indoor air concentrations of naphthalene and 2-methylnaphthalene both exceed their respective MTCA Method C air cleanup levels, indicating that the presence of these two chemicals in the DNAPL beneath the building in the MFA could pose a vapor intrusion concern. An evaluation of fluorene, pyrene, and acenaphthene indoor air concentrations could not be made because no toxicity criteria are available for these chemicals from which to derive an air cleanup level. However, the concentrations of these chemicals were all low relative to naphthalene and 2-methylnaphthalene air concentrations and are all below the cleanup levels derived for naphthalene, which has a similar toxic potency to these chemicals through the oral pathways (i.e., oral RfDs are on the same order of magnitude). Furthermore, these chemicals, while they technically meet EPA’s definition of volatility, are not very volatile and are not expected to result in vapor intrusion concerns.

Although naphthalene and 2-methylnaphthalene exceed their respective industrial air cleanup levels, modeled indoor air concentrations are likely overestimated. The goal of this evaluation as a screening level assessment was to evaluate whether the vapor intrusion pathway is a potential concern at the MFA. Therefore, the indoor air concentrations used for this evaluation are designed to overestimate rather than underestimate indoor air concentrations from the vapor intrusion pathway.

The modeled indoor air concentration for 2-methylnaphthalene exceeded the MTCA Method C cleanup level only slightly (by a factor of approximately 2.5). Considering the degree of conservatism that is built into the JE Model, it is unlikely that 2-methylnaphthalene is present in the DNAPL in concentrations that are a concern for the vapor intrusion pathway. The modeled indoor air concentrations for naphthalene exceeded the cleanup level based on non-carcinogenic effects by an order of magnitude and carcinogenic effects by nearly two orders of magnitude, indicating that the vapor intrusion pathway could be a potential concern at this site for naphthalene.

This evaluation follows MTCA’s guidance for cleanup of contaminated sites for the protection of public health. As such, the toxicity criteria used to calculate cleanup levels are derived to be protective of the general public. However, chemical concentrations originating from commercial/industrial operations (that is, chemicals that are actively used on site) are subject to eight-hour permissible exposure limits (PELs) developed under the Washington Industrial Safety and Health Act (WAC 296-62-07515). PELs are air concentrations established as safe for healthy adult workers to breathe eight hours/day, five days/week over a working lifetime that are usually several of orders of magnitude greater than the toxicity criteria used in risk assessment evaluations. The PEL for naphthalene is 10 ppm (or 52,000 micrograms per cubic meter [µg/m^3]). Operating facilities are required by state law to maintain indoor air quality consistent with these PELs in order to protect employee health. This site is an operating facility that regularly uses and handles naphthalene-containing products (including diesel fuels). Therefore, because *“…it is difficult and sometimes impossible to eliminate or adequately account for contributions from ‘background’ sources”* (USEPA 2002), the modeled indoor air values also were compared to the PEL. The modeled indoor air concentration for naphthalene was several orders of magnitude below the PEL. Therefore, indoor air concentrations meet the state regulatory requirements for the protection of worker health at an operating facility.

In order to address potential vapor concerns identified by the JE model, a vapor intrusion assessment was conducted at the Mechanics Shop (URS 2010b). Four eight-hour air samples were collected inside the Mechanics Shop (in Office #2 and the lunchroom, which were determined most likely to be impacted by NAPL observed at soil boring location PB-59), and three samples were collected outside the Mechanics Shop (two ambient air and a field blank). The four indoor samples were all conservatively collected above the three cracks observed in the building floor slab. All seven samples were analyzed for naphthalene and 2-methylnaphthalene by EPA Method TO-17. No analytes were detected, with the exception of one detection of naphthalene at the method reporting limit (0.49 µg/m^3) at location MFA-IA-3 (the lunchroom location nearest to soil boring location PB-59). This detection was below both the MTCA Method C air noncancer cleanup level of 3.0 µg/m^3 and the MTCA Method C air cancer cleanup level of 0.74 µg/m^3, indicating that the vapor intrusion pathway is potentially complete but insignificant due to the single detection being well below applicable and relevant criteria.

During a supplemental investigation conducted in 2012, 14 borings were advanced within and adjacent to the Mechanics Shop to further evaluate the nature and extent of COCs in that area (URS 2012b). Concentrations of COCs identified at those 14 boring locations did not exceed concentrations previously identified at location PB-59. Therefore, the vapor intrusion assessment conducted using concentrations from location PB-59 are deemed conservative.

This section discusses preliminary cleanup standards that could be used to develop and evaluate cleanup action alternatives. The preliminary cleanup standards listed in this section are not approved by Ecology as final cleanup standards for the site. Final cleanup standards will be established in the CAP. However, Ecology expects that cleanup standards will be *"…initially established during the scoping of the remedial investigation and may be further refined during the remedial investigation and/or feasibility study"* per WAC 173-340-350(9)(a).

WAC 173-340-700(3) defines the term "cleanup standards" as follows:

> *"Cleanup standards shall consist of the following:*
>
> - *Cleanup levels for hazardous substances present at the site*
> - *The location where these cleanup levels must be met (POC)*
> - *Other regulatory requirements that apply to the site because of the type of action and/or location of the site ('applicable state and federal laws')"*

This section also establishes preliminary remediation levels, because some cleanup action alternatives are likely to include remediation levels. MTCA explains the difference between cleanup levels and remediation levels as follows:

> *"Remediation levels are not the same as cleanup levels. A cleanup level defines the concentrations of hazardous substances above which a contaminated medium (e.g., soil) must be remediated in some manner (e.g., treatment, containment, and/or institutional controls). A remediation level, on the other hand, defines the concentration (or other method of identification) of a hazardous substance in a particular medium above or below which a particular cleanup action component (e.g., soil treatment or containment) will be used. Remediation levels, by definition, exceed cleanup levels."*

6.1 PRELIMINARY CLEANUP LEVELS

The MFA and TWP Area are part of the same industrial facility and treated as one site. In addition, the investigation of the MFA has been performed under the AAFS process outlined for the TWP Area in the CAP and PCMP (Woodward-Clyde 1997c). Because much of the same rationale used to establish cleanup levels in the TWP CAP is expected to be applicable to the MFA, the final cleanup levels established for the TWP Area are provided here as background for establishing the preliminary cleanup levels for the MFA. However, the preliminary cleanup levels developed for the MFA are based on current MTCA cleanup levels.

The final cleanup levels for the TWP Area are:

- MTCA Method C Industrial soil cleanup levels (WAC 173-340-745[5])
- MTCA Standard Method C potable groundwater cleanup levels for groundwater within the deed restricted area

- MTCA Standard Method B potable groundwater cleanup levels for groundwater outside the deed restricted area

The PCMP for the TWP identifies that the POC coincides with the deed restriction boundary.

Preliminary cleanup levels for the MFA have been developed for the COCs identified in Section 3.3, which include seven carcinogenic PAH compounds, 2-methylnaphthalene, naphthalene, and DRO, as well as the rarely detected compounds dibenzofuran and PCP. The following rationale was used to develop preliminary cleanup levels for soil and groundwater at the MFA at the points of compliance discussed in Section 6.3.

- The MFA portion of the site meets the criteria for an industrial property under WAC 173-340-745. Because it is reasonable to assume maximum exposures at the MFA consistent with industrial land use, MTCA Method C industrial cleanup levels (WAC 173-340-745[5][b][iii]) are appropriate for soil throughout the MFA, and MTCA Method C cleanup levels (WAC 137-340-720[5][b][iii]) are appropriate for groundwater within the boundaries of the proposed deed-restricted area defining the existing COC plume in groundwater.

- Standard MTCA Method C Cleanup levels for this site established for the cPAHs, naphthalene, and 2-methylnaphthalene do not have to be adjusted downwards to take into account multiple hazardous substances per WAC 173-340-745(6)(a). Downwards adjustments to cleanup levels are only required if site exposures at the MTCA Method C levels would result in cumulative cancer risks greater than 1×10^{-5} or cumulative hazards greater than a hazard quotient of 1. The carcinogenic PAHs are already evaluated as one compound via the TTEC approach; therefore, exposure to multiple carcinogens is already taken into account in the total cPAH cleanup value. For the two non-cancer chemicals, naphthalene[1] and 2-methylnaphthalene, their toxicity does not affect the same target organ system (see their EPA IRIS RfD and reference concentration files [http://www.epa.gov/iris/]); therefore, their toxic hazards are not additive.

- Because groundwater containing COCs has the potential to migrate beyond the property boundaries, MTCA Standard Method B groundwater cleanup levels (WAC 173-340-720[4][b][iii]) are appropriate beyond the proposed deed-restricted area defining the existing COC plume boundary.

- In accordance with WAC 173-340-440, institutional controls memorialized through an environmental covenant on the MFA property that limits the property to industrial use and prohibits the use of groundwater would be required in order to use MTCA Method C cleanup levels.

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[1] Naphthalene is possibly a carcinogen by inhalation, see discussion in Section 5; however, Ecology's CLARC data base is not treating this chemical as a carcinogen.

MTCA also requires consideration of potential human-health based values for groundwater protection (i.e., soil to groundwater pathway) under WAC 173-340-745(5)(b)(iii)(A), and the soil to vapor pathway under WAC 173-340-745[5][b][iii][C]). The soil to vapor pathway is discussed in Section 5.3, and the soil to groundwater pathway is discussed in Sections 6.4.1.1 and 7.1, as well as in the following text. MTCA Method C soil cleanup levels for protection of groundwater are applicable at the site, rather than MTCA Method B soil cleanup levels, because MTCA Method C groundwater cleanup levels would apply in the area within the conditional POC for groundwater. Based on this and the bullets above, the soil and groundwater preliminary cleanup levels for the COCs at the site are shown in Table 6-1. These preliminary cleanup levels are the most currently available as obtained from Ecology's CLARC database (WDOE 2015). With the exception of the addition of the preliminary soil cleanup levels for protection of groundwater and the change in the PCP preliminary cleanup levels, the values in Table 6-1 match the previously established cleanup goals for the TWP Area. Note that the PCP numbers only changed due to clarification received from Ecology regarding the number of significant figures. According to Ecology, cleanup levels should only include two significant figures (White 2015).

MTCA requires that cleanup levels for cPAHs be established by considering mixtures of the seven cPAH compounds as a single hazardous substance (WAC 173-340-708[8][e]). All seven cPAH compounds must be included in any sample analysis, and a TTEC for the mixture must be calculated (WDOE ND). The resulting TTEC value is then compared to the cleanup level established for benzo(a)pyrene.

For TPH as diesel or heavy oil, International Paper has elected not to perform fractionation analysis of the petroleum compounds at this stage of the RI/FS and therefore has elected not to calculate MTCA Method B or C preliminary cleanup levels for TPH. Instead, TPH preliminary cleanup levels at the site are based on conservative MTCA Method A groundwater cleanup values and MTCA industrial soil cleanup values shown in Tables 720-1 and 745-1, respectively, of WAC 173-340 (see Table 6-1).

Pathways to ecological receptors within the MFA are considered to be incomplete because groundwater impacts are located beneath paved areas, and the impacts under those areas do not migrate to surface water bodies. Under WAC 173-340-7491(1)(b), no further terrestrial ecological evaluation is required because all soil contaminated with hazardous substances is covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed to the soil contamination. Therefore, no preliminary cleanup levels have been identified as no significant adverse terrestrial risk is anticipated at the site (WAC 173-340-745(5)(b)(ii).

6.2 PRELIMINARY REMEDIATION LEVELS

Some cleanup action alternatives developed and evaluated during the RI/FS include remediation levels developed consistent with WAC 173-340-355 to identify the concentrations or other criteria at which different cleanup action components would be implemented. Remediation levels are used at sites when more than one cleanup action component is used to achieve the cleanup levels. Treatment or removal of DNAPL as a source at the MFA is a primary consideration, as a means of addressing the highest concentrations of hazardous substances per

WAC 173-340-360(2)(c)(ii)(A). On this basis, a preliminary remediation level for soil containing DNAPL is established as:

> *"Physically treat or remove as a source, to the extent practicable, all soil containing field indications of DNAPL"*

A similar remediation level (established as a cleanup goal) was included in the CAP for the TWP Area (Woodward-Clyde 1997b). In addition to treatment or removal of the source (e.g., NAPL) under WAC 173-340-360(2)(c)(ii)(A), a "nonpermanent" groundwater cleanup action must implement groundwater containment to the maximum extent practicable to avoid lateral and vertical expansion of the groundwater volume affected by hazardous substances (WAC 173-340-360(2)(c)(ii)(B)).

6.3 PRELIMINARY POINTS OF COMPLIANCE

The rationale establishing the final POC in the MFA CAP is expected to be similar to that presented in the TWP CAP (Woodward-Clyde 1997b). A standard POC would be used for soil to either meet cleanup levels throughout the site (WAC 173-340-745[7] and -740[6][b]), or to contain hazardous substances adequately to prevent migration and/or human contact in accordance with MTCA Section 173-340-745(7) and -740(6)(f). The CAP would establish institutional controls through a restrictive covenant, thereby:

- Ensuring that industrial land use is maintained within the deed-restricted area of the MFA
- Allowing use of 1) MTCA Method C soil cleanup levels for protection of groundwater and/or 2) containment and/or treatment of soil with concentrations greater than MTCA Method C cleanup levels
- Restricting activities within the deed restricted area to maintain the integrity of the cleanup action

This RI/FS anticipates that a conditional POC would be established for groundwater in accordance with WAC 173-340-720(8)(c), which allows Ecology to approve a conditional POC if it can be demonstrated that it is not practicable to meet cleanup levels throughout the site within a reasonable time frame and all practicable methods of treatment are used in the site cleanup action.

The conditional POC for groundwater in the MFA would be determined using a method similar to that used for the TWP (Woodward-Clyde 1997b). The conditional POC would be established as close as practicable to the source of hazardous substances, which is anticipated to be along the alignments of the two rows of TMW wells installed during the MFA Additional Investigation in September 2008 (Figure 3-7). Groundwater monitoring data collected from those wells indicated that MTCA Method B cleanup levels generally are met at those locations, except for occasional PAH exceedances outside the conditional POC boundary (currently believed to be associated with suspended sediment, and not representative of dissolved-phase concentrations). The treatment or removal of soil sources to groundwater would be expected to result in lower groundwater concentrations and continually improving results at the conditional POC.

For soil, it is expected that the cleanup action would either meet soil cleanup levels based on the protection of groundwater throughout the site (WAC 173-340-745[7] and -740[6][b]) or provide adequate containment and/or treatment of hazardous substances to prevent migration or contact with those substances and meet the requirements for a conditional POC in accordance with WAC 173-340-740(6)(f). The requirements for using a conditional POC under WAC 173-340-740 (6)(f) for sites where containment of hazardous substances is the selected cleanup action include:

- The selected cleanup action is permanent to the maximum extent practicable using the procedures in WAC 173-340-360.
- The cleanup action is protective of human health. The department may require a site-specific human health risk assessment conforming to the requirements of this chapter to demonstrate that the cleanup action is protective of human health.
- The cleanup action is demonstrated to be protective of terrestrial ecological receptors under WAC 173-340-7490 through 173-340-7494.
- Institutional controls are put in place under WAC 173-340-440 that prohibit or limit activities that could interfere with the long-term integrity of the containment system.
- Compliance monitoring under WAC 173-340-410 and periodic reviews under WAC 173-340-430 are designed to ensure the long-term integrity of the containment system.
- The types, levels and amount of hazardous substances remaining on site and the measures that would be used to prevent migration and contact with those substances are specified in the draft CAP.

As is the case for soil, the institutional controls established in the CAP would both maintain industrial land use within the deed-restricted area of the MFA and memorialize use of MTCA Method C cleanup levels for groundwater within the conditional POC boundary for groundwater specified in the CAP, establish requirements for restricting activities and withdrawal and use of groundwater in the MFA, and O&M requirements. The restrictive covenant would meet the requirements of WAC 173-340-440(8), (9), and (10), as well as requirements in the Uniform Environmental Covenants Act (Chapter 64.70 Revised Code of Washington [RCW]). MTCA Method B potable groundwater cleanup levels would be used in the MFA outside the conditional POC boundary. COC compliance monitoring would be performed at the TMW wells along that boundary. Additional monitoring of sentinel wells (e.g., MFA AV wells) also could be performed within and outside of the conditional POC boundary.

6.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

MTCA requires that cleanup actions comply with legally applicable state and federal laws and regulations, as well as other applicable or relevant and appropriate requirements (ARARs). This section discusses the ARARs that potentially apply to the cleanup alternatives.

“Legally applicable” requirements under MTCA are *“those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations adopted under state or federal law that specifically address a hazardous substance, cleanup action, location or other circumstances at the site”* (WAC 173-340-710[3]).

“Relevant and appropriate” requirements are *“those cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that, while not legally applicable to the hazardous substance, cleanup action, location, or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site”* (WAC 173-340-710[4]). WAC 173-340-710(4) identifies the criteria to be used in determining whether a requirement is relevant and appropriate, which include whether:

- The purpose for which the statute or regulations under which the requirement was created is similar to the purpose of the cleanup action
- The media regulated or affected by the requirement is similar to the media contaminated or affected at the site
- The hazardous substance regulated by the requirement is similar to the hazardous substance found at the site
- The entities or interests affected or protected by the requirement are similar to the entities or interests affected by the site
- The actions or activities regulated by the requirement are similar to the cleanup action contemplated at the site
- Any variance, waiver, or exemption to the requirements are available for the circumstances of the site
- The type of place regulated is similar to the site
- The type and size of structure or site regulated is similar to the type and size of structure or site affected by the release or contemplated by the cleanup action
- Any consideration of use or potential use of affected resources in the requirement is similar to the use or potential use of the resources affected by the site or contemplated cleanup action

In accordance with WAC 173-340-710(9)(b), cleanup actions conducted under a consent decree or agreed order are exempt from the procedural requirements of certain state and local laws, including[2]:

- Washington State Clean Air Act (Chapter 70.94 RCW)
- Washington State Solid Waste Management Act (Chapter 70.95 RCW)
- Washington State Hazardous Waste Management Act (Chapter 70.105 RCW)
- Washington State Construction Projects in Water Act (Chapter 75.20 RCW, recodified as Chapter 77.55 RCW)
- Washington State Water Pollution Control (Chapter 90.48 RCW)
- Washington State Shoreline Management Act (Chapter 90.58 RCW)
- Any laws requiring or authorizing local government permits or approvals for the action

The cleanup action still must comply with the substantive requirements of the laws in accordance with WAC 173-340-710(9)(c). It is part of Ecology's role under a consent decree or other order to ensure compliance with the substantive requirements, and to provide an opportunity for comment by the public, state agencies, and local governments (WAC 173-340-710[9][d]).

6.4.1 Potential Chemical-Specific ARARs

Chemical-specific ARARs are health-based or risk-based numerical values or methodologies, which when applied to site-specific conditions, establish numerical cleanup levels. The cleanup levels quantify the amount or concentration of a hazardous substance allowed to be present in or discharged to the environment. Table 6-1 presents the preliminary cleanup levels for groundwater and soil at the MFA, as derived from the potential chemical-specific ARARs which are presented in Table 6-2. The chemical-specific ARARs are based on values obtained from Ecology's CLARC database (August 2015). Changes in the chemical-specific ARARs compared to the draft final revised FS dated February 2014 resulted in the following:

- Rounding to two significant figures instead of three (according to Ecology, cleanup levels should only include two significant figures)
- Changing the basis for the MTCA Method C air cleanup levels from non-cancer to cancer (2-methylnaphthalene, naphthalene, and dibenzofuran)

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[2] This exemption does not apply if Ecology determines that the exemption would result in loss of necessary approval from a federal agency to administer any federal law.

- Using EPA chemical-specific properties in the migration to groundwater calculations (2-methylnaphthalene and dibenzofuran).

Preliminary cleanup and remediation levels and preliminary POCs are discussed in detail in Sections 6.1, 6.2, and 6.3.

6.4.1.1 Soil

MTCA Regulations, WAC 173-340-745(3) and (5), 173-340-708(8), and 173-340-355. MTCA Method C and A industrial cleanup levels are potentially applicable to evaluating soil cleanup standards at the site. Because the MFA portion of the site meets the criteria for industrial land use (WAC 173-340-745), the proposed preliminary cleanup levels for the rarely detected semivolatile compounds dibenzofuran and PCP, the PAH compounds 2-methylnaphthalene and naphthalene, and for cPAHs in soil are based on the standard MTCA Method C industrial soil cleanup levels (WAC 173-340-745[5][b]). The total concentration of the cPAH compounds (benzo[a]pyrene, indeno[1,2,3-cd]pyrene, dibenzo[a,h]anthracene, chrysene, benzo[k]fluoranthene, benzo[b]fluoranthene, and benzo[a]anthracene) is compared to the cleanup level using the Toxicity Equivalency Factor methodology of WAC 173-340-708(8). Concentration limits for TPH as diesel or heavy oil are based on MTCA Method A industrial soil cleanup levels (WAC 173-340-900, Table 745-1). International Paper has elected to not perform fractionation analysis of the petroleum compounds found at the site, and therefore has elected not to calculate MTCA Method B or C cleanup levels. Table 6-1 presents the preliminary cleanup levels that will be met at the conditional POC (Section 6.3).

Pathways to ecological receptors are considered to be incomplete because groundwater impacts are localized beneath the paved area, and those impacts do not migrate to surface water bodies (Section 5.0). Under WAC 173-340-7491(1)(b), no further terrestrial ecological evaluation is required because all soil contaminated with hazardous substances is covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from exposure to the soil contamination. Therefore, no potential chemical-specific ARARs have been identified as no significant adverse terrestrial risk is anticipated at the site (WAC 173-340-745(5)(b)(ii).

When developing soil cleanup levels, MTCA also requires consideration of the soil to vapor pathway, as discussed in detail in Section 5.3, and protection of groundwater. Preliminary air cleanup levels were developed for volatile COCs and are summarized in Table 6-2.

Table 6-2 also summarizes the preliminary soil cleanup levels for protection of groundwater for DRO, the PAH compounds that have been detected in soil at the MFA, and the two semivolatile organic compounds dibenzofuran and PCP, which also have been rarely detected at the MFA site (see also Section 3.3 for a discussion of the nature and extent of COCs). Both MTCA Method B and Method C soil cleanup levels protective of groundwater are included in Table 6-2 for completeness. MTCA Method C cleanup levels for soil protective of groundwater are applicable rather than MTCA Method B cleanup levels, since MTCA Method C groundwater cleanup levels would apply in the area within the conditional POC for groundwater.

The cleanup action alternatives evaluated in this RI/FS also include remediation levels evaluated in accordance with WAC 173-340-355. The remediation level is established to distinguish when various potential cleanup action components would be implemented (see Section 6.2).

6.4.1.2 Groundwater

MTCA Regulations, WAC 173-340-720. Groundwater at the site has no present or reasonably foreseeable use for drinking water purposes. However, MTCA requires groundwater to be protected based on its highest potential beneficial use as potable groundwater (WAC 173-340-720[1][a]). Both MTCA Standard Method B and C cleanup levels for potable water have been proposed for the site based on the existing and anticipated use of the property. The cleanup levels for 2-methylnaphthalene, naphthalene, and cPAHs in groundwater are based on the MTCA Standard Method C potable water cleanup levels for groundwater beneath the MFA (WAC 173-340-720[5][b]). Concentration limits for individual PAH compounds and cPAHS in groundwater beyond the existing COC plume boundaries are based on MTCA Standard Method B Cleanup Levels for potable water (WAC 173-340-720[4][b]). Finally, concentration limits for TPH as diesel or heavy oil are based on MTCA Method A groundwater cleanup levels (WAC 173-340-720, Table 720-1) both within the current COC plume and beyond the existing COC plume boundaries. Table 6-1 presents the preliminary cleanup levels. These cleanup levels will be met at the conditional POC as described in Section 6.3.

Safe Drinking Water Act Primary Drinking Water Regulations, 40 Code of Federal Regulations (CFR) 141.61(a), and Washington State Department of Health Drinking Water Standards (WAC 246-290-310[7]). The federal and state primary drinking water regulations establish health-based maximum contaminant levels for public water systems. Although site groundwater does not supply a public water system, the federal and state maximum contaminant levels are potentially relevant and appropriate requirements for these waters where groundwater is a potential source of drinking water. The federal maximum contaminant level (MCL) for benzo(a)pyrene is 0.2 mg/L and is potentially relevant and appropriate to groundwater at the site. No other site COCs are regulated by the Safe Drinking Water Act. Table 6-1 presents the preliminary cleanup levels, which will be met at the conditional POC as described in Section 6.3. Since MTCA groundwater cleanup levels are more stringent for benzo(a)pyrene (reported as cPAHs), the federal MCL for benzo(a)pyrene is not included in this table.

6.4.2 Potential Action-Specific ARARs

Action-specific ARARs are usually technology- or activity-based requirements or restrictions on actions taken with respect to hazardous substance(s). These requirements set performance, design or other standards that would be used to implement the proposed cleanup action and are triggered by the particular cleanup action alternative. The action-specific requirements do not in themselves determine the selected cleanup or interim action alternative; rather, they indicate how, or to what level, a cleanup action alternative must achieve a standard. The potential applicability of the action-specific ARARs to the soil and groundwater alternatives is summarized in Tables 6-3 and 6-4, respectively.

Model Toxics Control Act Cleanup Action Requirements

The MTCA implementing regulations specify requirements that potentially affect implementation of a remedial design/cleanup action at the site. These regulations are potentially applicable requirements to implement the selected cleanup action alternative at the site.

Monitored Natural Attenuation, Expectations for Cleanup Action Alternatives, WAC 173-340-370. WAC 173-340-370(7) states that MNA may be appropriate at sites where: 1) source control has been conducted to the maximum extent practicable, 2) leaving contaminants on site during the restoration time frame does not pose an unacceptable threat to human health or the environment, 3) there is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the site, and 4) cleanup actions conducted will not result in a significantly greater overall threat to human health or the environment than other alternatives.

Applicability to Soil and Groundwater Alternatives: WAC 173-340-370(7) is applicable to cleanup action alternatives that include MNA as part of the cleanup action. This includes all groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

Institutional Controls, WAC 173-340-440. In accordance with this regulation, appropriate institutional controls shall be described in a restrictive covenant on the property when cleanup levels are established using MTCA Method C (WAC 173-340-440(4)(b)). The covenant shall be executed by the property owner and recorded with the register of deeds for the county in which the site is located, shall run with the land, and shall be binding on the owner's successors and assigns. In addition, the covenant shall prohibit activities on the site that may interfere with a cleanup action, O&M, monitoring, or other measures necessary to assure the integrity of the cleanup action and continued protection of human health and the environment or that may result in the release of a hazardous substance that was contained as a part of the cleanup action.

Applicability to Soil and Groundwater Alternatives: WAC 173-340-440 is applicable to cleanup action alternatives that use MTCA Method C cleanup levels. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

Compliance Monitoring Requirements, WAC 173-340-410. This regulation requires the performance of compliance monitoring for all cleanup actions. A compliance monitoring plan must be submitted to Ecology for review and approval. Compliance monitoring plans may include monitoring for chemical constituents, biological testing, and physical parameters, as appropriate. Where the cleanup action includes engineered or institutional controls, documented observations on the performance of these controls may be required. Long-term monitoring shall be required if on-site disposal, isolation, or containment is the selected cleanup action for a site or a portion of a site. Such measures shall be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760. Compliance monitoring plans shall be specific to the media being tested and shall contain a sampling and analysis plan meeting the requirements of WAC 173-340-820. In addition, all analytical procedures shall be consistent with the requirements specified in WAC 173-340-830.

Applicability to Soil and Groundwater Alternatives: WAC 173-340-410 is applicable to all cleanup action alternatives conducted under MTCA. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

6.4.2.1 Stormwater Management

Stormwater Permit Program, 40 CFR 122.26, Chapter 173-226 WAC. The Federal Clean Water Act, as delegated to Ecology under RCW 90.48.260, requires that coverage under the general stormwater permit must be obtained for stormwater discharges associated with construction activities disturbing more than 1 acre. The disturbed area for this project is expected to be greater than 1 acre. Since Ecology has determined that this permit is not exempt under WAC 173-340-710(9), the site would obtain coverage under the Washington State General Stormwater Permit for Construction Activities to meet both the procedural and substantive provisions this requirement. In addition, a stormwater pollution prevention plan would be prepared before beginning land-disturbing activities. The plan would describe the best management practices that would be implemented to protect surface water quality. Once construction begins, the site would be monitored weekly to ensure stormwater runoff does not cause the receiving surface water body to exceed water quality standards. These requirements would be coordinated with any applicable local grading and erosion control requirements by the Longview Municipal Code (LMC) or Cowlitz County Code (CCC) as provided in Section 6.4.3.2.

Applicability to Soil and Groundwater Alternatives: 40 CFR 122.26 and WAC 173-226 are applicable to cleanup action alternatives where the disturbed area is greater than 1 acre. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and three groundwater alternatives (GW1, GW2, and GW3) being considered for the MFA in this FS.

6.4.2.2 Hazardous Waste and Environmental Media Management

RCRA and Washington Hazardous Waste Management Act (RCW 70.105) and Dangerous Waste Regulations; 40 CFR 260, 261, 262, 263, and 268; Chapter 173-303 WAC. The Federal RCRA regulations and the Washington State Dangerous Waste regulations apply to the cleanup action alternatives for the MFA because hazardous constituents from the TWP Area, a RCRA corrective action site, migrated to the MFA and contaminated media potentially contains a listed waste (listed waste designation code F034). These regulations identify the requirements for characterization, management, and disposal of waste including contaminated media (i.e., soil and groundwater). The requirements of the Federal RCRA regulations and Washington State Dangerous Waste Regulations must be complied with fully for off-site activities. For on-site activities, only the substantive requirements of the Federal RCRA regulations and the Washington Dangerous Waste regulations must be met. Off-site disposition of waste would occur at facilities that are licensed and permitted to accept the specific hazardous waste or contaminated media.

Applicability to Soil and Groundwater Alternatives: These regulations are potentially applicable to cleanup action alternatives that include characterization and on-site management of groundwater, soil, de-watering water and water treatment residuals, and the off-site transportation and disposal of soil, water, and water treatment residuals. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

Federal EPA and Washington State "Contained-In" Policy (USEPA 1986, WDOE 1993); Federal Register preambles; EPA memos and correspondences; Hazardous Waste. According to EPA and Ecology "contained-in" policies, contaminated environmental media is not a "solid waste" and therefore, is not a hazardous waste. However, contaminated media that contains a hazardous waste becomes subject to RCRA 1) when it exhibits a characteristic of hazardous waste (i.e., ignitable, corrosive, reactive or toxic), or 2) when it is contaminated with listed hazardous waste. If contaminated environmental media contain hazardous waste, they are subject to all applicable RCRA requirements until they no longer contain hazardous waste. EPA considers contaminated environmental media to no longer contain hazardous waste 1) when it no longer exhibits a characteristic of hazardous waste, and 2) when concentrations of hazardous constituents from listed hazardous wastes are below health-based levels. The approval of Ecology is required for "contained-in" determinations and may require implementation of "contingent management," which would be addressed during development of the CAP. As discussed below, land disposal restrictions (LDRs) are not applicable to environmental media (contaminated soil and groundwater) that receives a "contained-in" determination prior to removal from the Area of Contamination (AOC).

Based on discussions with Ecology, a "contained-in" determination for disposition of soil off site would be issued for soil with COC concentrations as follows:

- Soil with concentrations less than MTCA Method B cleanup levels for F034 hazardous constituents would be disposed of at a RCRA Subtitle D facility as solid waste

- Soil with contamination above MTCA Method B cleanup levels and below MTCA Method C cleanup levels or 10 times the Universal Treatment Standards (UTS) value for F034 hazardous constituents, whichever is higher, would be disposed of as non-hazardous waste in a hazardous waste facility permitted under RCRA Subtitle C

- Soil with alternative concentrations may be approved by Ecology based upon waste properties (solubility, mobility, toxicity, and interactive effects of the contaminants present that can impact these properties) and exposure potential and the effect of any management controls that could less this exposure potential

Applicability to Soil and Groundwater Alternatives: This policy is potentially applicable to cleanup action alternatives that include soil excavation and off-site disposal, on-site water treatment with off-site disposal of water treatment residuals, and off-site disposal of groundwater. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

LDRs, 40 CFR 268, WAC 173-303-140. Wood treating facility operations at this site ceased in 1985, prior to the LDR for waste designation F034 being established. Ecology has indicated that LDRs would not apply to any contaminated media containing F034, because the F034 listing became applicable to waste after August 12, 1997, so long as the contaminated media is not actively managed. Furthermore, environmental media that has received a "contained-in" determination before the media is removed from the AOC does not have to comply with LDRs. However, soil and groundwater, including construction dewatering effluent, which is actively managed must comply with LDRs. Active management includes removal, excavation, mixing with other wastes, and on-site treatment, but does not include consolidation within the AOC or *in situ* treatment in accordance with the AOC policy discussed below. Water treatment residuals that are contaminated with listed waste constituents (i.e., those constituents resulting in an F034 waste designation code) must also comply with the LDRs.

LDRs for contaminated soil would include 1) meeting the land disposal treatment requirements in 40 CFR 268.40 and the UTS in 40 CFR 268.48 for nonwastewaters, or 2) meeting alternative soil LDRs under 40 CFR 268.49. Alternative LDR treatment standards for contaminated soil are applied for all constituents listed in the UTS (40 CFR 268.48) that are detected at concentrations greater than 10 times the UTS at the site. Alternative LDR treatment standards for contaminated soil require a 90 percent reduction in the applicable hazardous constituents or treatment to ten times the UTS, whichever is greater. LDRs for contaminated groundwater and construction dewatering effluent would include meeting the land disposal treatment requirements in 40 CFR 268.40 and the UTS in 40 CFR 268.48 for wastewaters. LDRs for contaminated water treatment residuals would include meeting the land disposal treatment requirements in 40 CFR 268.40 and the UTS in 40 CFR 268.48 for nonwastewaters.

Applicability to Soil and Groundwater Alternatives: LDRs are applicable to cleanup action alternatives where soil contaminated with listed waste constituents (i.e., those constituents resulting in an F034 waste designation code) is excavated, and where the cleanup action alternative does not include disposal at a facility authorized to accept "corrective action management unit (CAMU)-eligible waste." LDRs are also applicable to cleanup action alternatives where groundwater, construction dewatering effluent, and water treatment residuals contaminated with listed waste constituents are generated, and where the cleanup action alternative does not include disposal at the Cowlitz publicly-owned treatment works (POTW) and/or a facility authorized to accept "CAMU-eligible waste." This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

AOC Policy, National Contingency Plan (55 FR 8758-8760, March 8, 1990), EPA guidance memorandum (USEPA 1996), Ecology AOC Policy (WDOE 1993). The AOC policy was established by EPA and Ecology to allow for the movement of hazardous waste within a defined AOC. An AOC is delineated by the areal extent of contiguous contamination, but may contain varying types and concentrations of hazardous substances. Movement of wastes within those areas is not considered to be land disposal and does not trigger the RCRA LDRs or minimum technology requirements. Consolidation or *in situ* treatment of hazardous waste within an AOC does not constitute disposal, and does not trigger LDRs. *Ex situ* treatment in tanks or containers or through incineration or transfer to another AOC is considered "active management" and triggers RCRA management and LDR requirements.

Applicability to Soil and Groundwater Alternatives: The AOC policy is potentially applicable to cleanup action alternatives that include management of soil that is contaminated with listed waste constituents (i.e., those constituents resulting in an F034 waste designation code). This includes some of the soil alternatives (S1 through S5, S5A, S5B, S5C, and S7) being considered for the MFA in this FS.

CAMUs, 40 CFR 264.555, WAC 173-303-646920. Soil and water treatment residuals that are contaminated with listed waste constituents (i.e., those constituents resulting in an F034 waste designation code) and for which Ecology does not provide a "contained-in" determination may be eligible for disposal in an off-site CAMU-eligible waste permitted hazardous waste landfill. CAMU-eligible waste includes solid and hazardous waste, contaminated media, and debris from cleanup activities. The off-site disposal of CAMU-eligible waste also is allowed if the following conditions are met:

- Principle hazardous constituents must be treated to meet the treatment standards in WAC 173-303-64660(3)(d)(iv); the adjusted treatment levels or methods that are protective of human health and the environment specified in WAC 173-303-64660(3)(d)(v)(A), (C), (D), or (E)(I); or the adjusted treatment standards that are protective of human health and the environment specified in WAC 173-303-64660(3)(d)(v)(E)(II) where the treatment significantly reduces the toxicity or mobility of the principal hazardous constituents, minimizing the short-term and long-term threats posed by the waste, including the threat at the remediation site. The treatment requirements specified in WAC 173-303-64660(3)(d)(iv) are: 1) for nonmetals, treatment must achieve 90 percent reduction in concentrations or 10 times the UTS, whichever is higher, 2) for metals, treatment must achieve 90 percent reduction in principle hazardous constituents as measured in leachate from the treated waste or media or 90 percent reduction in total constituent concentrations, but not less than 10 times the UTS. Principle hazardous constituents are constituents that the regulatory agency determines pose a risk to human health and the environment and that are substantially higher than the cleanup levels or goals of the site. These include carcinogens that pose a potential direct risk from ingestion or inhalation at site at or above 10^{-3} and noncarcinogens that pose a potential direct risk from ingestion or inhalation at the site an order of magnitude or greater above their RfD. Soils that exceed the adjusted treatment levels, even soil containing DNAPL, can be disposed offsite as CAMU-eligible waste if the off-site landfill treats the soil to approved treatment levels or uses an approved method, such as macro-encapsulation, to treat the soils that is protective of human health and the environment. The treatment can occur at the off-site landfill.

- The landfill must be a RCRA hazardous waste facility whose permit authorizes receipt of CAMU-eligible waste. The landfill will have met the minimum design requirements for management of CAMU-eligible waste under the regulations.

- The landfill must notify the regulatory agency of its intent to receive CAMU-eligible waste and receive notification of no objections; the landfill must notify people on the facility mailing list. These requirements are specifically defined in the RCRA hazardous waste facility CAMU-eligible waste provisions of the off-site permit. The provisions of this permit may modify, reduce or eliminate such notification requirements.

- The landfill must obtain a permit modification specifically authorizing receipt of the waste. These requirements are specifically defined by the RCRA hazardous waste facility “CAMU-eligible waste” provisions of the off-site permit which may modify, reduce or eliminate such requirements.

Disposal of the waste would not need to meet LDRs. However, the permitted hazardous waste landfill must treat the wastes to approved treatment levels or methods outlined in the first bullet above.

Applicability to Soil and Groundwater Alternatives: These regulations are applicable to cleanup action alternatives that include off-site disposal at a permitted hazardous waste landfill of excavated soil, including soil containing DNAPL, and water and water treatment residuals that are contaminated with listed waste constituents. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

Treatment by Generator, 40 CFR 262.34, WAC 173-303-200 and -201. These regulations apply to cleanup action alternatives that include on-site treatment of hazardous or dangerous wastes. Dangerous or hazardous wastes may be treated on site without a dangerous waste treatment permit, provided the waste is managed *in situ* in accordance with 40 CFR 262.34 and WAC 173-303-200 and -201.

Applicability to Soil and Groundwater Alternatives: These regulations are potentially applicable to cleanup action alternatives that include on-site treatment of construction dewatering effluent and condensed liquids from electrical resistance heating (ERH) prior to discharge to a POTW or to the land surface. This includes some soil alternatives (S1 through S4, S5B, S5C, S6, and S7) and one groundwater alternative (GW1) being considered for the MFA in this FS.

Washington Solid Waste Management Handling Standards Regulations, Chapter 173-350 WAC. These regulations potentially apply to off-site disposal of solid nonhazardous wastes and contaminated media, and are potentially relevant and appropriate to on-site cleanup actions governing contaminated media management. Environmental media and residuals would be transported and disposed of at a permitted solid waste landfill in accordance with the waste acceptance criteria for the landfill.

Applicability to Soil and Groundwater Alternatives: WAC 173-350 is applicable to cleanup action alternatives that include off-site disposal of solid nonhazardous wastes and contaminated media. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

6.4.2.3 Dewatering Effluent Management

Clean Water Act Pretreatment Regulations, 40 CFR 503.5. These regulations are potentially applicable if water is discharged to the Cowlitz Sewer Operating Board POTW. The discharge would need to meet the discharge requirements in CCC 15.14.160 and any other requirements established pursuant to a permit or discharge authorization under CCC 15.14.180. In addition, the discharge would need to meet any federally-required limitations for discharge of pollutants in the POTW under 40 CFR 503.5.

Applicability to Soil and Groundwater Alternatives: WAC 173-226 is applicable to cleanup action alternatives that include discharge of construction dewatering effluent and condensed liquids from ERH to the Cowlitz County POTW. This includes some soil alternatives (S1 through S4, S5B, S5C, S6, and S7) and one groundwater alternative (GW1) being considered for the MFA in this FS.

State Waste Discharge Permit Program, Chapter 173-216 WAC. These regulations would be potentially applicable if treated water is discharged directly to the ground. This regulation requires the use of all known, available and reasonable methods to prevent and control the discharge of wastes into the waters of the state. In addition, disposal of wastes that present a risk to human health, including the potential chronic effects of lifetime exposure to waste materials, are not allowed.

Applicability to Soil and Groundwater Alternatives: WAC 173-216 is potentially applicable to cleanup action alternatives that include discharge of treated construction dewatering effluent or condensed liquids from ERH directly to the ground. However, discharge of treated water to the ground is not planned for any of the cleanup action alternatives evaluated.

Submission of Plans and Reports for Construction of Wastewater Facilities, Chapter 173-240 WAC. These regulations are potentially applicable if treated water is discharged directly to the ground. They require the submittal and approval of engineering reports and plans and specifications prior to constructing or modifying industrial wastewater facilities.

Applicability to Soil and Groundwater Alternatives: WAC 173-240 is potentially applicable to cleanup action alternatives that include discharge of treated construction dewatering effluent or condensed liquids from ERH directly to the ground. However, discharge of treated water to the ground is not planned for any of the cleanup action alternatives evaluated.

6.4.2.4 Air Quality

Washington Clean Air Act and Implementing Regulations, Chapter 173-400 and 173-460 WAC, Southwest Clean Air Agency (SWCAA) Regulation 400. These regulations establish general emission standards for all stationary sources and more specific emission standards for specific types of sources. In addition, all emission sources are required to use reasonably available control technology to control air emissions.

The regulations provide exemptions from registration (SWCAA 400-101). For instance, sources are exempt if they emit less than the following: 1.0 tons per year combined criteria and VOCs, 0.005 tons per year lead, 1.0 tons per year ozone depleting substances, and 1.0 tons per year toxic air pollutions or less than the applicable small quantity emission rate under Chapter 173-460 WAC, whichever is less. An air discharge permit application shall be submitted for all new installations, modifications, changes, and alterations to process and emission control equipment consistent with the definition of "new source" (SWCAA 400-109). If a source is exempt under SWCAA 400-101, a written authorization to confirmation exemption must be requested and received from SWCAA. If source is not exempt, then compliance with a new source review permit requirements must be met through substantive review by SWCAA.

Toxics best available control technology must be installed and operated on sources of toxic air pollutants, which include naphthalene and cPAHs, to control toxic air emissions. Furthermore, the toxic emission rate must be quantified and the impacts of these emissions must be demonstrated to be less than the acceptable source impact limit at the site boundary (Chapter 173-460 WAC, SWCAA 400-076). Compliance with acceptable source impact limits can be demonstrated by comparing emissions to the small quantity emission reduction table or through dispersion modeling. Sources subject to MTCA cleanup actions are not exempt from these regulations. Compliance with the new source review requirements would be met through substantive review by SWCAA and/or Ecology. Chapter 173-400 and SWCAA 400-040(3) also require control of fugitive dust emissions during construction activities.

Applicability to Soil and Groundwater Alternatives: These regulations are potentially applicable to cleanup action alternatives where air emissions are anticipated, including *in situ* solidification, *in situ* ERH, and biosparging. This includes some of the soil alternatives (S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 and GW3) being considered for the MFA in this FS.

6.4.2.5 Underground Injection and Well Installation and Abandonment

Washington Underground Injection Control Program, Chapter 173-218 WAC. The underground injection control regulations potentially apply to cleanup action alternatives that include enhanced bioremediation and chemical oxidation. Injection wells used for remediation are considered to be Class V injection wells and must be registered with Ecology and are either rule authorized or must receive a state waste discharge permit. If rule-authorized under WAC 173-200-100, the well would need to not cause a violation of water quality standards for groundwater of the state per Chapter 173-200 WAC. If not rule-authorized, the underground injection control well would need to demonstrate compliance with WAC 173-218-090 and -110, by 1) not directly discharging into an aquifer, 2) having a separation between the bottom of the well and the top of the aquifer, 3) meeting additional groundwater protection requirements if the well is located in a groundwater protection area as defined in WAC 173-218-030, and obtaining a state waste discharge permit authorization under Chapter 173-216. Pursuant to WAC 173-340-710(9)(b), Class V injection wells are exempt if authorized in accordance with a MTCA consent decree. Substantive compliance with the requirements of Chapter 173-218 and 173-216 WAC would be met through review by Ecology.

Applicability to Soil and Groundwater Alternatives: WAC 173-218 is potentially applicable to cleanup action alternatives that include injection of materials into the subsurface, which is expected to occur during chemical oxidation and bioremediation. This includes three of the groundwater alternatives (GW1 through GW3) being considered for the MFA in this FS.

Washington Water Well Construction Act Regulations, Chapter 173-160 WAC. These regulations are potentially applicable to the installation, operation, or closure of monitoring and treatment wells.

Applicability to Soil and Groundwater Alternatives: WAC 173-160 is applicable to cleanup alternatives that include the construction of monitoring or treatment wells. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

Regulation and Licensing of Well Contractors and Operators, Chapter 173-162 WAC. These regulations apply to all water well contractors and operators who are providing well installation, maintenance, or abandonment services in Washington. These regulations are potentially applicable to any well contractor or operator who installs wells at the site.

Applicability to Soil and Groundwater Alternatives: WAC 173-162 is applicable to cleanup action alternatives that include the construction of monitoring or treatment wells. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4) being considered for the MFA in this FS.

6.4.2.6 State Environmental Policy Act

State Environmental Policy Act, RCW 43.21.036, WAC 197-11-250 through 268. For MTCA cleanup actions, the MTCA and State Environmental Policy Act processes are to be combined to reduce duplication and improve public participation (WAC 97-11-250). It is anticipated that Ecology would be the lead agency as stipulated by WAC 197-11-253. State Environmental Policy Act requirements would be incorporated into the MTCA public notification process. More specifically, the State Environmental Policy Act checklist would be attached to the draft MFA CAP, with the intent of having public review of these occur concurrently.

Applicability to Soil and Groundwater Alternatives: These regulations are applicable to all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4).

6.4.3 Local Requirements

The MFA is located within the city limits of Longview, and the TWP Area is located within unincorporated Cowlitz County. Since construction or development activities may occur in the MFA and disposal of excavated soil may occur at the TWP Area, both City and County ordinances potentially apply to the cleanup actions. As described in Section 6.4 regarding WAC 173-340-710(9)(b), cleanup actions conducted under a consent decree or other order are exempt from the procedural requirements of laws requiring or authorizing local government permits or approvals for the action. Rather than obtain a permit under the local codes and ordinances described below, the selected cleanup action would need to comply with the substantive requirements of the laws in accordance with WAC 173-340-710(9)(c).

6.4.3.1 City of Longview Requirements Associated with Maintenance Facility Area Activities

City of Longview requirements may be applicable to cleanup action activities conducted within the MFA. Construction and development within these areas may require substantive compliance with the local requirements discussed in this section. The potential applicability of the location-specific ARARs to the soil and groundwater alternatives is summarized on Tables 6-3 and 6-4, respectively.

Special Flood Hazard Area Development Permit (Chapter 17.24 LMC). Construction or development within any area of special flood hazard requires a permit per LMC 17.24.110. Special flood hazard areas are mapped by the City of Longview pursuant to the Federal Insurance Administration in a scientific and engineering report entitled “The Flood Study for the City of Longview,” (City of Longview 2001) (LMC 17.24.060). Development” means any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations located within the area of special flood hazard (LMC 17.24.040). Cleanup action activities that meet the definition of “development” would require substantive compliance with Chapter 17.24 of the LMC.

Applicability to Soil and Groundwater Alternatives: This regulation is applicable to all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4).

Shoreline Development Permit (Chapter 17.60 LMC, Ordinance 2786, passed 2000). Development within 200 feet of the shoreline would need to meet the requirements of the Cowlitz County Shoreline Management Master Program. If within 200 feet of the high water mark, substantive compliance with this requirement would be met through review and coordination with Cowlitz County, including any work associated with the TWP Area.

Applicability to Soil and Groundwater Alternatives: This regulation is potentially applicable to cleanup action alternatives that include development within 200 feet of the shoreline. However, construction activities are not anticipated within 200 feet of the shoreline for any of the cleanup action alternatives evaluated.

Critical Areas Permit (Chapter 17.10 LMC, Ordinance 2821, passed January 8, 2009). Development within critical areas or their buffers may require a permit. Specifically, under the LMC, all persons proposing development or alteration, whether on public or private property, within 100 feet of critical areas or their buffers, shall obtain a Critical Area permit pursuant to this chapter, except as exempted pursuant to LMC 17.10.070.

“Critical area” includes wetlands, fish and wildlife habitat conservation areas, frequently flooded areas, geologically hazardous areas, and areas with a critical recharging effect on aquifers used for potable water. “Development” includes any manmade changes to improved or unimproved land, including buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, and activities of a similar nature.

Exemptions from critical areas permit are identified in LMC 17.10.070 and include in part:

- Development occurring within a volcanic hazard area as described in Section 17.10.140 and containing no other critical area(s) as defined by this chapter
- Development occurring within frequently flooded areas provided the development meets the requirements of LMC 17.24, Flood Damage Prevention Ordinance
- Maintenance, operation, and reconstruction of existing public and private roads, streets, driveways, and the installation, construction, or replacement of utility lines in improved city rights-of-way, not including electric substations, provided that reconstruction of any such facilities are not expanded within, or do not extend outside of, the previously disturbed areas within a critical area or designated buffer
- Maintenance, operation, and reconstruction of existing structures and equipment operating areas, provided that reconstruction of any such structures and facilities are not expanded within, or do not extend outside of, the previously disturbed areas within a critical area or designated buffer
- Minimal site investigative work (as required by a city, state, or federal agency, or any other applicant) such as surveys, soil logs, percolation tests, and other related activities so long as impacts on environmentally critical areas are minimized and disturbed areas are restored to the pre-existing level of function and value within 1 year after such tests are concluded
- Applicants who are required to obtain Shoreline Permits, Section 404 Permits from the US Army Corps of Engineers, and/or an Ecology 401 Water Quality Certification

Applications for projects within designated Geologic Hazard Areas as described in LMC 17.10.140 shall not be exempt. If the activity is not exempt, compliance with a critical areas permit requirement would be met through substantive review by the City of Longview.

Applicability to Soil and Groundwater Alternatives: This regulation is applicable to all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and groundwater alternatives (GW1 through GW4).

Stormwater Runoff and Erosion Controls (Chapter 17.80 LMC, Ordinance 3079, passed January 8, 2009). This local requirement applies to 1) water or pollutants directly or indirectly entering waters of the state or the storm drainage system generated on any developed and undeveloped lands, and 2) new development, redevelopment, and construction site activities, unless exempt.

The local ordinance provides qualified exemptions for the following: 1) projects disturbing less than 5 acres that meet the requirements delineated in the City of Longview Stormwater Manual that have obtained an “Erosivity Waiver” to be exempt from the requirements of 17.80.050(G)(2) to submit a Stormwater Pollution Prevention Plan, 2) underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics that are exempt and must only meet the Minimum Requirement #2, Construction Stormwater Pollution Prevention, identified in the City of Longview Stormwater Manual, and 3) normal landscape activities and gardening.

If the activities associated with the selected cleanup action alternative are not exempt, compliance with the stormwater runoff and erosion control requirements would be met through substantive review by the City of Longview.

Applicability to Soil and Groundwater Alternatives: This regulation is potentially applicable to cleanup action alternatives that include construction activities, unless an exemption is obtained as discussed above. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and three of the groundwater alternatives (GW1 through GW3) being considered for the MFA in this FS.

Building Permits (Chapter 16 LMC). The City of Longview has adopted the International Building Codes Chapter 51-11 WAC (2006 Energy Code), Chapter 51-13 WAC (2006 Ventilation and Indoor Air Quality Code), Chapter 51-50 WAC (2006 International Building Code including the Appendix Chapters E, as further amended by Chapter 51-50 WAC, I and J), Chapter 51-51 WAC (2006 International Residential Code including the Appendix Chapters G and H), Chapter 51-52 WAC (2006 International Mechanical Code), and Chapters 51–56 and 51–57 WAC (2006 Uniform Plumbing Code and Uniform Plumbing Code Standards with amendments and additions). Under the Building Code (LMC 16.02), building permits are required for all new construction of buildings, and all alterations, additions, improvements and repairs of existing buildings as well as moved, converted, or demolished buildings. Demolition and/or construction of buildings or portion of buildings would need to meet the substantive requirements of the following permits:

- Plumbing permit: for all new plumbing, relocated fixtures, and new or replaced sewer lines
- Electrical permit: for all new electrical installations, alterations, additions, or repairs of existing electrical installations
- Mechanical permit: for all new or altered heating, air conditioning, ventilation, ducting, and gas appliance installations
- Life safety permit: for fire extinguishing systems, hood and duct systems, flammable and combustible materials, and tank removals (Chapter 18.10 LMC) administered by the fire department

Applicability to Soil and Groundwater Alternatives: This regulation is potentially applicable to cleanup action alternatives that include demolition and/or construction of buildings or portion of buildings, including replacing sewer lines and upgrading the electrical power supply. This includes all soil alternatives (S1 through S5, S5A, S5B, S5C, S6, and S7) and one of the groundwater alternatives (GW1) being considered for the MFA in this FS.

Longview Historic Preservation Ordinance (Chapter 16.12 LMC). Review is required for construction of a new building or structure or reconstruction, alteration, restoration, remodeling, repairing, moving, or demolishing any existing property on the Longview register of historic places or within an historic district on the Longview register of historic places. If any structures at the site are listed on the register, compliance with this requirement would be met through substantive review by the City of Longview.

Applicability to Soil and Groundwater Alternatives: This regulation is potentially applicable to cleanup action alternatives that impact buildings or structures listed on the Longview register of historic places. However, the Mechanics Shop is not anticipated to be a listed historic place.

Standard Plans and Specifications for Sanitary Sewers, Storm Sewers, and Water (Chapter 14.06 LMC). Standard plans and specifications for modifications to public works connecting to City of Longview infrastructure would need to meet the requirements of the City's Standard Plans and Specifications and be reviewed and approved.

Applicability to Soil and Groundwater Alternatives: This regulation is potentially applicable to cleanup action alternatives that include discharge of construction dewatering effluent and condensed liquids from ERH to the Cowlitz County POTW. This includes some soil alternatives (S1 through S4, S5B, S5C, S6, and S7) and one groundwater alternative (GW1) being considered for the MFA in this FS.

6.4.3.2 Cowlitz County Requirements Associated with Treated Wood Products Area Activities

Cowlitz County requirements may be applicable to cleanup action activities conducted within the TWP Area. Construction and development within these areas may require substantive compliance with the local requirements discussed in this section. The potential applicability of the location-specific ARARs to the soil and groundwater alternatives is summarized on Tables 6-3 and 6-4, respectively.

No buildings are planned for construction or demolition within the TWP Area portion of the site, therefore, the Cowlitz County Building Code is not applicable. Substantive compliance with the following Cowlitz County requirements may be required if construction or development is planned for the TWP Area:

Floodplain Management Permit (Chapter16.25 CCC). Construction or development within any areas of special flood hazard requires a permit. "Development" means any human-made change to improved or unimproved real estate, including but not limited to buildings or other structures, and all works. "Works" are any dam, wall, wharf, embankment, levee, dike, pile, bridge, road, abutments, excavation, structure, subdivision, channel alteration, culvert, fill, earth movement or removal, mining, building, aboveground or underground hazardous material storage, or other similar development attached to or occurring upon real property (CCC 16.25.030). Cleanup action activities that meet the definition of "development" would require substantive compliance with Chapter 16.25 CCC.

Applicability to Soil and Groundwater Alternatives: No construction or development is currently planned for the TWP area. Therefore, this regulation is not applicable to any of the cleanup action alternatives.

Shoreline Development Permit (Chapter 19.20 CCC). Development within 200 feet of the shoreline would need to meet the requirements of the Cowlitz County Shoreline Management Master Program. If within 200 feet of the high water mark, substantive compliance with this requirement would be met through review and coordination with Cowlitz County, including any work associated with the TWP Area.

Applicability to Soil and Groundwater Alternatives: No construction or development is currently planned for the TWP area. Therefore, this regulation is not applicable to any of the cleanup action alternatives.

Critical Areas Permit (Chapter 19.15 CCC). Development within critical areas or their buffers may require a permit. Exemptions are similar to those under the LMC and are identified in CCC 19.15.070. If the activity associated with the cleanup action is not exempt, compliance with a critical areas permit requirement would be met through substantive review by Cowlitz County.

Applicability to Soil and Groundwater Alternatives: No construction or development is currently planned for the TWP area. Therefore, this regulation is not applicable to any of the cleanup action alternatives.

Grading Ordinance (Chapter 16.35 CCC). This ordinance requires grading or engineered grading plans for excavation and grading projects, unless exempt under CCC 16.35.050 (i.e., projects under 500 cubic yards that are outside of a critical area). Generally, grading plans are required for projects in excess of 100 cubic yards and within a critical area, projects with a natural slope in excess of 50 percent, projects requiring grading of 5,000 cubic yards, or projects that are located within a critical area as defined in Chapter 19.15 CCC. Specific requirements for exemptions and grading plan requirements can be found in Chapter 16.25 CCC. If the activities associated with the selected cleanup action are not exempt, compliance with the grading plan and permit requirement would be met through substantive review by Cowlitz County.

Applicability to Soil and Groundwater Alternatives: No construction or development is currently planned for the TWP area. Therefore, this regulation is not applicable to any of the cleanup action alternatives.

This section discusses development of cleanup action alternatives subsequent to the AAFS. The cleanup action alternatives are based on the previous selection of treatment technologies and cleanup action alternative analysis, the pilot testing performed, and the results of implementing the cleanup action alternative selected under the AAFS.

7.1 QUANTITIES AND LOCATION OF ENVIRONMENTAL MEDIA REQUIRING CLEANUP

Development of cleanup action alternatives relies on an assessment of the quantities of environmental media that require cleanup, and the location of those environmental media relative to site features. This assessment is performed using the evaluation of the nature and extent of contamination (Section 3.3), the preliminary cleanup standards and remediation levels (Section 6.0), and the site description information (Section 1.0). Cleanup action alternatives have been developed for both impacted soil and groundwater media (“soil alternatives” and “groundwater alternatives”).

7.1.1 Lateral and Vertical Extent of Soil Requiring Cleanup

The lateral and vertical extent of COCs (including DNAPL) exceeding the preliminary cleanup standards in soil and groundwater beneath the site were estimated in 2011 using EVS. This is a kriging-based modeling software package designed to facilitate the visualization, analysis, and quantification of environmental samples in two and three dimensions (2-D and 3-D). Soil boring and monitoring well boring logs processed by EVS were first used to develop a model of site geology, DNAPL occurrence, and sheen observations. The logs were reduced to three primary subsurface geologic types (fill, sand, and silt) with additional surface refinement provided by known topographic output from AutoCAD. The resulting model output (Appendix H) was used to confirm continuity of the silt layer as a natural barrier in addition to estimating surface elevation, depth to silt, and depth to bottom of silt. Additional application of the geology model was to create a conservative 3-D volumetric model of potential sheen/DNAPL presence, taking into account both sheen and DNAPL observations recorded on the boring logs.

Data from soil investigations conducted between 1999 and 2008 were compared against preliminary cleanup standards to produce mathematically-derived estimates of the lateral and vertical extent of soil requiring cleanup. The model output from this analysis (Appendix H) was evaluated, and generalized lateral extent boundaries were prepared for naphthalene, DRO, and DNAPL. Factors such as DNAPL occurrence where no chemical data were available, as well as site geology and hydrogeology, were considered in the interpretation of the data. In nearly all cases, other COCs exceeding the preliminary cleanup levels are co-located with either naphthalene or DRO. However, at locations PB-68 and PB-70 (one of two samples, see Section 3.3.2), other COCs were noted to exceed the preliminary cleanup levels even though DRO and naphthalene are below the preliminary cleanup levels.

The model-interpreted boundaries for naphthalene, DRO, and DNAPL in soil were superimposed on one another and depicted on a site plan view, which was then used to bound the overall area (laterally) of soil requiring cleanup. This overall area of soil requiring cleanup also considers the exceedance of other COCs at location PB-68 and includes a consideration of where COCs exceed the protection of groundwater standard. Although the naphthalene concentration in soil at PB-07 exceeded the MTCA Method C soil cleanup level for protection of groundwater (Table 6-2), this location was not included in the overall area of soil requiring cleanup because this is an isolated exceedance of the cleanup level and concentrations of naphthalene in the well (97-5A) downgradient of this location have not exceeded the MTCA Method C groundwater cleanup level since August of 2000. Furthermore, the overall area of soil requiring cleanup does not include PB-70, because only the primary sample and not the field duplicate collected from this site slightly exceeded the MTCA Method C soil cleanup level for protection of groundwater for 2-methylnaphthalene, and the average concentration of this chemical in the environmental sample and the field duplicate is less than the cleanup level.

The model input data were updated in 2013 with new DNAPL/sheen observations from two test pits completed for the ISS treatability study in August 2011 and soil borings advanced during the Mechanics Shop Investigation in December 2011. The model was re-run with the new data set to update the interpreted boundaries for DNAPL at the site. The boundaries for naphthalene and DRO were updated manually with the new analytical data. The final superimposed lateral extent boundaries are shown on soil alternative Figure 7-1 and subsequent soil cleanup action alternative figures, as appropriate.

Based on the analytical data collected during the RI, the depth of soil cleanup has been interpreted to extend a few inches into the Upper Silt throughout most of the MFA, but generally does not penetrate the Upper Silt. As discussed in Section 3.3.4, the presence of COCs beneath the Upper Silt within Aquifer A indicates that in at least some areas COCs have migrated through the silt and presumably have contaminated the entire thickness of the Upper Silt in those areas. Because most of the samples collected within the Upper Silt exhibited COC concentrations lower than the preliminary cleanup levels, soil alternatives evaluated in the RI/FS are based on cleanup of soil present above the Upper Silt. Some cleanup of the Upper Silt itself ultimately may be included as part of the cleanup design, but does not affect the evaluation of alternatives in this RI/FS.

7.1.2 Quantity of Soil Requiring Cleanup

The quantities of soil requiring cleanup were estimated based on the lateral and vertical extent of soil containing COCs described in Section 7.1.1. The volume of DNAPL and the mass of COCs other than DNAPL present with the soil volume requiring cleanup also were estimated. These contaminant volume and mass estimates relied on general assumptions regarding soil density, NAPL saturation, and porosity. The estimated mass of COCs other than DNAPL also relied on the 95 percent upper confidence level mean for concentrations of key COCs within the soil volume requiring remediation. Details regarding these assumptions are included in the calculations provided in Appendix I. Estimated quantities of soil and COCs requiring cleanup are:

- 6,300 cubic yards of soil containing COCs exceeding the cleanup levels but not exhibiting DNAPL

- 170 cubic yards of soil exhibiting DNAPL

- 1,550 gallons of DNAPL

- 176,000 pounds of COCs other than DNAPL

7.1.3 Lateral and Vertical Extent of Groundwater Requiring Cleanup

Data from the September 2008 and March 2009 groundwater sampling events were compared against preliminary cleanup levels to produce mathematically-derived estimates of the lateral and vertical extent of groundwater requiring cleanup. The model output from this analysis (Appendix H) was evaluated and the generalized lateral extent boundaries were prepared for cPAHs and DRO. The evaluation took into consideration such factors as sporadic cPAH exceedances of the preliminary cleanup level (Section 7.4), site geology, and site hydrogeology.

The area of groundwater requiring cleanup is focused on the apparent “core” of the COC plume in groundwater, recognizing that other exceedances sometimes occur at wells located outside of this core plume (Section 7.4). The superimposed lateral extent boundaries are shown on Figures 7-14 through 7-17. The treatment thickness (i.e., vertical extent) is considered to be the entire thickness of Aquifer A, approximately 35 feet (generally 10 to 45 feet bgs).

7.2 SCREENING OF CLEANUP ACTION ALTERNATIVE COMPONENTS

MTCA allows, but does not require, an initial screening of cleanup action alternatives or components of cleanup action alternatives as part of the FS process (WAC 173-340-350[8][b]). Under federal cleanup programs this initial screening step uses the terminology “technology types and process options” to refer to components of cleanup actions that can be assembled into complete cleanup action alternatives. The equivalent terminology under MTCA is “components of alternatives.”

This section lists the cleanup action alternative components that were considered for soil and groundwater and provides a brief rationale for those that were excluded from cleanup action alternative development in Sections 7.3 and 7.4.

7.2.1 Soil Alternative Components

Cleanup action alternative components considered for the soil above the Upper Silt included those previously considered as part of the AAFS (Section 4.1), as well as additional technologies not previously considered. Some soil alternatives that were previously eliminated from consideration in the AAFS were retained for further consideration in this evaluation due to changes in evaluation factors (e.g., the prior imperative to not impact Port of Longview facility operations). The soil alternative components that were considered and retained for use in developing complete alternatives are listed below. Each of these are developed into complete alternatives and discussed further in Section 7.3.

- Excavation (inside and outside Mechanics Shop)

- *In situ* solidification by mechanical mixing (inside and outside Mechanics Shop)

- ERH (inside and outside Mechanics Shop)

- Containment (not to be used as a stand-alone cleanup action alternative with soil containing DNAPL)
- DNAPL recovery (only considered for inside Mechanics Shop)

The soil alternative components that were considered but not retained were:

- Phytoremediation, because this technology is not compatible with the land use, the contaminants, or the hydrogeology at the site.
- Passive and active venting and biosparging, because these technologies have been used to the extent practicable at the site and DNAPL remains in soil.
- *Ex situ* biological, physical, or chemical treatment of soil (e.g., landfarming, composting, or *ex situ* chemical treatment), because of the large on-site area that would be disturbed for both excavation and soil handling and treatment, with a potentially lengthy impact on Port of Longview operations. In addition, *ex situ* treatment of soil would require a RCRA permit.
- Soil flushing, because this technology mobilizes contaminants into the saturated zone for recovery and treatment whereas the goals at this site are to prevent the movement of the contaminants into the saturated zone
- *In situ* chemical treatment, because the chemical reactions (such as oxidation) occur in the aqueous phase, thus requiring the addition of large quantities of water to the relatively unsaturated soil above the Upper Silt. This addition of water would potentially mobilize the contaminants and would create very poor soil conditions for future use by the Port of Longview. *In situ* chemical treatment in the unsaturated zone is typically screened out of consideration at similar sites for these reasons and because the large quantities of water and reagent that would be required become prohibitively costly.
- EK-Bio, because use of this technology at creosote sites is not proven and unlikely to be effective in the presence of DNAPL. EK-Bio is a technology that can clean up impacted sites (typically chlorinated or inorganic chemicals) by stimulating the biodegradation rates through a specialized bacteria and substrate. An electric field is established by applying voltage to electrodes installed in the targeted subsurface area. The electric gradient created between electrodes allows migration of substances through the soil independently of the hydraulic properties in the soil.
- *In situ* solidification by jet grouting, because this method of ISS uses an excessive amount of grout to solidify subsurface soil and generates waste which has to be disposed off site. Jet grouting is commonly used to stabilize existing foundations in buildings and injects grout, water, and compressed air at very high pressures that disrupt the soil so it mixes with the injected grout to form a homogeneous mixture. The process flushes excess soil and a portion of the injected mixture through a discharge port at the surface and the final mixture is more than half grout. The waste

generated by the process is substantial and the required off-site disposal increases the cost relative to other methods of ISS.

- *In situ* solidification by permeation grouting (also referred to as pressure grouting), because this method of ISS is not reliable in achieving a homogeneous mix in subsurface soil. Permeation grouting injects grout at high pressure either vertically or horizontally into the zone being treated but does not directly disrupt or remove soil. The grout follows the path of least resistance during injection so the consistency of the final mix cannot be assured throughout the treatment zone. The questionable quality and consistency of the final mix and the potential to mobilize contaminants during the injection process eliminates this soil alternative component from consideration.

7.2.2 Soil Disposal Alternative Components

Many of the soil alternatives described in Section 7.3 include the excavation and disposal of MFA soil containing either COCs above MTCA Method C cleanup levels or DNAPL. This section presents an analysis of options that could be used as components of cleanup action alternatives for soil disposal. The selected component is then incorporated into the soil alternatives developed in Section 7.3.

Based on the analysis of soil disposal ARARs (Section 6.4), there are three candidate process options for contaminated soil disposal:

1. Off-site incineration of all soil containing DNAPL or COCs above MTCA Method C cleanup levels
2. Off-site incineration of soil containing DNAPL and incorporation of soil containing COCs above MTCA Method C cleanup levels (but not exhibiting DNAPL) beneath the TWP cap
3. Off-site RCRA stabilization (encapsulation or treatment) and disposal of soil containing DNAPL and off-site disposal of soil containing COCs above MTCA Method C cleanup levels (but not exhibiting DNAPL) at a facility approved to receive CAMU-eligible waste

Option 2, which would involve modifying the consent decree for the TWP Area, was proposed for consideration by Ecology in the general comments on the May 2007 draft RI/FS report dated March 19, 2008 (WDOE 2008). The engineering requirements for Option 2, which consists of expanding the existing TWP cover system for long-term disposal of contaminated soil from the MFA, was evaluated by analyzing the as-built topography and estimating the feasibility of revisions to that topography. Calculations show that maintaining the existing slopes and increasing the total height of the TWP cover system would provide only approximately 400 cubic yards of additional capacity (Appendix I). Because more than 400 cubic yards of contaminated soil is estimated to be excavated from the MFA, an alternative design would be required. One design that could create enough capacity within the boundaries of the existing barrier wall and cover system would entail removing the top and northeast section of the cover system and reconstructing it with steeper-sided slopes (Figure I-1, Appendix I). Modifying this portion of the cover system appears to have the least impact, as no wells or piping are present in this area. The slopes of the cover system could be increased to a maximum of 4 to 1 without having a detrimental effect on the cover system performance. A potential 1,700 cubic yards of additional capacity could be realized; assuming the total height was increased by 3 feet, the existing slopes of the cover system were maintained on three sides, and the slope on one side is increased (Figure I-1, Appendix I).

The costs to transport and dispose of soil containing COCs at concentrations greater than preliminary cleanup levels have been estimated as:

1. Incineration: $640 per ton
2. TWP: $165 per ton
3. CAMU-eligible disposal in Arlington, Oregon (Waste Management Inc.): $160 per ton
4. Off-site RCRA stabilization of soil containing DNAPL in Arlington, Oregon (Waste Management Inc.): $295 per ton

Backup documentation for these cost estimates is included in Appendix J.

Transporting all excavated soil for incineration, including both soil containing DNAPL and soil containing COCs exceeding MTCA Method C cleanup levels, is substantially more costly than the other process options considered. Incorporating soil containing COCs exceeding preliminary cleanup levels into the TWP appears to be less costly than transporting this soil for disposal as CAMU-eligible waste. However, this option would require modification of the consent decree for the TWP area. Furthermore, based on the ARARs discussion in Section 6.4, there is some uncertainty regarding the regulatory requirements associated with incorporation into the TWP. Placing soil into the TWP would require a demonstration that this disposal option met all requirements under WAC 173-340-360 for selection of cleanup actions, as well as having to satisfy requirements under the AOC Policy (Section 6.4), RCRA, and state Dangerous Waste Regulations, for example. Because of this regulatory uncertainty, this RI/FS uses Process Option 3 (off-site RCRA stabilization and disposal of soil containing DNAPL and off-site disposal of soil containing COCs above MTCA Method C cleanup levels but not exhibiting DNAPL at a facility approved to receive CAMU-eligible waste) for all soil alternatives which rely on off-site soil disposal.

The soil disposal process options selected for analysis may be reassessed at the CAP and the design phases, and new information may result in selecting a different soil disposal process option. Future selection of a different soil disposal process option would not alter the conclusions of this RI/FS. A related issue to the method of soil disposal is the level of soil segregation performed during excavation, which would impact the relative volume being disposed using CAMU-eligible disposal versus off-site RCRA stabilization and disposal. This RI/FS conservatively assumes that all soil between the existing geotextile fabric (3 feet bgs) and the Upper Silt (8 feet bgs) within the excavation boundaries exceeds preliminary cleanup levels and a portion of it includes a 4-inch layer of DNAPL-saturated soil. DNAPL-saturated soil would be segregated from the other soil for off-site soil disposal at a thickness of 1 foot. In addition, some of the soil excavated may not exceed preliminary cleanup levels and could remain on site. A cost/benefit analysis may be performed during the CAP and design phase to determine whether the costs of performing additional field screening and analytical testing necessary to more thoroughly segregate soil are warranted based on the potential for lower disposal costs. The level of segregation may also be refined in the future based on input from excavation contractors, but would not alter the conclusions of this RI/FS.

7.2.3 Groundwater Alternative Components

Cleanup action alternative components considered for the groundwater below the Upper Silt included those previously considered as part of the AAFS (Section 4.2), as well as additional technologies not previously considered. The groundwater alternative components that were considered and retained for use in developing complete alternatives are listed below. Each of these are developed into complete alternatives and discussed further in Section 7.4.

- ERH
- Enhanced biodegradation
- Biosparging
- Chemical oxidation
- MNA

The groundwater alternative components that were considered but not retained were:

- Phytoremediation, because this technology is not compatible with the land use, the contaminants, or the hydrogeology at the site

- Extraction and treatment technologies (e.g., pumping, dual-phase extraction, in-well stripping), because aquifer testing in 1995 showed that very high groundwater extraction rates (greater than 50 gpm per well) would be required to achieve groundwater capture in the high-permeability Aquifer A

- Containment, because empirical evidence indicates that the plume is stable even in the absence of containment (migration is not the primary threat from contaminants in groundwater) and containment would not result in ultimate restoration of the aquifer

7.3 *IN SITU* SOIL REMEDIATION TREATABILITY STUDIES

Treatability studies were performed to support the evaluation of two soil cleanup action technologies being considered (URS 2013b). As discussed in Section 3.2.9, two test pits (TP-01 and TP-02) were excavated within the MFA, and samples collected from these test pits were used in the *in situ* solidification (ISS) treatability study and *in situ* thermal remediation (ISTR) treatability study. Test pit TP-01 was located north of the Mechanics Shop in an area previously characterized as less impacted, and TP-02 was located east of the Mechanics Shop in an area previously characterized as more impacted (e.g., within the DNAPL affected area). The results of the two treatability studies are summarized in Sections 7.3.1 and 7.3.2.

7.3.1 ISS Treatability Study

The ISS treatability study was conducted by Kemron Environmental Services of Atlanta, Georgia. This study included both preliminary ISS evaluation testing of 25 test mixes (9 using soil from TP-01, 16 using soil from TP-02) and additional optimization ISS evaluation testing of variations of 1 preliminary test mix, as well as 6 newly developed test mixes using soil from TP-02. Tests were performed to evaluate test mixes for strength, leachability, and hydraulic conductivity criteria.

ISS treatability study results indicate that there are multiple test mixes that would be expected to meet cleanup goals at the site. Evaluation of test mixes with both TP-01 and TP-02 soil indicate that hydraulic conductivity goal of 1 x 10^{-6} cm/sec could be met for all samples tested. For the area representative of TP-01, a basic mix of Portland cement and bentonite would likely be sufficient to reduce leachable COC concentrations to below MTCA Method A or C cleanup levels for groundwater. Test mixes for TP-02 soil were also identified for which leachability tests yielded COC concentrations that met MTCA Method C cleanup levels for groundwater. In addition, results indicate that leaching concentrations would continue to decrease with time.

Mix 16 (12.5 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent organoclay), Mix 17 (12.5 percent NewCem slag cement, 2 percent bentonite, and 2 percent organoclay), and Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda) all appear to be test mixes capable of meeting cleanup goals at the site based upon the results of this ISS treatability study. All three of these mixes met hydraulic conductivity criterion, with permeability results of 3.2 x 10^{-8} cm/sec (Mix 16), 3.0 x 10^{-8} cm/sec (Mix 17), and 1.9 x 10^{-7} cm/sec (Mix 28). These three mixes also met leachability criterion, with American Nuclear Society (ANS) 16.1 5-Day results meeting MTCA Method C groundwater cleanup levels, with the exception of DRO in Mix 28. All three mixes met the minimum strength criterion and the long-term maximum strength criterion at 28 days. The volumetric expansion for Mix 16 was not reported. However, the volumetric expansion result was 43 percent for Mix 17 and 35 percent for Mix 28 at 28 days. The greater degree of volumetric expansion observed for Mix 17 is primarily attributed to the relatively larger percentage of additives incorporated into Mix 17 than into Mix 28.

7.3.2 ISTR Treatability Study

The ISTR treatability study testing was conducted by Global Remediation Solutions of Longview, Washington. The study included both boiling flask and soil cell testing procedures. Tests were performed to evaluate the following: physical behavior of NAPL; reductions of COC concentrations in heating soil using both dry heating and steaming methods; and whether special construction considerations (e.g., heat tracing of process piping) would be required for thermal treatment of soil in the MFA.

DNAPL was observed to both desorb from soil and to convert to LNAPL during the ISTR treatability study; and this could result in efficient removal of DNAPL from the site subsurface. ISTR results also indicate that PAH concentrations in highly impacted soil collected from test pit TP-02 could be reduced by 45 percent with 5 days of steam heating, and that DRO concentrations could be reduced by 50 percent with 5 days of steam heating. Continued heating through 15 days resulted in an additional 23 percent reduction in DRO concentrations, and negligible additional reduction was observed in PAH concentrations. If these treatability study reduction percentages were realized in the MFA during field implementation, 13 of 17 locations that currently exceed the cPAH TTEC cleanup level would have TTEC concentrations reduced to below the cleanup level. Finally, no special construction requirements were identified during the ISTR treatability study.

7.4 SOIL ALTERNATIVES

This section describes the cleanup action alternatives developed for soil above the Upper Silt. The soil alternatives are listed in Table 7-1 and summarized in Table 7-2 including system components, treatment times, treatment areas, and treatment volumes. As detailed in Section 8, the soil alternatives developed in this section are all protective of human health.

Comments on the revised FS were received from Ecology in September 2014 (Petersen 2014). In those comments and in subsequent discussions, Ecology recommended that International Paper and the Port meet to discuss Port issues and concerns related to potential future site uses, particularly in regard to the management of volumetric expansion of soil associated with *in situ* soil solidification. International Paper subsequently met with the Port on December 10, 2014. A follow-up conference call between International Paper and the Port occurred on March 20, 2015, and an additional meeting was held between International Paper and the Port at the Seattle AECOM office on March 27, 2015. Based on meetings and discussions between International Paper and the Port, Alternative S5B was revised. The revised Alternative S5B was presented to Ecology in a technical memorandum (Appendix K), and is included in Section 7.4.7. In addition, based on the Ecology comments, an FS clarification deliverable was prepared and submitted to Ecology on June 22, 2015 (Appendix L).

All soil alternatives are assumed to include institutional controls memorialized through a restrictive environmental covenant on the MFA property, which limits the property to industrial uses. This restrictive environmental covenant is a requirement of using MTCA Method C cleanup levels (WAC 173-340-440). All soil alternatives assume that this restrictive environmental covenant also places conditions on excavation at the site until soil cleanup levels are achieved. Furthermore, because varying amounts of soil containing DNAPL and/or COCs at concentrations exceeding the cleanup levels will remain on site following implementation of the soil alternatives, all soil alternatives rely on asphalt pavement and long-term maintenance of the asphalt pavement to prevent direct contact with these materials. Long-term monitoring and maintenance of the asphalt paved area would be required to ensure the integrity of the asphalt pavement. An O&M plan would be developed, annual inspections would be performed, and maintenance would be performed, as required.

All soil alternatives include some level of groundwater monitoring. The scope of the groundwater monitoring and associated costs would vary depending upon the quantity of contamination remaining in the soil following remediation. Groundwater monitoring is also included as part of the groundwater alternatives. Because long-term groundwater monitoring is included as part of all soil (and groundwater) alternatives, 5-year reviews would be performed for all alternatives. The 5-year review would assess whether the cleanup action continues to satisfy the MTCA requirements for cleanup actions (WAC 173-340-360(2)) including whether it continues to be protective of human health and whether cleanup levels have been achieved. . Financial assurance demonstration would also be included for all soil alternatives.

7.4.1 Alternative S1 – Comprehensive Excavation (Baseline Alternative)

The baseline alternative (Alternative S1) for the soil cleanup action is the only permanent soil alternative developed in this RI/FS and is used when comparing alternatives to one another in the disproportionate cost analysis to assess whether other alternatives are permanent to the maximum extent practicable pursuant to WAC 173-340-360(3)(e).

The baseline alternative for soil consists of excavation and off-site landfill disposal or off-site treatment and disposal of all soil located above the Upper Silt containing NAPL or COCs at concentrations exceeding cleanup levels (Figure 7-1). The depth of the Upper Silt layer varies over the MFA. Although the depth of excavation would vary over the MFA, an average depth of approximately 8 feet bgs is assumed for this alternative. Soil with COCs at concentrations greater than the preliminary cleanup levels located within the Upper Silt would not be excavated, because of the risk of breaching this aquitard and contaminating Aquifer A. To assess whether contaminants left in place within the Upper Silt are impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 2 years following completion of excavation. In addition, the asphalt pavement over the excavation area would be reconstructed and maintained over the long-term to limit direct contact with soil exceeding the cleanup levels remaining in the Upper Silt.

The remediation level established in Section 6.2 would be used to segregate soil for either landfill disposal or treatment to encapsulate or destroy the COCs. Soil containing COCs at concentrations exceeding the cleanup level, but with no indication of DNAPL, would be eligible for off-site disposal at a landfill facility permitted to receive CAMU-eligible waste. Soil exhibiting field indications of DNAPL would not be eligible for direct off-site disposal at a landfill because of the characteristics of the waste stream, but would instead be treated off-site by the landfill to encapsulate or destroy the COCs.

Under the baseline alternative for soil, shoring would be utilized to support the Mechanics Shop building foundation and the TWP barrier wall during excavation (Figure 7-1). For purposes of producing the excavation cost estimates, the shoring system was assumed to be a freeze wall that would be keyed into the Upper Silt. The freeze wall is believed to provide the following advantages over other shoring systems:

- Eliminating perched water infiltration into the excavation, thus eliminating the collection, treatment, and disposal of an undetermined volume of construction dewatering effluent containing a listed waste

- Providing structural support of the Mechanics Shop building foundation during excavation, with minimal vibration during shoring installation

Any shoring system utilized at the site would be selected by the contractor implementing the cleanup action.

Soil would be excavated and segregated as uncontaminated overburden, soil likely containing COCs but not exhibiting DNAPL, and soil containing DNAPL. The last two categories of soil would be placed in shipping containers equipped with drainage nets and staged on site within an area equipped with temporary secondary containment. Water and DNAPL would be decanted and phase-separated by pumping or vacuum extraction from the shipping containers until the soil was dry enough to transport for disposal.

The baseline alternative for soil includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action
3. Planning for temporary relocation of Port of Longview maintenance yard and Mechanics Shop building operations
4. Decommissioning horizontal and vertical bioventing wells within the excavation area
5. Installing a shoring system adjacent to and inside the Mechanics Shop building and adjacent to the TWP barrier wall to support the building foundation and barrier wall during excavation
6. Demolishing and reconstructing approximately one quarter of the Port of Longview Mechanics Shop building
7. Demolishing and reconstructing utilities and yard features, including yard pavement (see Figure 4 in Appendix L), roadways, storm water culverts, fencing, and retaining walls
8. Decommissioning and replacing groundwater monitoring wells within the excavation area
9. Excavating, stockpiling, and analytical testing of clean overburden material to confirm re-use as backfill
10. Excavating, handling, dewatering (including phase separation and separate disposal of liquid DNAPL), segregating, hauling, treating, and disposing of soil containing DNAPL and COCs exceeding cleanup levels
11. Post-excavation sampling and analysis of soil and over-excavation as required based on initial post-excavation sampling results
12. Backfilling the excavation with structural fill from a source verified to be free of impacted media with a permeability determined to be protective of any remaining contaminated portions of the Upper Silt.
13. Implementing environmental protection measures during construction, including handling and treatment of construction stormwater and perched groundwater
14. Closure reporting
15. Long-term monitoring and maintenance of the asphalt paved area

Under this baseline alternative for soil, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2. Detailed calculations are provided in Appendix I.

7.4.2 Alternative S2 – Comprehensive Excavation Outside Building Footprint

Alternative S2 consists of excavation and off-site landfill disposal or off-site treatment and disposal of soil located above the Upper Silt and outside the footprint of the Port of Longview Mechanics Shop building that exhibits DNAPL and COCs at concentrations exceeding the cleanup level (Figure 7-2). The depth of the Upper Silt layer varies over the MFA. Although the depth of excavation would vary over the MFA, an average depth of approximately 8 feet bgs is assumed for this alternative. Soil with COCs at concentrations greater than the preliminary cleanup levels located within the Upper Silt would not be excavated, because of the risk of breaching this aquitard and contaminating Aquifer A. To assess whether contaminants left in place within the Upper Silt and under the Mechanics Shop building are impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 2 years following completion of excavation. In addition, the asphalt pavement over the excavation area would be reconstructed and maintained over the long-term to limit direct contact with soil exceeding the cleanup levels remaining in the Upper Silt.

Handling and disposal of excavated soil would be the same under Alternative S2 as under the baseline alternative for soil. However, under Alternative S2, residual soil containing COCs exceeding preliminary cleanup levels would remain beneath the building, with the building structure acting as containment to limit water infiltration and thus mobilization of the residual COCs. Because this soil alternative relies on containment of soil exceeding cleanup levels beneath the building, (a) compliance monitoring would be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760 (WAC 173-340-410(3)) (see Section 6.4.2), and (b) the disproportionate cost analysis, provided in Section 9, will be used to demonstrate that this soil alternative, if selected, is permanent to the maximum extent practicable in accordance with WAC 173-340-740(6)(f).

Soil shoring under Alternative S2 would be equivalent to that under the baseline alternative for soil, except that the shoring system would be installed around a portion of the building perimeter instead of beneath a portion of the building.

Alternative S2 includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action
3. Planning for temporary revisions to Port of Longview maintenance yard operations
4. Decommissioning of the horizontal and vertical bioventing wells within the excavation area
5. Installing a shoring system adjacent to the Mechanics Shop building and the TWP barrier wall to support the building foundation and barrier wall during excavation
6. Demolishing and reconstructing utilities and yard features, including yard pavement (see Figure 4 in Appendix L), roadways, storm water culverts, fencing, and retaining walls

7. Decommissioning and replacing groundwater monitoring wells located within the excavation area
8. Excavating stockpiling, and analytical testing of clean overburden material to confirm re-use as backfill
9. Excavating, handling, dewatering (including phase separation and separate disposal of liquid DNAPL), segregating, hauling, treating, and disposing of soil containing DNAPL and soil outside of the building footprint containing COCs exceeding cleanup levels
10. Post-excavation sampling and analysis of soil and over-excavation as required based on initial post-excavation sampling results
11. Backfilling of the excavation with structural fill from a source verified to be free of impacted media with a permeability determined to be protective of any remaining contaminated portions of the Upper Silt
12. Implementing environmental protection measures during construction, including handling and treatment of construction stormwater and perched groundwater
13. Closure reporting
14. Long-term monitoring and maintenance of the asphalt paved area

Under Alternative S2, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2, as well as the estimated quantities of untreated contaminated media and contaminants that would remain on site above the Upper Silt and beneath the Mechanics Shop building. Detailed calculations are provided in Appendix I.

7.4.3 Alternative S3 – DNAPL Excavation Outside Building Footprint

Alternative S3 for soil consists of excavation and off-site landfill disposal or off-site treatment and disposal of soil located above the Upper Silt and outside the footprint of the Port of Longview Mechanics Shop building that exhibits DNAPL and preservation of the existing asphalt paved area over soil containing COCs at concentrations exceeding the cleanup level in the northern part of the maintenance yard (Figure 7-3). The depth of the Upper Silt layer varies over the MFA. Although the depth of excavation would vary over the MFA, an average depth of approximately 8 feet bgs is assumed for this alternative. Soil with COCs at concentrations greater than the preliminary cleanup levels located within the Upper Silt would not be excavated, because of the risk of breaching this aquitard and contaminating Aquifer A. To assess whether contaminants left in place within the Upper Silt, under the Mechanics Shop building, and in the northern part of the maintenance yard are impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 2 years following completion of excavation. In addition, the asphalt pavement over the excavation area would be reconstructed and the existing asphalt pavement in the northern part of the maintenance yard and the reconstructed asphalt pavement would be maintained over the long-term to limit direct contact with soil exceeding the cleanup levels remaining in the Upper Silt and in the northern part of the maintenance yard.

The preliminary cleanup level established in Section 6.2 would be used to segregate soil for either retention under the existing asphalt paved area or off-site landfill treatment and disposal. Some soil containing COCs at concentrations exceeding the cleanup level, but not exhibiting field indications of DNAPL, would be incidentally excavated and would be eligible for off-site disposal at a landfill facility permitted to receive CAMU-eligible waste. Off-site disposal of the excavated soil would be equivalent to the baseline alternative for soil.

Under Alternative S3, residual soil containing COCs would remain beneath the existing asphalt paved area in the northern part of the maintenance yard area and beneath the building. The building structure would limit water infiltration and thus mobilization of residual COCs beneath the building. Although not impermeable, the asphalt pavement would significantly reduce water infiltration and thus mobilization of the residual COCs from beneath the asphalt pavement. A cross section of the existing asphalt paved area is shown on Figure 4 included in Appendix L. Because this soil alternative relies on containment of soil exceeding cleanup levels beneath the existing asphalt paved area and the building, (a) compliance monitoring would be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760 (WAC 173-340-410(3)) (see Section 6.4.2), and (b) the disproportionate cost analysis, provided in Section 9, will be used to demonstrate that this soil alternative, if selected, is permanent to the maximum extent practicable in accordance with WAC 173-340-740(6)(f).

Soil handling and shoring under Alternative S3 would be equivalent to that under the baseline alternative for soil, except that the shoring system would be installed around a portion of the building perimeter instead of beneath a portion of the building.

Alternative S3 for soil includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action
3. Planning for temporary revisions to Port of Longview maintenance yard operations
4. Decommissioning horizontal and vertical bioventing wells within the excavation area
5. Installing a shoring system adjacent to the Mechanics Shop building and the TWP barrier wall to support the building foundation and barrier wall during excavation
6. Demolishing and reconstructing utilities and yard features, including yard pavement, roadways, storm water culverts, fencing, and retaining walls
7. Decommissioning and replacing groundwater monitoring wells located within the excavation area
8. Excavating, stockpiling, and analytical testing of clean overburden material
9. Excavating, handling, dewatering (including phase separation and separate disposal of liquid DNAPL), segregating, hauling, treating, and disposing of soil containing DNAPL and some incidental soil containing COCs exceeding cleanup levels
10. Post-excavation sampling and analysis of soil and over-excavation as required based on initial post-excavation sampling results

11. Backfilling the excavation with structural fill from a source verified to be free of impacted media with a permeability determined to be protective of any remaining contaminated portions of the Upper Silt.
12. Reconstructing the existing asphalt paved area over the area of DNAPL excavation (see Figure 4 in Appendix L)
13. Implementing environmental protection measures during construction, including handling and treatment of construction stormwater and perched groundwater
14. Closure reporting
15. Long-term monitoring and maintenance of the asphalt paved area

Under Alternative S3, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2, as well as the estimated quantities of untreated contaminated media and contaminants that would remain on site above the Upper Silt and beneath the Mechanics Shop building and the asphalt pavement in the northern part of the maintenance yard. Detailed calculations are provided in Appendix I.

7.4.4 Alternative S4 – DNAPL Excavation Outside Building Footprint, Limited Excavation Inside

Alternative S4 for soil consists of excavation and off-site landfill disposal or off-site treatment and disposal of soil that contains DNAPL located above the Upper Silt and outside the footprint of the Port of Longview Mechanics Shop building and within accessible areas of the building, and preservation of the existing asphalt paved area over soil containing COCs at concentrations exceeding the preliminary cleanup levels in the northern part of the maintenance yard (Figure 7-4). The depth of the Upper Silt layer varies over the MFA. Although the depth of excavation would vary over the MFA, an average depth of approximately 8 feet bgs is assumed for this alternative. Soil with COCs at concentrations greater than the preliminary cleanup levels located within the Upper Silt would not be excavated, because of the risk of breaching this aquitard and contaminating Aquifer A. To assess whether contaminants left in place within the Upper Silt, under the Mechanics Shop building (inaccessible areas only), and in the northern part of the maintenance yard are impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 2 years following completion of excavation. In addition, the asphalt pavement over the excavation area would be reconstructed and the existing asphalt pavement in the northern part of the maintenance yard and the reconstructed asphalt pavement would be maintained over the long-term to limit direct contact with soil exceeding the cleanup levels remaining in the Upper Silt and in the northern part of the maintenance yard.

Under this soil alternative, the building envelope and foundation would remain intact. Excavation would be conducted inside the building by demolishing portions of the floor slab and removing soil to the extent that the building foundation is not threatened. The remediation level established in Section 6.2 would be used to segregate soil for either retention under the existing asphalt paved area or off-site landfill disposal/treatment. Some soil containing COCs at concentrations exceeding the preliminary cleanup level, but not exhibiting field indications of DNAPL, would be incidentally excavated and eligible for off-site disposal at a landfill facility permitted to receive CAMU-eligible waste. Off-site disposal of the excavated soil would be equivalent to the baseline alternative for soil.

Under Alternative S4, residual soil containing COCs would remain beneath the existing asphalt paved area in the northern part of the maintenance yard area and beneath the building. The building structure would limit water infiltration and thus mobilization of residual COCs beneath the building. Although not impermeable, the asphalt pavement would significantly reduce water infiltration and thus mobilization of the residual COCs from beneath the asphalt paved area. A cross section of the existing asphalt paved area is shown on Figure 4 included in Appendix L. Because this soil alternative relies on containment of soil exceeding cleanup levels beneath the existing asphalt paved area and the building, (a) compliance monitoring would be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760 (WAC 173-340-410(3)) (see Section 6.4.2), and (b) the disproportionate cost analysis, provided in Section 9, will be used to demonstrate that this soil alternative, if selected, is permanent to the maximum extent practicable in accordance with WAC 173-340-740(6)(f).

Soil handling and shoring under Alternative S4 would be equivalent to that under the baseline alternative for soil, except that the shoring system would be installed around a portion of the building perimeter, instead of beneath a portion of the building as in the baseline alternative.

Alternative S4 for soil includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action
3. Planning for temporary revisions to Port of Longview maintenance yard and building operations
4. Decommissioning horizontal and vertical bioventing wells within the excavation area
5. Installing a shoring system adjacent to the Mechanics Shop building and the TWP barrier wall to support the building foundation and barrier wall during excavation
6. Demolishing and reconstructing interior features of approximately one quarter of the Port of Longview Mechanics Shop building
7. Demolishing and reconstructing utilities and yard features, including yard pavement, roadways, storm water culverts, fencing, and retaining walls
8. Decommissioning and replacing groundwater monitoring wells located within the excavation area
9. Excavating, stockpiling, and analytical testing of clean overburden material to confirm re-use as backfill
10. Excavating, handling, dewatering (including phase separation and separate disposal of liquid DNAPL), segregating, hauling, treating, and disposing of soil containing DNAPL and some incidental soil containing COCs exceeding cleanup levels
11. Post-excavation sampling and over-excavation as required based on initial post-excavation sampling results

12. Backfilling the excavation with structural fill from a source verified to be free of impacted media with a permeability determined to be protective of any remaining contaminated portions of the Upper Silt.
13. Reconstructing the existing asphalt paved area over the area of DNAPL excavation (see Figure 4 in Appendix L)
14. Implementing environmental protection measures during construction, including handling and treatment of construction stormwater and perched groundwater
15. Closure reporting
16. Long-term monitoring and maintenance of the asphalt paved area

Under Alternative S4, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2, as well as the estimated quantities of untreated contaminated media and contaminants that would remain on site above the Upper Silt and beneath the Mechanics Shop building (inaccessible areas only) and the asphalt pavement in the northern part of the maintenance yard. Detailed calculations are provided in Appendix I.

7.4.5 Alternative S5 – Solidification Outside Building Footprint

Alternative S5 consists of in-place mechanical mixing of solidifying agents with soil at the MFA located outside the footprint of the Port of Longview Mechanics Shop building that contains NAPL or COCs at concentrations exceeding the preliminary cleanup levels (Figure 7-5). Because potential breaches of the Upper Silt are addressed during solidification by simultaneous mixing of solidification additives and soil, the top foot of the Upper Silt is assumed to be included in the treatment volume for this alternative. Therefore, additional contaminated soil would be addressed compared to the excavation alternatives, and additional benefit would be obtained as a result. Because the depth of the Upper Silt layer varies over the MFA, the depth of solidification would also vary across the site. The average solidification depth is assumed to be 9 feet bgs. To assess whether solidified soil and contaminants left in place under the Mechanics Shop building are impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 10 years following completion of solidification. In addition, the asphalt pavement over the solidification area would be reconstructed and maintained over the long-term to limit direct contact with treated soil.

The mixing agent would be selected, based on the bench-scale treatability testing already performed as discussed in Section 7.3.1, to bind the COCs within a modified matrix exhibiting significantly lower permeability compared to the surrounding soil. This treatment reduces the likelihood of COC migration by diverting groundwater around the treated matrix, and chemically binding the impacted media within the matrix. The solidified soil would also be covered with asphalt pavement. This soil alternative includes additional groundwater monitoring compared to the excavation soil alternatives to document parameters specifically related to solidification performance including leachability and strength.

Solidification of soil beneath the Mechanics Shop building is not included in this soil alternative. Therefore, residual, unsolidified soil containing COCs would remain beneath the building, with the building structure and the solidified soil outside the building acting as containment to limit water infiltration and thus mobilization of the residual COCs. Because this soil alternative relies on containment of soil exceeding preliminary cleanup levels beneath the building, (a) compliance monitoring would be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760 (WAC 173-340-410(3)) (see Section 6.4.2), and (b) the disproportionate cost analysis, provided in Section 9, will be used to demonstrate that this soil alternative, if selected, is permanent to the maximum extent practicable in accordance with WAC 173-340-740(6)(f).

Alternative S5 includes performing a pilot test on a 1,600 square foot section (approximately 5 percent of the total treatment area) of the site prior to full-scale implementation. The pilot-test would be performed to further refine the mix design and determine the preferred mixing tools and techniques for full-scale remediation. Only mechanical mixing is being considered for this soil alternative, and these may include, but are not limited to, mixing with large-diameter augers, excavator buckets, or specialized *in situ* benders manufactured by Lang Tool Company. The pilot test would include strength and leachability testing similar to that previously performed during bench-scale testing, and would also further define the cure time for solidified soil. During the pilot test, additional soil sampling would be performed to determine whether soil below 3 feet bgs exceeds preliminary cleanup levels and, if not, whether segregating additional soil below this level would benefit the project by reducing the volume of soil requiring solidification.

Full-scale solidification is conservatively assumed to include soil exceeding preliminary cleanup levels from 3 to 9 feet bgs within the designated treatment boundary. The existing clean materials beneath and including the existing asphalt pavement (0 to 3 feet bgs) would be removed. A cross section of the existing asphalt paved area is shown on Figure 4 included in Appendix L. The clean materials beneath the asphalt would be temporarily stockpiled for reuse after solidification. Asphalt above the solidification treatment area would be removed and recycled. Solidification would extend horizontally to immediately adjacent to the building and the TWP area slurry wall and be completed in an alternating pattern to protect them from damage. Obstacles such as two existing retaining walls located near the Mechanics Shop and along the east side of the road, as well as a large storm water culvert pipe would be removed and reconstructed following solidification activities. The solidified soil would be covered with new geotextile material overlaid by reused crushed rock excavated from the site and stockpiled prior to solidification and new asphalt (see Zone 2 – Proposed Utility Corridor Asphalt Paved Area in Figure 4, Appendix L). The asphalt pavement would not be impermeable, but it is anticipated that the majority of storm water would drain along the surface or within the rock above the solidified soil.

The solidification process is estimated to create volumetric expansion of the treated soil of approximately 35 percent, which is conservative based upon the 26 to 36 percent range identified during the bench-scale treatability test of preferred Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda). This volumetric expansion would result in an average site height increase of approximately 2.5 feet. This soil alternative assumes that the expanded material would remain onsite. The increased volume of material in the treatment area would result in higher elevations in the area south of the new rail road spur. Because portions of the road and the storage yard surface appear low compared to surrounding areas, the site grade could be increased in a manner that maintains current drainage patterns and provides the Port a smooth level working surface. Clean structural fill, similar to the crushed rock below the existing asphalt pavement, would be imported to transition between the new higher grades where solidification would be completed and the surrounding existing grade. Solidified soil would not be moved outside of the treatment limits and would always be covered with 3 feet of clean structural fill to allow the Port to perform shallow excavation work in the future without encountering contaminated materials.

Implementation of this soil alternative includes evaluation and mitigation of impacts to Port of Longview operations. Implementation of this soil alternative would impact Port operations by temporarily limiting access to the work truck storage bays along the east side of the Mechanics Shop for 1 to 2 months. A portion of the MFA storage yard south of the rail spur would not be accessible to the Port for the majority of the construction period, which is estimated to be 4 to 6 months. In addition, there would likely be temporary short-term interruptions in utilities to the Mechanics Shop when excavation or solidification work is performed near utilities.

Alternative S5 for soil includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action, including pilot-scale testing of the mixing agent and various mechanical mixing equipment and methods based on the results reported in the final *in situ* treatability study report (URS 2013b)
3. Planning for temporary revisions to Port of Longview maintenance yard operations
4. Implementing a pilot-scale test in a 40- by 40-foot area of the site where DNAPL is present and documenting findings and recommendations in a report
5. Decommissioning horizontal and vertical bioventing wells within the solidification area
6. Demolishing and reconstructing utilities and yard features, including yard pavement (see Zone 2 – Proposed Utility Corridor Asphalt Paved Area in Figure 4, Appendix L), roadways, storm water culverts, fencing, and retaining walls
7. Decommissioning and replacing groundwater monitoring wells located within the solidification area
8. Excavating, stockpiling, and analytical testing of clean overburden material to confirm re-use as backfill
9. Temporarily storing and reusing all clean overburden material (e.g., crushed rock beneath the existing asphalt pavement) to maintain approximately 3 feet of clean fill above all solidified soil
10. In-place mixing of soil with the mixing agent and mechanical mixing equipment recommended by the pilot test
11. Grading surface of solidified soil and installing a geomembrane or other physical marker above the solidified soil to demarcate the top of the solidified soil
12. Reusing existing clean overburden materials stockpiled on site and importing clean structural fill as needed to meet new site grades

13. Implementing environmental protection measures during construction (e.g., stormwater pollution prevention plan), including handling and treatment of construction stormwater
14. Closure reporting
15. Long-term monitoring of leachate and physical performance of solidified soil and long-term monitoring and maintenance of the asphalt paved area

Under Alternative S5, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2, as well as the estimated quantities of untreated contaminated media and contaminants that would remain on site above the Upper Silt and beneath the Mechanics Shop building. As described above, solidification would address additional contaminated soil located in the top foot of the Upper Silt. However, the mass of contaminants in the top foot of Upper Silt has not been quantified because of the risk of breaching the Upper Silt during drilling and soil sampling, potentially resulting in further contamination of Aquifer A. Additional benefits would be obtained by solidification of the top foot of the Upper Silt. Detailed calculations are provided in Appendix I.

7.4.6 Alternative S5A – Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop

Alternative S5A includes all same components outside the building footprint as Alternative S5 and adds recovery of DNAPL inside the building footprint where the extent of DNAPL has been confirmed (see Figure 7-6). The goal of this soil alternative is to remove as much DNAPL from below the building as practicable (estimated to be 50 gallons). However, residual, unsolidified soil containing COCs and any unrecovered DNAPL would still remain beneath the building following recovery efforts. The building structure and the solidified soil outside the building would act as containment to limit water infiltration and thus mobilization of the residual COCs and DNAPL. Because this soil alternative relies on containment of soil exceeding preliminary cleanup levels beneath the building, (a) compliance monitoring would be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760 (WAC 173-340-410(3))(See Section 6.4.2), and the disproportionate cost analysis, provided in Section 9, will be used to demonstrate that this soil alternative, if selected, is permanent to the maximum extent practicable in accordance with WAC 173-340-740(6)(f).

A number of extraction systems could be employed for DNAPL recovery beneath the Mechanics Shop (e.g., manual bailing, periodic extraction using truck-mounted vacuum equipment, dedicated custom installed DNAPL pumping system, etc.). The pumping system further described below assumes the installation of five pumps located in new recovery wells. The recovery system would be designed to extract DNAPL while minimizing collection of perched groundwater. A conceptual layout of the DNAPL Recovery System is shown on Figure 7-7. The pump intakes would be positioned near the bottom of each recovery well between approximately 7 to 9 feet bgs. To maximize recovery, the wells would be constructed using stainless steel wire wrapped screen with pea gravel filter pack. DNAPL that enters the recovery wells would be transferred to storage drums located in a secondary containment storage unit located outside the building. One air compressor and a controller to operate each pump would be adjacent to the storage drums. Although, compressed air is already present in the building for shop use, this soil alternative includes a dedicated air compressor with filters and a regulator to run the DNAPL recovery pumps. The compressed air system would also include a refrigerant dryer system to ensure clean dry air is supplied to the DNAPL recovery pumps. It is assumed that power to the new air compressor and pump controller would come from the building electrical room, but would be metered separately.

The conceptual design includes five pumps (two pumps in the parts storage room and three pumps in the work truck storage room) connected to independent drums. Connecting these two areas to their own drum would allow easier documentation of recovery rates and totals. However, the system could easily be expanded to include additional pumps with all recovered DNAPL routed into one larger AST. To enhance recovery of DNAPL small finger heaters would be installed in each well to increase temperatures slightly and decrease viscosity which should help DNAPL flow into the pump intake. Recovered DNAPL would be routed to the storage drums via tubing, and air supply and exhaust tubing would also be connected to each pump. The tubing bundle would be routed inside rigid pipe mounted inside the Mechanics Shop to protect it from damage. To minimize odors from the recovered DNAPL temporarily stored at the site, a vent would be extended to at least 2 feet above the roofline. If necessary, further odor abatement could be implemented using a small carbon canister connected via flexible hose between the secondary containment unit and the vent stack.

This soil alternative includes mitigation of impacts to the Port of Longview operations. For solidification outside the building, it would have the same impacts as Alternative S5. In addition, approximately 3 to 5 weeks would also be needed to install the DNAPL recovery system inside the storage bays and the parts storage areas. The Port would also need to temporarily move equipment and supplies in the designated areas where recovery wells, trenching, or mounting of hose would be completed. A small area (3 feet from the edge of the building) would also be needed outside the north wall of the Mechanics Shop building to locate the recovery system equipment for several years. This would reduce access along the north side of the building, but access in this area by fork lifts and vehicles would still be possible. Once the DNAPL recovery system starts operating, International Paper would need occasional access to the well heads inside the building and the equipment located outside the building.

Alternative S5A for soil includes the following significant elements:

1. All elements of Alternative S5
2. Five new recovery wells installed inside the building; two, 2-inch wells in the parts storage room and three, 4-inch wells in the work truck storage room
3. Five 2-foot square vaults to protect well head equipment
4. Five bottom feeding pneumatic pumps either 2- or 4-inch diameter
5. One air compressor with refrigerant dryer, filters, and regulator
6. Secondary containment storage unit with two drums and vent stack
7. Five 75-watt finger heaters to elevate DNAPL temperatures inside the well to decrease viscosity and increase recovery

8. Ongoing O&M of the system until recovery reaches diminishing returns (assumed to be 3 years)

Under Alternative S5A, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2, as well as the estimated quantities of untreated contaminated media and contaminants that would remain on site above the Upper Silt and beneath the Mechanics Shop building. As described for Alternative S5, solidification would address additional contaminated soil located in the top foot of the Upper Silt. However, the mass of contaminants in the top foot of Upper Silt has not been quantified because of the risk of breaching the Upper Silt during drilling and soil sampling, potentially resulting in further contamination of Aquifer A. Additional benefits would be obtained by solidification of the top foot of the Upper Silt. Detailed calculations are provided in Appendix I.

7.4.7 Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks

Alternative S5 consists of in-place mechanical mixing of solidifying agents with soil at the MFA located outside and inside the footprint of the Port of Longview Mechanics Shop building that contains NAPL or COCs at concentrations exceeding the preliminary cleanup levels (Figure 7-8). Because potential breaches of the Upper Silt are addressed during solidification by simultaneous mixing of solidification additives and soil, the top foot of the Upper Silt is assumed to be included in the treatment volume for this alternative. Therefore, additional contaminated soil would be addressed compared to the excavation alternatives, and additional benefit would be obtained as a result. Because the depth of the Upper Silt layer varies over the MFA, the depth of solidification would also vary across the site. The average solidification depth is assumed to be 9 feet bgs. To assess whether solidified soil is impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 10 years following completion of solidification. In addition, the asphalt pavement over the excavation and solidification areas would be reconstructed and maintained over the long-term to limit direct contact with treated soil and soil exceeding the cleanup levels remaining in the Upper Silt in the vicinity of the railroad tracks.

The mixing agent would be selected, based on the bench-scale treatability testing already performed as discussed in Section 7.3.1, to bind the COCs within a modified matrix exhibiting significantly lower permeability compared to the surrounding soil. This treatment reduces the likelihood of COC migration by diverting groundwater around the treated matrix, and chemically binding the impacted media within the matrix. This soil alternative includes additional groundwater monitoring compared to the excavation soil alternatives to document parameters specifically related to solidification performance including leachability and strength.

Alternative S5 includes performing a pilot test on a 1,600 square foot section of the site prior to full-scale implementation. The pilot-test would be performed to further refine the mix design and determine the preferred mixing tools and techniques for full-scale remediation. Only mechanical mixing is being considered for this soil alternative, and these may include, but are not limited to, mixing with large-diameter augers, excavator buckets, or specialized *in situ* benders manufactured by Lang Tool Company. The pilot test would include strength and leachability testing similar to that previously performed during bench-scale testing, and would also further define the cure time for solidified soil. During the pilot test, further characterization of shallow soil in Zone 1 would be conducted to assess whether any soil below 3 feet bgs could be removed from *in situ* solidification treatment. Any soil identified as containing concentrations of COCs below cleanup levels could be placed above solidified soil within Zones 2 and 3 to provide additional depth in which the Port could work during potential future development or could be used as backfill in Zone 1. In either case, site grades in Zones 2 and 3 could be reduced slightly with the reduced volume of material requiring solidification.

The site would be divided into three distinct treatment area zones as follows:

1. Zone 1: Zone 1 includes the area in the vicinity of and extending 80 feet to the south of the railroad tracks (see Figures 7-8 and 7-9). Soil that contains COCs at concentrations exceeding the preliminary cleanup levels in this zone would be excavated to the top of the Upper Silt instead of being solidified in place. Impacted soil would be relocated within the AOC from Zone 1 to Zones 2 and 3, and would be treated by *in situ* solidification in Zones 2 and 3. The excavated area (Zone 1) would be backfilled to site grade using clean imported materials, and new pavement would be installed. A cross section of Zone 1 is shown on Figure 4 included in Appendix L. This would provide the Port with unrestricted site use in this area during potential future development (e.g., future rail dump pit).

2. Zone 2: Zone 2 includes a 20-foot wide utility corridor and a 55-foot wide area that includes the nearby access road referred to as “North Tie Road” (see Figure 7-9). Within this zone, soil that contains DNAPL or COCs at concentrations exceeding the preliminary cleanup levels would be treated using *in situ* solidification, along with soil relocated from Zone 1. *In situ* solidification would be completed to approximately 1 foot into the Upper Silt, which is approximately 9 feet bgs on average. Three feet of clean material (0.5 feet of asphalt and 2.5 feet of clean fill) and a layer of geotextile fabric would be placed above the solidified material. Cross sections for Zone 2 are shown on Figure 4 included in Appendix L. This would provide the Port with ability to perform utility and other general site work without restrictions within this 3 foot depth.

3. Zone 3: Zone 3 includes the remainder of the treatment area at the site (see Figure 7-9). Within this zone, soil that contains DNAPL or COCs at concentrations exceeding cleanup levels, along with soil relocated from Zone 1, would be treated using *in situ* solidification to within one foot of the ground surface. *In situ* solidification would be completed to approximately 1 foot into the Upper Silt, which is approximately 9 feet bgs on average. One foot of clean material (0.5 feet of asphalt or concrete and 0.5 feet of clean fill) and a layer of geotextile fabric would be placed above the solidified material. Cross sections for Zone 3 are shown on Figure 4 included in Appendix L.

The portion of the Mechanics Shop building above the solidification treatment area would be completely removed to allow solidification using the same methods utilized for outside the building footprint (see Figure 7-10). The concrete floor, exterior wall footings, and utilities would be removed in the part of the building with lower ceiling heights. This would increase solidification efficiency and reduce mobilization costs associated with specialized labor and equipment needed for working inside a building. It would also eliminate the need for more complicated specialized solidification work below the exterior walls and around building footings, and is thus expected to speed up solidification work and reduce risks associated with working inside a structure. The existing clean materials beneath the building would be removed to a depth of 3 feet bgs and temporarily stockpiled for reuse after solidification. Following solidification, the portion of the building removed would be reconstructed on new footings and a new concrete floor would be poured. Based on solidification of soil from approximately 3 to 9 feet bgs under the building, calculations indicate that the top surface of solidified soil could be near the concrete floor slab. Solidified materials within 1 foot of the concrete floor slab would be relocated to outside the building footprint within Zone 3.

Outside the building footprint, the existing clean materials beneath and including the existing asphalt pavement (0 to 3 feet bgs) would be removed. A cross section of the existing asphalt paved area is shown on Figure 4 included in Appendix L. The clean materials beneath the asphalt would be temporarily stockpiled for reuse after solidification. Asphalt above the solidification treatment area would be removed and recycled. Solidification would extend horizontally to immediately adjacent to the TWP area slurry wall and be completed in an alternating pattern to protect it from damage. Obstacles such as two existing retaining walls located near the Mechanics Shop and along the east side of the road, as well as a large storm water culvert pipe would be removed and reconstructed following solidification activities where necessary. The solidified soil would be covered with new geotextile material overlaid by reused crushed rock excavated from the site and stockpiled prior to solidification. New asphalt would be installed outside of the building footprint. The asphalt pavement would not be impermeable, but would have a permeability that is significantly lower than the underlying base course backfill above the solidified material. Storm water would drain along the surface or within the base course backfill above the solidified soil.

The solidification process is estimated to create volumetric expansion of the treated soil of approximately 35 percent, which is conservative based upon the 26 to 36 percent range identified during the bench-scale treatability test of preferred Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda). This soil alternative assumes that all solidified material would remain on-site and would not be moved outside of the treatment limits. The site would be graded to manage volumetric expansion of the solidified materials and provide a more uniform site topography, enhance drainage, and maintain control of storm water in the vicinity of the Mechanics Shop building. If the solidification process results in higher than anticipated volumetric expansion, then excess solidified soil would be disposed of at Subtitle D landfill, if COC concentrations are less than ten times the LDRs, or at a Subtitle C landfill as CAMU-eligible waste. A strip drain would be installed along the north and east perimeter of the building (see Figure 7-10) to route storm water to the Port’s existing storm water treatment system. Clean structural fill, similar to the crushed rock below the existing asphalt pavement, would be imported to transition between the new higher grades where solidification would be completed and the surrounding existing grade.

The post-remediation site grades within North Tie Road east of the Mechanics Shop are currently shown on Figure 7-9 as a few feet higher in elevation than both the building slab elevation to the west of that road and the grading boundary at the TWP Area to the east of that road. These grades are also shown in comparison to existing site grades in cross sections included in Appendix M. This is an illustration of one potential grading configuration, and other configurations are also possible. Final post-remediation site grades shall not exceed a 2% slope in the transverse direction or a 5% slope in the longitudinal direction along equipment transport routes and in equipment operational areas in order to allow the Port of Longview to transport and operate existing equipment. As mentioned above, additional storm water that drained to the west from the road toward the Mechanics Shop could be controlled by adding a strip drain or other structure connected to the existing storm water system. Additional storm water that drained to the east from the road toward the TWP Area could also be controlled by installing storm water catchment structures, or by sloping to the north and south toward the existing swale catchments. Any additional loads created by the placement of solidified soil above or across the TWP Area barrier wall could be supported by bridging both sides of the barrier wall. Further evaluation of stormwater control and loading issues could be performed during the engineering design of this remedy.

This soil alternative includes mitigation of impacts to the Port of Longview operations. For solidification outside the building it would have the same impacts as Alternative S5. In addition, the Port would need to temporarily move all equipment and supplies out of the designated areas within the Mechanics Shop building where part of the building would be demolished, solidification would be completed, and part of the building would be reconstructed. The site would be restored to previous conditions. Approximately 6 months would be needed to complete partial building demolition, solidification, and building reconstruction.

Alternative S5B for soil includes the following significant elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action, including pilot-scale testing of the mixing agent and various mechanical mixing equipment and methods based on the results reported in the final *in situ* treatability study report (URS 2013b)
3. Planning for temporary revisions to Port building and maintenance yard operations
4. Implementing a pilot-scale test in a 40-foot by 40-foot area of the site where DNAPL is present and documenting findings and recommendations in a report
5. Performing additional soil sampling to determine whether soil below 3 feet bgs exceeds preliminary cleanup levels and, if not, whether segregating additional soil below this level would benefit the project by reducing the volume of soil requiring solidification
6. Decommissioning horizontal and vertical bioventing wells within the solidification area
7. Demolishing and reconstructing utilities and yard features, including yard pavement (see Figure 4 in Appendix L), roadways, storm water culverts, fencing, and retaining walls (where necessary)
8. Decommissioning and replacing groundwater monitoring wells located within the solidification area
9. Demolishing the portion of the Mechanics Shop building with lower ceiling heights including removing the concrete floor inside the building and the exterior wall footings
10. Protecting or removing and replacing existing utilities under the building

11. Excavating, stockpiling, and analytical testing of clean overburden material to confirm reuse as backfill
12. Temporarily storing and reusing all clean overburden material
13. Excavating and relocating contaminated soil within 80 feet of the railroad tracks
14. Mechanically solidifying soil in Zones 2 and 3 and relocated soil from Zone 1
15. Grading surface of solidified soil and installing a geotextile fabric or other physical marker above the solidified soil to demarcate the top of the solidified soil
16. Reusing clean fill materials stockpiled on site above solidified soil in Zones 2 and 3, and as backfill in Zone 1
17. Importing and placing clean fill as necessary to backfill Zone 1 and transition between existing grades and the new higher elevations in Zones 2 and 3
18. Reconstructing the portion of the building removed for solidification including the concrete floor inside the building and the exterior wall footings
19. Implementing environmental protection measures during construction (e.g., storm water pollution protection plan), including handling and treatment of construction storm water
20. Closure reporting
21. Long-term monitoring of leachate and physical performance of solidified soil and long-term monitoring and maintenance of the asphalt paved area

Under Alternative S5B, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2. As described above, solidification would address additional contaminated soil located in the top foot of the Upper Silt. However, the mass of contaminants in the top foot of Upper Silt has not been quantified because of the risk of breaching the Upper Silt during drilling and soil sampling, potentially resulting in further contamination of Aquifer A. Additional benefits would be obtained by solidification of the top foot of the Upper Silt. Detailed calculations are provided in Appendix I. All soil with COCs exceeding the cleanup levels and exhibiting DNAPL would be solidified in the top foot of the Upper Silt and above at the MFA including under the Mechanics Shop building under this alternative.

7.4.8 Alternative S5C – Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop

Alternative S5C includes all same components outside the building footprint as Alternative S5 and adds *in situ* treatment by ERH of COCs and DNAPL inside the building footprint and immediately adjacent to the north and east sides of the Mechanics Shop building up to the existing retaining wall (Figure 7-11). Therefore, the area and associated volume of soil treated by solidification would be reduced compared to Alternative S5. The overall area treated in Alternative S5C is identical to S5B, but part of the area is treated by ERH. The rationale for the layout in this soil alternative is that ERH is more efficient with a wider footprint. In addition, using ERH treatment near the retaining wall eliminates the need to remove the retaining wall, reduces cost, and simplifies solidification work and site restoration activities.

The goal of this soil alternative is to treat soil containing COCs and DNAPL beneath and adjacent to the building by passing electricity into an array of electrodes to increase the temperature to near the boiling point of water. The resulting heat would transfer COCs, with boiling points below the soil temperature, into the vapor phase and boil perched groundwater. A multi-phase vacuum extraction system would remove the vaporized COCs, along with water, for above ground treatment prior to exhaust to the atmosphere. This soil alternative assumes ERH treatment is completed concurrently with solidification activities, but it could also be performed as part of a phased approach to site cleanup. If ERH is performed in conjunction with pilot testing of solidification outside the building, then results of the ERH treatment and solidification could be compared and used to adjust the approach for the remainder of the site.

The current extent of DNAPL and COCs, as shown on Figure 7-11, indicates a discontinuous area under the Mechanics Shop. Because ERH is more effective across a continuous treatment zone, this soil alternative utilizes one treatment area under the building. A conceptual layout for ERH electrodes under the building is shown on Figure 7-12. The subsurface zone with active heating is anticipated to be 8 feet thick (2 to 10 feet bgs) which is slightly thicker than the targeted treatment area (3 to 8 feet bgs). The extended vertical treatment zone is recommended to ensure that maximum temperature is reached where COCs and DNAPL are present.

Electrodes would be installed vertically throughout the site. A limited access drill rig would be used for electrode installation inside the building. Multi-phase extraction wells would also be installed throughout the treatment area to capture mobilized COCs and water vapor. Large gauge electrical conductors would be connected between each electrode and a power control unit located near the northwest corner of the Mechanics Shop. Piping would connect the extraction wells to the above-ground treatment system also located near the northwest corner of the building. The system could be designed and installed in a way to allow Port operations to continue while the active heating occurs under the building by installing electrical conduits and piping in trenches. Alternatively, piping and conductors for the electrodes could be surface mounted at a reduced installation cost, but the Port would not have access to the ERH area while treatment occurs.

This soil alternative includes mitigation of impacts to the Port of Longview operations. For solidification outside the building, this soil alternative would have the same impacts as Alternative S5. In addition, approximately 6 months would be needed to complete active heating inside and adjacent to the Mechanics Shop. The Port would also need to temporarily move the equipment and supplies out of the designated areas where the ERH would be implemented. ERH has the potential to damage underground utilities that are sensitive to heat, but they can be avoided, temporarily bypassed, insulated, or cooled with water.

Alternative S5C for soil includes the following significant elements:

1. All elements of Alternative S5 except the existing retaining wall near the building would remain in place and the area and volume of solidification is reduced

2. Upgrading the electrical power supply to the site

3. Drilling and installing electrodes, temperature probes, and vapor extraction points where ERH treatment would be performed

4. Wiring and installing temporary treatment compound

5. Protecting existing utilities from heat damage during ERH treatment

6. Heating and treating the subsurface inside and adjacent to the Mechanics Shop building for approximately 6 months; collecting, treating, and sampling of condensed liquids as required; collecting, treating, and sampling of air emissions as required

7. Shutting down the system and demobilizing equipment

8. Performing post-treatment temperature monitoring for approximately 6 months

9. Performing post-treatment verification soil sampling using push-probe techniques

10. Closure reporting

Under Alternative S5C, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2. Solidification and ERH treatment would address additional contaminated soil located in the Upper Silt. However, the mass of contaminants in the Upper Silt has not been quantified, because of the risk of breaching the Upper Silt during drilling and soil sampling, potentially resulting in further contamination of Aquifer A. Additional benefits would be obtained by solidification and ERH treatment of the Upper Silt. Detailed calculations are provided in Appendix I. All soil with COCs exceeding the cleanup levels and exhibiting DNAPL would be solidified in the top foot of the Upper Silt and the Upper Sand or treated using ERH throughout the Upper Silt and the Upper Sand at the MFA including under the Mechanics Shop building under this alternative.

7.4.9 Alternative S6 – DNAPL Treatment by Electrical Resistance Heating

Alternative S6 for soil consists of soil treatment by ERH throughout the area of DNAPL occurrence (including beneath Mechanics Shop), and preservation of the existing asphalt pavement over soil containing COCs at concentrations exceeding the cleanup level. Because there is little concern of breaching the Upper Silt during ERH treatment, soil within the Upper Silt would be treated. Therefore, additional contaminated soil would be addressed compared to Alternative S3 and additional benefit would be obtained as a result. To assess whether contaminants left in place in the northern part of the maintenance yard are impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 2 years following completion of ERH treatment. In addition, the asphalt pavement over the treatment area and asphalt pavement in the northern part of the maintenance yard would be maintained over the long-term to limit direct contact with soil exceeding the cleanup levels. (Asphalt over the treatment area will be maintained because ERH may not be able to achieve cleanup levels based on the results of the treatability study (see Section 7.3.2).)

This soil alternative would entail installation of an array of electrodes throughout the treatment area and passing electricity into the array (Figure 7-13). The treatment would be performed in a phased approach. Phase I would focus on treatment of the smaller area under the Mechanics Shop building and Phase II would treat the area outside the building. Information learned from Phase I would be used for more efficient implementation of the larger Phase II area.

The resistance of the soil to the conduction of the electricity between the electrodes results in heating of the soil and perched groundwater, causing transfer of soil contaminants with boiling points below that of the soil temperature into the vapor phase and boiling of the groundwater. A vacuum extraction system (wells and vacuum pump) would remove the vaporized contaminants, and the vapor phase would be treated prior to exhaust. Steam/liquids would be condensed and treated prior to discharge. Treatment of the vapor and liquid phases would be accomplished using thermal processes that destroy the contaminants.

Under Alternative S6, residual soil containing COCs would remain beneath the existing asphalt paved area in the northern part of the maintenance yard area. Although not impermeable, the asphalt pavement would significantly reduce water infiltration and thus mobilization of the residual COCs from beneath the existing asphalt paved area. A cross section of the existing asphalt paved area is shown on Figure 4 included in Appendix L. Because this soil alternative relies on containment of soil exceeding cleanup levels beneath the existing asphalt paved area, (a) compliance monitoring would be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760 (WAC 173-340-410(3)) (see Section 6.4.2), and (b) the disproportionate cost analysis, provided in Section 9, will be used to demonstrate that this soil alternative, if selected, is permanent to the maximum extent practicable in accordance with WAC 173-340-740(6)(f).

Alternative S6 for soil includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action, including collecting soil physical characteristics data
3. Planning for temporary revisions to Port of Longview maintenance yard and Mechanics Shop building operations
4. Decommissioning of the horizontal and vertical bioventing wells within the treatment area
5. Decommissioning and replacing groundwater monitoring wells located within the treatment area with wells that can accommodate the elevated soil temperatures and steam buildup
6. Upgrading the electrical power supply to the site Phase I drilling and installing electrodes, temperature probes, and vapor extraction points under the Mechanics Shop building
7. Wiring and installing temporary treatment compound
8. Protecting existing utilities from heat damage during ERH treatment
9. Phase I heating and treating the subsurface under the Mechanics Shop building for approximately 6 months; collecting, treating, and sampling of condensed liquids as required; collecting, treating, and sampling of air emissions as required

10. Shutting down Phase I and performing post-treatment temperature monitoring for approximately 6 months
11. Phase II drilling and installing electrodes, temperature probes, and vapor extraction points outside the Mechanics Shop building
12. Phase II heating and treating the subsurface outside the Mechanics Shop building for approximately 6 months; collecting, treating, and sampling of condensed liquids as required; collecting, treating, and sampling of air emissions as required
13. Shutting down Phase II system and demobilizing equipment
14. Performing post-treatment temperature monitoring of Phase II area for approximately 6 months
15. Performing post-treatment verification soil sampling using push-probe techniques
16. Closure reporting
17. Long-term monitoring and maintenance of the asphalt paved area

Based on an estimated ERH recovery effectiveness of greater than 80 percent for the primary COCs, under Alternative S6, the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2, as well as the estimated quantities of untreated contaminated media and contaminants that would remain on site beneath the asphalt pavement in the northern part of the maintenance yard. ERH treatment would also address additional contaminated soil located in the Upper Silt. However, the mass of contaminants in the Upper Silt has not been quantified, because of the risk of breaching the Upper Silt during drilling and soil sampling, potentially resulting in further contamination of Aquifer A. Additional benefits would be obtained by ERH treatment of the Upper Silt. Detailed calculations are provided in Appendix I.

7.4.10 Alternative S7 – DNAPL Excavation and Electrical Resistance Heating

Alternative S7 for soil consists of excavation and off-site landfill disposal or off-site treatment and disposal of soil from the MFA located above the Upper Silt and outside the footprint of the Mechanics Shop building that contains DNAPL, preservation of the existing asphalt paved area over soil containing COCs at concentrations exceeding the cleanup level, and ERH treatment of soil within the building footprint (Figure 7-14). Because there is little concern of breaching the Upper Silt during ERH treatment, soil within the Upper Silt would be treated within the building footprint. Therefore, additional contaminated soil would be addressed compared to the excavation alternatives that address soil underneath the building footprint, and additional benefit would be obtained as a result. To assess whether contaminants left in place within the Upper Silt outside the building footprint and in the northern part of the maintenance yard are impacting groundwater within Aquifer A, long-term groundwater monitoring would be performed for a period of 2 years following completion of excavation and ERH treatment. In addition, the asphalt pavement over the excavation area would be reconstructed, and the existing asphalt pavement in the northern part of the maintenance yard and the reconstructed asphalt pavement would be maintained over the long-term to limit direct contact with soil exceeding the cleanup levels remaining in the Upper Silt and in the northern part of the maintenance yard.

Soil handling and off-site disposal of the excavated soil would be equivalent to the baseline alternative for soil, and ERH would be equivalent to Alternative S5C. The treatment would be performed in a phased approach. Phase I would focus on ERH treatment of the area under the Mechanics Shop building and Phase II would excavate soil from the designated area outside the building.

Under Alternative S7, residual soil containing COCs would remain beneath the existing asphalt paved area in the northern part of the maintenance yard area. The building structure would limit water infiltration and thus mobilization of residual COCs beneath the building. Although not impermeable, the asphalt pavement would significantly reduce water infiltration and thus mobilization of the residual COCs. A cross section of the existing asphalt paved area is shown on Figure 4 included in Appendix L. Because this soil alternative relies on containment of soil exceeding cleanup levels beneath the existing asphalt paved area, (a) compliance monitoring would be required until residual hazardous substance concentrations no longer exceed site cleanup levels established under WAC 173-340-700 through 173-340-760 (WAC 173-340-410(3)) (see Section 6.4.2), and (b) the disproportionate cost analysis, provided in Section 9, will be used to demonstrate that this soil alternative, if selected, is permanent to the maximum extent practicable in accordance with WAC 173-340-740(6)(f).

Alternative S7 for soil includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action, including collecting physical characteristics data to allow ERH system design
3. Planning for temporary revisions to Port of Longview maintenance yard and Mechanics Shop building operations
4. Upgrading of the electrical power supply to the site
5. Drilling and installing electrodes, temperature probes, and vapor extraction points within the building for Phase I
6. Wiring and installing temporary treatment compound
7. Phase I heating and treating subsurface for approximately 6 months; collecting, treating, and sampling of condensed liquids as required; collecting treating, and sampling of air emissions as required
8. Shutting down ERH equipment, Phase I site restoration, and demobilizing
9. Phase I post-treatment temperature monitoring for approximately 6 months
10. Post-treatment verification soil sampling within the Mechanics Shop building using push-probe techniques
11. Decommissioning of the horizontal and vertical bioventing wells within the excavation area
12. Constructing foundation retaining wall (not using soil freezing) adjacent to the Mechanics Shop building to support foundation during excavation and contain any remaining COCs under building, with wall keyed into silt

13. Demolishing and reconstructing utilities and yard features, including yard pavement, roadways, storm water culverts, fencing, and retaining walls
14. Decommissioning and replacing groundwater monitoring wells located within the excavation area
15. Excavating, stockpiling, and analytical testing of clean overburden material to confirm re-use as backfill
16. Excavating, handling, dewatering (including phase separation and separate disposal of liquid DNAPL), segregating, hauling, treating, and disposing of soil containing DNAPL and some incidental soil containing COCs exceeding cleanup levels
17. Phase II post-excavation sampling and analysis of soil and over-excavation as required based on initial post-excavation sampling results
18. Backfilling of the excavation with structural fill from a source verified to be free of impacted media with a permeability determined to be protective of any remaining contaminated portions of the Upper Silt
19. Reconstructing the existing asphalt paved area over the area of DNAPL excavation (see Figure 4 in Appendix L) and site restoration
20. Implementing environmental protection measures during construction, including handling and treatment of construction stormwater and perched groundwater
21. Closure reporting
22. Long-term monitoring and maintenance of the asphalt paved area

Based on the estimated ERH recovery effectiveness greater than 80 percent for the primary COCs, under Alternative S7 the estimated quantities of contaminated media and contaminants that would be remediated above the Upper Silt are summarized in Table 7-2, as well as the estimated quantities of untreated contaminated media and contaminants that would remain on site above the Upper Silt outside the building footprint and beneath the asphalt pavement in the northern part of the maintenance yard. ERH treatment would address additional contaminated soil located in the Upper Silt underneath the Mechanics Shop building. However, this mass of contaminants in the top foot of Upper Silt has not been quantified, because of the risk of breaching the Upper Silt during drilling and soil sampling, potentially resulting in further contamination of Aquifer A. Additional benefits would be obtained by ERH treatment of the top foot of the Upper Silt. Detailed calculations are provided in Appendix I.

7.5 GROUNDWATER ALTERNATIVES

This section describes the cleanup action alternatives developed for groundwater beneath the Upper Silt in Aquifer A. The groundwater alternatives are listed in Table 7-1 and summarized in Table 7-3 including system components, treatment times, treatment areas, and treatment volumes. All groundwater alternatives developed in this section assume that treatment or removal of soil sources would be performed as part of the soil alternatives. All groundwater alternatives are assumed to include institutional controls memorialized through a restrictive covenant on the MFA property, which limits the property to industrial uses and prohibits the use of groundwater until groundwater cleanup levels are achieved. This restrictive covenant is a requirement of using MTCA Method C cleanup levels (WAC 173-340-440).

All groundwater alternatives also include the installation and long-term monitoring of wells at the conditional POC, to ensure that COCs at concentrations greater than MTCA Method B cleanup levels do not migrate beyond the conditional POC.

Because institutional controls, the implementing restrictive covenant, and long-term monitoring at the conditional POC are a part of all groundwater alternatives, these elements of the cleanup action are not discussed in each section, and are not considered as part of the comparative analysis of alternatives in Section 9.

As discussed in Section 3.3, Nature and Extent of COC, cPAH concentrations in groundwater samples from various monitoring wells located outside of the anticipated conditional POC boundary occasionally exceed the MTCA Method B cleanup level. These exceedances have been historically inconsistent and geographically variable. All groundwater alternatives include MNA as a cleanup action component applicable to these wells, within the approximate area of the MNA shown on Figures 7-15 through 7-18. The scope of the groundwater monitoring and the associated costs would vary depending upon the quantity of contamination remaining in the soil following remediation. To address this, various levels of groundwater monitoring are included in the soil alternatives.

Future monitoring of MNA in this area may require installation of additional wells to define the MNA boundary or to provide sufficient monitoring data.

The need for additional wells or monitoring would be assessed as part of the CAP and cleanup action design and is not included in the comparative cost estimates prepared for this FS. Removal of the residual source in soil and treatment of the core of the COC plume in groundwater is expected to expedite MNA in areas outside of direct treatment. Because MNA is a part of all groundwater alternatives, this element of the cleanup action is not discussed in each section and is not considered as part of the comparative analysis of alternatives in Section 9.

Restoration timeframes initially presented in this section are further discussed in Section 8.

7.5.1 Alternative GW1 – Electrical Resistance Heating and Enhanced Biodegradation (Baseline Alternative)

The baseline alternative for groundwater (Alternative GW1) consists of ERH followed by enhanced biodegradation, taking advantage of the elevated ground temperatures following completion of ERH. ERH consists of installation of electrodes within Aquifer A throughout the area where groundwater contains DRO at concentrations exceeding the Method A groundwater cleanup level (Figure 7-15). The resistance of the saturated soil to the conduction of the electricity between the electrodes would result in heating of the soil and boiling of the groundwater, causing transfer of soil contaminants with boiling points below that of water into the vapor phase. A vacuum extraction system (wells and vacuum pump) would remove the vaporized contaminants, and the vapor phase would be treated prior to exhaust. Steam/liquids would be condensed and treated prior to discharge. Treatment of the vapor and liquid phases would be accomplished using thermal processes that destroy the contaminants. ERH treatment would be conducted for approximately 1 year.

Residual COC concentrations may remain following ERH treatment, and therefore the baseline alternative for groundwater assumes enhancement of natural biodegradation process as a polishing treatment to achieve groundwater cleanup levels. Enhanced biodegradation would be accomplished following post-ERH treatment rebound of microbial populations through injection of an oxygen-releasing compound during the cooling phase following active ERH. Oxygen-releasing compound would be injected during four events over the course of 1 year. Both ERH (with treatment of the recovered vapor stream) and enhanced biodegradation are treatment technologies that destroy or detoxify COCs. Following the active treatment phase, groundwater monitoring would be conducted for 4 years.

The baseline alternative for groundwater includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action, including collection of physical characteristics data to allow system design
3. Planning for temporary revisions to Port of Longview Mechanics yard operations
4. Decommissioning horizontal and vertical bioventing wells within the treatment area
5. Decommissioning and replacing groundwater monitoring wells located within the treatment area with wells that can accommodate the elevated soil temperatures and steam buildup
6. Upgrading of the electrical power supply to the site
7. Drilling and installing electrodes, temperature probes, and vapor extraction points
8. Wiring and installing temporary treatment compound
9. Heating and treating subsurface for approximately 1 year; collecting, treating, and sampling of condensed liquids as required; collecting, treating, and sampling of air emission as required
10. Shutting down and demobilizing equipment
11. Post-treatment temperature monitoring for approximately 1 year
12. Injecting oxygen-releasing chemical four times over 1 year, using push-probe injection technology
13. Groundwater monitoring for 4 years following the last injection event to verify achievement of cleanup levels
14. Closure reporting

Under this baseline alternative for groundwater, no COCs would remain in groundwater beneath the MFA at concentrations exceeding cleanup levels (MTCA Method C).

7.5.2 Alternative GW2 – Chemical Oxidation and Monitored Natural Attenuation

Alternative GW2 for groundwater consists of *in situ* chemical oxidation followed by MNA until cleanup levels are achieved (Figure 7-16). Chemical oxidation, most likely using persulfate or Fenton’s reagent (the FS assumes persulfate), would be performed during multiple injection events using temporary push-probe injection points or short-term injection wells throughout the area where DRO concentrations in groundwater exceed MTCA Method A cleanup levels. Push-probe technology may not be practical if soil solidification is selected as the soil alternative (Alternatives S5, S5A, S5B, and S5C), requiring the use of auger drilling for implementation of chemical oxidation. Oxidants would be injected during 4 events over a 2-year period. MNA would be implemented following chemical oxidation and would continue until cleanup levels are achieved, which is estimated to require 6 years. Chemical oxidation and MNA are treatment technologies that detoxify COCs through chemical processes that alter the COCs to less toxic or non-toxic chemicals.

Alternative GW2 for groundwater includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action
3. Planning for temporary revisions to Port of Longview maintenance yard operations
4. Injecting a chemical oxidant (e.g., persulfate) four times over 2 years
5. Groundwater performance and compliance monitoring for 6 years following the last injection event to monitor natural attenuation and verify achievement of cleanup levels
6. Closure reporting

Under Alternative GW2 for groundwater, no COCs would ultimately remain in groundwater beneath the MFA at concentrations exceeding cleanup levels (MTCA Method C). However, the treatment processes included under Alternative GW2 operate relatively slowly, and achievement of cleanup levels is expected to require several years (see Section 8).

7.5.3 Alternative GW3 – Active Biosparging

Alternative GW3 for groundwater consists of upgrading and continuing operation of the existing biosparging system installed below the Upper Silt within Aquifer A (Figure 7-17). The existing system is described in Section 3.2.6. This system has been demonstrated to reduce COC concentrations in groundwater. Alternative GW3 assumes a soil alternative is selected that treats or removes much of the DNAPL source at the site. With source treatment or removal accomplished, Alternative GW3 assumes that active biosparging would achieve further COC reductions in the groundwater. Additional vertical biosparging wells would be installed within the central portion of the COC plume east and north of the existing horizontal bioventing and sparging wells. Biosparging can be viewed as an alternative means (compared to injection of a chemical – Alternative GW2) of increasing the oxygen content in the aquifer and thereby enhancing natural biodegradation. Active biosparging would be performed for approximately 16 years. Following the active treatment phase, groundwater monitoring would be conducted for 4 years.

Biosparging, as a form of enhanced biodegradation, detoxifies COCs through biological processes that chemically alter the COCs to less toxic or non-toxic chemicals.

Alternative GW3 includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action, including the biosparging system upgrades and preparation of a work plan and long-term O&M plan
3. Planning for temporary revisions to Port of Longview maintenance yard operations
4. Reconstructing existing biosparging infrastructure after implementation of selected soil alternative
5. Installing additional vertical biosparging injection wells (Figure 7-17)
6. Installing new monitoring wells surrounding the treatment area to confirm radius of influence and other performance criteria
7. Operating, maintaining, and monitoring the biosparging system for approximately 16 years.
8. Shutting down and demobilizing equipment
9. Groundwater monitoring for 4 years following shutdown to verify achievement of cleanup levels
10. Closure reporting

Under Alternative GW3 for groundwater, no COCs would ultimately remain in groundwater beneath the MFA at concentrations exceeding cleanup levels (MTCA Method C). However, the treatment processes included under Alternative GW3 operate relatively slowly, and achievement of cleanup levels is expected to have a longer restoration time frame (see Section 8).

7.5.4 Alternative GW4 – Monitored Natural Attenuation

Alternative GW4 for groundwater consists of monitoring natural (unenhanced) attenuation of COCs in groundwater until cleanup levels are achieved (Figure 7-18). Alternative GW4 assumes that a soil alternative is selected that treats or removes much of the DNAPL source at the site. Site conditions appear to be favorable for unenhanced natural biodegradation as long as relatively lower COC concentrations are present. This groundwater alternative assumes that the previous remediation at the site, in combination with treatment or removal of DNAPL sources in soil would allow final groundwater treatment through natural processes to be effective in a reasonable timeframe (see restoration timeframe discussion in Section 8). Biodegradation is a treatment process that detoxifies COCs through biological process that chemically alter the COCs to less toxic or non-toxic chemicals. As part of the 5-year reviews to be performed for this groundwater alternative, a statistical analysis of groundwater monitoring results would be performed to assess whether groundwater concentrations are decreasing, stable, or increasing. If progress towards achieving the cleanup levels cannot be demonstrated, the need for implementing the contingent cleanup action would be assessed. The contingent cleanup action consists of *in situ* chemical oxidation, as described in Section 7.4.2.

Alternative GW4 for groundwater includes the following elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action
3. Installing new monitoring wells surrounding and within the treatment area to confirm efficacy
4. Groundwater monitoring for 30 years to verify achievement of cleanup levels
5. Closure reporting

Under Alternative GW4 for groundwater, no COCs would ultimately remain in groundwater beneath the MFA at concentrations exceeding the cleanup level (MTCA Method C Industrial). However, the treatment processes included under Alternative GW4 operate relatively slowly, and achievement of cleanup levels is expected to have a long restoration timeframe (see Section 8).

This section evaluates each of the soil and groundwater alternatives developed in Section 7 individually, using the criteria established by MTCA. WAC 173-340-360 requires first that all cleanup action alternatives evaluated meet the following four threshold requirements:

1. Protect human health and the environment
2. Comply with cleanup standards (WAC 173-340-700 through 760)
3. Comply with applicable state and federal laws (WAC 173-340-710)
4. Provide for compliance monitoring (WAC 173-340-410 and 720 through 760)

MTCA then requires that cleanup action alternatives that fulfill the threshold requirements also be evaluated against the following “other requirements” (WAC 173-340-360[2][b]):

5. Use permanent solutions to the maximum extent practicable by evaluating specific elements described in WAC 173-340-360(3)
6. Provide for a reasonable restoration time frame (WAC 173-340-360[4])
7. Consider public concerns (WAC 173-340-600)

This section individually evaluates each cleanup action alternative against criteria numbers 1 through 4, number 6, and number 7 (see Sections 8.1 and 8.2 and Table 8-1). Section 9 of this FS compares the cleanup action alternatives to one another by assessing their relative degrees of permanence (Criterion 5 above).

Further analysis of criterion number 7, public concerns, will be performed in the future CAP after public comment on this FS has been received. Public concerns received to date include the Port of Longview’s stated preference for alternatives that allow for foreseeable future uses, require less maintenance, and limits future costs associated with contaminated media left on site.

Although soil and groundwater alternatives are evaluated separately in the following sections, both a soil alternative and a groundwater alternative will be selected for the site. Furthermore, the selected soil alternative and the selected groundwater alternative would be implemented concurrently. By implementing the soil and groundwater alternatives concurrently, additional benefits and efficiencies would be realized.

8.1 EVALUATION OF SOIL ALTERNATIVES

8.1.1 Alternative S1 – Comprehensive Excavation (Baseline Alternative)

The evaluation of Alternative S1 (Baseline Alternative) using MTCA criteria is summarized in Table 8-1. The baseline alternative for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by excavating and landfilling or treating off site all soil located above the Upper Silt containing NAPL or COCs at concentrations exceeding the cleanup level. This soil alternative meets the requirements under MTCA that treatment or removal of sources would be conducted for liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions. This soil alternative complies with the anticipated final cleanup standards by removing soil sources located above the Upper Silt containing NAPL or COC concentrations exceeding MTCA Method C cleanup levels. However, this alternative does not meet Ecology's expectation that treatment technologies will be emphasized at sites containing liquid wastes and areas contaminated with high concentrations of hazardous substances (WAC 173-340-370(1)). This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt. The baseline alternative for soil complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for excavation, disposal, and site restoration. This soil alternative provides compliance monitoring by including post-excavation sampling to demonstrate that soil remaining on site following implementation of the action meets the cleanup standards. The baseline alternative for soil provides a reasonable restoration timeframe by removing all soil sources located above the Upper Silt containing NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 2 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, excavation, and site restoration.

8.1.2 Alternative S2 – Comprehensive Excavation Outside Building Footprint

The evaluation of Alternative S2 using MTCA criteria is summarized in Table 8-1. Alternative S2 for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by excavating and landfilling or treating off-site soil located above the Upper Silt containing NAPL or COCs at concentrations exceeding the cleanup level and which is accessible outside the building footprint. However, this alternative does not meet Ecology's expectation that treatment technologies will be emphasized at sites containing liquid wastes and areas contaminated with high concentrations of hazardous substances (WAC 173-340-370(1)). This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the building for the direct contact pathway. The vapor intrusion study found no unacceptable risks for the vapor intrusion pathway under current conditions. Therefore, this soil alternative is protective of human health via this pathway.

This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions. The presence of the building overlying residual COCs in soil and the foundation retaining wall along the northeast building perimeter contains this residual source by significantly limiting water infiltration that could mobilize COCs from this soil to groundwater below the Upper Silt, as they do under the existing conditions at the site. Furthermore, COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. This constitutes an empirical demonstration that even under current conditions little leaching to groundwater has occurred. Removal of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater. The Upper Silt would limit migration of COCs from soil above the Upper Silt to groundwater below, as is also true for Alternatives S3 through S5. Further assessment of the feasibility of removing the residual COC concentrations in soil beneath the building is performed in Section 9 of this document.

Alternative S2 complies with the anticipated final cleanup levels by removing soil located above the Upper Silt outside the building footprint or containing soil under the Mechanics Shop building exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for excavation, disposal, and site restoration. This soil alternative provides compliance monitoring by including post-excavation sampling to demonstrate that soil remaining in the area of excavation following implementation of the action meets the cleanup standards. Alternative S2 for soil provides a reasonable restoration timeframe by removing soil sources located above the Upper Silt outside the building footprint or containing soil under the Mechanics Shop building containing NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 2 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, excavation, and site restoration.

8.1.3 Alternative S3 – DNAPL Excavation Outside Building Footprint

The evaluation of Alternative S3 using MTCA criteria is summarized in Table 8-1. Alternative S3 for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by excavating and landfilling or treating off-site soil located above the Upper Silt containing NAPL that is accessible outside the building footprint and capping soil containing COCs at concentrations exceeding the cleanup level. However, this alternative does not meet Ecology’s expectation that treatment technologies will be emphasized at sites containing liquid wastes and areas contaminated with high concentrations of hazardous substances (WAC 173-340-370(1)). This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the building and the existing asphalt paved area in the northern part of the maintenance yard for the direct contact pathway. The vapor intrusion study found no unacceptable risks for the vapor intrusion pathway under current conditions. Therefore, this soil alternative is protective of human health via this pathway.

This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions. The presence of the existing asphalted paved area and building overlying the residual COCs in soil and the foundation retaining wall along the northeast building perimeter would limit water infiltration that could mobilize COCs from this soil to groundwater below the Upper Silt, as they do under the existing conditions at the site. COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. This constitutes an empirical demonstration that even under current conditions little leaching to groundwater has occurred. Removal of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater. Further assessment of the feasibility of removing the residual COC concentrations in soil beneath the building is performed in Section 9 of this document.

Alternative S3 complies with the anticipated final cleanup standards by removing soil located above the Upper Silt outside the building footprint or containing soil under the Mechanics Shop building and existing asphalt paved area in the northern part of the maintenance yard exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for excavation, disposal, and site restoration. This soil alternative provides compliance monitoring by including post-excavation sampling to demonstrate that soil remaining in the area of excavation following implementation of the action meets cleanup levels. Alternative S2 for soil provides a reasonable restoration timeframe by removing soil located above the Upper Silt outside the building footprint or containing soil under the Mechanics Shop building and existing asphalt paved area in the northern part of the maintenance yard containing NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 2 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, excavation, and site restoration.

8.1.4 Alternative S4 – DNAPL Excavation Outside Building Footprint, Limited Excavation Inside

The evaluation of Alternative S4 using MTCA criteria is summarized in Table 8-1. Alternative S4 for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by excavating and landfilling or treating off-site soil located above the Upper Silt containing NAPL that is accessible outside and inside the building footprint without demolishing the building itself, and by capping soil containing COCs at concentrations exceeding the cleanup level. However, this alternative does not meet Ecology's expectation that treatment technologies will be emphasized at sites containing liquid wastes and areas contaminated with high concentrations of hazardous substances (WAC 173-340-370(1)). This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the building and the existing asphalt paved area for the direct contact pathway. The vapor intrusion study found no unacceptable risks for the vapor intrusion pathway under current conditions. Therefore, this soil alternative is protective of human health via this pathway.

This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions. The presence of the building overlying the residual COCs in soil and the foundation retaining wall along the northeast building perimeter contains this residual source by significantly limiting water infiltration that could mobilize COCs from this soil to groundwater below the Upper Silt, as they do under the existing conditions at the site. COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. This constitutes an empirical demonstration that even under current conditions little leaching to groundwater has occurred. Removal of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater.

Alternative S4 complies with the anticipated final cleanup standards by removing soil located above the Upper Silt outside the building footprint or containing soil under the Mechanics Shop building and existing asphalt paved area in the northern part of the maintenance yard exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for excavation, disposal, and site restoration. This soil alternative provides compliance monitoring by including post-excavation sampling to demonstrate that soil remaining in the area of excavation following implementation of the action meets the cleanup standards. Alternative S4 for soil provides a reasonable restoration timeframe by removing soil located above the Upper Silt outside the building footprint or containing soil under the Mechanics Shop building and existing asphalt paved area in the northern part of the maintenance yard exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 2 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, excavation, and site restoration.

8.1.5 Alternative S5 – Solidification Outside Building Footprint

The evaluation of Alternative S5 using MTCA criteria is summarized in Table 8-1. Alternative S5 for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by solidifying soil located in the Upper Sand and the top foot of the Upper Silt containing NAPL or COCs at concentrations exceeding the cleanup level and which is accessible outside the building footprint. This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the solidified soil and the residual COC concentrations in soil remaining below the top foot of the Upper Silt and beneath the building for the direct contact pathway. The vapor intrusion study found no unacceptable risks for the vapor intrusion pathway under current conditions. Therefore, this soil alternative is protective of human health via this pathway.

This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions. The presence of the building and the foundation retaining wall along the northeast building perimeter overlying and around the residual, unsolidified COCs in soil contains this residual source by significantly limiting water infiltration that could mobilize COCs from this soil to groundwater below the Upper Silt, as they do under the existing conditions at the site. COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. This constitutes an empirical demonstration that even under current conditions little leaching to groundwater has occurred. Treatment of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater.

Alternative S5 complies with anticipated final cleanup levels by solidifying soil located in the Upper Sand and the top foot of the Upper Silt or containing soil under the Mechanics Shop building exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for demolition, solidification, and site restoration. This soil alternative provides compliance monitoring by including long-term monitoring of leachate and physical performance testing of solidified soil. This soil alternative provides a reasonable restoration timeframe by solidifying soil located in the Upper Sand and the top foot of the Upper Silt or containing soil under the Mechanics Shop building exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 2 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, solidification, and site restoration.

8.1.6 Alternative S5A – Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop

The evaluation of Alternative S5A using MTCA criteria is summarized in Table 8-1. Alternative S5A for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by solidifying soil located in the Upper Sand and the top foot of the Upper Silt containing NAPL or COCs at concentrations exceeding the cleanup level and which is accessible outside the building footprint. Within the northeastern portion of the building footprint, this soil alternative uses DNAPL recovery to reduce the volume of DNAPL present in this area. This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the solidified soil and the residual COC concentrations in soil remaining below the top foot of the Upper Silt and beneath the building for the direct contact pathway. The vapor intrusion study found no unacceptable risks for the vapor intrusion pathway under current conditions. Therefore, this soil alternative is protective of human health via this pathway.

This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions. The presence of the building and the foundation retaining wall along the northeast building perimeter overlying and around the residual, unsolidified COCs and DNAPL in soil contains this residual source by significantly limiting water infiltration that could mobilize COCs from this soil to groundwater below the Upper Silt, as they do under the existing conditions at the site. COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. This constitutes an empirical demonstration that even under current conditions little leaching to groundwater has occurred. Treatment of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater.

Alternative S5A complies with anticipated final cleanup levels by solidifying soil located in the Upper Sand and the top foot of the Upper Silt or containing soil under the Mechanics Shop building exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels.

This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for demolition, DNAPL recovery, solidification, waste disposition, and site restoration. This soil alternative provides compliance monitoring by including long-term monitoring of leachate and physical performance testing of solidified soil. This soil alternative provides a reasonable restoration timeframe by recovering DNAPL, solidifying soil located in the Upper Sand and the top foot of the Upper Silt, or containing soil under the Mechanics Shop building exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 5 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, DNAPL recovery, solidification, and site restoration.

8.1.7 Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks

The evaluation of Alternative S5B using MTCA criteria is summarized in Table 8-1. Alternative S5B for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by solidifying soil located in the Upper Sand and the top foot of the Upper Silt containing NAPL or COCs at concentrations exceeding the cleanup level. This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the solidified soil and the residual COC concentrations in soil remaining below the top foot of the Upper Silt for the direct contact pathway. This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions. Treatment of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater.

Alternative S5B complies with anticipated final cleanup levels by solidifying soil located in the Upper Sand and the top foot of the Upper Silt exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for demolition, solidification, and site restoration. This soil alternative provides compliance monitoring by including long-term monitoring of leachate and physical performance testing of solidified soil. This soil alternative provides a reasonable restoration timeframe by solidifying soil located in the Upper Sand and the top foot of the Upper Silt containing NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 2 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, solidification, and site restoration.

8.1.8 Alternative S5C – Solidification Outside Building Footprint, Electrical Resistance Heating Treatment under Mechanics Shop

The evaluation of Alternative S5C using MTCA criteria is summarized in Table 8-1. Alternative S5C for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by solidifying soil located in the Upper Sand and the top foot of the Upper Silt containing NAPL or COCs at concentrations exceeding the cleanup level and which is accessible outside the building footprint. This soil alternative uses ERH beneath the northeastern portion of the building and adjacent to the northeastern portion of the building to drive COCs from soil located in the Upper Sand and the Upper Silt and capture and destroy the mobilized COCs. This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the solidified soil and the residual COC concentrations in soil remaining below the top foot of the Upper Silt outside the building footprint for the direct contact pathway. This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions.

Alternative S5C complies with anticipated final cleanup levels by solidifying or treating soil located in the Upper Sand and the Upper Silt exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for demolition, solidification, ERH, COC capture and treatment, waste disposition, and site restoration. This soil alternative provides compliance monitoring by including long-term monitoring of leachate and physical performance testing of solidified soil and by including post-treatment verification soil sampling for ERH-treated soil. This soil alternative provides a reasonable restoration timeframe by treating soil located in the Upper Sand and the Upper Silt containing NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 3 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, demolition, solidification, installation of ERH electrodes and treatment system, treatment time, and site restoration.

8.1.9 Alternative S6 – DNAPL Treatment by Electrical Resistance Heating

The evaluation of Alternative S6 using MTCA criteria is summarized in Table 8-1. Alternative S6 for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by driving COCs from DNAPL-contaminated soil located in the Upper Sand and the Upper Silt using *in situ* thermal treatment, capturing and destroying the COCs, and preserving the existing asphalt paved area over untreated portions of the site. This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the residual COC concentrations in soil remaining beneath the existing asphalt paved area for the direct contact pathway. This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions.

Alternative S6 complies with the anticipated final cleanup levels by treating soil in the Upper Sand and the Upper Silt or containing soil under the existing asphalt paved area in the northern part of the maintenance yard exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying

ARARs as part of the action and complying with those ARARs for demolition, ERH, COC capture and treatment, waste disposition, and site restoration. This soil alternative provides compliance monitoring by including post-treatment verification soil sampling. This soil alternative provides a reasonable restoration timeframe by treating soil located in the Upper Sand and the Upper Silt containing NAPL, and containing COC concentrations exceeding MTCA Method C cleanup levels in soil located under the existing asphalt paved area in the northern part of the maintenance yard within approximately 3 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, installation of ERH electrodes and treatment system, treatment time, and site restoration.

8.1.10 Alternative S7 – DNAPL Excavation and Electrical Resistance Heating

The evaluation of Alternative S7 using MTCA criteria is summarized in Table 8-1. Alternative S7 for soil meets the threshold requirements of WAC 173-340-360. This soil alternative protects human health and the environment by excavating and landfilling or treating off-site soil located above the Upper Silt containing NAPL or COCs at concentrations exceeding the cleanup level which is accessible outside the building footprint. Within the building footprint, this soil alternative uses ERH beneath the northeastern portion of the building to drive COCs from soil located in the Upper Sand and the Upper Silt and capture and destroy the mobilized COCs. This soil alternative uses the restrictive environmental covenant on the property (required for use of MTCA Method C cleanup levels) to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the existing asphalt paved area for the direct contact pathway. This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat or remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]) for groundwater cleanup actions.

Alternative S7 complies with the anticipated final cleanup standards by removing NAPL and COCs from soil in the Upper Sand (and the Upper Silt beneath the building footprint) to MTCA Method C cleanup levels. This soil alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for demolition, excavation, ERH, COC capture and treatment, waste disposition, and site restoration. This soil alternative provides compliance monitoring by including post-excavation sampling and post-treatment verification soil sampling in the area where ERH is used. This soil alternative provides a reasonable restoration timeframe by removing soil sources located above the Upper Silt (outside of the building footprint), treating soil located in the Upper Sand and the Upper Silt (beneath the building footprint), and containing soil located under the existing asphalt paved area in the northern part of the maintenance yard exhibiting NAPL or COC concentrations exceeding MTCA Method C cleanup levels within approximately 3 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, excavation, installation of ERH electrodes and treatment system, treatment time, and site restoration.

8.2 EVALUATION OF GROUNDWATER ALTERNATIVES

This evaluation of groundwater alternatives assumes that the selected groundwater alternative will be implemented along with one of the soil alternatives evaluated in Section 8.1. This analysis assumes that the companion soil alternative selected meets the requirements under MTCA that treatment or removal of the source of the release will be conducted for liquid wastes and areas contaminated with high concentrations of hazardous substances (WAC 173-340-360(2)[c][ii][A]). All evaluated groundwater alternatives are considered protective because the residual source in soil would be treated, removed, or contained. However, the groundwater alternatives vary substantially in their estimated restoration timeframes.

None of the groundwater alternatives evaluated under this section include active hydraulic control of groundwater containing COCs (WAC 173-340-360(2)[c][ii][B]). Treatment or removal of the residual COC source in soil by implementation of the selected soil alternative is expected to prevent the future dissolution of COCs into groundwater. As discussed in Section 3.2.6, the extent and concentrations of COCs in groundwater decreased during operation of the biosparging system, and since shutdown of the system, no significant rebound in COC concentrations has been evident. The empirical evidence from the site, including low residual COC concentrations currently present in groundwater and the absence of a residual source in soil, indicates that COC migration at unacceptable concentrations is very unlikely. Buildings, pavement, and treatment of soil located above groundwater are all expected to act as a barrier to infiltration to prevent vertical and lateral expansion of the groundwater plume. Monitoring of sentinel wells is included in all groundwater alternatives to verify this conclusion (WAC 173-340-740(6)(f) – point of compliance).

8.2.1 Alternative GW1 – Electrical Resistance Heating and Enhanced Biodegradation (Baseline Alternative)

The evaluation of Alternative GW1 using MTCA criteria is summarized in Table 8-1. The baseline alternative for groundwater (Alternative GW1) meets the threshold requirements of WAC 173-340-360. This groundwater alternative protects human health and the environment through *in situ* treatment of groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup level. This groundwater alternative uses ERH as the primary groundwater treatment to drive COCs from groundwater and capture and destroy the COCs. Enhanced biodegradation would be used as a follow-up to ERH to treat residual COCs in groundwater. The baseline alternative for groundwater complies with the anticipated final cleanup standards by treating or removing COCs from groundwater within the conditional POC boundary to MTCA Method C cleanup levels. Treatment within this boundary would reduce the residual source concentration and thereby greatly reduce the potential for migration of COCs beyond the conditional POC at concentrations exceeding MTCA Method B cleanup levels. This groundwater alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for demolition, ERH, COC capture and treatment, waste disposition, underground injection, and site restoration. This groundwater alternative provides compliance monitoring by including post-treatment groundwater monitoring.

This groundwater alternative provides a reasonable restoration timeframe by treating groundwater containing COC concentrations exceeding MTCA Method C cleanup levels within approximately 6 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, installation of the ERH system, expected ERH treatment time, expected biodegradation treatment time, and site restoration. COC concentrations in groundwater are currently near or below the anticipated cleanup levels. Treatment or removal of the residual COC source in soil by implementation of the selected soil alternative is expected to prevent the future dissolution of COCs into groundwater. The baseline alternative for groundwater would rapidly treat the higher COC concentrations in the vicinity of AV-10 and eliminate the currently observed fluctuations above and below the cleanup levels for some COCs at some monitoring wells. Enhanced biodegradation is included as a polishing step if residual COC concentrations remain at some locations. Because COC concentrations in groundwater are expected to be low following ERH treatment, any enhanced biodegradation polishing treatment is expected to be minimal and of short duration under this groundwater alternative (approximately 1 year).

8.2.2 Alternative GW2 – Chemical Oxidation and Monitored Natural Attenuation

The evaluation of Alternative GW2 using MTCA criteria is summarized in Table 8-1. Alternative GW2 for groundwater meets the threshold requirements of WAC 173-340-360. This groundwater alternative protects human health and the environment through *in situ* treatment of groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup level. This groundwater alternative involves chemical oxidation using persulfate or Fenton’s reagent as the primary groundwater treatment, with MNA to reduce any residual COCs in groundwater. Alternative GW2 for groundwater complies with the anticipated final cleanup standards by removing COCs from groundwater within the conditional POC boundary to MTCA Method C cleanup levels. Treatment within this boundary would reduce the residual source concentration and thereby reduce the potential for migration of COCs beyond the conditional POC at concentrations exceeding MTCA Method B cleanup levels. This groundwater alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for underground injection and associated activities. This groundwater alternative provides compliance monitoring by including groundwater monitoring during and after treatment.

Alternative GW2 provides a reasonable restoration timeframe by treating groundwater containing COC concentrations exceeding MTCA Method C cleanup levels within approximately 7 years of approval of the CAP. This estimate of restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, expected biodegradation treatment time, and expected MNA time. COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. Treatment or removal of the residual COC source in soil by implementation of the selected soil alternative is expected to prevent the future dissolution of COCs into groundwater. Chemical oxidation under this groundwater alternative would treat the residual COCs in groundwater, reducing the higher concentrations of COCs in the vicinity of AV-10 and eliminating the minor fluctuations in COCs above cleanup levels noted in the vicinity of other monitoring wells within the MFA. MNA would be used as a polishing step to achieve MTCA Method C cleanup levels in groundwater.

Estimation of expected restoration timeframe using MNA is complicated by the effects the biosparging system has had on geochemical parameters Aquifer conditions in the absence of biosparging system operation cannot be reasonably modeled based on available data because the majority of the site groundwater monitoring has been conducted during active biosparging system operation. The addition of oxygen to the subsurface via the biosparging system has demonstrated that biodegradation occurs at the site, but that more than 6 years is required to achieve cleanup levels. The restoration timeframe under this groundwater alternative would likely be longer than the restoration timeframe under the baseline alternative, but is very likely to be shorter than the restoration timeframe using active biosparging (Alternative GW3) or MNA alone (Alternative GW4). Therefore, the restoration timeframe for Alternative GW2 has been estimated at 7 years.

8.2.3 Alternative GW3 – Active Biosparging

The evaluation of Alternative GW3 using MTCA criteria is summarized in Table 8-1. Alternative GW3 for groundwater meets the threshold requirements of WAC 173-340-360. This groundwater alternative protects human health and the environment through *in situ* treatment of groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup level. This groundwater alternative uses active biosparging to enhance biodegradation of COCs in groundwater. Alternative GW3 for groundwater complies with the anticipated final cleanup standards by treating or removing COCs from groundwater within the conditional POC boundary to MTCA Method C cleanup levels. Treatment within this boundary would reduce the residual source concentration and thereby reduce the potential for migration of COCs beyond the conditional POC at concentrations exceeding MTCA Method B cleanup levels. This groundwater alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs for underground air injection. This groundwater alternative provides compliance monitoring by including groundwater monitoring during and after treatment.

Alternative GW3 provides a reasonable restoration timeframe by treating groundwater containing COC concentrations exceeding MTCA Method C cleanup levels within approximately 20 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, and expected biodegradation treatment time. COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. Treatment or removal of the residual COC source in soil by implementation of the selected soil alternative is expected to prevent the future dissolution of COCs into groundwater. Continued biosparging under this groundwater alternative would treat the residual COCs in groundwater by reducing the higher COC concentrations in the vicinity of AV-10 and eliminating the minor fluctuations in COCs above cleanup levels noted in the vicinity of other monitoring wells within the MFA.

Previous operation of the biosparging system has demonstrated that this technology is an effective means of stimulating hydrocarbon-degrading bacteria and thus enhancing biodegradation. However, the low residual COC concentrations remaining in groundwater are typically the most difficult to treat using any remediation technology, and biosparging appears to have reached its practical endpoint. Significant COC concentrations in groundwater have not been detected over the last 4 years of biosparging operation, implying that achieving COC concentrations consistently below the anticipated cleanup levels would take longer than an additional 4 years. COC concentration trends in monitoring wells located near the biosparging wells cannot meaningfully be extrapolated into the future to provide a reliable restoration timeframe under conditions of continued operation. The restoration timeframe under this groundwater alternative would likely be longer than the restoration timeframe under the baseline alternative or Alternative GW2, but shorter than the restoration timeframe using MNA (Alternative GW4). Therefore, the restoration timeframe for Alternative GW3 has been estimated as 20 years.

8.2.4 Alternative GW4 – Monitored Natural Attenuation

The evaluation of Alternative GW4 using MTCA criteria is summarized in Table 8-1. Alternative GW4 for groundwater meets the threshold requirements of WAC 173-340-360. This groundwater alternative protects human health and the environment through *in situ* treatment of groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup level. This groundwater alternative uses MNA to demonstrate biodegradation of COCs in groundwater. If progress towards the remediation goals cannot be demonstrated during the 5-year reviews, then the need for implementation of the contingent cleanup action (i.e., chemical oxidation) would be assessed. Alternative GW4 for groundwater complies with the anticipated final cleanup standards by treating or removing COCs from groundwater within the conditional POC boundary to MTCA Method C cleanup levels. This groundwater alternative complies with state and federal laws by identifying ARARs as part of the action and complying with those ARARs. This groundwater alternative provides compliance monitoring by including groundwater monitoring during the course of MNA and after cleanup levels have been achieved to demonstrate that rebound does not occur. This groundwater alternative provides a reasonable restoration timeframe by reducing COC concentrations to MTCA Method C cleanup levels within approximately 30 years of approval of the CAP. This restoration timeframe is based on best engineering judgment by comparing the proposed action to similar actions and considering the likely lead times for design, permitting, coordination of revisions to Port of Longview operations, and expected MNA time frame.

As discussed in Section 8.2.2 for Alternative GW2, estimation of expected restoration timeframe using MNA is complicated by the effects the existing biosparging system operation has had on the monitoring data. However, assuming that upgradient monitoring well, LL-01.15, is representative of background conditions, it appears that the aquifer conditions in the absence of contamination are favorable for biodegradation. Monitoring data from this upgradient monitoring well has shown DO concentrations at 8 mg/L, well above the DO concentration considered favorable for biodegradation (e.g., 1 to 2 mg/L). Under these aquifer conditions, natural biodegradation is expected to be a substantial mechanism of natural attenuation at the site, especially on the plume boundary, with overall reduction of the plume expected over time. The restoration timeframe under this groundwater alternative would be longer than the restoration timeframe under any of the other groundwater alternatives; however, the native aquifer conditions show that the restoration timeframe is reasonable. The restoration timeframe for Alternative GW4 has been estimated at 30 years.

8.2.5 Additional MTCA Requirements For Natural Attenuation

Under WAC 173-340-370(7), natural attenuation of hazardous substances may be appropriate where:

> *a. Source control (including removal and/or treatment of hazardous substances) has been conducted to the maximum extent practicable;*
>
> *b. Leaving contaminants on site during the restoration timeframe does not pose an unacceptable threat to human health or the environment;*
>
> *c. There is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the site; and*
>
> *d. Appropriate monitoring requirements are conducted to ensure that the natural attenuation process is taking place and that human health and the environment are protected"*

Alternative GW4 would only be implemented along with one of the soil alternatives assessed in this FS and which has been found to meet the requirement of source control to the maximum extent practicable.

Under Alternative GW4, groundwater containing COCs at concentrations exceeding MTCA Method C cleanup levels during the restoration timeframe would remain beneath property controlled by the Port of Longview. The MFA property would be subject to a restrictive environmental covenant limiting the land use to industrial and prohibiting the use of groundwater. This prohibition, maintained by a legal restriction on property owned by a government entity, would effectively prevent exposure to COCs in groundwater. Groundwater is not needed on site a as a drinking water source because municipal water is available. Monitoring of sentinel wells would ensure that COCs in groundwater do not migrate beyond the on-property, conditional POC at concentrations above MTCA Method B cleanup levels, which are protective of human health and the environment.

The presence of hydrocarbon-degrading bacteria in the aquifer at the site has been demonstrated through laboratory testing, and field measurements of geochemical parameters indicate that native aquifer conditions are favorable for on-going biodegradation.

Alternative GW4 includes monitoring to document on-going biodegradation and continued protection of human health and the environment.

This section selects preferred cleanup action alternatives by comparing the relative degree of permanence of the cleanup action alternatives. MTCA requires that the cleanup action alternative for a site use permanent solutions to the maximum extent practicable, as evaluated by performing a disproportionate cost analysis (WAC 173-340-360[3][e][ii][A]). In this analysis, the cleanup action alternatives are ranked from most to least permanent, based on the evaluation of the alternatives using the following specific criteria (WAC 173-340-360[3][f]):

1. Protectiveness (WAC 173-340-360[3][f][i]) – Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality.
2. Permanence (WAC 173-340-360[3][f][ii]) – The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.
3. Cost (WAC 173-340-360[3][f][iii]) – The cost to implement the alternative, including the cost of construction, the net present value of any long-term costs, and agency oversight costs that are cost recoverable. Long-term costs include O&M costs, monitoring costs, equipment replacement costs, and the cost of maintaining institutional controls. Cost estimates for treatment technologies shall describe pretreatment, analytical, labor, and waste management costs. The design life of the cleanup action shall be estimated and the cost of replacement or repair of major elements shall be included in the cost estimate.
4. Effectiveness over the long term (WAC 173-340-360[3][f][iv]) – Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes. The following types of cleanup action components may be used as a guide, in descending order, when assessing the relative degree of long-term effectiveness: reuse or recycling; destruction or detoxification; immobilization or solidification; on-site or off-site disposal in an engineered, lined and monitored facility; on-site isolation or containment with attendant engineering controls; and institutional controls and monitoring.
5. Management of short-term risks (WAC 173-340-360[3][f][v]) – The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.
6. Technical and administrative implementability (WAC 173-340-360[3][f][vi]) – Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary off-site facilities, services and

materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential cleanup actions.

7. Consideration of public concerns (WAC 173-340-360[3][f][vii]) – Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site. This final requirement is evaluated based on comments received from the Port of Longview on submitted documents. Further analysis of this criterion will be performed in the future CAP after public comment on this FS has been received.

The relevance of each of these criteria varies on a site-by-site basis. The ranked alternatives are compared against the baseline alternative, which is the most permanent alternative being considered. The test used to evaluate the ranked alternatives is given in MTCA as:

> ***Test**. Costs are disproportionate to benefits if the incremental costs of the alternative over that of a lower cost alternative exceed the incremental degree of benefits achieved by alternative over that of the lower cost alternative (WAC 173-340-360[3][e][i]).*

The term "disproportionate" implies that the degree of exceedance of incremental costs to incremental benefits must be substantial. MTCA further clarifies the disproportionate cost analysis as follows:

> *The comparison of benefits and costs may be quantitative, but will often be qualitative and require the use of best professional judgment. In particular, the department has the discretion to favor or disfavor qualitative benefits and use that information in selecting a cleanup action. Where two or more alternatives are equal in benefits, the department shall select the less costly alternative provided the requirements of subsection (2) of this section are met (WAC 173-340-360[3][e][ii][C]).*

At environmental sites, quantitative comparisons of cost versus benefit typically must compare cost in dollars against non-monetary measures of benefits (such as mass or volume of contaminant removed). One approach to measuring benefit, used in this FS, is to estimate the amount and rate of contaminant reduction using each cleanup action alternative. These quantitative estimates of benefit are used in Sections 9.1.1, 9.1.2, 9.1.3, 9.2.1, 9.2.2, and 9.2.3, along with quantitative estimates of the cost of each cleanup action alternative, to assess protectiveness, permanence, and cost (criteria 1, 2 and 3 above). The remaining criteria were assessed in a qualitative manner, as allowed under MTCA (WAC 173-340-360[3][e][ii][C]), using best professional judgment.

This evaluation is organized by medium and criterion. Under the subheading for each criterion, all cleanup action alternatives are compared based on that criterion. The alternatives are listed in

Table 7-1, and the elements of the soil and groundwater alternatives are summarized in Tables 7-2 and 7-3, respectively, to facilitate comparison.

9.1 COMPARISON OF SOIL ALTERNATIVES

This section compares soil alternatives for selection under MTCA requirements to use permanent solutions to the maximum extent practicable. The procedure for determining whether a cleanup action uses permanent solutions to the maximum extent practicable is provided in detail in this section. It includes a “disproportionate cost analysis” (DCA) and a comparative evaluation of the following seven criteria in WAC 173-340-360(f):

- Protectiveness
- Permanence
- Cost
- Effectiveness over the long term
- Management of short-term risks
- Technical and administrative implementability
- Consideration of public concerns

The DCA compares the relative costs and benefits of all the soil alternatives which are listed below:

Alternative S1 –	Comprehensive Excavation (Baseline Alternative)
Alternative S2 –	Comprehensive Excavation Outside Building Footprint
Alternative S3 –	DNAPL Excavation Outside Building Footprint
Alternative S4 –	DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
Alternative S5 –	Solidification Outside Building Footprint
Alternative S5A –	Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
Alternative S5B –	Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
Alternative S5C –	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
Alternative S6 –	DNAPL Treatment by Electrical Resistance Heating
Alternative S7 –	DNAPL Excavation and Electrical Resistance Heating

9.1.1 Protectiveness

The comparative protectiveness of the 10 soil alternatives is evaluated in this section by comparing the overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, the time required to reduce risk at the facility and attain cleanup standards, the on-site and off-site risks resulting from implementing the soil alternative, and the improvement of the overall environmental quality.

9.1.1.1 Quantitative Protectiveness Evaluation Component

A key element of the comparative protectiveness evaluation is captured by a quantitative comparison of the relative protectiveness and permanence (see Section 9.1.2) of each soil alternative against the relative cost of each soil alternative. In this analysis, the degree of risk reduction achieved by each soil alternative is evaluated by considering an estimate of contaminant removed or stabilized in soil by each alternative as a surrogate measure of risk reduction, and therefore the "benefit" of each soil alternative. Two separate measures of benefit were used to evaluate the ten soil alternatives; they are as follows:

- DNAPL volume in gallons
- Mass of COCs in pounds

The volume of DNAPL removed or stabilized by each soil alternative, which is one measure of evaluating the benefit, was estimated and compared to the total soil alternative cost. A graph showing cost versus DNAPL volume for each soil alternative is provided in Appendix J. The second measure used to determine benefit was the mass of COCs removed or stabilized by each soil alternative. The mass was estimated in pounds for each soil alternative and also compared to the total soil alternative cost as shown in a graph provided in Appendix J. Calculations of the estimated DNAPL volume and total COC mass (other than DNAPL) removal or solidification above the Upper Silt by each soil alternative are provided in Appendix I. Solidification and ERH treatment would address additional contaminated soil located in the Upper Silt. Therefore, additional benefits would be obtained by solidification or ERH treatment compared to the excavation alternatives. The estimated cost to implement each soil alternative is shown in Table 9-1, with backup materials in Appendix J.

To effectively compare the benefit of each soil alternative against the cost of each soil alternative, the calculated numerical values of the benefit (DNAPL and COC mass) and cost data (e.g., the estimated cost of each soil alternative in dollars), were mathematically converted to unitless relative benefits and costs using a calculation method described as follows. This conversion calculates the estimated incremental change in benefit and cost of each soil alternative relative to the lowest and highest benefit/cost alternatives (WDOE 2007). The resulting unitless relative benefit (DNAPL and COC mass) and cost values range between zero and one for each soil alternative, as shown on Table 9-2. The unitless values of benefit for DNAPL and COC mass are plotted relative to total soil alternative cost to directly compare each alternative (see Figure 9-1). In general, the alternative that plots the furthest below (bottom right corner of the graph) the reference line is considered to have the greatest benefit for the cost. Any two alternatives plotted on the graph can be directly compared by evaluating the slope of a line connecting the two data points to determine whether the incremental change in cost as a fraction of the total cost range is greater to or less than the incremental change in benefit. The equations for calculating the relative cost and benefit values are shown in the graphic below.

Unitless Cost Versus Benefit Calculation

Terms:

$C_{S1}\ldots C_{S7}$ – Total estimated cost of each alternative, S1 through S7
MinCOST – The cost of the lowest cost alternative
MaxCOST – The cost of the highest cost alternative
$RelC_{S1}\ldots RelC_{S7}$ – The calculated relative cost of each alternative, S1 through S7

$B_{S1}...B_{S7}$ – Total estimated benefit (as defined in the text) of each alternative, S1 through S7
MinBEN – The benefit of the lowest benefit alternative
MaxBEN – The benefit of the highest benefit alternative
$RelB_{S1}\ldots RelB_{S7}$ – The calculated relative benefit of each alternative, S1 through S7

Equations for Relative Cost and Benefit of Each Alternative (Alternative S1 used as an example):

$$RelC_{S1} = \frac{[C_{S1} - MinCOST]}{[MaxCOST - MinCOST]} \qquad RelB_{S1} = \frac{[B_{S1} - MinBEN]}{[MaxBEN - MinBEN]}$$

The graphical presentation of the results of this relative cost versus benefit analysis (Figure 9-1) shows that Alternative S5B – is the most favorable soil alternative considering either the benefit of removed/stabilized DNAPL or COC mass. Alternative S5B achieves 100 percent of the benefit achieved by the baseline soil alternative (both when benefit is measured as DNAPL removal and COC mass removal in the Upper Sand) but at a lower cost. Figure 9-1 also illustrates that the costs of implementing any soil alternative other than Alternative S5B are disproportionate compared to Alternative S5B. The data point for Alternative S5B is below any 1:1 reference lines from the other alternatives. If a line were drawn between the data point for Alternative S5B to the data points for all other soil alternatives all have slopes much steeper than 1.0, indicating substantially greater costs for relatively little additional benefit under each of the other soil alternatives.

Figure 9-1 can also be used to compare the relative costs and benefits between other soil alternatives. For example, Alternative S1 is more favorable than Alternative S2 because the data points for these two soil alternatives fall on a line with a slope of approximately 1.0 when comparing the relative mass benefit and on a line with a slope less than 1.0 when comparing relative DNAPL benefit. This indicates that the additional cost of Alternative S1 results in a comparable increase in incremental benefit – the additional cost to implement Alternative S1 over Alternative S2 is *not* disproportionate. In contrast, the costs to implement Alternatives S1, S2, or S7 are considerably disproportionate to the costs to implement either Alternative S5A or S5C. Relative to the benefit of COC mass Alternative S5 and S5A are the next two most favorable soil alternatives based on the relative position of the data points for these alternatives on Figure 9-1.

9.1.1.2 *Qualitative Protectiveness Evaluation Component*

The degree to which existing risks are reduced by each soil alternative, the on-site risks resulting from implementing each soil alternative, and improvement of the overall environmental quality under each soil alternative, are evaluated quantitatively in Section 9.1.1.1 as relative “benefit.” Other components of the comparative protectiveness evaluation are largely qualitative and are discussed below.

The estimated time required for each soil alternative to reduce risk at the facility and attain cleanup standards does not vary greatly between soil alternatives, because most soil alternatives rely on construction techniques that can be implemented in similar timeframes (e.g., soil excavation over various footprints and *in situ* solidification. Alternatives S2 through S5, S5B, and S5C are all estimated to be implementable within 2 years of CAP approval. Alternatives S5C, S6, and S7 are estimated to require an additional year because they rely on an *in situ* technology (ERH) that requires additional time for installation, operation, and decommissioning.

The off-site risks resulting from implementing each soil alternative can be evaluated by considering the risks associated with transport and disposition of soil containing COCs under each soil alternative. For this criterion, Alternatives S5, S5A, S5B, S5C, and S6 have the lowest off-site risk because only very small quantities of soil containing COCs would be transported off site (e.g., primarily drill cuttings and miscellaneous investigation-derived waste). The remaining soil alternatives have similar off-site risks to one another, because all of these soil alternatives transport similar quantities of soil to similar destinations for similar treatment. Soil alternatives that transport smaller volumes of soil (such as Alternatives S3, S4, and S7) could be considered to have slightly lower off-site risks than those that transport larger volumes (Alternatives S1 and S2).

9.1.2 Permanence

The comparative permanence of the 10 soil alternatives is evaluated in this subsection by evaluating the degree to which each soil alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the soil alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.

The quantitative estimation and comparison of “benefit” for each soil alternative under Section 9.1.1.1 captures many of the elements of the comparative permanence evaluation. In general, soil alternatives that remove or treat a larger fraction of the DNAPL and COCs in soil can be considered more permanent because less contaminant would remain with the potential to act as a residual source and the potential to result in future exposures. Because varying amounts of soil containing DNAPL and/or COCs at concentrations exceeding the cleanup levels will remain on site following implementation of the soil alternatives, all soil alternatives rely on asphalt pavement and long-term maintenance of the asphalt pavement to prevent direct contact with these materials.

The treatment technologies considered by the soil alternatives include, in generally decreasing order of relative irreversibility:

1. Incineration destroys contaminants thereby reducing toxicity, mobility, and volume. Incineration would only be used for DNAPL, not DNAPL-contaminated soil.
2. ERH and DNAPL recovery remove contaminants/DNAPL and allow them to be destroyed, thereby reducing toxicity, mobility, and volume.
3. Solidification immobilizes contaminants and eliminates them as sources, thereby reducing mobility of contaminants. As discussed in Section 7.3.1, the hydraulic conductivity of the preferred solidification mix, Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda), was tested at 1.9×10^{-7} cm/sec, which met the hydraulic conductivity goal of 1×10^{-6} cm/sec. The volume of contaminants is unchanged by the solidification process. However, the volume of the treated soil will increase, because of the addition of the solidifying agents (cement, bentonite grout, and caustic soda). The solidification process is estimated to create volumetric expansion of the treated soil of approximately 35 percent, which is conservative based upon the 26 to 36 percent range identified during the bench-scale treatability test of preferred Mix 28.
4. Off-site stabilization/treatment of soil with landfill disposal treats the contaminants off-site, thereby reducing mobility of the contaminants, prior to placement in an engineered, lined and monitored facility. As with solidification, the volume of contaminants is unchanged by the stabilization/treatment process. However, the volume of the treated soil will increase, because of the additives used for stabilization/treatment.
5. Landfill disposal contains contaminants off-site in an engineered, lined, and monitored facility, thereby reducing the mobility of contaminants. There is no change to the volume of contaminants and impacted soil with this technology.
6. On-site containment using asphalt pavement contains contaminants thereby reducing the mobility of the contaminants as a result of reducing infiltration.

However, evaluation of the relative irreversibility of the soil alternatives needs to take into consideration that most soil alternatives rely on more than one technology and apply each to differing volumes of soil with differing levels of contamination. For each soil alternative, the percentages of soil addressed by each of the treatment technologies listed above are presented in Table 9-3. The soil alternatives are discussed below in decreasing order of relative irreversibility (i.e., from greatest degree of irreversibility to least).

Alternative S5C is considered the least reversible soil alternative because it does not rely on containment on site for any soil with DNAPL or COCs exceeding the cleanup levels (the “target” soil volume). It relies on ERH, which removes and destroys contaminants, for approximately 21 percent of the target volume (soil in the Upper Sand layer) with DNAPL or COCs exceeding the cleanup levels. It also relies on solidification, which immobilizes contaminants thus eliminating them as sources, for the remaining 79 percent of the target volume with DNAPL or COCs exceeding the cleanup levels. However, ERH technology is not ideal for the heavy-end hydrocarbons that are the focus of the cleanup action.

Alternative S5B is considered the next least reversible soil alternative because it also does not rely on containment on site for any soil with DNAPL or COCs exceeding the cleanup levels and it relies on solidification for 100 percent of the target volume with DNAPL or COCs exceeding the cleanup levels.

Alternative S5A is considered the next least reversible soil alternative because it relies on containment on site for approximately 6 percent of the target volume with DNAPL or COCs exceeding the cleanup levels (beneath the building). It relies on solidification for the remaining 94 percent of the target volume with DNAPL or COCs exceeding the cleanup levels. Although DNAPL recovery is planned which would reduce the volume of DNAPL beneath the building, DNAPL recovery is not very efficient. Furthermore, COCs adsorbed to soil beneath the building would not be removed by DNAPL recovery. Therefore, this soil alternative is not as irreversible as Alternative S5C and S5B.

Alternative S5 is considered the next least reversible soil alternative because it relies on containment on site for approximately 6 percent of the target volume with DNAPL or COCs exceeding the cleanup levels. It relies on solidification for the remaining 94 percent of the target volume with DNAPL or COCs exceeding the cleanup levels.

Alternative S6 relies on ERH to remove and destroy contaminants from approximately 78 percent of the target soil volume, while relying on containment for the remaining 22 percent of the target volume. However, ERH technology is not ideal for the heavy-end hydrocarbons that are the focus of the cleanup action.

Alternative S1 is the next most irreversible soil alternative, which relies on off-site treatment and landfill disposal for approximately 8 percent of the target volume, but relies on direct off-site landfill disposal for approximately 92 percent of the target volume.

Alternative S2 relies on containment on site for about 6 percent of the target volume, relies on off-site treatment and landfill disposal for approximately 7 percent of the target volume, and relies on direct landfill disposal for approximately 87 percent of the target volume.

Alternative S7 uses ERH to remove and destroy contaminants for approximately 6 percent of the target volume, off-site treatment and landfill disposal of approximately 7 percent of the target volume, on-site containment for approximately 23 percent of the target volume, and direct landfill disposal of the remaining 64 percent of the target volume. However, ERH technology is not ideal for the heavy-end hydrocarbons that are the focus of the cleanup action.

Alternative S4 relies on off-site treatment and landfill disposal of approximately 8 percent of the excavated soil, on-site containment for approximately 25 percent, and landfill disposal of the remaining 67 percent of the target volume.

Alternative S3 relies on off-site treatment and landfill disposal of approximately 7 percent of the target volume, on-site containment for approximately 28 percent of the target volume, and direct landfill disposal of the remaining 65 percent of the target volume.

The treatment technologies relied upon by each soil alternative vary with regard to the probable completeness of treatment, and therefore each technology results in treatment residuals of varying characteristics and quantity remaining following treatment.

Treatment residuals from Alternative S5 consist of a solidified soil mass containing chemically and physically bonded COCs with a much reduced probability of leaching, migration, and exposure. To the extent that the lateral and vertical extent of solidification covered the entire soil volume outside the building with COCs exceeding the cleanup level, and to the extent that soil mixing was uniform and complete, unsolidified soil outside the building footprint containing COCs would be minimal. Achieving good mixing and sufficient lateral and vertical coverage should be straightforward at this site because of the relatively open work area and the shallow depth of the contamination. Bench testing has been performed (see Section 7.3.1) and was used to optimize the mixture to be used for solidification.

Treatment residuals from Alternative S5A consist of a solidified soil mass containing chemically and physically bonded COCs with a much reduced probability of leaching, migration, and exposure and recovered DNAPL. The solidified mass would be identical for this soil alternative as Alternative S5. Therefore, the discussion in the paragraph above for Alternative S5 is applicable to Alternative S5A. The volume of recovered DNAPL from beneath the building would depend on the efficiency of DNAPL recovery, which typically is not very high. Furthermore, contaminants adsorbed to soil beneath the building would not be removed or treated. The recovered DNAPL would be recycled or destroyed through incineration.

Treatment residuals from Alternative S5B consist of a solidified soil mass containing chemically and physically bonded COCs with a much reduced probability of leaching, migration, and exposure. To the extent that the lateral and vertical extent of solidification covered the entire soil volume outside and beneath the building with COCs exceeding the cleanup level and to the extent that soil mixing was uniform and complete, unsolidified soil outside and beneath the building containing COCs would be minimal. Achieving good mixing and sufficient lateral and vertical coverage should be straightforward at most of this site because of the relatively open work area and the shallow depth of the contamination. Achieving good mixing within the building would also be straightforward, because the portion of the building where solidification would be performed would be demolished prior to solidification. Bench testing has been performed (see Section 7.3.1) and was used to optimize the mixture to be used for solidification.

Treatment residuals from Alternative S5C consist of a solidified soil mass containing chemically and physically bonded COCs with a much reduced probability of leaching, migration, and exposure and recovered DNAPL and COCs from ERH treatment. The solidified mass would be identical for this soil alternative as Alternative S5. Therefore, the discussion in the paragraph above for Alternative S5 is applicable to Alternative S5A. ERH treatment is a relatively minor component of Alternative S5C. Therefore, the discussion of ERH treatment residuals is provided in the paragraph below for Alternative S6.

Treatment residuals from Alternative S6 depend on the completeness of ERH coverage and the percentage of DNAPL and COCs driven from the soil by heating. The ERH process applied to the site contaminants should result in good COC concentration reduction, and removal of most free NAPL. Some COC concentrations usually remain following ERH treatment, and ensuring complete treatment coverage is less straightforward than for solidification. Treatment residuals from ERH have similar characteristics to existing contaminants. Soil contained on site has similar characteristics to the soil currently present at the site.

Alternative S1 relies primarily on excavation and off-site landfill disposal with approximately 8 percent of the target soil volume treated off-site prior to landfill disposal. Under this alternative, no soil containing COCs exceeding the cleanup levels or DNAPL would remain on site above the Upper Silt. Any recovered DNAPL liquids would be recycled or destroyed through incineration. Incineration residuals are minimal and managed at the incineration facility. Landfilled soil (unless treated at the landfill) has similar characteristics to the soil currently present at the site.

Alternatives S2 through S4 and S7 rely primarily on excavation and off-site landfill disposal, and on-site containment, with 7 to 8 percent of the target soil volume treated off-site prior to landfill disposal. DNAPL liquids recovered would be recycled or destroyed using incineration and/or ERH. Landfilled soil (unless treated at the landfill), and soil contained on site, have similar characteristics to the soil currently present at the site.

9.1.3 Cost

The estimated cost to implement each soil alternative is summarized in Table 9-1, with backup materials in Appendix J. The analysis of the relative cost of each soil alternative compared to the relative benefit is included in Section 9.1.1.1.

9.1.4 Effectiveness over the Long Term

MTCA provides guidance for the relative degree of long-term effectiveness of the various treatment components relied upon by the soil alternatives:

> *WAC 173-340-360(3)(f)(iv): The following types of cleanup action components may be used as a guide, in descending order, when assessing the relative degree of long-term effectiveness:*
>
> [1] *Reuse or recycling*
>
> [2] *Destruction or detoxification*
>
> [3] *Immobilization or solidification*
>
> [4] *On-site or off-site disposal in an engineered, lined and monitored facility*
>
> [5] *On-site isolation or containment with attendant engineering controls*
>
> [6] *Institutional controls and monitoring*

Therefore, DNAPL recovery with off-site recycling or incineration is considered by the WAC to achieve the first- and second-highest relative degree of long-term effectiveness, respectively. ERH or off-site treatment which destroy COCs, are considered by the WAC to achieve the second-highest relative degree of long-term effectiveness. Solidification or encapsulation of

COCs is considered by Ecology to achieve the third-highest relative degree of long-term effectiveness. The WAC considers off-site disposal in an engineered, lined, and monitored facility to achieve the fourth-highest relative degree of long-term effectiveness compared to other treatment and disposal options. On-site containment is considered by the WAC to achieve the fifth-highest relative degree of long-term effectiveness, compared to other treatment technologies. For each soil alternative, the percentages of soil and DNAPL addressed by each of the treatment technologies listed above are presented in Table 9-3.

The degree to which each soil alternative relies on these treatment components provides a relative comparison of the long-term effectiveness of the soil alternatives and was calculated in this evaluation using progressively higher unit weights for on-site containment, off-site disposal, solidification, and ERH treatment and incineration. This relative comparison of the soil alternatives is presented as follows from greatest to the least relative degree of long-term effectiveness:

- Alternative S6
  - ERH treatment (resulting in destruction of contaminants) of 78 percent of target soil volume with on-site containment of 22 percent
  - ERH treatment with off-site incineration of 75 percent of DNAPL and on-site containment of 25 percent of DNAPL
  - Contaminated soil in Upper Silt throughout ERH treatment area is partially addressed

- Alternative S5C
  - Solidification of approximately 79 percent of the target soil volume and ERH treatment (resulting in destruction of contaminants) of approximately 21 percent of the target soil volume
  - Solidification of 70 percent of DNAPL, off-site incineration of 22 percent of DNAPL, and on-site containment of 8 percent of DNAPL
  - Contaminated soil in Upper Silt throughout the site is addressed except under the building where it is partially addressed by ERH

- Alternative S5B
  - Solidification of 100 percent of the target soil volume
  - Solidification of 100 percent of DNAPL
  - Contaminated soil in Upper Silt throughout the site is addressed

- Alternative S5A
  - Solidification of approximately 94 percent of the target soil volume, and on-site containment of 6 percent of the target soil volume
  - Solidification of 94 percent of DNAPL, off-site incineration of 3 percent of DNAPL, and on-site containment of 3 percent of DNAPL
  - Contaminated soil in Upper Silt throughout the solidification area is addressed (outside the building footprint)

- Alternative S5

  - Solidification of approximately 94 percent of the target soil volume and on-site containment of 6 percent
  - Solidification of 94 percent of DNAPL and on-site containment of 6 percent of DNAPL
  - Contaminated soil in Upper Silt throughout solidification area is addressed

- Alternative S7
  - Off-site disposal of 72 percent of target soil volume, on-site containment of 22 percent of target soil volume, and ERH treatment (resulting in destruction of contaminants) of 6 percent of target soil volume
  - Off-site disposal of 63 percent of DNAPL, off-site incineration of 36 percent of DNAPL, and on-site containment of 1 percent of DNAPL
  - Contaminated soil in Upper Silt beneath the building footprint is partially addressed

- Alternative S1
  - Off-site disposal of 100 percent of target soil volume
  - Off-site disposal of 66 percent of DNAPL and off-site incineration of 34 percent of DNAPL
  - Contaminated soil in Upper Silt is not addressed

- Alternative S4
  - Off-site disposal of 77 percent of target soil volume and on-site containment of 23 percent
  - Off-site disposal of 66 percent of DNAPL and off-site incineration of 34 percent of DNAPL
  - Contaminated soil in Upper Silt is not addressed

- Alternative S2
  - Off-site disposal of approximately 94 percent of target soil volume and on-site containment of 6 percent
  - Off-site disposal of 63 percent of DNAPL, off-site incineration of 31 percent of DNAPL, and on-site containment of 6 percent of DNAPL
  - Contaminated soil in Upper Silt is not addressed

- Alternative S3
  - Off-site disposal of 72 percent of target soil volume and on-site containment of 28 percent
  - Off-site disposal of 63 percent of DNAPL, off-site incineration of 31 percent of DNAPL, and on-site containment of 6 percent of DNAPL
  - Contaminated soil in Upper Silt is not addressed

Implementation of any of the alternatives including solidification (Alternatives S5, S5A, S5B, and S5C) will result in treatment residuals remaining on site. As discussed in Section 7.3.1, the hydraulic conductivity of the preferred solidification mix, Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda), was tested at 1.9 x 10-7 cm/sec. This significantly lower permeability compared to the surrounding soil reduces the mobility of COCs within the treated matrix. Although the volume of the treated soil will increase, because of the addition of the solidifying agents (cement, bentonite grout, and caustic soda), the volume of contaminants is unchanged by the solidification process. The solidification process is estimated to create volumetric expansion of the treated soil of approximately 35 percent, which is conservative based upon the 26 to 36 percent range identified during the bench-scale treatability test of preferred Mix 28.

All of the solidification alternatives include performing a pilot test at the site prior to full-scale implementation. The pilot test would be performed to further refine the mix design and determine the preferred mixing tools and techniques for full-scale remediation. The pilot test would include strength and leachability testing similar to that previously performed during bench-scale testing, and would also further define the cure time for solidified soil. These tests would confirm the effectiveness of the solidification process in reducing leaching of contaminants from the impacted soil. Direct contact with treatment residuals would be controlled through implementation of institutional controls (including an environmental covenant) and engineering controls (asphalt pavement). These controls are expected to effectively limit direct contact with treated soil.

Alternatives S6, S5B, and S5C best meet Ecology’s expectation that treatment technologies will be emphasized at sites containing liquid wastes and areas contaminated with high concentrations of hazardous substances (WAC 173-340-370(1)). Finally, soil within the top foot of the Upper Silt would be solidified and soil within the Upper Silt would be treated via ERH as part of Alternatives S5, S5A, S5B, S5C, S6, and S7 (only under the building). Therefore, as discussed above, additional contaminated soil would be addressed compared to alternatives that rely only on excavation (which only address soil to the top of the Upper Silt), and, as a result, additional benefit would be obtained for Alternatives S5, S5A, S5B, S5C, S6, and S7.

9.1.5 Management of Short-Term Risks

Short-term risks to human health and the environment during construction and implementation of the soil alternatives include risks from construction activities and potential short-term exposure to DNAPL and COCs. In general, soil alternatives that are less complex, involve less transportation of contaminated soil, and are of shorter duration typically have lower short-term risks.

Alternative S5 is considered to have the lowest short-term risks for the following reasons:

- Solidification would occur from the top of the contaminated zone through the total thickness of the Upper Sand and one foot into the Upper Silt, binding contaminants within and above the Upper Silt with little opportunity for additional release into Aquifer A

- No contaminated soil would be transported, eliminating potential risks from transportation and handling at the point of disposition

- Little contaminated soil would be brought to the ground surface, minimizing worker exposures

- Shoring would only be required to protect the building foundation and the TWP slurry wall. No shoring would be required to control inflows of perched groundwater or to stabilize excavation walls.
- The construction processes involved are of relatively short duration and utilize standard construction techniques

Unique to Alternative S5 are the risks associated with grout and bentonite materials needed for solidification and use of large-diameter auger equipment. The risks from this activity are similar to other construction projects that rely on concrete work and drilling techniques. The short-term risks associated with Alternative S5 can be managed by using standard construction quality assurance and health and safety protocols.

Alternative S5A is considered to have the second lowest short-term risks because it has the same short-term risks of Alternative S5 plus the short-term risks association with DNAPL recovery within the building. This includes risks associated with drilling and installing piping, electrical systems, and other equipment within the building. Potential exposures to DNAPL could result from a release from the above-ground piping and product storage tanks.

Alternative S6 is considered to have the third lowest short-term risks for many of the same reasons as Alternative S5 (e.g., lack of soil removal and transport, lack of shoring required). Alternative S6 is more complex, requiring extensive drilling, piping, and high voltage electrical work, including inside the Mechanics Shop. The operational time is also longer than for the other soil alternatives. Potential exposures to COCs could result from release from above-ground water and vapor recovery and treatment piping and equipment. Faults in the vapor treatment system could result in releases of COCs to the atmosphere. Alternative S6 short-term risks require management both using standard construction protocols and specialized health and safety protocols specific to ERH technology.

Alternative S5C combines ERH and solidification and is considered to have the fourth lowest short-term risks because this alternative has the short-term risks associated with both approaches.

Alternative S5B is considered to have the fifth lowest short-term risks because it has the same short-term risks of Alternative S5 plus the short-term risks associated with excavation of soil in the northern part of the maintenance yard and building demolition. Short-term risks associated with excavation include:

- Shoring would be required to control perched groundwater inflow and stabilize the excavation walls.
- Contaminated soil would be brought to the ground surface and consolidated in the southern part of the site, with on-site management of soil dewatering and consequent management of DNAPL and water waste streams. This would increase risks to worker safety and potential exposure pathways from releases, however these risks can be controlled with engineering controls and BMPs.
- The thin Upper Silt unit could easily be breached during excavation, with the potential for additional release of COCs to Aquifer A.

Excavation-focused Alternatives S2 and S3 are considered to have the sixth lowest short-term risks based on the following:

- Extensive shoring installation would be required to protect the building foundation and the TWP slurry wall, control perched groundwater inflow, and stabilize the excavation walls.
- Contaminated soil would be brought to the ground surface and managed in containers, with on-site management of soil dewatering and consequent management of DNAPL and water waste streams. This would increase risks to worker safety and potential exposure pathways from releases, however these risks can be controlled with engineering controls and BMPs.
- Contaminated soil would need to be transported substantial distances. Accidents during transport, though rare, do occur and could result in both releases to the environment and harm to human health. Traffic-related accidents may be minimized by relying primarily on rail transport from the site.
- The thin Upper Silt unit could easily be breached during excavation, with the potential for additional release of COCs to Aquifer A.

The short-term risks for Alternatives S5B, S2, and S3 require management both using standard construction protocols and specialized health and safety protocols specific to DNAPL and groundwater handling.

Alternatives S1 and S4 have all of the short-term risks listed for Alternatives S2 and S3, with the addition of the construction risks associated with either excavation within the building (S4) or complete demolition and reconstruction of a portion of the building (S1).

Alternative S7 combines ERH and excavation and therefore has the short-term risks associated with both approaches, including work within the Mechanics Shop.

9.1.6 Technical and Administrative Implementability

All soil alternatives could be implemented at the site with regard to technically practicability; availability of necessary off-site facilities; services and materials; administrative and regulatory requirements; scheduling; size; complexity; monitoring requirements; access for construction operations and monitoring; and integration with existing facility operations and other current or potential cleanup actions. However, some soil alternatives would be more easily implemented than others, based on the relative complexity of implementation, the degree of disruption to Port operations, and the technical certainty each technology's effectiveness given the site and contaminant characteristics. The discussion below is presented in the relative order from greatest to least implementable soil alterative.

Alternative S5 is the most favorable with regard to technical and administrative implementability for many of the same reasons listed Section 9.1.5. This soil alternative is less complex than the other soil alternatives because it relies less on shoring and dewatering control, does not involve work within the Mechanics Shop and does not involve off-site transport of soil (including permitting and treatment at the disposal facilities). The solidification of the top foot of the Upper Silt as part of the process eliminates the technical complexity associated with the excavation alternatives of not inadvertently penetrating the silt during excavation. Solidification is expected to work well to sequester the contaminants at the site based upon previously completed bench test studies. Future pilot testing would be performed to verify that the solidification mixture could allow future excavation or drilling, as needed, for installation of utilities, truck pits, or foundations. The solidification process is estimated to create volumetric expansion of the treated soil of approximately 35 percent. This volumetric expansion would result in an average site height increase of approximately 2.5 feet in the area south of the new rail road spur. Because portions of the road and the storage yard surface appear low compared to surrounding areas, the site grade can be increased in a manner that maintains current drainage patterns and provides the Port a smooth level working surface. Because of the increased strength of the solidified soil, future excavation although feasible requires more robust excavation techniques than would be selected for native or imported gravel soil (e.g., larger excavators might be needed to excavate utility trenches). Solidified soil generated during hypothetical future excavations would require characterization and disposal at a facility approved to receive CAMU-eligible waste, because the solidified soil would contain a listed waste. Procedures for characterizing and disposing of any solidified soil excavated in the future would be written in to the institutional controls plan for the site. Similarly, worker notifications and health and safety precautions for performing excavation in the solidified soil would be provided in the institutional controls plan for the site.

Alternative S3 is the next most favorable, because it involves excavation over a smaller area than the other excavation alternatives, and does not include work within the Mechanics Shop. All excavation alternatives include the complexities of shoring and contaminated soil and DNAPL handling, transport, and disposal and the technical challenge of not penetrating the Upper Silt during excavation.

Alternative S2 is slightly less favorable than Alternative S3, because more area would be excavated under Alternative S2.

Alternative S5A is slightly less favorable than Alternative S2, because it involves some limited work inside the Mechanics Shop, with some disruption to Port Operations within the building.

Alternatives S5A, S1, and S4 are less favorable than Alternative S5A, because they involve work inside the Mechanics Shop, as well as shoring, contaminated soil and DNAPL handling, transport, and disposal, and the technical challenge of not penetrating the Upper Silt during excavation.

Alternatives S5C, S6, and S7 are considered the least favorable with regard to technical and administrative implementability because they include ERH technology. Use of this technology likely requires upgrading the power supply to the property; additionally the installation and operation is complex, potentially lengthy, and disruptive to Port operations (because of above-ground infrastructure in place for a substantial time). Effective ERH treatment requires installation of heating electrodes to approximately 12 feet bgs (through and below the Upper Silt) to provide a sufficient soil thickness for heat retention. Penetration of the Upper Silt could provide migration pathways for any untreated DNAPL or COCs.

9.1.7 Consideration of Public Concerns

The only public input received during the development of the RI/FS report was received from the Port of Longview. Therefore, this final requirement is evaluated based on those comments received from the Port of Longview on submitted documents. Further analysis of this criterion will be performed in the future CAP after public comment on this FS has been received. The discussion below progresses from most favored to least favored alternative by the Port.

Alternative S1 is believed to be generally favored by the Port of Longview, because all soil containing NAPL or COCs at concentrations exceeding the cleanup levels would be excavated and removed from the site.

Alternative S2 is believed to be generally slightly less favored by the Port of Longview than Alternative S1, because of concerns related to the reliance on containment to address contaminants beneath the building.

Alternatives S5B and S5C are believed to be generally favored less by the Port of Longview than Alternative S2, because of proposed impacts to the topography of the site due to bulking of soil during the solidification process and/or the potential removal of the 2- to 3-foot clean gravel layer beneath the existing asphalt paved area. Port concerns regarding Alternative S5B have been mitigated in revisions to this alternative (see discussion in Section 7.4), and Table 1 of Appendix K. The concerns regarding S5C would be addressed during the design of the cleanup action to minimize impacts on Port of Longview’s long-term operations.

Alternatives S5A and S5 are believed to be generally favored less by the Port of Longview than Alternatives S5B and S5C, because of concerns related to the reliance on containment to address contaminants beneath the building, as well as potential impacts to the topography of the site due to bulking of soil during the solidification process and the potential removal of the 2 to 3-foot clean gravel layer beneath the existing asphalt paved area.

Alternatives S6 and S7 are believed to be generally favored less by the Port of Longview than Alternatives S5A and S5, because of concerns related to the reliance on containment to address contaminants beneath the existing asphalt paved area in the northern portion of the site.

Alternatives S3 and S4 are believed to be generally the least favored by the Port of Longview, because of concerns related to the reliance on containment to address contaminants beneath the building and beneath the existing asphalt paved area in the northern portion of the site.

9.2 COMPARISON OF GROUNDWATER ALTERNATIVES

This section compares groundwater alternatives for selection under MTCA requirements to use permanent solutions to the maximum extent practicable. The procedure for determining whether a cleanup action uses permanent solutions to the maximum extent practicable is provided in detail in this section. It includes a “disproportionate cost analysis” (DCA) and a comparative evaluation of the following seven criteria in WAC 173-340-360(f):

- Protectiveness
- Permanence
- Cost
- Effectiveness over the long term
- Management of short-term risks
- Technical and administrative implementability
- Consideration of public concerns

The DCA compares the relative costs and benefits of all the groundwater alternatives which are listed below:

- Alternative GW1 – Electrical Resistance Heating and Enhanced Biodegradation (Baseline Alternative)

- Alternative GW2 – Chemical Oxidation and Monitored Natural Attenuation

- Alternative GW3 – Active Biosparging

- Alternative GW4 – Monitored Natural Attenuation

9.2.1 Protectiveness

The comparative protectiveness of the four groundwater alternatives is evaluated in this section by comparing the overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, the time required to reduce risk at the facility and attain cleanup standards, the on-site and off-site risks resulting from implementing the groundwater alternative, and the improvement of the overall environmental quality.

9.2.1.1 Quantitative Protectiveness Evaluation Component

As discussed for the soil alternatives (Section 9.1.1.1), a key element of the comparative protectiveness evaluation is captured by a quantitative comparison of the relative protectiveness and permanence (see also Section 9.2.1.2) of each groundwater alternative against the relative cost of each groundwater alternative (Table 9-4). In this analysis, the degree of risk reduction achieved by each groundwater alternative is evaluated by considering an estimate of restoration timeframe as a surrogate measure of risk reduction, and therefore the “benefit” of each groundwater alternative. The restoration rate in cubic feet per year was estimated for each groundwater alternative as shown on Table 9-5. A graph showing cost versus the estimated restoration rates for each groundwater alternative is provided in Appendix J.

To effectively evaluate groundwater alternatives, the relative benefit of each groundwater alternative was compared against the relative cost of each groundwater alternative. The numerical values of the benefit (restoration rate) and cost data (e.g., the estimated cost of each groundwater alternative in dollars), were first converted to unitless values for relative benefits and costs (see Section 9.1.1.1) using the same calculation method described previously for soil. The resulting unitless relative benefit and cost values each range between zero and one for each groundwater alternative and are plotted on Figure 9-2.

The graphical presentation of the results of this relative cost versus benefit analysis (Figure 9-2) shows that Alternative GW2 is the most favorable groundwater alternative when this analysis method is used. Alternative GW2 achieves nearly 70 percent of the benefit achieved by the baseline groundwater alternative however, the baseline groundwater alternative is clearly disproportionately costly compared to Alternative GW2 because the baseline alternatives data point is above the 1:1 reference line that runs through the GW2 data point. Alternative GW2 achieves substantially more benefit than either Alternative GW4 or GW3 and is not disproportionately costly when compared to these other two groundwater alternatives.

9.2.1.2 Qualitative Protectiveness Evaluation Component

The degree to which existing risks are reduced, the time required to reduce risks and attain cleanup standards, and the improvement of the overall environmental quality are assessed quantitatively in Section 9.2.1.1. The focus of this evaluation is on relative restoration timeframe for each groundwater alternative and on-site and off-site risks related to implementation of each alternative.

The estimated time required for each groundwater alternative to reduce risk at the facility and attain cleanup varies greatly between the groundwater alternatives. Alternative GW1 is estimated to reach MTCA Method C cleanup levels within 6 years of CAP approval, and Alternative GW2 is estimated to take slightly longer and reach cleanup levels within 7 years of CAP approval. Alternatives GW3 and GW4 are estimated to require a much longer time to achieve MTCA Method C cleanup levels – 20 years and 30 years, respectively. Treatment or removal of source soil is expected to significantly reduce the restoration timeframes for the groundwater alternatives.

The on-site and off-site risks associated with each groundwater alternative were compared qualitatively. Alternative GW4 has the lowest on-site and off-site risks, because it does not involve any active treatment, unless the contingent cleanup action is found to be necessary to achieve cleanup levels within the 30-year cleanup action timeframe. If the contingent cleanup action is implemented under Alternative GW4, then the on-site and off-site risks would be similar to those of Alternative GW2 (see below).

Alternative GW3 has the next lowest on-site and off-site risks, because it involves relatively little infrastructure construction, transports no treatment chemicals to the site, does not use high voltage electricity, and has a low potential to release high concentrations of COCs to the atmosphere or surrounding groundwater.

Alternative GW2 has the second highest on-site and off-site risks. The off-site risks are associated with the need to transport chemical oxidation chemicals to the site for multiple injection events. The on-site risks include:

- The risk of numerous penetrations of the Upper Silt to inject into Aquifer A, potentially increasing migration routes to the aquifer
- Potentially aggressive oxidation of COCs and generation of uncontrolled by-products, heat, or pH changes
- Potentially unforeseen movement/mobilization of COCs in groundwater associated with oxidant injection

The baseline alternative has the highest on-site and off-site risks, including:

- The risk of numerous penetrations of the Upper Silt to install ERH electrodes and inject oxygen releasing compounds into Aquifer A, potentially increasing migration/mobilization of COCs in the aquifer and creating migration pathways
- Potential releases to the atmosphere of COCs liberated as vapor
- Off-site risks associated with the need for transport of enhanced biodegradation chemicals to the site for potential multiple injection events

9.2.2 Permanence

In general, the groundwater alternatives that are quantitatively ranked in Section 9.2.1.1 as having the highest benefit based on restoration timeframe are also the most permanent. This is because the more aggressive treatment options that result in the shorter restoration timeframe are also likely to achieve the most certain comprehensive destruction of COCs. Thus, the baseline alternative (Alternative GW1) and Alternative GW2 are considered most permanent. These groundwater alternatives rely primarily on either thermal process or active chemical oxidation to achieve most COC treatment. These technologies are irreversible and destroy or remove the COCs.

Alternatives GW3 and GW4 are considered relatively less permanent because they rely on biological processes that are slower and operate less uniformly over the site. Biosparging (Alternative GW3) has been shown to be irreversible based on the absence of COC concentration rebound noted since the biosparging system was turned off (see Section 3.2.6); however this technology has also been shown to be relatively slow in achieving COC reductions to the anticipated cleanup levels. Alternative GW4 includes a contingent cleanup action of chemical oxidation, if needed, to achieve cleanup levels within the 30-year cleanup action timeframe. If the contingent cleanup action is implemented at the site, then the permanence of GW4 is considered to be the same as GW2.

9.2.3 Cost

The estimated cost to implement each groundwater alternative is shown in Table 9-4, with backup materials in Appendix J. The analysis of the relative cost of each groundwater alternative compared to the relative benefit is included in the analysis discussed under Section 9.2.1.1.

9.2.4 Effectiveness over the Long Term

The guidance provided in WAC 173-340-360(3)(f)(iv) regarding the relative degree of long-term effectiveness of cleanup action components is less directly applicable for comparison of the groundwater alternatives than the soil alternatives at this site. All groundwater alternatives rely on destruction or detoxification processes, which are considered by the WAC to achieve the second-highest relative degree of long-term effectiveness (WAC 173-340-360[3][f][iv]). Although all groundwater alternatives use destruction and detoxification, the processes used in each groundwater alternative operate over different time periods. This is one reason why Section 9.2.1.1 uses “restoration timeframe” as a measure of differential benefit between groundwater alternatives.

In general, the baseline alternative (Alternative GW1) and Alternative GW2 are considered to have a slightly higher effectiveness over the long term compared to Alternatives GW3 and GW4. This is because the more aggressive treatment process options included in the baseline alternative and Alternative GW2 removes more COC mass sooner, providing less time for COCs to potentially migrate. Also, Alternatives GW3 and GW4 rely on biological processes that are likely to operate less uniformly over the site, reducing their effectiveness compared to the more aggressive treatment options presented in Alternatives GW1 and GW2, unless the contingent cleanup action is implemented at Alternative GW4 which would make GW4 essentially equivalent to GW2 over the long-term.

9.2.5 Management of Short-Term Risks

Short-term risks to human health and the environment during construction and implementation of the groundwater alternatives include risks from construction and operation, maintenance and monitoring activities, as well as potential exacerbation of COC migration. In general, groundwater alternatives that are less complex and involve less active treatment typically have lower short-term risks. The following discussion progresses from relative least to greatest degree of short-term risks.

Alternative GW4 has the least short-term risk, because it involves the least construction effort and does not alter the groundwater regime through injection or heating (which has the potential to change COC distribution), unless the contingent cleanup action is found to be necessary to achieve cleanup levels within the 30-year cleanup action timeframe. (If the contingent cleanup action is implemented under Alternative GW4, then the short-term risks would be similar to those of GW2 [see below]). This groundwater alternative involves the longest monitoring time frame, increasing trips to the site and handling of purged groundwater and groundwater samples (i.e., activities with inherent health and safety risks). The short-term risks associated with this groundwater alternative can be managed using health and safety protocols that are standard for the environmental industry.

Alternative GW3 has the second lowest short-term risk, because it involves relatively little construction effort and alters the groundwater regime through a technology (air sparging) that has been extensively tested at the site. Like Alternative GW4, this groundwater alternative involves many more trips to the site and sampling events, when compared to the baseline alternative (Alternative GW1) and Alternative GW2. The short-term risks associated with this groundwater alternative can be managed using health and safety protocols that are standard for the construction, drilling, and environmental industries.

Alternative GW2 has more short-term risk than Alternatives GW3 and GW4 because of the extensive network of injection wells that need to be installed, the safety risks associated with the chemical oxidant itself, and the risk that injecting fluid into the aquifer would cause unexpected movements of the COC plume. In spite of these additional risks, the short-term risks associated with this groundwater alternative can be managed using health and safety protocols that are standard for the construction, drilling, and environmental industries.

The baseline alternative (Alternative GW1) has the greatest short-term risk, because it relies on both injection of bioaugmentation materials and the complex infrastructure associated with ERH. The risks from ERH include unexpected mobilization of COCs, unexpected releases of COCs to the atmosphere, and safety issues related to high voltage, high heat, and extensive infrastructure construction and demolition. The short-term risks associated with this groundwater alternative can be managed using health and safety protocols that have been developed and tested for this technology.

9.2.6 Technical and Administrative Implementability

All groundwater alternatives could be implemented at the site with regard to technically practicability, availability of necessary off-site facilities; services and materials; administrative and regulatory requirements; scheduling; size; complexity; monitoring requirements; access for construction operations and monitoring; and integration with existing facility operations and other current or potential cleanup actions. However, some groundwater alternatives would be more easily implemented than others, based on the relative complexity of implementation, the degree of disruption to Port operations, and the technical certainty each technology’s effectiveness given the site and contaminant characteristics. The discussion below is presented from the most favorable to the least favorable relative technical and administrative feasibility.

Alternative GW4 is the most favorable with regard to technical and administrative implementability, because it involves the installation of a few additional wells followed by long-term monitoring of those wells, unless the contingent cleanup action is found to be necessary to achieve cleanup levels within the 30-year cleanup action timeframe. (If the contingent cleanup action is implemented under Alternative GW4, then the implementability would be similar to those of Alternative GW2 [see below]). The administrative requirements for well installation and long-term monitoring are straightforward and have already been implemented at the site during the RI. Alternative GW4 has relatively little impact to Port operations.

Alternative GW3 is the next most favorable, because it involves the installation of relatively little additional infrastructure, most of which can be installed below grade. The technology for Alternative GW3 has already been implemented at the site, and this groundwater alternative would simply expand that implementation.

Alternative GW2 is the next most favorable. Although an extensive network of injection wells would be required, work at any one injection well has a small footprint, thereby minimizing impacts to Port operations. The injection well infrastructure would be primarily below grade. An Underground Injection Permit from Ecology would be required, but there should be no impediments to obtaining this permit. In terms of technical efficacy, chemical oxidation projects must always meet the challenges of a good match between the selected oxidant and the COCs, and achieving good contact, through adequate injection, between the oxidant and the COCs. Numerous site-specific conditions can inhibit the effectiveness of this technology, and multiple injections are often required to achieve comprehensive site coverage and adequate contact with the COCs.

The baseline alternative is the least favorable with regard to technical and administrative implementability. ERH requires the installation and demolition of some above-ground infrastructure which would impede Port operations. In addition, the technology vendor was unwilling to commit to being able to achieve cleanup levels using this technology, except at great expense (exceeding the costs presented in this FS). This groundwater alternative also requires the most extensive permitting.

9.2.7 Consideration of Public Concerns

The only public input received during the development of the RI/FS report was received from the Port of Longview. Therefore, this final requirement is evaluated based on those comments received from the Port of Longview on submitted documents. Further analysis of this criterion will be performed in the future CAP after public comment on this FS has been received. The discussion below is presented in order of most favored to least favored groundwater alternative from the Port’s viewpoint.

Alternatives GW1 and GW2 are believed to be generally favored by the Port of Longview, because groundwater containing COCs at concentrations exceeding the cleanup levels would be treated more aggressively within a shorter timeframe (less than 10 years).

Alternative GW4 is believed to be generally less favored by the Port of Longview, because of concerns related to the reliance on monitoring to address groundwater contamination for a longer timeframe (30 years). However, a contingent cleanup action is included as a component of this groundwater alternative to achieve cleanup levels within the 30-year cleanup action timeframe, if necessary.

Alternative GW3 is believed to be generally the least favored by the Port of Longview, because of concerns related to the reliance on monitoring to address groundwater contamination for a longer timeframe (20 years).

9.3 PREFERRED CLEANUP ACTION ALTERNATIVES

This section draws conclusions based on the analyses presented in Section 9.1 and 9.2 and recommends preferred cleanup action alternatives for consideration in the CAP. The selected cleanup action alternatives must address both soil and groundwater at the site; therefore, this section recommends both a preferred soil alternative (Section 9.1) and a preferred groundwater alternative (Section 9.2), to be implemented together.

9.3.1 Preferred Soil Alternative

The preferred soil alternative is Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks. Under this soil alternative, DNAPL and COCs exceeding the cleanup levels in soil located in the Upper Sand and the top foot of the Upper Silt would be immobilized in place. This soil alternative exhibits several substantial advantages over the other soil alternatives evaluated:

- The other soil alternatives are disproportionately costly compared to Alternative S5B, when relative benefits and costs are compared (Figure 9-1 and Section 9.1.1.1)

- Alternative S5B has the highest combined rank considering the seven MTCA criteria including consideration of the qualitative protectiveness evaluation. Table 9-6 presents a summary of the rankings for all of the soil alternatives.

- Alternative S5B meets Ecology’s expectation that treatment technologies will be emphasized at sites containing liquid wastes and areas contaminated with high concentrations of hazardous substances (WAC 173-340-370(1))

- Alternative S5B avoids the short-term and off-site risks associated with off-site transport and off-site disposal of soil containing DNAPL and COCs

- Alternative S5B is the second least reversible behind Alternative S5C, because the soil alternatives that include excavation rely on off-site landfill disposal for 65 to 100 percent of the target soil volume and all soil alternatives except Alternative S1 and Alternative S5C rely on on-site containment for 5 to 30 percent of the target soil volume

- Treatment residuals from Alternative S5B consists of a solidified soil mass containing chemically and physically bonded COCs with a much reduced probability of leaching, migration, and exposure

- Alternative S5B has the second highest expected effectiveness over the long term, because solidification is considered a more effective technology than off-site landfill disposal and on-site containment, which are relied upon by most of the other soil alternatives

- Alternative S5B has the fifth lowest short-term risks, for the following reasons:

  - Solidification would occur from the top of the contaminated zone through the top foot of the Upper Silt, binding contaminants within the top foot and above the Upper Silt with little opportunity for additional release into Aquifer A.

  - No contaminated soil would be transported, eliminating potential risks from transportation and handling at the point of disposition.

  - The construction processes involved are of relatively short duration and utilize standard construction techniques.

9.3.2 Preferred Groundwater Alternative

The preferred groundwater alternative is Alternative GW4 – Monitored Natural Attenuation. Alternative GW4 has the highest combined rank considering the seven MTCA criteria including consideration of the qualitative protectiveness evaluation (Table 9-7). This alternative has the least impact on Port operations and complements the preferred soil alternative. Solidification of soil above the Upper Silt requires follow-on groundwater monitoring to demonstrate leaching conditions following solidification. This monitoring could be combined with MNA monitoring. Solidification of soil located in the Upper Sand and the top foot of the Upper Silt is expected to improve the efficacy of natural biodegradation processes in Aquifer A by sequestering the residual source.

Although more aggressive groundwater cleanup actions are not disproportionately costly compared to Alternative GW4, the additional impacts to Port operations, the additional short-term risks, and the uncertainties regarding efficacy of those more aggressive groundwater alternatives are not warranted given that COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA. This combined with the expected improvements in groundwater quality following soil solidification and the low potential for migration of existing COCs in groundwater make MNA a reasonable groundwater alternative for this site, as demonstrated by the evaluation using the seven MTCA criteria performed in Section 9.2 and summarized on Table 9-7. Furthermore, if progress towards achieving the cleanup levels cannot be demonstrated during the 5-year reviews, the need for implementing the contingent cleanup action, chemical oxidation (Alternative GW2), would be assessed.

Although Aquifer A conditions are expected to be conducive to natural biodegradation, especially in the absence of a residual source in the Upper Sand and the top foot of the Upper Silt, the aquifer is not optimally suited to MNA. The site data do not allow a rigorous quantitative demonstration of the restoration timeframe expected for the MNA groundwater alternative, especially considering the changed conditions that would result from implementation of the soil alternative.

Because of the uncertainties associated with restoration timeframe for MNA, Alternative GW4 includes a provision for a contingent cleanup action consisting of Alternative GW2, which is not disproportionately costly compared to the other groundwater alternatives. The CAP would establish a suitable monitoring period following implementation of the soil alternative when the progress of the groundwater MNA alternative would be evaluated. If benchmark criteria for the groundwater cleanup action are not met, then the contingent cleanup action would be implemented without reopening the Consent Decree.

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Tables

Table 1-1
MTCA RI/FS Regulatory Requirements
RI/FS Port of Longview MFA – International Paper

MTCA Reference: WAC 173-340-350	Requirements for Remedial Investigation/ Feasibility Study	International Paper Action	Referenced Report
WAC 173-340-350 (7)	**Remedial Investigation**		
7 a	Purpose	Addressed impacts noted during construction of barrier wall and defined during additional investigation of offsite area.	• URS 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Section 1.4 of this document.
7 b	Scoping Activities		
7 b i	(Assemble and evaluate existing data)	Completed summary of offsite investigations.	• Woodward-Clyde 1998 - Offsite Investigation Work Plan. • Section 3.2 of this document
7 b ii	Develop Preliminary Conceptual Site Model as defined in WAC 173-340-200	Completed site investigations starting in late 1980's through present defining subsurface geology/hydrogeology and extent of impacts. Geologic cross sections presented in Offsite Investigation Report and Additional Action Feasibility Study report. Conceptual site model further developed and presented in this document.	• Woodward-Clyde 1996 - Tidal Study Summary Report. • Woodward-Clyde 1997 - Performance and Compliance Monitoring Plan. • URS 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Sections 3.4 and 5.1 of this document
7 b iii	Identify Likely Cleanup Levels for Site	Completed identification of cleanup levels: Soil - MTCA Method C (Method A for TPH) outside deed restricted area. Groundwater - MTCA Method B (Method A for TPH) outside deed restricted area.	• Woodward-Clyde 1997 - Performance and Compliance Monitoring Plan – Section 3.2. • Woodward-Clyde 1997 - Cleanup Action Plan – Section 4.2. • Section 6.1 of this document
7 b iv	Identify Cleanup Action Component to Address Releases at Site	Additional Action Feasibility Study and Additional Action Work Plan previously identified cleanup action components. These are further described in Section 7.2 of this document.	• URS 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • URS 2002 - Work Plan, Additional Action for Port of Longview Maintenance Facility Area. • Section 7.2 of this document
7 c	Content		
7 c i	General Facility Information	Identified previously in Offsite Investigation Report and Additional Action Feasibility Study, and presented in Appendix A of this document.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Appendix A of this document.

Table 1-1
MTCA RI/FS Regulatory Requirements
RI/FS Port of Longview MFA – International Paper

MTCA Reference: WAC 173-340-350	Requirements for Remedial Investigation/ Feasibility Study	International Paper Action	Referenced Report
7 c ii	Site Conditions Map	Site plans showing site and defining extent of impacts in both soil and groundwater	• URS Sept 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Figures 2-1 through 2-2 and Figures 3-1 through 3-15 of this document.
7 c iii (A, B, C)	Field Investigations Characterize Distribution of Hazardous Substances on Site • A – surface water • B – Soils • C – Geology and ground water system characteristics	Conducted investigations in barrier wall area, Eastern and Western Areas, and MFA area. Actual extent of MFA impacted soil and groundwater is summarized in "Offsite Investigation Report and Additional Action Feasibility Study" and in Section 3 of this document.	• URS 2000 - Soil and Groundwater Investigation of the Eastern Area. • URS 2000 - Soil and Groundwater Investigation of the Western Area. • URS 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Section 3 of this document.
7 c iii (D)	Air Impacts	Performed evaluation of air impact potential. Identified a low potential for air impacts due to nature of contaminants and isolated location (under 3+ feet of fill and asphalt cap).	• URS 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Section 5.3 of this document.
7 c iii (E)	Land Use	Identified the permissible land uses and the actual land use as industrial.	• URS 2000 - Offsite Investigation Report and Additional Action Feasibility Study • Section 1.3 of this document.
7 c iii (F)	Natural Resources and Ecological Receptors	Performed the 1997 Focused Feasibility Study (TWP) and concluded that potential receptors could be created by future construction, but no natural or ecological receptors were identified.	• 1997 - Focused Feasibility Study (TWP Area). • URS 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Section 5.2.2 of this document.
7 c iii (G)	Sources of Hazardous Substances	Identified in aerial photographs that lineament leading away from TWP, likely transported contaminants from TWP area to MFA area.	• Woodward-Clyde 1996 - Tidal Study Summary Report • Woodward-Clyde 1997 - Performance and Compliance Monitoring Plan. • URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Section 1.2 of this document

Table 1-1
MTCA RI/FS Regulatory Requirements
RI/FS Port of Longview MFA – International Paper

MTCA Reference: WAC 173-340-350	Requirements for Remedial Investigation/ Feasibility Study	International Paper Action	Referenced Report
7 c (H)	Regulatory Classifications (if any)		• F032 - wood treating wastes
7 c iv	Work Plans: SAP and HASP	Prepared prior to initiation of fieldwork. SAP presented in each subsequent work plans on MFA parcel.	• Woodward-Clyde 1997 - Performance and Compliance Monitoring Plan.
7 c v	Other Information		
WAC 173-340-350 (8)	Feasibility Study		
8 c i	General requirements		
8 c i (A, B)	Cleanup Action Alternatives, Reasonable Number	Identified 14 alternatives – • 10 alternatives for soils • 4 alternatives for groundwater.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study, Section 7.7, and Section 7 of this document.
8 c i (C)	Components	Identified and discussed alternatives.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study, Section 7.7, and Section 7 of this document.
8 c i (D)	Remediation Levels	Discussed Evaluation Criteria.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study, Section 7.9, and Sections 8 and 9 of this document.
8 c i (E)	Residual Threats	Evaluated residual threats for each technology discussed.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study, Section 7.9, and Sections 8 and 9 of this document.
8 c i (F)	Points of Compliance	Identified as proposed deed restriction boundaries.	• Woodward-Clyde 1997 - Performance and Compliance Monitoring Plan.
8 c i (G)	Evaluation/Comparison	Evaluated technologies and presented tabulated comparison.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study, Section 7.9-7.10, and Sections 8 and 9 and Tables 7-1, 7-2, and 8-1 of this document.
8 c i (H)	Selection of Preferred Alternative	Selected preferred Soil and Groundwater remediation alternative.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study, Section 7.10, and Section 9 of this document.
8 c i (I)	Other Information Required by Ecology (if any)		

Table 1-1
MTCA RI/FS Regulatory Requirements
RI/FS Port of Longview MFA – International Paper

MTCA Reference: WAC 173-340-350	Requirements for Remedial Investigation/ Feasibility Study	International Paper Action	Referenced Report
8 c ii	Permanent Alternatives		
8 c ii (A)	Include Most Practical Permanent Alternative	Determined the most permanent cleanup action alternative to be soil removal, and this alternative was evaluated with others.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study. • Section 9 of this document.
8 c ii (B) – I	Selected Model Remedy	Soil removal was not the selected remedy	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study.
8 c ii (B) – II	Action not Technically Possible	Soil removal was technically infeasible, and not the preferred alternative	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study.
8 c ii (B) – III	Acton Disproportionately Costly	Costs for soil removal alternatives were disproportionately high.	• URS September 2000 - Offsite Investigation Report and Additional Action Feasibility Study.
9	Additional Requirements		
9 a	Cleanup Levels	Determined cleanup levels during the RI phase of project as follows: Soil: MTCA Method B (Method A for TPH) outside deed restricted area. Groundwater: MTCA Method B (Method A for TPH)	• Woodward-Clyde 1997 - Performance and Compliance Monitoring Plan – Section 3.2. • Woodward-Clyde 1997 - Cleanup Action Plan – Section 4.2. • Section 6.1 of this document
9 b	Compliance with Other Laws	Identified other Applicable, Relevant, and Appropriate Requirements	• URS 2002 - Work Plan, Additional Action for Port of Longview Maintenance Facility Area – Section 2.2, and Section 6.4 of this document.
9 c	Treatability Studies	Groundwater treatment pilot tests were conducted for ORC and biosparging technologies.	• Port, Ecology, and International Paper 2000 - meeting at which ORC results were presented. • URS 2005 - Annual Remedial Operations and Groundwater Monitoring Report.
9 d	Other Information (if any)		

Notes:

HASP - health and safety plan
MFA - Maintenance Facility Area
MTCA - Model Toxics Control Act
ORC - oxygen releasing compound
RI/FS - remedial investigation/feasibility study
SAP - sampling and analysis plan
TPH - total petroleum hydrocarbons
TWP - treated wood products
WAC - Washington Administrative Code

Table 2-1
Selected Groundwater Elevation Data
RI/FS Port of Longview MFA – International Paper

Aquifer A									
Well ID[a]	Screen Interval Depth (feet bgs)	Screen Interval Elevation Elev. (feet above msl)	MP Elev. (feet)[b]	Depth to Water (feet below MP)			Water Table Elev. (feet above msl)		
				9/10/2003	9/22/2008	3/19/2009	9/10/2003	9/22/2008	3/19/2009
97-1.A	10 - 20	3.98 - -6.02	13.98	10.86	10.92	NM	3.12	3.06	--
97-1.B[c]	45 - 55	-30.03 - -40.3	14.97	12.00	--	--	2.97	--	--
97-5.A	14 - 24	1.93 - -8.07	15.93	12.72	12.78	11.32	3.21	3.15	4.61
97-5.B[c]	49 - 59	-33.41 - -43.41	15.59	12.20	--	--	3.39	--	--
97-6.A[h]	12 - 22	1.06 - -8.94	13.06	9.94	--	--	3.12	--	--
97-6.B	46.5 - 56.5	-33.30 - -43.30	13.12	9.69	9.99	8.51	3.43	3.13	4.61
99EA-3A	15 - 20	-0.21 - -5.21	14.79	11.70	11.79	10.26	3.09	3.00	4.53
04-6.A	15 - 30	-1.42 - -16.42	13.58	--	10.35	8.81	--	3.23	4.77
AV-09	14 - 19	1.61 - -3.39	15.61	NM	12.54	10.98	--	3.07	4.63
AV-10	10 - 15	3.54 - -1.46	13.54	NM	10.39	8.95	--	3.15	4.59
AV-11	10.5 - 15.5	2.14 - -2.86	12.64	NM	9.59	8.11	--	3.05	4.53
AV-12	10.5 - 15.5	3.10 - -1.90	13.60	NM	10.53	8.96	--	3.07	4.64
AV-13	10 - 15	4.28 - -0.72	14.28	NM	11.21	10.18	--	3.07	4.10
TMW-01[d]	20 - 30	-4.70 - -14.70	15.3	--	12.14	10.53	--	3.16	4.77
TMW-02[d]	17 - 27	-4.08 - -14.08	12.92	--	9.71[e]	8.06[f]	--	3.21	4.86
TMW-03[d]	17 - 27	-1.49 - -11.49	15.51	--	12.23	10.65	--	3.28	4.86
TMW-04[d]	13 - 23	0.05 - -9.95	13.05	--	9.83	8.25	--	3.22	4.80
TMW-05[d]	10 - 20	3.49 - -6.51	13.49	--	10.27	8.70	--	3.22	4.79
TMW-06[d]	13 - 23	0.33 - -9.67	13.33	--	10.12	8.53	--	3.21	4.80
TMW-07[d]	15 - 25	0.74 - -9.26	15.74	--	12.55	11.00	--	3.19	4.74
TMW-08[d]	15 - 25	-1.08 - -11.08	13.92	--	12.75	9.21	--	1.17	4.71
TMW-09[d]	15 - 25	-0.31 - -10.31	14.69	--	11.47	9.88[g]	--	3.22	4.81
TMW-10[d]	13.5 - 23.5	1.67 - -8.33	15.17	--	11.99	10.40	--	3.18	4.77
TMW-11[d]	12 - 22	1.82 - -8.18	13.82	--	10.62	8.97	--	3.20	4.85
TMW-12[d]	10 - 20	2.65 - -7.35	12.65	--	9.44	7.72	--	3.21	4.93

Perched Groundwater									
Well ID[a]	Screen Interval Depth (feet bgs)	Screen Interval Elevation Elev. (feet above msl)	MP Elev. (feet)[b]	Depth to Water (feet below MP)			Water Table Elev. (feet above msl)		
				3/4/2003	6/12/2003	12/11/2003	3/4/2003	6/12/2003	12/11/2003
BV-12	4 - 8	9.18 - 5.18	13.18	4.77	4.59	3.35	8.41	8.59	9.83
BV-13	4 - 7	8.29 - 5.29	12.29	3.33	4.78	3.23	8.96	7.51	9.06
BV-14	4 - 7	7.99 - 4.99	11.99	NM	4.48	NM	NM	7.51	NM
BV-15	4 - 8	9.90 - 5.90	13.90	6.08	NM	4.98	7.82	NM	8.92

Notes:

-- - not available

[a] AV - air venting well, BV - bioventing well, TMW - temporary monitoring well

[b] Relative to State Planar Coordinate System

[c] Well decommissioned in 2006

[d] Well installed in September 2008

[e] Water level collected on September 23, 2008

[f] Water level collected on March 18, 2009

[g] Water level collected on March 17, 2009

[h] Damaged and replaced with well 04-6A in 2004

bgs - below ground surface
ID - identification
MFA- Maintenance Facility Area
MP - measuring point
msl - mean sea level
NM - not measured
RI/FS - remedial investigation/feasibility study

Table 3-1
RI/FS Screening Levels
RI/FS Port of Longview MFA – International Paper

Chemicals of Concern		Soil Screening Levels			Groundwater Screening Levels	
		MTCA Method C Direct Contact	MTCA Method C Protection of Groundwater (Calculated using MTCA Defaults for Sand Soil Type)	MTCA Method C Protection of Groundwater (Calculated using soil properties for silty loam)[e]	MTCA Method B	MTCA Method C
TPH		**(mg/kg)**			**(mg/L)**	
Diesel Range Organics[a]		2,000	2,000	2,000	0.500	0.500
Residual Range Organics[a]		2,000	2,000	2,000	0.500	0.500
PAHs		**(µg/kg)**			**(µg/L)**	
Naphthalene		70,000,000	9,700	18,000	160	350
2-Methylnaphthalene		14,000,000	3,800[F]	7,100[f]	32	70
Acenaphthylene		NE	NE	NE	NE	NE
Acenaphthene		210,000,000	210,000	420,000	960	2,100
Fluorene		140,000,000	220,000	430,000	640	1,400
Phenanthrene		NE	NE	NE	NE	NE
Anthracene		1,100,000,000	5,000,000	9,900,000	4,800	11,000
Fluoranthene		140,000,000	1,400,000-	2,800,000	640	1,400
Pyrene		110,000,000	1,400,000	2,900,000	480	1,100
Benzo[g,h,i]perylene		NE	NE	NE	NE	NE
cPAHs	**TEF** [b]	**(µg/kg)**			**(µg/L)**	
Benzo[a]pyrene[c]	1	18,000	2,300	4,700	0.012	0.12
Benzo[a]anthracene[c]	0.1	180,000	8,600	17,000	0.12	1.2
Benzo[b]fluoranthene[c]	0.1	180,000	30,000	59,000	0.12	1.2
Benzo[k]fluoranthene[c]	0.1	180,000	30,000	59,000	0.12	1.2
Chrysene[c]	0.01	1,800,000	96,000	190,000	1.2	12
Dibenzo[a,h]anthracene[c]	0.1	180,000	43,000	86,000	0.12	1.2
Indeno[1,2,3-cd]pyrene[c]	0.1	180,000	83,000	170,000	0.12	1.2
TTEC		**18,000**	**2,300**	**4,700**	**0.012**	**0.12**
VOCs		**(µg/kg)**			**(µg/L)**	
1,2,4-Trimethylbenzene		NE	NE	NE	NE	NE
1,3,5-Trimethylbenzene		35,000,000	2,900[f]	4,900[f]	80	180
2-Butanone (methyl ethyl ketone)		2,100,000,000	43,000[f]	27,000[f]	4,800	11,000
4-Isopropyltoluene		NE	NE	NE	NE	NE
Acetone		3,200,000,000	63,000	39,000	7,200	16,000
Carbon Disulfide		350,000,000	12,000	15,000	800	1,800
Ethylbenzene		350,000,000	15,000	20,000	800	1,800
Isopropylbenzene (cumene)		350,000,000	33,000[f]	56,000[f]	800	1,800
m,p-Xylenes		700,000,000 [d]	30,000	40,000	1,600 [d]	3,500 [d]
Naphthalene		70,000,000	9,700	18,000	160	350
o-Xylene		700,000,000 [d]	32,000	45,000	1,600 [d]	3,500 [d]
Toluene		280,000,000	10,000	13,000	640	1,400
SVOCs		**(µg/kg)**			**(µg/L)**	
Dibenzofuran		3,500,000	6,500[f]	13,000[f]	16	35
Pentachlorophenol		330,000	35	3.5	0.22	2.2

Table 3-1
RI/FS Screening Levels
RI/FS Port of Longview MFA – International Paper

Chemicals of Concern	Soil Screening Levels			Groundwater Screening Levels	
	MTCA Method C Direct Contact	MTCA Method C Protection of Groundwater (Calculated using MTCA Defaults for Sand Soil Type)	MTCA Method C Protection of Groundwater (Calculated using soil properties for silty loam)[e]	MTCA Method B	MTCA Method C
Metals	**(µg/kg)**			**(µg/L)**	
Arsenic	88,000	340	340	0.058	0.58
Barium	700,000,000	5,800,000	5,800,000	3,200	7,000
Cadmium	NE	2,400	2,400	8	18
Chromium (Cr)	5,300,000,000 (CrIII) 11,000,000 (CrVI)	1,100,000,000 (CrIII) 40,000 (CrVI)	1,100,000,000 (CrIII) 40,000 (CrVI)	24,000 (CrIII) 48 (CrVI)	53,000 (CrIII) 110 (CrVI)
Lead	NE	NE	NE	NE	NE
Mercury	NE	NE	NE	NE	NE
Selenium	18,000,000	18,000	18,000	80	180
Silver	18,000,000	30,000	30,000	80	180

Notes:

MTCA Cleanup Regulation, WAC 173-340. MTCA Method A, B, and C soil and groundwater values are from Ecology website CLARC tables downloaded as of August 2015 (https://fortress.wa.gov/ecy/clarc/reporting/CLARCReporting.aspx).

[a] TPH screening levels are based on the MTCA Method A cleanup levels

[b] TEF applied in TTEC cleanup level calculations

[c] These seven compounds are cPAHs and screening levels are typically based upon TTEC cleanup level values that are sums of concentrations of all seven compounds after applying the associated TEF – rather than based upon individual screening levels for each individual compound. Note: CLARC table values for benzo(k)fluoranthene, chrysene, and dibenzo(a,h)anthracene were not calculated correctly as per WAC 173-340-902 (Table 708-2) and the WA Dept. of Ecology guidance on evaluating human health toxicity of cPAHs using TEFs.

[d] MTCA level for xylenes is based on total xylenes.

[e] The soil properties for silty loam were obtained from the Johnson and Ettinger Model for Vapor Intrusion (http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm)

[f] The chemical specific properties used in the migration to groundwater calculations were obtained from EPA (2015).

CLARC - Cleanup Levels and Risk Calculation
cPAHs - carcinogenic polycyclic aromatic hydrocarbons
MFA - Maintenance Facility Area
µg/kg - micrograms per kilogram
µg/L - micrograms per liter
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
MTCA - Model Toxics Control Act
NE - not established
PAHs - polycyclic aromatic hydrocarbons
RI/FS - remedial investigation/feasibility study
SVOCs - semivolatile organic compounds
TEF - toxicity equivalency factor
TPH - total petroleum hydrocarbons
TTEC - total toxic equivalent concentration
VOCs - volatile organic compounds
WAC - Washington Administrative Code

Table 3-2
Summary of Initial Remedial Investigation Soil Analytical Results (1997 to 2000)
RI/FS Port of Longview MFA - International Paper

Sample ID	Date Collected	Sample Depth (ft bgs)	Diesel Range Organics[a]	Residual Range Organics[a]	2-Methylnaphthalene	Acenaphthene	Benzo[a]anthracene[b]	Benzo[a]pyrene[b]	Benzo[b]fluoranthene[b]	Benzo[k]fluoranthene[b]	Chrysene[b]	Dibenzofuran	Dibenzo[a,h]anthracene[b]	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene[b]	Naphthalene	Pentachlorophenol	Pyrene	TTEC[b]
			TPH (mg/kg)		PAHs (µg/kg)															
MTCA Method C Soil Cleanup Levels, Direct Contact			2,000	2,000	14,000,000	210,000,000	180,000	18,000	180,000	180,000	1,800,000	3,500,000	180,000	140,000,000	140,000,000	180,000	70,000,000	330,000	110,000,000	18,000
MTCA C Soil Cleanup Levels, Protection of Groundwater			2,000	2,000	3,800	210,000	8,600	2,300	30,000	30,000	96,000	6,500	43,000	1,400,000	220,000	83,000	9,700	35	1,400,000	2,300
Investigation of Areas of Soil Impact Outside the Containment Area (URS Greiner Woodward-Clyde, 1998)																				
97-8.A	10/11/1997	4.5	NA	NA	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	10 U	10 U	11	5 U	300 U	10	1.1
97-8.A	10/11/1997	9	NA	NA	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	10 U	10 U	5 U	5 U	300 U	10 U	NA
97-1.A	11/7/1997	5	NA	NA	0.005 UJ	10 UJ	5 UJ	40 UJ	200 UJ	30 UJ	50 UJ	0 UJ	10 UJ	50 UJ	10 UJ	5 UJ	7 J	10 UJ	10 UJ	NA
97-1.A	11/7/1997	9	NA	NA	0.005 UJ	10 UJ	5 UJ	40 UJ	200 UJ	30 UJ	50 UJ	0 UJ	10 UJ	50 UJ	10 UJ	5 UJ	5 UJ	10 UJ	10 UJ	NA
97-2.A	11/10/1997	4.5	NA	NA	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	14	10 U	5 U	6	300 U	14	NA
97-2.A	11/10/1997	9	NA	NA	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	10 U	10 U	5 U	5 U	300 U	10 U	NA
97-3.A	11/10/1997	5	NA	NA	5.0 U	10 U	18	14	24	10 U	29	5 U	5 U	76	10 U	8	5	300 U	58	19
97-3.A	11/11/1997	11	NA	NA	5.0 U	10 U	10 U	10 U	10 U	10 U	10 U	5 U	5 U	10 U	10 U	5 U	5 U	300 U	10 U	NA
97-9.A	11/11/1997	4.5	NA	NA	5.0 U	53	44	27	86	22	74	46	7	47	39	21	199	300 U	45	46
97-9.A	11/11/1997	11	NA	NA	5.0 U	213	10 U	10 U	10 U	10 U	10 U	5 U	5 U	16	101	5 U	3,300	300 U	11	NA
Additional Perimeter Boring Investigation Work Plan, Former Treated Wood Products Area (URS Greiner Woodward-Clyde, 1999)																				
PB-01	7/14/1998	3 - 4.5	**3,300**	50 U	NA	**225,000**	**29,500**	**6,820**	11,900	3,740	26,200	NA	1,000 U	234,000	177,000	1,530	**532,000**	10,000 U	139,000	**11,749**
PB-02	7/15/1998	7.5 - 9	**3,300**	50 U	NA	47,500	8,050	1,930	3,510	1,170	7,120	NA	1,000 U	52,300	37,000	1,000 U	**137,000**	10,000 U	30,600	**3,274**
PB-03	7/15/1998	6 - 7.5	42	50 U	NA	620	121	100 U	100 U	100 U	144	NA	100 U	811	482	100 U	1,160	1,000 U	444	14
PB-04	7/15/1998	4.5 - 6	1,800	50 U	NA	44,400	6,240	1,670	2,890	1,000 U	5,470	NA	1,000 U	40,700	39,800	1,000 U	**245,000**	10,000 U	24,600	**2,638**
PB-05	7/16/1998	3 - 4.5	25 U	50 U	NA	95	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	42	10 U	42	100 U	10 U	NA
PB-06	7/16/1998	1.5 - 3	54	50 U	NA	308	25	24	41	14	33	NA	10 U	60	108	16	46	100 U	48	34
PB-07	7/16/1998	3 - 4.5	74	50 U	NA	1,030	33	15	29	11	49	NA	10 U	143	473	10 U	**12,300**	100 U	106	23
PB-08	7/16/1998	3 - 4.5	25 U	50 U	NA	65	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	56	10 U	24	100 U	10 U	NA
PB-09	7/16/1998	3 - 4.5	25 U	50 U	NA	50	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	47	10 U	41	100 U	10 U	NA
PB-10	7/16/1998	3 - 4.5	25 U	50 U	NA	340	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	128	10 U	171	100 U	10 U	NA
PB-11	7/17/1998	6 - 7.5	**13,000**	50 U	NA	**691,000**	100,000 U	100,000 U	100,000 U	100,000 U	100,000 U	NA	100,000 U	474,000	**537,000**	100,000 U	**4,060,000**	1,000,000 U	340,000	NA
PB-11	7/17/1998	9 - 10.5	54	50 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	8,100	10,000 U	1,000 U	NA
PB-12	7/17/1998	7.5 - 9	100	50 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	8,130	10,000 U	1,000 U	NA
PB-12	7/17/1998	9 - 10.5	25 U	50 U	NA	100 U	100 U	100 U	100 U	100 U	100 U	NA	100 U	100 U	100 U	100 U	6,700	1,000 U	100 U	NA
PB-13	7/17/1998	7.5 - 9	25 U	50 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	**11,800**	10,000 U	1,000 U	NA
97-4.B	7/20/1998	6 - 7.5	25 U	50 U	NA	100 U	100 U	100 U	100 U	100 U	100 U	NA	100 U	100 U	100 U	100 U	900	1,000 U	100 U	NA
97-4.B	7/20/1998	9 - 10.5	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
97-5.A	7/21/1998	9.5 - 11	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
97-5.A	7/21/1998	12.5 - 14	25 U	50 U	NA	10 U	11	15	21	10 U	13	NA	10 U	14	10 U	10 U	10 U	100 U	15	18
PB-14	7/21/1998	7.5 - 9	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	25	100 U	10 U	NA
97-10.A	7/22/1998	9.5 - 11	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
97-10.A	7/22/1998	11 - 12.5	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
97-6.B	7/23/1998	7.5 - 9	490	50 U	NA	4,290	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	1,000 U	4,740	3,840	1,000 U	**187,000**	10,000 U	3,270	NA
97-6.B	7/23/1998	10.5 - 12	1,900	500 U	NA	55,500	7,900	2,210	3,950	1,320	7,320	NA	1,000 U	47,500	53,800	1,000 U	**245,000**	10,000 U	31,800	**3,600**

Table 3-2
Summary of Initial Remedial Investigation Soil Analytical Results (1997 to 2000)
RI/FS Port of Longview MFA - International Paper

Sample ID	Date Collected	Sample Depth (ft bgs)	Diesel Range Organics[a]	Residual Range Organics[a]	2-Methylnaphthalene	Acenaphthene	Benzo[a]anthracene[b]	Benzo[a]pyrene[b]	Benzo[b]fluoranthene[b]	Benzo[k]fluoranthene[b]	Chrysene[b]	Dibenzofuran	Dibenzo[a,h]anthracene[b]	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene[b]	Naphthalene	Pentachlorophenol	Pyrene	TTEC[b]
			TPH (mg/kg)		PAHs (µg/kg)															
MTCA Method C Soil Cleanup Levels, Direct Contact			2,000	2,000	14,000,000	210,000,000	180,000	18,000	180,000	180,000	1,800,000	3,500,000	180,000	140,000,000	140,000,000	180,000	70,000,000	330,000	110,000,000	18,000
MTCA C Soil Cleanup Levels, Protection of Groundwater			2,000	2,000	3,800	210,000	8,600	2,300	30,000	30,000	96,000	6,500	43,000	1,400,000	220,000	83,000	9,700	35	1,400,000	2,300
Soil and Groundwater Investigation of Eastern Area (URS Greiner Woodward-Clyde, 2000)																				
99EA-SB1	1/5/1999	8.5 - 10	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99EA-SB1	1/5/1999	14.5 - 16	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99EA-SB2	1/5/1999	7 - 8.5	460	75	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	4,070	3,300 U	3,300 U	3,300 U	16,500 U	3,300 U	NA
99EA-SB2	1/5/1999	8.5 - 10	25 U	62	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99EA-SB3	1/5/1999	5.5 - 7	130 U	980	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	16,500 U	3,300 U	NA
99EA-SB3	1/5/1999	8.5 - 10	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99EA-SB3	1/5/1999	10 - 11.5	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	18	1,650 U	330 U	NA
Soil and Groundwater Investigation of Western Area (URS Greiner Woodward-Clyde, 2000)																				
99NW-SB1	1/6/1999	4 - 5.5	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99NW-SB1	1/6/1999	8.5 - 10	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99NW-SB2	1/6/1999	4 - 5.5	250 U	1,200	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	165,000 U	33,000 U	NA
99NW-SB2	1/6/1999	8.5 - 10	25 U	79	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	16,500 U	3,300 U	NA
99NW-SB3	1/6/1999	2.5 - 4	25 U	200	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	16,500 U	3,300 U	NA
99NW-SB3	1/6/1999	8.5 - 10	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99SW-SB1	1/7/1999	1 - 2.5	600	550	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	33,000 U	165,000 U	33,000 U	NA
99SW-SB1	1/7/1999	5.5 - 7	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99SW-SB1	1/7/1999	8 - 8.5	25 U	91	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99SW-SB2	1/7/1999	1 - 2.5	25 U	74	660 U	660 U	660 U	660 U	660 U	660 U	660 U	660 U	660 U	660 U	660 U	660 U	660 U	3,300 U	660 U	NA
99SW-SB2	1/7/1999	5.5 - 7	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99SW-SB3	1/7/1999	2.5 - 4	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99SW-SB3	1/7/1999	8.5 - 10	25 U	50 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99SW-SB4	1/7/1999	1 - 2.5	25 U	100	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	16,500 U	3,300 U	NA
99SW-SB4	1/7/1999	5.5 - 7	25 U	80	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	330 U	1,650 U	330 U	NA
99SW-SB4	1/7/1999	10 - 11.5	25 U	50 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	3,300 U	16,500 U	3,300 U	NA

Table 3-2
Summary of Initial Remedial Investigation Soil Analytical Results (1997 to 2000)
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Sample ID	Date Collected	Sample Depth (ft bgs)	Diesel Range Organics[a]	Residual Range Organics[a]	2-Methylnaphthalene	Acenaphthene	Benzo[a]anthracene[b]	Benzo[a]pyrene[b]	Benzo[b]fluoranthene[b]	Benzo[k]fluoranthene[b]	Chrysene[b]	Dibenzofuran	Dibenzo[a,h]anthracene[b]	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene[b]	Naphthalene	Pentachlorophenol	Pyrene	TTEC[b]
			TPH (mg/kg)		PAHs (µg/kg)															
MTCA Method C Soil Cleanup Levels, Direct Contact			2,000	2,000	14,000,000	210,000,000	180,000	18,000	180,000	180,000	1,800,000	3,500,000	180,000	140,000,000	140,000,000	180,000	70,000,000	330,000	110,000,000	18,000
MTCA C Soil Cleanup Levels, Protection of Groundwater			2,000	2,000	3,800	210,000	8,600	2,300	30,000	30,000	96,000	6,500	43,000	1,400,000	220,000	83,000	9,700	35	1,400,000	2,300
Additional Perimeter Boring Investigation Report and Maintenance Facility Work Plan (URS Greiner Woodward-Clyde, 2000)																				
PB-15	7/19/1999	3 - 5	**9,600**	500 U	NA	**260,000**	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	NA	200,000 U	200,000 U	200,000 U	200,000 U	**4,580,000**	200,000 U	200,000 U	NA
PB-15	7/19/1999	5 - 7	430	500 U	NA	4,430	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	1,000 U	1,230	2,370	1,000 U	**67,500**	10,000 U	1,000 U	NA
PB-17	7/19/1999	3 - 5	25 U	50 U	NA	416	47	71	92	32	57	NA	11	311	341	32	115	100 U	179	93
PB-17	7/19/1999	5 - 7	75	50 U	NA	2,500	100 U	100 U	100 U	100 U	100 U	NA	100 U	427	2,150	100 U	969	1,000 U	192	NA
PB-18	7/19/1999	3 - 5	**5,000**	500 U	NA	143,000	**20,200**	10,000 U	11,900	10,000 U	17,100	NA	10,000 U	128,000	113,000	10,000 U	**845,000**	100,000 U	76,400	**3,381**
PB-20	7/20/1999	3.5 - 5.5	**4,600**	500 U	NA	103,000	10,000 U	10,000 U	10,000 U	10,000 U	10,000 U	NA	10,000 U	55,400	60,500	10,000 U	**426,000**	100,000 U	35,100	NA
PB-20	7/20/1999	5.5 - 7.5	110	51	NA	3,110	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	**76,900**	10,000 U	1,000 U	NA
PB-21	7/20/1999	3.5 - 5.5	25 U	50 U	NA	128	100 U	100 U	100 U	100 U	100 U	NA	100 U	100 U	100 U	100 U	1,750	1,000 U	100 U	NA
PB-21	7/20/1999	5.5 - 7.5	38	50 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	1,000 U	1,000 U	1,000 U	1,000 U	**10,700**	10,000 U	1,000 U	NA
PB-23	7/20/1999	5.5 - 7.5	25 U	50 U	NA	563	100 U	100 U	100 U	100 U	100 U	NA	100 U	100 U	218	100 U	100 U	1,000 U	100 U	NA
PB-24	7/20/1999	3.5 - 5.5	**7,100**	500 U	NA	**236,000**	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	NA	200,000 U	220,000	200,000 U	200,000 U	**697,000**	200,000 U	200,000 U	NA
PB-26	7/20/1999	3.5 - 5.5	**3,100**	500 U	NA	103,000	**14,600**	**12,600**	11,200	10,000 U	12,800	NA	10,000 U	73,700	56,000	10,000 U	**73,300**	100,000 U	48,700	**15,308**
PB-27	7/20/1999	3.5 - 5.5	25 U	50 U	NA	312	10 U	20	25	10 U	10	NA	10 U	56	254	22	220	100 U	35	25
PB-27	7/20/1999	5.5 - 7.5	39	52	NA	339	100 U	100 U	100 U	100 U	100 U	NA	100 U	100 U	100 U	100 U	4,460	1,000 U	100 U	NA
PB-28	7/21/1999	3.5 - 5.5	25 U	50 U	NA	499	107	100 U	226	100 U	136	NA	100 U	444	109	100 U	2,650	1,000 U	293	35
PB-28	7/21/1999	5.5 - 7.5	**26,000**	2,500 U	NA	**576,000**	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	NA	200,000 U	308,000	**323,000**	200,000 U	**3,080,000**	200,000 U	200,000 U	NA
PB-29	7/21/1999	5.5 - 7.5	25 U	50 U	NA	412	10 U	10 U	10 U	10 U	10 U	NA	10 U	30	283	10 U	220	100 U	16	NA
PB-31	7/21/1999	3.5 - 5.5	**3,200**	500 U	NA	93,900	20,000 U	20,000 U	20,000 U	20,000 U	20,000 U	NA	20,000 U	119,000	42,800	20,000 U	**242,000**	200,000 U	80,300	NA
PB-33	7/21/1999	3.5 - 5.5	25 U	50 U	NA	76	10 U	10 U	10 U	10 U	10 U	NA	10 U	18	13	10 U	30	100 U	10 U	NA
PB-34	7/21/1999	5 - 7	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 UJ	10 U	NA	10 U	16	38	10 U	10 U	100 U	10 U	NA
PB-34	7/21/1999	7 - 9	44	50 U	NA	1,080	3,360	**3,120**	3,440	3,670	3,950	NA	3,660	3,650	1,810	3,580	**10,500**	**17,300**	3,470	**4,931**
PB-34	7/21/1999	9 - 11	25 UJ	50 UJ	NA	12 J	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	NA	10 UJ	10 UJ	10 UJ	10 UJ	770 J	100 UJ	10 UJ	NA
PB-34	7/21/1999	11 - 13	25 UJ	50 UJ	NA	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	NA	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	100 UJ	10 UJ	NA
PB-35	8/2/1999	7 - 9	44	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
PB-35	8/2/1999	9 - 11	39	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
PB-37	8/2/1999	5.5 - 7.5	25 U	50 U	NA	11	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	40	100 U	10 U	NA
PB-39	8/2/1999	3.5 - 5.5	25 U	50 U	NA	24	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	15	100 U	10 U	NA
PB-40	8/2/1999	5.5 - 7.5	40	93	NA	525	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	74	10 U	9,690	100 U	10 U	NA
PB-41	8/3/1999	5.5 - 7.5	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	41	100 U	10 U	NA
PB-42	8/3/1999	3.5 - 5.5	39	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
PB-43	8/3/1999	3.5 - 5.5	43	50 U	NA	13	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA

Table 3-2
Summary of Initial Remedial Investigation Soil Analytical Results (1997 to 2000)
RI/FS Port of Longview MFA - International Paper

Sample ID	Date Collected	Sample Depth (ft bgs)	Diesel Range Organics[a]	Residual Range Organics[a]	2-Methylnaphthalene	Acenaphthene	Benzo[a]anthracene[b]	Benzo[a]pyrene[b]	Benzo[b]fluoranthene[b]	Benzo[k]fluoranthene[b]	Chrysene[b]	Dibenzofuran	Dibenzo[a,h]anthracene[b]	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene[b]	Naphthalene	Pentachlorophenol	Pyrene	TTEC[b]
			TPH (mg/kg)		PAHs (µg/kg)															
MTCA Method C Soil Cleanup Levels, Direct Contact			2,000	2,000	14,000,000	210,000,000	180,000	18,000	180,000	180,000	1,800,000	3,500,000	180,000	140,000,000	140,000,000	180,000	70,000,000	330,000	110,000,000	18,000
MTCA C Soil Cleanup Levels, Protection of Groundwater			2,000	2,000	3,800	210,000	8,600	2,300	30,000	30,000	96,000	6,500	43,000	1,400,000	220,000	83,000	9,700	35	1,400,000	2,300
Offsite Investigation Report and Additional Action Feasibility Study (URS Greiner Woodward-Clyde, 2000)																				
PB-44	2/23/2000	5 - 6	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	100 U	10 U	NA
PB-45	2/23/2000	5 - 7	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	50 U	10 U	NA
PB-46	2/23/2000	5 - 7	**3,000**	50 U	NA	73,000	**41,700**	**26,800**	**37,200**	12,300	45,300	NA	3,200	184,000	57,100	9,960	**18,900**	240 U	147,000	**37,689**
PB-47	2/23/2000	5 - 6	35	50 U	NA	915	10 U	32	37	10 U	26	NA	10 U	68	1,340	22	286	50 U	74	38
PB-48	2/23/2000	6.5 - 7	25 U	50 U	NA	89	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	33	10 U	481	50 U	10 U	NA
PB-49	2/23/2000	7 - 9	25 U	50 U	NA	204	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	44	10 U	81	50 U	10 U	NA
PB-50	2/24/2000	3 - 4.5	25 U	88	NA	10 U	25	20	68	15	29	NA	10 U	58	10 U	19	16	50 U	47	33
PB-51	2/24/2000	3 - 5	25 U	350	NA	20	134	104	386	79	154	NA	36	266	24	113	62	50 U	236	180
PB-52	2/24/2000	7.5 - 9	41	50 U	NA	1,090	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	400	10 U	1,010	50 U	10 U	NA
PB-53	2/24/2000	7 - 8.5	38	50 U	NA	1,560	10 U	10 U	10 U	10 U	10 U	NA	10 U	22	1,620	10 U	348	50 U	10 U	NA
PB-53	2/24/2000	8.5 - 9	52	50 U	NA	2,170	10 U	10 U	10 U	10 U	10 U	NA	10 U	10	608	10 U	9,050	50 U	10 U	NA
PB-54	2/24/2000	8.5 - 9	67	180	NA	1,390	10 U	10 U	11	10 U	10 U	NA	10 U	13	108	10 U	**13,600**	50 U	11	1.1
PB-55	2/24/2000	5 - 7	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	50 U	10 U	NA
PB-56	2/25/2000	7 - 9	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	50 U	10 U	NA
PB-57	2/25/2000	7 - 8	36	50 U	NA	1,130	10 U	10 U	11	10 U	10 U	NA	10 U	13	411	10 U	2,020	50 U	10 U	1.1
PB-57	2/25/2000	8 - 9	71	50 U	NA	189	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	**11,300**	50 U	10 U	NA
PB-58	2/25/2000	5.5 - 7	25 U	50 U	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U	50 U	10 U	NA

Notes:

Numbers in **bold** indicate the result meets or exceeds the MTCA Method C Soil Cleanup Levels, Protection of Groundwater.

MTCA Cleanup Regulation, WAC 173-340. MTCA Method C soil values are from Ecology website CLARC tables downloaded as of August 2015 (https://fortress.wa.gov/ecy/clarc/reporting/CLARCReporting.aspx).

*Pattern profile does not match the laboratory standard pattern.

[a] TPH cleanup levels are based on MTCA Method A values.

[b] cPAH cleanup levels under MTCA are based on the calculated total toxicity of the mixture using the Toxicity Equivalency Methodology in WAC 173-340-780 (8). The mixture of cPAHs shall be considered a single hazardous substance and compared to the applicable MTCA Method C cleanup levels for benzo(a)pyrene. TTEC was calculated using only results reported as detected.

CLARC - Cleanup Levels and Risk Calculation
cPAH - carcinogenic polycyclic aromatic hydrocarbon
ft bgs - feet below ground surface
ID - identification
J - result is an estimated value
µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
MFA - Maintenance Facility Area
MTCA - Model Toxics Control Act

NA - not analyzed
NE - not established
PAHs - polycyclic aromatic hydrocarbons
RI/FS - remedial investigation/feasibility study
TPH - total petroleum hydrocarbons
TTEC - total toxic equivalent concentration
U - compound was analyzed for but not detected above the reporting limit shown
UJ - the associated quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**AV-09**												
Date Collected			**5/3/2002**	**9/11/2002**	**3/6/2003**	**9/12/2003**	**3/10/2004**	**9/10/2004**	**3/15/2005**	**9/21/2005**	**3/22/2006**	**9/27/2006**	**3/8/2007**	**6/8/2007**	**9/19/2007**
Remedial System Status:			*Baseline*	*Bioventing and Biosparging System Operational*											
QAQC:															
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics^{a}	0.5	0.5	0.250 U	0.250 U	0.25 U	0.053 J	0.150 J	0.051 J	0.21 J	0.25 U	0.16 J	0.093 J	0.26 U	0.25 U	0.27 U
Residual Range Organics^{a}	0.5	0.5	0.500 U	0.500 U	0.5 U	0.53 U	0.210 J	0.52 U	0.50 U	0.50 U	0.16 J	0.50 U	0.52 U	0.50 U	0.53 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	147	0.743	0.19	0.064 U	0.96 U	0.015 U	0.061 J	0.1 U	0.022 U	0.059	0.026 J	0.011 J	0.0054 U
2-Methylnaphthalene	32	70	NA	NA	0.020 U	0.015 U	NA	0.0094 J	0.0074 J	0.1 U	0.01 J	0.57	0.010 J	0.0026 J	0.0023 J
Acenaphthylene	NE	NE	0.244 U	0.0305	0.020 U	0.0033 J	NA	0.0054 J	0.0037 J	0.0023 J	0.0053 J	0.040	0.020 U	0.020 U	0.02 U
Acenaphthene	960	2,100	3.99	0.627	0.16	0.018 U	NA	0.0085 J	0.021 J	0.10 U	0.01 J	1.7	0.055 J	0.020 U	0.0052 J
Dibenzofuran	16	35	NA	NA	0.020 U	0.0074 J	NA	0.02 U	0.0097 J	0.1 U	0.0075 J	1.1	0.015 J	0.020 U	0.020 U
Fluorene	640	1,400	0.689	0.271	0.042	0.01	NA	0.008 J	0.014 J	0.10 U	0.015 J	1.7	0.037 J	0.020 U	0.0049 J
Phenanthrene	NE	NE	0.936	0.538	0.24	0.099	NA	0.031	0.17	0.10 U	0.071	3.2	0.45 J	0.0085 J	0.042
Anthracene	4,800	11,000	0.0953	0.0961	0.037	0.028	NA	0.044	0.068 J	0.024 J	0.048	0.42	0.13 J	0.020 J	0.023
Fluoranthene	640	1,400	0.0608	0.204	0.14	0.21	NA	0.052	0.5	0.042 J	0.13	1.9	1.6 J	0.021	0.12
Pyrene	480	1,100	0.0477	0.123	0.12	0.18	NA	0.048	0.43	0.046 J	0.11	0.96	1.3 J	0.017 J	0.10
Benzo[a]anthracene^{b}	0.12	1.2	0.0244 U	0.0244 U	0.064	**0.12**	0.036 J	0.027	**0.22**	0.022 J	0.066	**0.33**	**0.96 J**	0.014 J	0.080
Chrysene^{b}	1.2	12	0.0244 U	0.0244 U	0.082	0.17	0.039 J	0.037	0.29	0.031 J	0.085	0.43	**1.3 J**	0.016 J	0.085
Benzo[b]fluoranthene^{b}	0.12	1.2	0.0244 U	0.0244 U	0.081	**0.12**	NA	0.041	**0.33**	0.037 J	0.096	**0.38**	**1.7 J**	0.023	**0.16**
Benzo[k]fluoranthene^{b}	1.2	12	0.0244 U	0.0244 U	0.069	0.23	NA	0.034	0.24	0.018 J	0.058	0.25	0.70 J	0.0071 J	0.043
Benzo[a]pyrene^{b}	0.012	0.12	0.0244 U	0.0244 U	**0.070**	**0.16**	NA	**0.033**	**0.28**	**0.025 J**	**0.08**	**0.25**	**1.2 J**	**0.013 J**	**0.076**
Indeno[1,2,3-cd]pyrene^{b}	0.12	1.2	0.0244 U	0.0244 U	0.051	0.10	NA	0.029	**0.25 J**	0.019 J	0.062	**0.18**	**0.99 J**	0.011 J	0.086
Dibenzo[a,h]anthracene^{b}	0.12	1.2	0.0488 U	0.0488 U	0.020 U	0.032	NA	0.0063 J	0.049 J	0.0038 J	0.0097 J	0.048	**0.23 J**	0.0026 J	0.018 J
Benzo[g,h,i]perylene	NE	NE	0.0244 U	0.0244 U	0.054	0.088	NA	0.032	0.26	0.025 J	0.064	0.21	0.91 J	0.012 J	0.082
Pentachlorophenol	0.22	2.2	0.244 U	0.244 U	2.0 U	0.5 UJ	0.96 U	1.0 UJ	0.95 U	1.0 U	0.095 U	1.0 U	0.96 UJ	0.96 U	1.0 UJ
TTEC^{b}	0.012	0.12	NA	NA	**0.0973**	**0.2219**	0.0040	**0.0471**	**0.3918**	**0.0353**	**0.1100**	**0.3731**	**1.671**	**0.0189**	**0.1156**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**AV-09**												
Date Collected			**12/19/2007**	**3/25/2008**	**9/23/2008**	**3/18/2009**	**9/23/2009**	**9/23/2009**	**3/17/2010**	**9/8/2010**	**3/9/2011**	**9/21/2011**	**3/14/2012**	**9/20/2012**	**3/13/2013**
Remedial System Status:			*Biosparging Only*		*System Shutdown*										
QAQC:								Field Filtered							
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.27 U	0.035 J	0.032 J	0.27 U	0.28 U	NA	0.27 U	0.28 U	0.28 U	0.30 U	0.30 U	0.26 *	0.30 *
Residual Range Organics[a]	0.5	0.5	0.53 U	0.50 UJ	0.52 U	0.53 U	0.56 U	NA	0.53 U	0.55 U	0.56 U	0.59 U	0.59 U	0.50 U	0.52 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.023 U	0.020 U	0.011 J	0.016 U	0.0077	0.014	0.14	0.063	0.044	0.0076	0.038	0.014	0.017
2-Methylnaphthalene	32	70	0.0059 J	0.020 U	0.020 U	0.0037 U	0.0034 U	0.0034 U	0.018	0.016	0.0037 U	0.0034 U	0.0048	0.0046	0.0073
Acenaphthylene	NE	NE	0.020 U	0.020 U	0.020 U	0.0011 J	0.00078 J	0.0096	0.0035 U	0.0036 U	0.0030 J	0.0020 J	0.0021 J	0.0024 J	0.0068
Acenaphthene	960	2,100	0.051	0.0052 J	0.020 U	0.0023 J	0.0082	0.0054 U	0.012	0.0063	0.017	0.0048	0.012	0.013	0.027
Dibenzofuran	16	35	0.012 J	0.020 U	0.020 U	0.0017 J	0.0032 J	0.0034 U	0.0048	0.0066	0.0081	0.0041	0.0094	0.0085	0.022
Fluorene	640	1,400	0.024	0.020 U	0.020 U	0.0018 J	0.0044	0.0013 J	0.0052	0.0043	0.0098	0.0033 J	0.010	0.010	0.027
Phenanthrene	NE	NE	0.32	0.039 U	0.011 J	0.012	0.039	0.0048 U	0.042	0.0089	0.10	0.02	0.052	0.074	0.10
Anthracene	4,800	11,000	0.10	0.035	0.0075 J	0.0072	0.012	0.0058	0.013	0.0064	0.040	0.026	0.054	0.099	0.23
Fluoranthene	640	1,400	0.80	0.092	0.025	0.021	0.11	0.0022 J	0.12	0.016	0.29	0.051	0.13	0.21	0.15
Pyrene	480	1,100	0.64	0.094	0.023	0.019	0.085 J	0.0011 J	0.11	0.015	0.25	0.048	0.12	0.21	0.14
Benzo[a]anthracene[b]	0.12	1.2	**0.61**	0.089	0.020	0.017	0.076	0.0034 U	0.09	0.013	**0.20**	0.038	0.11	**0.17**	0.11
Chrysene[b]	1.2	12	0.61	0.090	0.022	0.018 J	0.086	0.0034 U	0.11	0.015	0.24	0.048	0.11	0.21	0.12
Benzo[b]fluoranthene[b]	0.12	1.2	**1.2**	**0.15**	0.032	0.032	**0.17**	0.0034 U	**0.19**	0.027	**0.46**	0.080	**0.22**	**0.33**	**0.22**
Benzo[k]fluoranthene[b]	1.2	12	0.38	0.045	0.010 J	0.010 J	0.053	0.0034 U	0.062	0.0079	0.15	0.031	0.064	0.12	0.074
Benzo[a]pyrene[b]	0.012	0.12	**0.68 J**	**0.12**	**0.025**	**0.023**	**0.12**	0.0034 U	**0.14**	**0.018**	**0.27**	**0.049**	**0.15**	**0.24**	**0.16**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	**0.76**	0.097	0.024 J	0.021	**0.13**	0.0034 U	**0.13**	0.021	**0.30**	0.057	**0.14**	**0.25**	**0.19**
Dibenzo[a,h]anthracene[b]	0.12	1.2	**0.14**	0.019 J	0.0052 J	0.0037 J	0.028	0.0034 U	0.031	0.0037	0.065	0.013	0.028	0.054	0.039
Benzo[g,h,i]perylene	NE	NE	0.75	0.086	0.023	0.020	0.12	0.0034 U	0.16	0.020	0.33	0.056	0.14	0.22	0.17
Pentachlorophenol	0.22	2.2	0.98 UJ	0.96 UJ	0.98 UJ	0.5 U	0.50 U	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TTEC[b]	0.012	0.12	**0.9951**	**0.1609**	**0.0343**	**0.0316**	**0.167**	NA	**0.191**	**0.0254**	**0.390**	**0.0714**	**0.207**	**0.335**	**0.22**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID			**AV-09**			**AV-10**										
Date Collected	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**9/17/2013**	**3/6/2014**	**9/29/2014**	**5/3/2002**	**9/11/2002**		**3/6/2003**		**9/12/2003**		**3/10/2004**		**9/10/2004**
Remedial System Status:						*Baseline*	*Bioventing and Biosparging System Operational*								
QAQC:								**DUP**		**DUP**		**DUP**		**DUP**	
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.36 *	0.45 *	0.29 J	**11.8 ***	**7.45 ***	**8.17 ***	**11 ***	**14 ***	**1,200 *J**	**660 *J**	**870 *J**	**950 *J**	**31 ***
Residual Range Organics[a]	0.5	0.5	0.40 J	0.38 J	**0.54** *	0.500 U	0.500 U	0.5 U	**0.92 ***	**1.4 ***	**150 *J**	**81 *J**	**110 *J**	**120 *J**	**3.2 ***
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.011	0.056	0.017	**1,150**	**867**	**800**	**1,500**	**1,400**	**26,000 J**	**17,000 J**	**480,000 J**	**93,000 J**	**2,400**
2-Methylnaphthalene	32	70	0.0050 J+	0.011	0.0034 U	NA	NA	NA	**830**	**820**	**42,000 J**	**25,000 J**	NA	NA	0.095 UJ
Acenaphthylene	NE	NE	0.0039	0.0047 J+	0.0034 U	2.44 U	5.90 U	3.4	5.8	5.6	230 J	150 J	NA		18
Acenaphthene	960	2,100	0.012	0.010	0.0032 J	114	68.3	54	300	300	**16,000 J**	**9,100 J**	NA	NA	**1,400**
Dibenzofuran	16	35	0.0057 J+	0.012	0.0043	NA	NA	NA	**160**	**170**	**11,000 J**	**6,500 J**	NA	NA	**930**
Fluorene	640	1,400	0.0073	0.013	0.0026 J	38.4	27.4	22.4	140	150	**9,300 J**	**5,600 J**	NA	NA	**790**
Phenanthrene	NE	NE	0.038	0.021	0.012	17.1	8.05	7.98	190	200	17,000 J	9,800 J	NA	NA	1,400
Anthracene	4,800	11,000	0.19	0.20	0.078	1.31	1.30	1.19	28	30	2,800 J	1,600 J	NA	NA	200
Fluoranthene	640	1,400	0.092	0.022	0.016	1.15	1.25	1.07	72	77	**7,200 J**	**4,300 J**	NA	NA	460
Pyrene	480	1,100	0.091	0.023	0.020	0.797	0.717	0.725	44	53	**3,700 J**	**2,200 J**	NA	NA	330
Benzo[a]anthracene[b]	0.12	1.2	0.071	0.019	0.015	0.0987	0.236 U	0.59 U	**11**	**12**	**1,100 J**	**590 J**	**20,000 J**	**4,200 J**	**80**
Chrysene[b]	1.2	12	0.081	0.020	0.017	0.0999	0.236 U	0.59 U	**9.8**	**11**	**1,000 J**	**550 J**	**16,000 J**	**3,400 J**	**77**
Benzo[b]fluoranthene[b]	0.12	1.2	**0.14**	0.036	0.028	0.0812	0.236 U	0.59 U	**4.3**	**4.9**	**400 J**	**230 J**	NA	NA	**39**
Benzo[k]fluoranthene[b]	1.2	12	0.048	0.011	0.0091	0.0718	0.236 U	0.59 U	**3.4**	**3.7**	**370 J**	**210 J**	NA	NA	**24**
Benzo[a]pyrene[b]	0.012	0.12	**0.098**	**0.027**	**0.020**	**0.0668**	0.236 U	0.59 U	**3.7**	**4.1**	**350 J**	**200 J**	NA	NA	**28**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.095	0.025	0.020	0.0244 U	0.236 U	0.59 U	**1.5**	**1.8**	**150 J**	**90 J**	NA	NA	**12**
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.021	0.0053	0.0036	0.0488 U	0.472 U	1.18 U	**0.33**	**0.41**	**34 J**	**20 J**	NA	NA	**2.6**
Benzo[g,h,i]perylene	NE	NE	0.099	0.025	0.021	0.0244 U	0.236 U	0.59 U	1.2	1.4	120 J	69 J	NA	NA	10
Pentachlorophenol	0.22	2.2	0.50 U	0.50 U	0.25 U	1.22 U	2.36 U	5.9 U	20 U	20 U	**13 J**	**9.5 J**	**1,700 J**	**330 J**	**3.0 J**
TTEC[b]	0.012	0.12	**0.14**	**0.037**	**0.028**	**0.0930**	NA	NA	**5.851**	**6.491**	**565**	**320**	**2,160**	**454**	**44.53**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID			**AV-10**												
Date Collected	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**3/15/2005**		**9/21/2005**	**3/22/2006**	**9/27/2006**	**3/8/2007**	**9/19/2007**	**12/19/2007**	**3/25/2008**	**9/25/2008**	**3/19/2009**	**9/23/2009**	**3/17/2010**
Remedial System Status:			*Bioventing and Biosparging System Operational*							*Biosparging Only*		*System Shutdown*			
QAQC:				**DUP**											
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics^{a}	0.5	0.5	**34** *	**38** *	**28** *	**31** *	**16** *	**1.5** *	**2.9** *	**6.1** *	**3.6 J***	**5.0** *	**4.1** *	**4.3** *	**4.6**
Residual Range Organics^{a}	0.5	0.5	**4.8** *	**5.1** *	**4.6** *	**7.3** *	**2.0** *	0.52 U	**0.84** *	**0.97** *	**0.65 J***	**1.1** *	**1.3** *	**0.86**	**0.96**
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	**1,500**	**1,500**	**1,300**	51	**200**	0.069 J	0.15	6.2	4.9	5.7	1.8	1.5	4.9
2-Methylnaphthalene	32	70	**2,400**	**2,100**	**5,200**	**850**	**980**	0.057 J	0.24	2.5	2.1	0.35	0.034 U	0.16	1.1
Acenaphthylene	NE	NE	22	18	61	26	17	0.20 J	2.3	6.4	1.7	4.8	1.3	4.1	5.0
Acenaphthene	960	2,100	**1,000**	920	**2,700**	**1,200**	870	1.7 J	17	65	42	140	46	160	240
Dibenzofuran	16	35	**640**	**550**	**1,900**	**700**	**450**	0.020 U	0.42	**18**	**16**	**51**	11	**28**	**43**
Fluorene	640	1,400	500	410	**1,700**	**640**	480	0.020 U	0.72	15	14	41	9.7	29	55
Phenanthrene	NE	NE	920	700	3,000	1,200	800	0.020 U	1.8	1.2	4.5	18	0.56	8.0	19
Anthracene	4,800	11,000	130	97	560	180	110	0.75 J	1.6	2.8	2.5	3.5	1.5	3.0	4.8
Fluoranthene	640	1,400	330	250	**1,000**	500	340	0.14 J	9.1	7.5	1.6	5.6	1.7	1.4	3.5
Pyrene	480	1,100	220	170	**810**	330	210	0.054 J	2.2	3.3	0.99	4.0	1.0	0.71 J	2.4
Benzo[a]anthracene^{b}	0.12	1.2	**41**	**32**	**210**	**78**	**47**	0.042 J	**1.6**	**0.82**	**0.16**	**0.39**	0.11	0.11	**0.35**
Chrysene^{b}	1.2	12	**39**	**30**	**210**	**77**	**47**	0.15 J	**1.3**	1.1	0.30	0.47	0.074 J	0.14	0.38
Benzo[b]fluoranthene^{b}	0.12	1.2	**19**	**15**	**99**	**36**	**20**	0.091 J	**1.2**	**0.96**	**0.32**^{d}	**0.19**	0.077	0.077	**0.20**
Benzo[k]fluoranthene^{b}	1.2	12	**14**	**11**	**68**	**26**	**15**	0.040 J	0.33	0.29	0.020 U^{d}	0.065	0.035 J	0.038	0.07
Benzo[a]pyrene^{b}	0.012	0.12	**14**	**11**	**73**	**29**	**14**	**0.050 J**	**0.51**	**0.52 J**	**0.16**	**0.12**	**0.06**	**0.047**	**0.14**
Indeno[1,2,3-cd]pyrene^{b}	0.12	1.2	**6.3 J**	**4.9 J**	**29**	**13**	**6.6**	0.033 J	**0.31 J**	**0.34**	**0.14**	0.087	0.033 J	0.028	0.086
Dibenzo[a,h]anthracene^{b}	0.12	1.2	**1.5 J**	**1.3 J**	**8.0 J**	**3.3**	**1.6**	0.0065 J	0.070 J	0.078 J	0.020 U	0.020 J	0.010 J	0.0047	0.019 J
Benzo[g,h,i]perylene	NE	NE	5.5	4.4	28	12	5.9	0.033 J	0.26	0.30	0.14	0.082	0.034	0.027	0.091
Pentachlorophenol	0.22	2.2	19 U	**2.4 J**	96 U	**13 J**	**1.5 J**	0.10 J	**0.32 J**	**0.81 J**	0.21 J	**0.80 J**	0.5 U	0.50 U	0.50 U
TTEC^{b}	0.012	0.12	**22.57**	**17.72**	**116.5**	**45.4**	**23.49**	**0.0728**	**0.874**	**0.780**	**0.225**	**0.200**	**0.0872**	**0.074**	**0.216**

Table 3-3
Summary of Groundwater Analytical Results
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Sample ID			AV-10									AV-11			
Date Collected	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	9/9/2010	3/8/2011	9/20/2011	3/14/2012	9/20/2012	3/14/2013	9/17/2013	3/7/2014	9/30/2014	5/3/2002	9/11/2002	3/6/2003	9/12/2003
Remedial System Status:			*System Shutdown*									*Baseline*	*Bioventing and Biosparging System Operational*		
QAQC:															
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**6.8** *	**6.2** *	**6.7** *	**7.5** *	**9.3** *	**7.5** *	**9.8** *	**6.6** *	**11** *	0.250 U	0.250 U	0.25 U	0.037 J
Residual Range Organics[a]	0.5	0.5	**2.6** *	**1.6** *	2.4 U	**3.4** *	**2.9** *	**2.9** *	**4.9** *	**2.3** *	**9.3** *	0.500 U	0.500 U	0.5 U	0.064 J
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	8.9	11	14	8.5	12	6.2	7.2	8.8	4.0	0.0242	0.291	0.020 U	0.017 U
2-Methylnaphthalene	32	70	1.3	5.1	7.3	1.8	1.6	0.55	1.2	4.0	0.86	NA	NA	0.020 U	0.019 U
Acenaphthylene	NE	NE	4.2	2.2	2.3	2.3	2.8	2.4	3.2	2.3	2.4	0.0241 U	0.0236 U	0.020 U	0.0098 U
Acenaphthene	960	2,100	210	97	100	100	130	92	100	140	91	0.0241 U	0.0778	0.020 U	0.016 U
Dibenzofuran	16	35	**100**	**31**	**20**	**52**	**36**	**34**	**44**	**100**	**41**	NA	NA	0.020 U	0.015
Fluorene	640	1,400	70	31	25	37	37	33	40	59	37	0.0241 U	0.0630	0.020 U	0.019
Phenanthrene	NE	NE	40	15	9.9	25	16	13	20	44	21	0.0241 U	0.136	0.020 U	0.052
Anthracene	4,800	11,000	8.3	6.6	7.6	8.1	11	10	11	7.4	15	0.0241 U	0.0257	0.020 U	0.011
Fluoranthene	640	1,400	9.1	2.6	1.6	3.2	3.0	3.0	3.9	4.6	3.4	0.0241 U	0.0623	0.020 U	0.04
Pyrene	480	1,100	5.8	1.6	0.93	1.9	1.6	1.7	2.2	2.5	2.4	0.0241 U	0.0439	0.020 U	0.03
Benzo[a]anthracene[b]	0.12	1.2	**0.68**	**0.14**	**0.13**	**0.20**	**0.16**	**0.18**	**0.17**	**0.14**	**0.19**	0.0241 U	0.0236 U	0.020 U	0.011
Chrysene[b]	1.2	12	0.69	0.094	0.079	0.095	0.100	0.16	0.15 J	0.16	0.13	0.0241 U	0.0236 U	0.020 U	0.015
Benzo[b]fluoranthene[b]	0.12	1.2	**0.24**	0.098	0.064 J	**0.14**	0.058	0.076	0.060	0.0470	0.098	0.0241 U	0.0236 U	0.020 U	0.011
Benzo[k]fluoranthene[b]	1.2	12	0.084	0.045	0.050 J	0.052	0.040	0.024 J	0.044	0.030 J	0.036	0.0241 U	0.0236 U	0.020 U	0.0095 J
Benzo[a]pyrene[b]	0.012	0.12	**0.16**	**0.068**	**0.049 J**	**0.11**	**0.054**	**0.057**	**0.048**	**0.031**	**0.034**	0.0241 U	0.0236 U	0.020 U	0.0085 J
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.061	0.038	0.029 J	0.077	0.033 J	0.035 J	0.027 J	0.018	0.027	0.0241 U	0.0236 U	0.020 U	0.0073 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.012 J	0.0071 J	0.022 J	0.021 J	0.0078 J	0.0066 J	0.0081 J	0.0030 J	0.017 U	0.0482 U	0.0472 U	0.020 U	0.0098 U
Benzo[g,h,i]perylene	NE	NE	0.049	0.043	0.036 J	0.083	0.032 J	0.034 J	0.025 J	0.020	0.017 J	0.0241 U	0.0236 U	0.020 U	0.0067 J
Pentachlorophenol	0.22	2.2	0.50 U	0.5 U	0.15 J	0.50 U	0.50 U	0.50 U	**0.40 J**	0.25 U	**0.36 J**	0.241 U	0.236 U	2.0 U	0.49 UJ
TTEC[b]	0.012	0.12	**0.275**	**0.102**	**0.0793**	**0.160**	**0.0849**	**0.091**	**0.080**	**0.056**	**0.072**	NA	NA	NA	**0.0125**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**AV-11**												
Date Collected			**3/10/2004**	**9/10/2004**	**3/15/2005**	**9/21/2005**	**3/22/2006**	**9/27/2006**	**3/8/2007**	**9/19/2007**	**12/19/2007**	**3/25/2008**	**9/23/2008**	**3/19/2009**	**9/23/2009**
Remedial System Status:			*Bioventing and Biosparging System Operational*								*Biosparging Only*		*System Shutdown*		
QAQC:															
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.120 J	0.039 J	0.39 *	0.26 U	0.25 U	0.25 U	0.26 U	0.15 J	0.27 U	0.028 J	0.012 J	0.27 U	0.26 U
Residual Range Organics[a]	0.5	0.5	0.360 J	0.057 J	0.29 J	0.52 U	0.077 J	0.50 U	0.52 U	**1.0 ***	0.53 U	0.53 UJ	0.53 U	0.56 UJ	0.52 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.96 U	4.7	0.046 J	0.15	0.02 U	0.021 U	0.0077 J	0.022 U	NA	0.020 U	0.0033 J	0.18	0.005 U
2-Methylnaphthalene	32	70	NA	0.054	0.0031 J	0.047 J	0.0033 J	0.0059 J	0.0045 J	0.0054 J	NA	0.020 U	0.019 U	0.059	0.0034 U
Acenaphthylene	NE	NE	NA	0.063	0.0031 J	0.004 J	0.0028 J	0.0024 U	0.0043 J	0.022 U	NA	0.020 U	0.019 U	0.0019 J	0.0034 U
Acenaphthene	960	2,100	NA	1.8	0.0034 J	0.087 J	0.0027 J	0.0094 J	0.0036 J	0.025	NA	0.020 U	0.019 U	0.031	0.0019 J
Dibenzofuran	16	35	NA	0.022	0.11 U	0.064 J	0.0071 U	0.0077 J	0.0064 J	0.017 J	NA	0.020 U	0.019 U	0.031	0.0034 U
Fluorene	640	1,400	NA	0.017 J	0.007 J	0.089 J	0.0029 J	0.011 J	0.0099 J	0.020 J	NA	0.020 U	0.019 U	0.025	0.00078 J
Phenanthrene	NE	NE	NA	0.016 J	0.019 J	0.20	0.01 J	0.029	0.026 J	0.049	NA	0.020 U	0.019 U	0.045	0.0034 U
Anthracene	4,800	11,000	NA	0.21	0.014 J	0.029 J	0.01 J	0.0092 J	0.012 J	0.011 J	NA	0.0045 J	0.019 U	0.0058	0.0052
Fluoranthene	640	1,400	NA	0.028	0.028 J	0.088 J	0.018 J	0.059	0.059 J	0.012 J	NA	0.016 J	0.0050 J	0.052	0.0054
Pyrene	480	1,100	NA	0.029	0.024 J	0.069 J	0.013 J	0.043	0.054 J	0.0062 J	NA	0.013 J	0.0057 J	0.041	0.0042 J
Benzo[a]anthracene[b]	0.12	1.2	0.028 J	0.014 J	0.018 J	0.017 J	0.01 J	0.026	0.022 J	0.0038 J	NA	0.0095 J	0.0061 J	0.023	0.0027 J
Chrysene[b]	1.2	12	0.025 J	0.022	0.022 J	0.02 J	0.014 J	0.032	0.030 J	0.022 U	NA	0.0064 J	0.0040 J	0.031 J	0.0027 J
Benzo[b]fluoranthene[b]	0.12	1.2	NA	0.02	0.02 J	0.012 J	0.012 J	0.032	0.028 J	0.022 U	NA	0.010 J	0.0054 J	0.044	0.0046
Benzo[k]fluoranthene[b]	1.2	12	NA	0.013 J	0.015 J	0.0075 J	0.011 J	0.020 J	0.015 J	0.022 U	NA	0.0040 J	0.019 U	0.013 J	0.0013 J
Benzo[a]pyrene[b]	0.012	0.12	NA	**0.012 J**	**0.014 J**	0.0079 J	0.0081 J	**0.025**	**0.019 J**	0.022 U	NA	0.0076 J	0.0044 J	**0.03**	0.0029 J
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	NA	0.016 J	0.013 J	0.0052 J	0.0074 J	0.020 J	0.014 J	0.022 U	NA	0.0066 J	0.0043 J	0.027	0.0030 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	NA	0.0025 J	0.0029 J	0.10 U	0.0031 J	0.0063 J	0.020 U	0.022 U	NA	0.020 U	0.019 UJ	0.0053	0.00075 J
Benzo[g,h,i]perylene	NE	NE	NA	0.017 J	0.012 J	0.0061 J	0.0098 J	0.022	0.014 J	0.022 U	NA	0.0083 J	0.0045 J	0.025	0.0034 U
Pentachlorophenol	0.22	2.2	0.96 U	0.95 UJ	1.1 U	1.0 U	0.095 U	1.1 U	0.97 UJ	1.1 U	NA	0.99 UJ	0.95 UJ	0.5 U	0.50 U
TTEC[b]	0.012	0.12	0.0031	**0.0188**	**0.0211**	**0.0123**	**0.0126**	**0.0358**	**0.0272**	0.0004	NA	0.0107	0.006	**0.0415**	0.004

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**AV-11**											**AV-12**	
Date Collected			**9/23/2009**	**3/17/2010**	**9/9/2010**	**3/9/2011**	**9/20/2011**	**3/14/2012**	**9/20/2012**	**3/14/2013**	**9/18/2013**	**3/7/2014**	**9/30/2014**	**5/3/2002**	
Remedial System Status:			*System Shutdown*											*Baseline*	
QAQC:			Field Filtered												**DUP**
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	NA	0.27 U	0.27 U	0.28 U	**0.58 ***	0.27 U	0.27 U	0.27 U	0.27 U	0.059 J	0.12 J	**0.667 ***	**0.651 ***
Residual Range Organics[a]	0.5	0.5	NA	0.53 U	0.54 U	0.55 U	**0.74 ***	0.54 U	0.53 U	0.54 U	0.53 UJ	0.10 J	0.35 *	0.500 U	0.500 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.0038 U	0.16	0.054	0.046	0.0041	0.0038 U	0.0034 U	0.0037 U	0.0034 J+	0.0047 J+	0.011	0.877	0.744
2-Methylnaphthalene	32	70	0.0036 U	0.027	0.020	0.0039 U	0.0036 U	0.0038 U	0.0034 U	0.0037 U	0.0034 U	0.0033 U	0.0034 U	NA	NA
Acenaphthylene	NE	NE	0.0093	0.00084 J	0.0036 U	0.0039 U	0.0011 J	0.00079 J	0.0034 U	0.0037 U	0.0034 U	0.0033 U	0.0034 U	0.145	0.194
Acenaphthene	960	2,100	0.0053 U	0.0068	0.009	0.0036 J	0.0041	0.0038 U	0.0015 J	0.0037 U	0.0034 UJ	0.0033 U	0.0021 J	10.3	9.95
Dibenzofuran	16	35	0.0036 U	0.0061	0.0088	0.0023 J	0.0037	0.0038 U	0.0034 U	0.0037 U	0.0034 UJ	0.0033 U	0.0016 J	NA	NA
Fluorene	640	1,400	0.0036 U	0.0039	0.0057	0.0039 U	0.0042	0.0038 U	0.0013 J	0.0037 U	0.001 J	0.0033 U	0.0012 J	2.01	1.98
Phenanthrene	NE	NE	0.0036 U	0.0043 U	0.0041	0.0093	0.021	0.0038	0.0053	0.0037 U	0.0034 UJ	0.0059 J+	0.0034 U	1.49	1.22
Anthracene	4,800	11,000	0.0030 J	0.0038	0.0031 J	0.014	0.015	0.017	0.011	0.0096	0.024	0.015	0.018	0.505	0.418
Fluoranthene	640	1,400	0.0043	0.0059	0.0036 J	0.020	0.017	0.0088	0.012	0.0043 J+	0.0018 J	0.0071	0.0034 U	0.215	0.165
Pyrene	480	1,100	0.0032 J	0.0045 U	0.0022 J	0.015	0.011	0.0056	0.011	0.0032 J	0.0021 J	0.0069	0.0023 J	0.173	0.135
Benzo[a]anthracene[b]	0.12	1.2	0.0036 U	0.0025 J	0.00087 J	0.011	0.0024 J	0.0038 U	0.0049	0.0012 J	0.0013 J	0.0014 J	0.0034 U	0.0247 U	0.0244 U
Chrysene[b]	1.2	12	0.0029 J	0.0024 J	0.00087 J	0.010	0.0042	0.0013 J	0.011	0.0037 U	0.0034 U	0.0014 J	0.0034 U	0.0247 U	0.0244 U
Benzo[b]fluoranthene[b]	0.12	1.2	0.0038 U	0.0047	0.00097 J	0.021	0.0032 J	0.0038 U	0.0093	0.0037 U	0.00054 J	0.0019 J	0.0034 U	0.0247 U	0.0244 U
Benzo[k]fluoranthene[b]	1.2	12	0.0013 J	0.0012 J	0.0036 U	0.0069	0.00078 J	0.0038 U	0.0031 J	0.0037 U	0.0034 U	0.00058 J	0.0034 U	0.0247 U	0.0244 U
Benzo[a]pyrene[b]	0.012	0.12	0.0024 J	0.0036	0.0036 U	**0.014**	0.0012 J	0.00092 J	0.0045	0.0037 U	0.0034 U	0.00074 J	0.0034 U	0.0247 U	0.0244 U
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0025 J	0.0026 J	0.00076 J	0.014	0.00091 J	0.00079 J	0.0045	0.0037 U	0.0034 U	0.0033 U	0.0034 U	0.0247 U	0.0244 U
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.00073 J	0.00069 J	0.0036 U	0.0028 J	0.0036 U	0.0038 U	0.0029 J	0.0037 U	0.0034 U	0.0033 U	0.0034 U	0.0494 U	0.0488 U
Benzo[g,h,i]perylene	NE	NE	0.0036 U	0.003 J	0.00052 J	0.014	0.00093 J	0.0038 U	0.0047	0.0037 U	0.0034 U	0.0033 U	0.0034 U	0.0247 U	0.0244 U
Pentachlorophenol	0.22	2.2	NA	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U	0.25 U	0.247 U	0.244 U
TTEC[b]	0.012	0.12	0.003	0.005	0.004	**0.0197**	0.0023	0.0010	0.0071	0.0001	0.0002	0.0011	NA	NA	NA

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID			**AV-12**												
Date Collected	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**9/11/2002**	**3/6/2003**	**9/12/2003**	**3/10/2004**	**9/10/2004**	**3/15/2005**	**9/21/2005**	**3/22/2006**	**9/27/2006**	**3/8/2007**	**6/8/2007**	**9/19/2007**	**3/26/2008**
Remedial System Status:			*Bioventing and Biosparging System Operational*											*Biosparging Only*	
QAQC:															
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.250 U	0.26*	0.083 J	0.21 J	0.12 J	0.19 J	0.27 U	0.11 J	0.06 J	0.26 U	0.25 U	0.28 U	0.045 J
Residual Range Organics[a]	0.5	0.5	0.500 U	0.5 U	0.084 J	0.40 J	0.12 J	0.25 J	0.53 U	0.27 J	0.50 U	0.52 U	0.50 U	0.15 J	0.53 UJ
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.122	0.056	0.071 U	0.067 J	0.077	0.07 J	0.075 J	0.03	0.085	0.0094 J	0.0096 J	0.020 U	0.036 U
2-Methylnaphthalene	32	70	NA	0.020 U	0.022 U	NA	0.02	0.011 J	0.12 U	0.008 J	0.024	0.020 U	0.020 U	0.020 U	0.020 U
Acenaphthylene	NE	NE	0.0934	0.041	0.0074 J	NA	0.023	0.0084 J	0.0077 J	0.012 J	0.0083 J	0.0061 J	0.020 U	0.0043 J	0.020 U
Acenaphthene	960	2,100	0.566	3.9	0.13	NA	0.28	0.039 J	0.12 U	0.03	0.081	0.020 U	0.020 U	0.020 U	0.020 U
Dibenzofuran	16	35	NA	0.055	0.028	NA	0.012 J	0.009 J	0.12 U	0.0071 U	0.018 J	0.020 U	0.020 U	0.020 U	0.020 U
Fluorene	640	1,400	0.0812	0.053	0.024	NA	0.011 J	0.0076 J	0.12 U	0.012 J	0.031	0.020 U	0.020 U	0.020 U	0.020 U
Phenanthrene	NE	NE	0.0495	0.36	0.074	NA	0.02 J	0.038 J	0.06 J	0.096	0.23	0.015 J	0.020 U	0.010 J	0.020 U
Anthracene	4,800	11,000	0.0986	0.094	0.04	NA	0.053	0.1 J	0.067 J	0.14	0.099	0.076	0.051	0.065	0.051
Fluoranthene	640	1,400	0.172	0.17	0.034	NA	0.017 J	0.072 J	0.059 J	0.25	0.55	0.052	0.0055 J	0.014 J	0.013 J
Pyrene	480	1,100	0.135	0.11	0.023	NA	0.014 J	0.066 J	0.062 J	0.22	0.54	0.044	0.0052 J	0.0071 J	0.012 J
Benzo[a]anthracene[b]	0.12	1.2	0.0240 U	0.020 U	0.0032 J	0.089 J	0.005 J	0.029 J	0.019 J	**0.16**	**0.37**	0.019 J	0.0053 J	0.0057 J	0.0098 J
Chrysene[b]	1.2	12	0.0240 U	0.020 U	0.0051 J	0.085 J	0.012 J	0.049 J	0.034 J	0.24	0.55	0.034	0.020 U	0.020 U	0.0054 J
Benzo[b]fluoranthene[b]	0.12	1.2	0.0240 U	0.020 U	0.0021 J	NA	0.008 J	0.055 J	0.034 J	**0.26**	**0.66**	0.031	0.020 U	0.0031 J	0.0084 J
Benzo[k]fluoranthene[b]	1.2	12	0.0240 U	0.020 U	0.0021 J	NA	0.0077 J	0.031 J	0.01 J	0.18	0.38	0.020 J	0.020 U	0.020 U	0.020 UJ
Benzo[a]pyrene[b]	0.012	0.12	0.0240 U	0.020 U	0.0094 U	NA	0.003 J	**0.032 J**	**0.019 J**	**0.21**	**0.44**	**0.019 J**	0.020 U	0.020 U	0.0046 J
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0240 U	0.025	0.0094 U	NA	0.0044 J	0.032 J	0.018 J	**0.18**	**0.37**	0.018 J	0.020 U	0.020 U	0.0037 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0481 U	0.025	0.0094 U	NA	0.02 U	0.0066 J	0.0025 J	0.043	0.091	0.020 U	0.020 U	0.020 U	0.020 U
Benzo[g,h,i]perylene	NE	NE	0.0240 U	0.026	0.0094 U	NA	0.005 J	0.038 J	0.018 J	0.2	0.42	0.020 J	0.020 U	0.020 U	0.0039 J
Pentachlorophenol	0.22	2.2	0.240 U	2 U	0.47 UJ	0.96 U	0.96 UJ	1.1 U	1.2 U	**0.62 J**	0.017 U	0.98 UJ	0.97 U	0.023 J	0.99 UJ
TTEC[b]	0.012	0.12	NA	0.005	0.0008	0.0098	0.0056	**0.0479**	**0.0277**	**0.2947**	**0.6326**	**0.0281**	0.0005	0.0009	0.0068

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	AV-12												
Date Collected			**9/25/2008**	**3/19/2009**	**9/23/2009**	**3/17/2010**	**9/9/2010**	**3/8/2011**	**9/20/2011**	**3/14/2012**	**9/19/2012**	**3/14/2013**	**9/18/2013**	**3/6/2014**	**9/30/2014**
Remedial System Status:			*System Shutdown*												
QAQC:															
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**0.58** *	0.27 U	0.27 U	0.28 U	0.28 U	0.057 J	0.28 U	0.29 U	0.25 U	**0.82** *	0.28 U	0.077 J	0.13 J
Residual Range Organics[a]	0.5	0.5	0.53 U	0.53 U	0.53 U	0.56 U	0.55 U	0.53 U	0.55 U	0.57 U	0.50 U	**0.80** *	0.079 J	0.065 J	0.27 J
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.0067 J	0.17	0.0034 U	0.14	0.07	0.018	0.013	0.0061	0.0082	0.0039 J+	0.0060 J+	0.0035 J+	0.015
2-Methylnaphthalene	32	70	0.019 U	0.054	0.0034 U	0.021	0.020	0.0037 U	0.0035 U	0.0035 U	0.0036	0.0033 U	0.0034 U	0.0033 UJ	0.0034 U
Acenaphthylene	NE	NE	0.019 U	0.0026 J	0.0023 J	0.0023 J	0.0024 J	0.0039	0.0055	0.0040	0.0040	0.0033 U	0.0034 U	0.00048 J	0.0021 J
Acenaphthene	960	2,100	0.019 U	0.027	0.0034 U	0.0061	0.011	0.0021 J	0.022	0.011	0.0021 J	0.0033 U	0.0034 U	0.00330 UJ	0.0018 J
Dibenzofuran	16	35	0.019 U	0.038	0.029	0.046	0.036	0.035	0.030	0.014	0.0034 U	0.0033 U	0.0034 U	0.0033 UJ	0.0018 J
Fluorene	640	1,400	0.019 U	0.029	0.008	0.011	0.015	0.0068	0.035	0.012	0.0048	0.0043 J+	0.0053 J	0.0023 J	0.0061
Phenanthrene	NE	NE	0.0091 J	0.029	0.006	0.0044 U	0.0064 U	0.0037 U	0.075	0.029	0.0055	0.0033 U	0.0051 J+	0.0033 UJ	0.0059 J+
Anthracene	4,800	11,000	0.063	0.03	0.033	0.053	0.036	0.079	0.078	0.085	0.092	0.13	0.15	0.057 J	0.13
Fluoranthene	640	1,400	0.0096 J	0.0068 U	0.0092	0.0099	0.0087	0.0037 U	0.023	0.026	0.012	0.0045 J+	0.0087	0.0033 UJ	0.0034 U
Pyrene	480	1,100	0.013 J	0.017	0.021 J	0.032	0.032	0.032	0.048	0.052	0.031	0.021	0.065	0.012 J	0.064
Benzo[a]anthracene[b]	0.12	1.2	0.0077 J	0.0036 U	0.005	0.0060	0.0042	0.0037 U	0.0044	0.012	0.0076	0.0025 J	0.007	0.0019 J	0.0034 U
Chrysene[b]	1.2	12	0.0068 J	0.0036 UJ	0.0044	0.0051	0.0033 J	0.0020 J	0.0038	0.011	0.0066	0.0013 J	0.006	0.0017 J	0.0035
Benzo[b]fluoranthene[b]	0.12	1.2	0.0095 J	0.0029 J	0.0099	0.012	0.0069	0.0037 U	0.0072	0.024	0.014	0.002 J	0.011	0.003 J	0.0034 U
Benzo[k]fluoranthene[b]	1.2	12	0.019 U	0.00094 J	0.003 J	0.0028 J	0.0024 J	0.0037 U	0.0018 J	0.0077	0.0048	0.0013 J	0.0045	0.0015 J	0.0034 U
Benzo[a]pyrene[b]	0.012	0.12	0.0081 J	0.0017 J	0.0063	0.0072	0.0041	0.0037 U	0.0037	**0.014**	0.0089	0.0012 J	0.0081	0.0021 J	0.0034 U
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0079 J	0.0017 J	0.0067	0.0065	0.0053	0.0037 U	0.0036	0.013	0.0087	0.00083 J	0.0077	0.0018 J	0.0034 U
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.019 U	0.00046 J	0.0015 J	0.0014 J	0.00092 J	0.0037 U	0.0010 J	0.0032 J	0.0021 J	0.0033 U	0.0016 J	0.00052 J	0.0034 U
Benzo[g,h,i]perylene	NE	NE	0.0070 J	0.0036 U	0.0071	0.0065	0.0049	0.0037 U	0.0042	0.016	0.0088	0.00089 J	0.0080	0.0033 UJ	0.0034 U
Pentachlorophenol	0.22	2.2	0.95 UJ	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U
TTEC[b]	0.012	0.12	0.0107	0.0023	0.009	0.010	0.006	0.00002	0.0055	**0.020**	**0.0127**	0.0018	0.011	0.0030	3.5E-05

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	AV-13												
Date Collected			**5/3/2002**	**9/11/2002**	**3/6/2003**	**9/11/2003**	**3/10/2004**	**9/10/2004**	**3/15/2005**	**9/21/2005**		**3/22/2006**		**9/27/2006**	
Remedial System Status:			*Baseline*	*Bioventing and Biosparging System Operational*											
QAQC:											**DUP**		**DUP**		**DUP**
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**0.909 ***	**2.40 ***	**1 ***	**1.7 ***	**1.5 ***	**1.1 ***	**1.9 ***	**0.63 ***	**0.64 ***	**1.3 ***	**1.3 ***	**0.80 ***	**0.76 ***
Residual Range Organics[a]	0.5	0.5	0.500 U	**1.40 ***	**0.83 ***	0.43 J	**0.92 ***	**0.6 ***	**1.3 ***	0.41 J	0.45 J	**0.87 ***	**0.97 ***	0.42 J	0.36 J
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.386	5.52	0.15	0.15 U	0.18 J	0.13	0.4	0.24	0.22	0.05 J	0.088 J	0.21	0.22
2-Methylnaphthalene	32	70	NA	NA	0.18	0.034 U	NA	0.032	0.033 J	0.11 U	0.12 U	0.0097 J	0.012 J	0.029	0.031
Acenaphthylene	NE	NE	0.0721	0.118 U	0.063	0.038	NA	0.077	0.092 J	0.052 J	0.049 J	0.075	0.091	0.062	0.068
Acenaphthene	960	2,100	4.60	4.28	5.3	5.3	NA	5.6	6.8	6.4	7.1	3.5	4.2	8.3	8.3
Dibenzofuran	16	35	NA	NA	0.064	0.027	NA	0.041	0.041 J	0.11 U	0.12 U	0.014 J	0.013 J	0.0091 J	0.011 J
Fluorene	640	1,400	0.0061	0.678	0.65	0.44	NA	1.2	0.45	0.23	0.22	0.19	0.23	0.070	0.090
Phenanthrene	NE	NE	0.0795	0.289	0.066	0.062	NA	0.14	0.11	0.04 J	0.043 J	0.036	0.029	0.028	0.031
Anthracene	4,800	11,000	0.129	0.121	0.13	0.054	NA	0.32	0.29	0.15	0.12	0.26	0.27	0.16	0.17
Fluoranthene	640	1,400	0.0242 U	0.118 U	0.020 U	0.02	NA	0.044	0.065 J	0.081 J	0.051 J	0.048	0.055	0.034	0.051
Pyrene	480	1,100	0.0242 U	0.118 U	0.020 U	0.0097	NA	0.03	0.039 J	0.068 J	0.037 J	0.036	0.041	0.029	0.037
Benzo[a]anthracene[b]	0.12	1.2	0.0242 U	0.118 U	0.020 U	0.0094 U	0.051 J	0.02 U	0.0067 J	0.018 J	0.011 J	0.013 J	0.014 J	0.0088 J	0.014 J
Chrysene[b]	1.2	12	0.0242 U	0.118 U	0.020 U	0.0094 U	0.042 J	0.02 U	0.0089 J	0.026 J	0.016 J	0.021	0.021	0.011 J	0.016 J
Benzo[b]fluoranthene[b]	0.12	1.2	0.0242 U	0.118 U	0.020 U	0.0094 U	NA	0.02 U	0.11 U	0.025 J	0.12 U	0.016 J	0.016 J	0.0068 J	0.0047 U
Benzo[k]fluoranthene[b]	1.2	12	0.0242 U	0.118 U	0.020 U	0.0094 U	NA	0.02 U	0.11 U	0.11 U	0.12 U	0.015 J	0.014 J	0.0051 U	0.0052 U
Benzo[a]pyrene[b]	0.012	0.12	0.0242 U	0.118 U	0.020 U	0.0094 U	NA	0.02 U	0.11 U	0.11 U	0.12 U	0.011 J	0.0091 J	0.0043 U	0.0044 U
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0242 U	0.118 U	0.020 U	0.0094 U	NA	0.02 U	0.11 U	0.11 U	0.12 U	0.0086 J	0.0092 J	0.0050 J	0.0094 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0483 U	0.236 U	0.020 U	0.0094 U	NA	0.02 U	0.11 U	0.11 U	0.12 U	0.0017 U	0.0017 U	0.0036 U	0.0037 U
Benzo[g,h,i]perylene	NE	NE	0.0242 U	0.118 U	0.020 U	0.0094 U	NA	0.02 U	0.11 U	0.11 U	0.12 U	0.012 J	0.0086 J	0.0055 J	0.0069 J
Pentachlorophenol	0.22	2.2	0.25 U	1.18 U	2.0 U	0.47 UJ	0.96 U	1.0 UJ	1.1 U	1.1 U	1.2 U	**0.64 J**	**0.63 J**	1.0 U	1.1 U
TTEC[b]	0.012	0.12	3.5E-05	NA	NA	NA	0.0055	NA	0.0008	0.0046	0.0013	**0.0165**	**0.0146**	0.0022	0.0025

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID			**AV-13**												
Date Collected	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**3/8/2007**		**9/18/2007**		**3/25/2008**		**9/24/2008**		**3/19/2009**		**9/23/2009**		**3/16/2010**
Remedial System Status:			*Bioventing and Biosparging System Operational*				*Biosparging Only*		*System Shutdown*						
QAQC:				**DUP**		**DUP**		**DUP**		**DUP**		**DUP**		**DUP**	
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.36 *	0.33 *	**0.58 ***	0.49 *	0.38 J	0.35 J	0.36 *	0.37 *	0.33 *	0.31 *	0.37 *	0.36 *	0.27 U
Residual Range Organics[a]	0.5	0.5	0.52 U	0.50 U	0.46 J	**0.58 ***	0.24 J	0.23 J	0.56 U	**0.56 ***	0.56 U	0.56 U	0.52 U	0.56 U	0.53 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.015 J	0.015 J	0.032	0.032	0.11	0.066	0.015 J	0.016 J	0.27	0.17	0.0014	0.011	0.011
2-Methylnaphthalene	32	70	0.0049 J	0.0060 J	0.010 J	0.0052 J	0.011 J	0.0040 J	0.0056 J	0.0051 J	0.1	0.065	0.0039 U	0.0034 U	0.0034 U
Acenaphthylene	NE	NE	0.036 J	0.040 J	0.045	0.042	0.022 U	0.020 U	0.021 J	0.019 J	0.0076	0.0074	0.0078	0.0076	0.0078
Acenaphthene	960	2,100	3.3 J	3.8 J	4.0	4.2	1.9	1.6	2.2	2.2	2.2	1.7	1.6	1.5	2.7
Dibenzofuran	16	35	0.013 J	0.010 J	0.020 U	0.0072 J	0.015 J	0.0093 J	0.023 U	0.020 U	0.065	0.046	0.0035 U	0.0034 U	0.0034 U
Fluorene	640	1,400	0.045 J	0.048 J	0.023	0.022	0.082	0.043	0.011 J	0.0093 J	0.06	0.043	0.0076	0.0064	0.0074
Phenanthrene	NE	NE	0.024 J	0.033 J	0.026	0.034	0.021 U	0.020 U	0.0077 J	0.0081 J	0.052	0.036	0.0047 U	0.0045 U	0.0077 U
Anthracene	4,800	11,000	0.11 J	0.15 J	0.11	0.12	0.11	0.093	0.065	0.064	0.044	0.039	0.063	0.053	0.016
Fluoranthene	640	1,400	0.079 J	0.085 J	0.024	0.037	0.067	0.042	0.025	0.017 J	0.023	0.01 U	0.0061	0.0055	0.0071
Pyrene	480	1,100	0.053 J	0.057 J	0.0086 J	0.018 J	0.044	0.031	0.019 J	0.0 J	0.019	0.008	0.0087 J	0.0074 J	0.0075
Benzo[a]anthracene[b]	0.12	1.2	0.014 J	0.015 J	0.020 U	0.0057 J	0.020 U	0.020 U	0.023 U	0.020 U	0.0046	0.003 U	0.0025 J	0.0034 U	0.0034 U
Chrysene[b]	1.2	12	0.030 J	0.029 J	0.020 U	0.0068 J	0.020 U	0.020 U	0.023 U	0.020 U	0.0066 J	0.003 UJ	0.003 J	0.0034 U	0.0034 U
Benzo[b]fluoranthene[b]	0.12	1.2	0.028 J	0.031 J	0.020 U	0.020 U	0.020 U	0.020 U	0.023 U	0.020 U	0.0058	0.003 U	0.004	0.003 J	0.0034 U
Benzo[k]fluoranthene[b]	1.2	12	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.023 U	0.020 U	0.0017 J	0.003 UJ	0.0015 J	0.0034 U	0.0034 U
Benzo[a]pyrene[b]	0.012	0.12	0.011 J	0.0085 J	0.020 U	0.020 U	0.020 U	0.020 U	0.023 U	0.020 U	0.003 J	0.003 U	0.0026 J	0.0022 J	0.0034 U
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0075 J	0.0085 J	0.020 U	0.020 U	0.020 U	0.020 U	0.023 U	0.020 U	0.0027 J	0.00059 J	0.0026 J	0.0034 U	0.0034 U
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.023 U	0.020 U	0.0007 J	0.003 U	0.00071 J	0.0034 U	0.0034 U
Benzo[g,h,i]perylene	NE	NE	0.0064 J	0.0090 J	0.020 U	0.020 U	0.020 U	0.020 U	0.023 U	0.020 U	0.0026 J	0.003 U	0.0035 U	0.0034 U	0.0034 U
Pentachlorophenol	0.22	2.2	0.99 UJ	0.96 UJ	1.0 UJ	1.0 UJ	0.99 UJ	0.99 UJ	1.2 U	1.0 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U
TTEC[b]	0.012	0.12	**0.0163**	**0.0142**	NA	0.0006	NA	NA	NA	NA	0.0046	0.00006	0.004	0.003	NA

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	AV-13												
Date Collected			3/16/2010	9/9/2010		3/8/2011		9/20/2011		3/14/2012		9/20/2012		3/14/2013	
Remedial System Status:			*System Shutdown*												
QAQC:			DUP		DUP		DUP		DUP		DUP		DUP		DUP
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.27 U	**2.5 J***	0.26 UJ	0.15 J	0.13 J	**0.97 J***	0.38 UJ	0.30 U	0.30 U	**1.0 ***	**0.90 J***	0.38 J*	**0.76 J***
Residual Range Organics[a]	0.5	0.5	0.53 U	0.52 U	0.52 U	0.48 U	0.52 U	**0.99 J***	0.76 UJ	0.60 U	0.60 U	**0.75 ***	**0.74 J***	0.54 U	**0.79 ***
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.011	0.04	0.054	0.017	0.022	0.038	0.035	0.0097	0.0097	0.023 J	0.021 J	0.019	0.024
2-Methylnaphthalene	32	70	0.0034 U	0.02	0.032	0.0033 U	0.0033 U	0.0052	0.0050	0.0039 U	0.0036 U	0.0047 J	0.0068 J	0.0048	0.0043
Acenaphthylene	NE	NE	0.0068	0.011	0.014	0.0052	0.0060	0.012	0.013	0.0036 J	0.0038	0.016	0.018	0.013	0.011
Acenaphthene	960	2,100	2.5	2.9	4.1	0.64	0.69	0.50	0.51	0.37	0.42	0.700	0.74	1.0	0.94
Dibenzofuran	16	35	0.0034 U	0.026	0.035	0.011	0.012	0.067	0.044	0.014	0.014	0.0062	0.0070	0.0043	0.0060
Fluorene	640	1,400	0.0062	0.026	0.035	0.032	0.037	0.14	0.098	0.025	0.025	0.017	0.018	0.014	0.014
Phenanthrene	NE	NE	0.011	0.024	0.032	0.012	0.013	0.29	0.22	0.064	0.072	0.0039 J	0.0059 J	0.0055 J	0.053 J
Anthracene	4,800	11,000	0.016	0.013	0.015	0.025	0.029	0.12	0.12	0.032	0.038	0.12	0.15	0.11	0.093
Fluoranthene	640	1,400	0.0074	0.0017 J	0.0028 J	0.014	0.016	0.062	0.057	0.065	0.076	0.0041	0.0042	0.0048 J	0.069 J
Pyrene	480	1,100	0.0069	0.0027 J	0.0031 J	0.0098	0.012	0.035	0.038	0.046	0.055	0.0049	0.0060	0.0099 J	0.045 J
Benzo[a]anthracene[b]	0.12	1.2	0.0034 U	0.0036 U	0.0033 U	0.00093 J	0.0012 J	0.0036 U	0.0033 U	0.0097	0.012	0.0034 U	0.0034 U	0.0033 UJ	0.0096 J
Chrysene[b]	1.2	12	0.0034 U	0.0036 U	0.0033 U	0.0025 J	0.0023 J	0.0044 U	0.0033 U	0.020	0.023	0.0034 U	0.0034 U	0.0033 UJ	0.012 J
Benzo[b]fluoranthene[b]	0.12	1.2	0.0034 U	0.0036 U	0.0033 U	0.0015 J	0.0025 J	0.0036 U	0.0033 U	0.014	0.015	0.0034 U	0.0034 U	0.0033 U	0.0036 J
Benzo[k]fluoranthene[b]	1.2	12	0.0034 U	0.0036 U	0.0033 U	0.0033 U	0.00086 J	0.0036 U	0.0033 U	0.0039 U	0.0047	0.0034 U	0.0034 U	0.0033 U	0.0019 J
Benzo[a]pyrene[b]	0.012	0.12	0.0034 U	0.0036 U	0.0033 U	0.0033 U	0.0033 U	0.0036 U	0.0033 U	0.0039	0.0043	0.0034 U	0.0034 U	0.0033 U	0.0017 J
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0034 U	0.0036 U	0.0033 U	0.00085 J	0.0033 U	0.0036 U	0.0033 U	0.0034 J	0.0036 J	0.0034 U	0.0034 U	0.0033 U	0.0037 U
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0034 U	0.0036 U	0.0033 U	0.0033 U	0.0033 U	0.0036 U	0.0033 U	0.00084 J	0.0010 J	0.0034 U	0.0034 U	0.0033 U	0.0037 U
Benzo[g,h,i]perylene	NE	NE	0.0034 U	0.0036 U	0.00046 J	0.00089 J	0.00067 J	0.0036 U	0.0033 U	0.0039	0.0041	0.0034 U	0.0034 U	0.0033 U	0.00086 J
Pentachlorophenol	0.22	2.2	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TTEC[b]	0.012	0.12	NA	NA	NA	0.00068	0.00048	NA	NA	0.0069	0.0082	NA	NA	NA	0.0033

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**AV-13**						**99EA-3A**						
Date Collected			**9/18/2013**		**3/6/2014**		**9/30/2014**		**1/13/1999**		**5/3/2002**	**9/11/2003**	**3/10/2004**	**9/10/2004**	**3/15/2005**
Remedial System Status:			*System Shutdown*						*Baseline*			*Bioventing and Biosparging System Operational*			
QAQC:				**DUP**		**DUP**		**DUP**		**DUP**					
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**1.8 ***	**2.0 ***	0.12 J	0.15 J	**0.56 ***	**0.55 ***	**0.87**	**0.95**	**2.99**	0.34 *	0.40 *	0.22 J	0.49 *
Residual Range Organics[a]	0.5	0.5	**1.7 ***	**1.9 ***	0.16 J	0.21 J	**0.94 ***	**0.85 ***	0.5 U	0.5 U	0.5 U	0.11 J	0.33 J	0.099 J	0.24 J
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.059	0.061	0.0057 J+	0.0057 J+	0.039	0.048	15	15	**263**	0.3 U	0.073 J	0.10	0.23
2-Methylnaphthalene	32	70	0.0098	0.011	0.0033 U	0.0033 U	0.0046 J+	0.0048 J+	**193**	**179**	NA	8.4	NA	0.074	1.5
Acenaphthylene	NE	NE	0.021	0.019	0.0033 U	0.0036 J+	0.011	0.010	10 U	10 U	0.244 U	0.12	NA	0.083	0.09 J
Acenaphthene	960	2,100	1.1	1.1	0.33	0.41	0.95	0.94	52	53	41.4	14	NA	10	9.3
Dibenzofuran	16	35	0.0067 J+	0.0093	0.0033 U	0.0033 U	0.0037	0.0033 J	10 U	10 U	NA	1.5	NA	0.021 J	0.015 J
Fluorene	640	1,400	0.020	0.022	0.0033 U	0.0033 U	0.0084	0.0086	10	11	7.43	3.7	NA	1.6	3.6
Phenanthrene	NE	NE	0.027	0.027	0.0093	0.010	0.020	0.015	10	10	6.25	3.4	NA	0.83	0.38
Anthracene	4,800	11,000	0.16	0.14	0.030	0.034	0.078	0.068	10 U	10 U	0.0574	0.063	NA	0.078	0.078 J
Fluoranthene	640	1,400	0.051	0.049	0.029	0.031	0.018	0.015	10 U	10 U	0.0258	0.15	NA	0.038	0.061 J
Pyrene	480	1,100	0.033	0.049	0.022	0.023	0.021	0.018	10 U	10 U	0.0251	0.12	NA	0.033	0.05 J
Benzo[a]anthracene[b]	0.12	1.2	0.0049	0.0074	0.0024 J	0.0022 J	0.0034 U	0.0034 U	10 U	10 U	0.0244 U	0.038	0.052 J	0.012 J	0.017 J
Chrysene[b]	1.2	12	0.015	0.018	0.0054	0.0034	0.0034 U	0.0034 U	10 U	10 U	0.0244 U	0.074	0.12	0.024	0.041 J
Benzo[b]fluoranthene[b]	0.12	1.2	0.0084	0.013 J[d]	0.0041	0.0025 J	0.0034 U	0.0034 U	10 U	10 U	0.0244 U	0.035	NA	0.02 J	0.037 J
Benzo[k]fluoranthene[b]	1.2	12	0.0034 U	0.0034 UJ	0.0012 J	0.0010 J	0.0034 U	0.0034 U	10 U	10 U	0.0244 U	0.071	NA	0.017 J	0.026 J
Benzo[a]pyrene[b]	0.012	0.12	0.0034 U	0.0034	0.0017 J	0.00076 J	0.0034 U	0.0034 U	10 U	10 U	0.0244 U	**0.045**	NA	0.01 J	**0.017 J**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0013 J	0.0034 J	0.0033 U	0.0033 U	0.0034 U	0.0034 U	10 U	10 U	0.0244 U	0.027	NA	0.013 J	0.017 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0034 U	0.00074 J	0.0033 U	0.0033 U	0.0034 U	0.0034 U	10 U	10 U	0.0488 U	0.0079 J	NA	0.0025 J	0.0026 J
Benzo[g,h,i]perylene	NE	NE	0.00087 J	0.0031 J	0.0033 U	0.0033 U	0.0034 U	0.0034 U	10 U	10 U	0.0244 U	0.021	NA	0.012 J	0.018 J
Pentachlorophenol	0.22	2.2	0.50 U	0.50 U	0.50 U	0.50 U	0.25 U	0.25 U	50 U	50 U	0.244 U	0.48 UJ	0.98 U	1.1 UJ	0.98 U
TTEC[b]	0.012	0.12	0.0016	0.0060	0.0025	0.0014	NA	NA	NA	NA	NA	**0.0636**	0.0064	**0.0167**	**0.0274**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**99EA-3A**												
Date Collected			**9/21/2005**	**3/22/2006**	**9/27/2006**	**3/8/2007**	**6/8/2007**	**9/18/2007**	**12/19/2007**	**3/25/2008**	**3/25/2008**	**9/23/2008 (4)**	**3/19/2009**	**3/19/2009**	**9/23/2009**
Remedial System Status:			*Bioventing and Biosparging System Operational*						*Biosparging*			*System Shutdown*			
QAQC:											**Filtered**			**Filtered**	
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.33 *	0.43 *	0.15 J	0.25 U	0.25 U	0.25 U	0.36 *	0.19 J	0.22 J	0.12 J	0.27 *	NA	0.27 U
Residual Range Organics[a]	0.5	0.5	0.50 U	0.30 J	0.25 J	0.50 U	0.50 U	0.21 J	**0.89 ***	0.53 UJ	0.53 UJ	0.52 U	0.53 U	NA	0.53 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.079 J	0.23	0.035 U	0.016 J	0.074	0.057	0.038 U	0.084	0.074	0.051 J	0.022 U	0.04 U	0.014
2-Methylnaphthalene	32	70	0.68	0.59	0.049	0.0091 J	0.012 J	0.023	0.0066 J	0.076	0.057	0.078 J	0.004 U	0.0095	0.02
Acenaphthylene	NE	NE	0.071 J	0.21	0.060	0.089 J	0.029	0.025	0.047	0.035	0.027	0.19 UJ	0.022	0.01	0.013
Acenaphthene	960	2,100	8.1	7.1	4.5	0.57 J	2.2	1.6	0.12	3.7	2.8	3.6 J	0.33	0.3	1.4
Dibenzofuran	16	35	0.11 U	0.012 J	0.0098 J	0.013 J	0.0071 J	0.0093 J	0.018 J	0.018 J	0.020 U	0.034 J	0.014	0.014	0.0051
Fluorene	640	1,400	3.5	2.9	1.6	0.044 J	0.94	0.71	0.076	1.4	0.96	1.6 J	0.12	0.11	0.45
Phenanthrene	NE	NE	0.098 J	0.12	0.058	0.13 J	0.026	0.051	0.57	0.37	0.031 U	0.78 J	0.27	0.034	0.1
Anthracene	4,800	11,000	0.065 J	0.098	0.073	0.19 J	0.064	0.050	0.39	0.13	0.037	0.24 J	0.29	0.16	0.047
Fluoranthene	640	1,400	0.069 J	0.16	0.20	1.0 J	0.13	0.081	1.4	0.91	0.022	2.0 J	0.91	0.027	0.24
Pyrene	480	1,100	0.074 J	0.16	0.18	0.83 J	0.096	0.055	1.2	0.83	0.011 J	1.8 J	0.86	0.023	0.18 J
Benzo[a]anthracene[b]	0.12	1.2	0.019 J	0.048	0.065	**0.20 J**	0.027	0.0096 J	**0.93**	**0.65**	0.020 U	**1.5 J**	**0.53**	0.02	**0.15**
Chrysene[b]	1.2	12	0.049 J	0.12	0.19	0.66 J	0.049	0.023	1.0	0.72	0.020 U	**1.7 J**	0.7 J	0.0038 J	0.17
Benzo[b]fluoranthene[b]	0.12	1.2	0.042 J	**0.12**	**0.19**	**0.47 J**	0.090	0.023	**1.8**	**1.2**	0.020 U	**2.8 J**	**1**	0.0053	**0.28**
Benzo[k]fluoranthene[b]	1.2	12	0.031 J	0.083	0.13	0.37 J	0.030	0.0054 J	0.54	0.36	0.020 U	0.84 J	0.29 J	0.0014	0.085
Benzo[a]pyrene[b]	0.012	0.12	**0.02 J**	**0.052**	**0.083**	**0.15 J**	**0.028**	0.005 J	**1.2 J**	**0.84**	0.020 U	**1.9 J**	**0.66**	0.0021 J	**0.20**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.022 J	0.055	0.089	**0.18 J**	0.035	0.0075 J	**1.2**	**0.71**	0.020 U	**1.6 J**	**0.62**	0.0016 J	**0.19**
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0049 J	0.011 J	0.013 J	0.036 J	0.0058 J	0.020 U	**0.21**	**0.14**	0.020 U	**0.38 J**	**0.13**	0.0005 J	0.042
Benzo[g,h,i]perylene	NE	NE	0.028 J	0.052	0.085	0.15 J	0.030	0.0057 U	1.1	0.67	0.020 U	1.6 J	0.56	0.0036 U	0.17
Pentachlorophenol	0.22	2.2	1.1 U	**0.62 J**	1.0 U	0.15 J	0.98 U	0.96 UJ	**0.64 J**	1.0 UJ	0.99 UJ	0.95 UJ	**1.1**	NA	0.50 U
TTEC[b]	0.012	0.12	**0.0324**	**0.0849**	**0.1336**	**0.2822**	**0.0473**	0.0098	**1.678**	**1.153**	NA	**2.629**	**0.924**	0.0050	**0.276**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID			**99EA-3A**											**97-6A**	
Date Collected	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**9/23/2009**	**3/16/2010**	**9/9/2010**	**3/8/2011**	**9/20/2011**	**3/14/2012**	**9/19/2012**	**3/14/2013**	**9/18/2013**	**3/7/2014**	**9/30/2014**	**8/7/1998**	**12/3/1998**
Remedial System Status:			*System Shutdown*											*Baseline*	
QAQC:			**Filtered**												
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	NA	0.27 U	0.29 U	0.14 J	0.30 U	0.28 U	0.27 U	0.28 *	0.28 U	0.46 *	**0.55 ***	**19.0**	**12.0**
Residual Range Organics[a]	0.5	0.5	NA	0.53 U	0.57 U	0.56 U	0.59 U	0.56 U	0.53 U	0.52 U	0.55 UJ	0.20 J	**0.62 ***	0.50 U	0.50 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.018	0.012 U	0.045	0.018	0.029 J	0.021	0.022 J	0.023 J	0.020 J	0.089 J	0.035 J	**10,100**	**9,150**
2-Methylnaphthalene	32	70	0.012	0.0051	0.027	0.0068	0.0046	0.011	0.0089	0.0059	0.0059 J+	0.014	0.0064 J+	NA	NA
Acenaphthylene	NE	NE	0.0079	0.0099	0.012	0.013	0.0076	0.029	0.012	0.015	0.014 J	0.015	0.016	NA	NA
Acenaphthene	960	2,100	0.98	0.94	1.1	0.77	0.75	0.070	1.1	2.0	1.2	1.8	1.1	NA	NA
Dibenzofuran	16	35	0.0035 U	0.0056	0.036	0.0051	0.033	0.066	0.0043	0.0034	0.0035 U	0.0098	0.024	NA	NA
Fluorene	640	1,400	0.23	0.48	0.49	0.085	0.11	0.11	0.019	0.016	0.014	0.018	0.01	NA	NA
Phenanthrene	NE	NE	0.0082	0.094	0.21	0.11	0.22	0.58	0.031	0.015	0.020	0.022	0.0034 U	NA	NA
Anthracene	4,800	11,000	0.016	0.039	0.053	0.055	0.043	0.14	0.036	0.051	0.057	0.048	0.093	NA	NA
Fluoranthene	640	1,400	0.0092	0.23	0.36	0.26	0.12	1.3	0.086	0.032	0.044	0.010	0.0082	NA	NA
Pyrene	480	1,100	0.0056 J	0.20	0.32	0.23	0.076	0.90	0.081	0.026	0.04	0.0095	0.0060	NA	NA
Benzo[a]anthracene[b]	0.12	1.2	0.0035 U	**0.14**	**0.30**	**0.19**	0.022	**0.22**	0.050	0.017	0.024	0.0060	0.0034 U	1.0 U	1.0 U
Chrysene[b]	1.2	12	0.00087 J	0.13	0.32	0.21	0.024	0.52	0.066	0.020	0.033	0.0092	0.0025 J	1.0 U	1.0 U
Benzo[b]fluoranthene[b]	0.12	1.2	0.0035 U	**0.27**	**0.55**	**0.34**	0.018	**0.49**	0.089	0.027	0.045	0.0069	0.0034 U	NA	NA
Benzo[k]fluoranthene[b]	1.2	12	0.00076 J	0.084	0.15	0.10	0.0053	0.11	0.028	0.0099	0.016	0.0022 J	0.0034 U	NA	NA
Benzo[a]pyrene[b]	0.012	0.12	0.0035 U	**0.19**	**0.38**	**0.23**	0.010	**0.11**	**0.063**	**0.020**	**0.028**	0.0031 J	0.0034 U	NA	NA
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.0035 U	**0.23**	**0.40**	**0.20**	0.0065	0.11	0.057	0.018	0.026	0.0035 U	0.0034 U	NA	NA
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0035 U	0.052	0.079	0.045	0.0017 J	0.022	0.012	0.0038	0.0053	0.00051 J	0.0034 U	NA	NA
Benzo[g,h,i]perylene	NE	NE	0.0035 U	0.22	0.36	0.20	0.0061	0.11	0.051	0.016	0.026	0.0035 U	0.0034 U	NA	NA
Pentachlorophenol	0.22	2.2	NA	0.50 U	0.50 U	0.50 U	0.081 J	**0.57**	0.50 U	0.50 U	0.50 U	0.25 U	0.25 U	5.0 U	5.0 U
TTEC[b]	0.012	0.12	0.0001	**0.269**	**0.531**	**0.320**	**0.0156**	**0.210**	**0.0873**	**0.028**	**0.040**	0.0048	2.50E-05	NA	NA

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**97-6A**											**04-6A[e]**	
Date Collected			**2/12/1999**	**5/19/1999**	**9/1/1999**	**11/30/1999**	**2/29/2000**	**6/6/2000**	**8/31/2000**	**11/28/2000**	**8/23/2001**	**9/10/2002**	**9/11/2003**	**9/10/2004**	
Remedial System Status:			*Baseline*									*Bioventing & Biosparging*		*Bioventing and Biosparging System Operational*	
QAQC:															**DUP**
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**5.7**	**2.0**	**15.0**	**7.4**	**5.8**	**7.5**	**12.3**	**18.2**	**9.8**	**10.0**	**7.1**	**1.5 ***	**1.5 ***
Residual Range Organics[a]	0.5	0.5	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**0.61**	0.50 U	0.50 U	0.35 J	0.11 J	0.13 J
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	**10,500**	**2,060 J**	**11,300**	**3,270**	0.1 U	**4,400**	**3,690**	**4,260**	**3,140**	**3,100**	**1,900**	26	26
2-Methylnaphthalene	32	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.93	1.2
Acenaphthylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	960	2,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	16	35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**63**	**64**
Fluorene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	4,800	11,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	480	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[a]anthracene[b]	0.12	1.2	1.0 U	**0.2 J**	10 U	1.0 U	**0.2**	**8.2**	0.378 U	**0.354**	**0.471**	**11.7**	**1.6**	**0.30**	**0.30**
Chrysene[b]	1.2	12	1.0 U	0.1 J	10 U	1.0 U	0.1 U	**7.6**	0.323 U	0.315	0.469	**9.87**	**1.6**	0.29	0.29
Benzo[b]fluoranthene[b]	0.12	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.028	0.029
Benzo[k]fluoranthene[b]	1.2	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.018 J	0.023
Benzo[a]pyrene[b]	0.012	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.016 J**	**0.016 J**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0029 J	0.0032 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[g,h,i]perylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	0.22	2.2	5.0 U	0.5 UJ	50 U	5.0 U	0.5 U	0.5 U	1.0 UJ	5.0 UJ	0.481 U	59.5 U	4.8 UJ	NA	NA
TTEC[b]	0.012	0.12	NA	**0.021**	NA	NA	**0.020**	**0.896**	NA	**0.0386**	**0.0518**	**1.269**	**0.176**	**0.0538**	**0.0544**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	04-6A^{e}												
Date Collected			9/20/2005		9/26/2006		3/7/2007	6/7/2007		6/7/2007	9/19/2007		9/19/2007	12/19/2007	
Remedial System Status:			*Bioventing and Biosparging System Operational*											*Biosparging Only*	
QAQC:				**DUP**		**DUP**			**DUP**	**Filtered**		**DUP**	**Filtered**		**DUP**
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics^{a}	0.5	0.5	**1.5 ***	**1.6 ***	**0.73 ***	**0.73 ***	0.29 *	**0.71 ***	**0.73 ***	**0.67 ***	**1.2 ***	**1.2 ***	**1.2 ***	**0.95 ***	**0.94 ***
Residual Range Organics^{a}	0.5	0.5	0.52 U	0.53 U	0.50 U	0.52 U	0.52 U	0.50 U	0.50 U	0.50 U	0.34 J	0.21 J	0.19 J	0.53 U	0.52 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	**260**	**240**	1.4	1.5	0.82	15	15	14	120	120	110	82	79
2-Methylnaphthalene	32	70	**33**	23	0.044	0.061	0.0083 J	0.025	0.018 J	3.5 J	1.4	1.2	0.86	0.58	0.60
Acenaphthylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	960	2,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	16	35	**62**	**58**	**37**	**43**	**20**	**31**	**36**	**29**	**59**	**59**	**43**	**42**	**45**
Fluorene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	4,800	11,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	480	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[a]anthracene^{b}	0.12	1.2	**0.39**	**0.36**	**0.40**	**0.58**	0.060	**0.21**	**0.24**	0.026	**0.53**	**0.44**	0.045	**0.19**	**0.25**
Chrysene^{b}	1.2	12	0.37	0.34	0.43	0.59	0.062	0.19	0.20	0.031	0.36	0.31	0.025	0.16	0.22
Benzo[b]fluoranthene^{b}	0.12	1.2	0.053	0.045	**0.26**	**0.27**	0.024	0.072	0.081	0.0073 J	**0.14**	**0.12**	0.0069 J	0.094 J	**0.17 J**
Benzo[k]fluoranthene^{b}	1.2	12	0.034 J	0.031 J	0.17	0.20	0.013 J	0.028	0.031	0.0050 J	0.044	0.037	0.0053 J	0.031	0.048
Benzo[a]pyrene^{b}	0.012	0.12	**0.03 J**	**0.025 J**	**0.21**	**0.22**	**0.013 J**	**0.050**	**0.052**	0.0054 J	**0.067**	**0.057**	0.0047 J	**0.060**	**0.11**
Indeno[1,2,3-cd]pyrene^{b}	0.12	1.2	0.011 J	0.0076 J	**0.16**	**0.15**	0.0078 J	0.030	0.034	0.0047 J	0.031	0.029	0.021 U	0.044	0.084
Dibenzo[a,h]anthracene^{b}	0.12	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[g,h,i]perylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	0.22	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TTEC^{b}	0.012	0.12	**0.0825**	**0.0728**	**0.3133**	**0.3459**	**0.0241**	**0.0859**	**0.0926**	0.0100	**0.1451**	**0.1227**	0.0107	**0.0975**	**0.1674**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID			**04-6A[e]**												
Date Collected	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**12/19/2007**	**9/23/2008**		**3/18/2009**		**9/23/2009**		**3/17/2010**		**9/8/2010**		**3/9/2011**	
Remedial System Status:			*Biosparging Only*	*System Shutdown*											
QAQC:			**Filtered**		**DUP**		**DUP**		**DUP**		**DUP**		**DUP**		**DUP**
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**0.80 ***	**1.1 ***	**1.1 ***	NA	NA	**1.4 ***	**1.3 ***	NA	NA	**0.53 ***	0.49 *	**0.91 ***	**1.1 ***
Residual Range Organics[a]	0.5	0.5	0.53 U	0.22 J	0.21 J	NA	NA	0.52 U	0.52 U	NA	NA	0.56 U	0.55 U	0.55 U	0.55 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	64	16	17	50	44	32	32	21 J	0.18 J	22	22	22	26
2-Methylnaphthalene	32	70	0.42	0.039	0.039	1.4	1.3	0.39	0.42	0.68 J	0.024 J	0.19	0.23	NA	NA
Acenaphthylene	NE	NE	NA	NA	NA	NA	NA	0.8	0.74	NA	NA	NA	NA	NA	NA
Acenaphthene	960	2,100	NA	NA	NA	NA	NA	68	60	NA	NA	NA	NA	NA	NA
Dibenzofuran	16	35	**34**	**62**	**61**	**49**	**45**	**56**	**52**	**22 J**	0.012 J	**43**	**30**	NA	NA
Fluorene	640	1,400	NA	NA	NA	NA	NA	24	18	NA	NA	NA	NA	NA	NA
Phenanthrene	NE	NE	NA	NA	NA	NA	NA	5.9	5.6	NA	NA	NA	NA	NA	NA
Anthracene	4,800	11,000	NA	NA	NA	NA	NA	3.3	3.0	NA	NA	NA	NA	NA	NA
Fluoranthene	640	1,400	NA	NA	NA	NA	NA	3.8	3.4	NA	NA	NA	NA	NA	NA
Pyrene	480	1,100	NA	NA	NA	NA	NA	1.6 J	1.4 J	NA	NA	NA	NA	NA	NA
Benzo[a]anthracene[b]	0.12	1.2	0.049	**0.27**	**0.29**	**0.18**	**0.18**	**0.17**	**0.14**	**0.19 J**	0.023 J	**0.20**	**0.18**	0.11	**0.15**
Chrysene[b]	1.2	12	0.046	0.22	0.25	0.13 J	0.14 J	0.14	0.11	0.13 J	0.027 J	0.14	0.14	0.076	0.12
Benzo[b]fluoranthene[b]	0.12	1.2	0.021 U	0.090	0.11	0.041	0.047	0.067 J	0.038 J	0.076 J	0.044 J	0.029	0.025	0.024 J	0.060 J
Benzo[k]fluoranthene[b]	1.2	12	0.021 U	0.030	0.042	0.014	0.016 J	0.021	0.014	0.025 J	0.014 J	0.011	0.0078	0.0081 J	0.020 J
Benzo[a]pyrene[b]	0.012	0.12	0.021 U	**0.067**	**0.082**	**0.024**	**0.029**	**0.041 J**	**0.021 J**	**0.050**	**0.031**	**0.012**	0.0099	**0.013 J**	**0.037 J**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.021 U	0.044 J	0.060 J	0.0067 J	0.012 J	0.026 J	0.0095 J	0.032	0.025	0.0042	0.0029 J	0.0053 J	0.022 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	NA	NA	NA	0.0035 U	0.0025 J	0.0065 J	0.0024 J	0.0076	0.0057	0.001 J	0.00094 J	0.0013 J	0.0046 J
Benzo[g,h,i]perylene	NE	NE	NA	NA	NA	NA	NA	0.0023 J	0.0076 J	NA	NA	NA	NA	NA	NA
Pentachlorophenol	0.22	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TTEC[b]	0.012	0.12	0.0054	**0.1126**	**0.1347**	**0.0495**	**0.0562**	**0.071**	**0.042**	**0.084**	**0.042**	**0.0379**	**0.0330**	**0.029**	**0.064**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	04-6A[e]												
Date Collected			9/20/2011		3/14/2012		9/20/2012		3/13/2013		9/18/2013		3/6/2014		9/29/2014
Remedial System Status:			*System Shutdown*												
QAQC:				DUP		DUP		DUP		DUP		DUP		DUP	
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**1.7 ***	**1.8 ***	**0.92 ***	**1.1 ***	**3.0 ***	**2.9 ***	**1.9 ***	**2.5 ***	**3.3 ***	**3.3 ***	**4.1 ***	**3.9 ***	**8.1 *J**
Residual Range Organics[a]	0.5	0.5	0.55 U	0.59 U	0.55 U	0.63 U	0.53 U	0.52 U	0.53 U	0.52 U	**0.56 ***	**0.63 ***	**0.50 J**	0.48 J	**1.8 * J**
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	140	130	19	20	**260**	**280**	**490 J**	**210 J**	**530**	**590**	**550**	**570**	**830**
2-Methylnaphthalene	32	70	4.8	4.8	0.48	0.5	11	11	**42 J**	16 J	31	**34**	18	18	**52**
Acenaphthylene	NE	NE	1.2	1.2	NA	NA	NA	NA	2.6	1.6	NA	NA	NA	NA	NA
Acenaphthene	960	2,100	110	110	NA	NA	NA	NA	210 J	110 J	NA	NA	NA	NA	NA
Dibenzofuran	16	35	**59**	**58**	**34**	**35**	**94**	**99**	**120 J**	**59 J**	**110**	**110**	**120**	**120**	**160**
Fluorene	640	1,400	51	49	NA	NA	NA	NA	140 J	62 J	NA	NA	NA	NA	NA
Phenanthrene	NE	NE	9.9	9.9	NA	NA	NA	NA	210 J	18 J	NA	NA	NA	NA	NA
Anthracene	4,800	11,000	3.8	3.6	NA	NA	NA	NA	27 J	3.5 J	NA	NA	NA	NA	NA
Fluoranthene	640	1,400	4.7	4.6	NA	NA	NA	NA	84 J	5.2 J	NA	NA	NA	NA	NA
Pyrene	480	1,100	2.1	2.1	NA	NA	NA	NA	51 J	2.6 J	NA	NA	NA	NA	NA
Benzo[a]anthracene[b]	0.12	1.2	**0.16**	**0.14**	**0.12**	**0.13**	**0.17**	**0.18**	**11 J**	**0.15 J**	**0.13**	**0.16**	0.10	0.10	**0.16**
Chrysene[b]	1.2	12	0.13	0.12	0.075	0.085	0.16	0.17	**9.5 J**	0.14 J	0.13	0.15	0.090	0.086	0.16
Benzo[b]fluoranthene[b]	0.12	1.2	0.055	0.045	0.034	0.037	0.041	0.045	**5.1 J**	0.049 J	0.041	0.057	0.037	0.034	0.033 J
Benzo[k]fluoranthene[b]	1.2	12	0.017	0.014	0.0084	0.013	0.016 J	0.016 J	**1.8 J**	0.022 J	0.020 J	0.028 J	0.011	0.010	0.016 J
Benzo[a]pyrene[b]	0.012	0.12	**0.033**	**0.028**	**0.017**	**0.021**	**0.026 J**	**0.029 J**	**3.4 J**	**0.034 J**	**0.024 J**	**0.034 J**	**0.020**	**0.018**	**0.035 J**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.015	0.015	0.0076	0.0086	0.009 J	0.010 J	**1.3 J**	0.021 J	0.015 J	0.022 J	0.010	0.0081	0.068 U
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0039	0.0036 J	0.0018 J	0.0020 J	0.034 U	0.034 U	**0.36 J**	0.011 J	0.036 U	0.0087 J	0.0023 J	0.0019 J	0.068 U
Benzo[g,h,i]perylene	NE	NE	0.014	0.013	NA	NA	NA	NA	0.96 J	0.021 J	NA	NA	NA	NA	NA
Pentachlorophenol	0.22	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TTEC[b]	0.012	0.12	**0.059**	**0.051**	**0.035**	**0.041**	**0.051**	**0.056**	**5.5**	**0.061**	**0.046**	**0.063**	**0.037**	**0.034**	**0.058**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	04-6A[E]	97-6.B											
Date Collected			**9/29/2014**	**8/7/1998**	**12/3/1998**	**2/12/1999**	**5/19/1999**	**9/1/1999**	**11/30/1999**	**2/29/2000**	**6/6/2000**	**8/31/2000**	**11/28/2000**	**8/23/2001**	**9/10/2002**
Remedial System Status:			*System Shutdown*	*Baseline*											*Bioventing and Biosparging System Operational*
QAQC:			**DUP**												
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	**6.3 ***	**1.5**	**2.2**	**2.2**	**2.1**	0.45	0.26	**2.3**	**1.1**	**2.0**	**1.5**	**0.97**	**0.60**
Residual Range Organics[a]	0.5	0.5	**1.7 ***	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.5 U	0.5 U	0.5 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	**930**	46.5	0.8 U	0.4	11.5 J	0.2	0.1 U	0.2 U	0.2 U	0.189 U	0.163 U	0.0482 U	0.0481 U
2-Methylnaphthalene	32	70	**60**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	960	2,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	16	35	**170**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	4,800	11,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	480	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[a]anthracene[b]	0.12	1.2	**0.15**	**0.3**	**0.3**	**0.2**	**0.2 J**	0.1 U	0.1	0.1	0.1	0.1 U	0.1 U	0.0482 U	0.024 U
Chrysene[b]	1.2	12	0.16	0.3	0.2	0.2	0.2 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.0482 U	0.024 U
Benzo[b]fluoranthene[b]	0.12	1.2	0.035 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[k]fluoranthene[b]	1.2	12	0.011 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[a]pyrene[b]	0.012	0.12	**0.043 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.067 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.067 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo[g,h,i]perylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	0.22	2.2	NA	**0.8**	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.482 U	0.24 U
TTEC[b]	0.012	0.12	**0.064**	**0.0330**	**0.0320**	**0.0220**	**0.0220**	NA	0.010	0.010	0.010	NA	NA	NA	NA

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**97-6.B**												
Date Collected			**9/12/2003**	**9/10/2004**	**9/20/2005**	**9/26/2006**	**3/7/2007**	**6/7/2007**	**6/7/2007**	**9/18/2007**	**9/18/2007**	**12/18/2007**	**12/18/2007**	**9/22/2008**	**9/23/2009**
Remedial System Status:			*Bioventing and Biosparging System Operational*									*Biosparging Only*		*System Shutdown*	
QAQC:									**Filtered**		**Filtered**		**Filtered**		
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.26	0.38 *	0.29 *	0.21 J	0.26 U	**0.53 ***	**0.62 ***	0.41 *	**0.50 ***	**0.63 ***	**0.62 ***	0.39	0.25 U
Residual Range Organics[a]	0.5	0.5	0.5 U	0.085 J	0.53 U	0.52 U	0.52 U	0.52 U	0.52 U	0.47 J	0.11 J	**0.72 ***	0.59 U	0.26 J	0.50 U
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.053 U	0.056	0.034 U	0.22	1.3 J	130	**160**	0.45	0.37	0.44	0.38	0.06	0.01
2-Methylnaphthalene	32	70	NA	0.027	0.021 U	0.056	0.077 J	10 J	13	0.021	0.013 J	0.011 J	0.0095 J	0.0089 J	0.0034 U
Acenaphthylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.011
Acenaphthene	960	2,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.006
Dibenzofuran	16	35	NA	0.016 J	0.021 U	0.019 J	0.020 U	3.9	3.7	0.019 J	0.011 J	0.0099 J	0.0070 J	0.0096 J	0.0043
Fluorene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0065
Phenanthrene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.04
Anthracene	4,800	11,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.095
Fluoranthene	640	1,400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.13
Pyrene	480	1,100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 J
Benzo[a]anthracene[b]	0.12	1.2	0.02	0.02 J	0.020 J	**0.38**	**0.26 J**	0.083	0.0066 J	0.020 J	0.020 U	0.049	0.020 J	**0.44**	0.088
Chrysene[b]	1.2	12	0.022	0.021	0.021 J	0.51	0.29 J	0.12	0.0072 J	0.014 J	0.020 U	0.052	0.017 J	0.54	0.097
Benzo[b]fluoranthene[b]	0.12	1.2	NA	0.0081 J	0.013 J	**0.57**	**0.39 J**	**0.15**	0.0055 J	0.027	0.020 U	0.081	0.029	**0.70**	**0.17**
Benzo[k]fluoranthene[b]	1.2	12	NA	0.008 J	0.010 J	0.36	0.25 J	0.055	0.0029 J	0.0082 J	0.020 U	0.025	0.011 J	0.23	0.054
Benzo[a]pyrene[b]	0.012	0.12	NA	0.0051 J	0.010 J	**0.45**	**0.34 J**	**0.10**	0.022 U	**0.016 J**	0.020 U	**0.047**	**0.015 J**	**0.55**	**0.12**
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	NA	0.0024 J	0.0066 J	**0.35**	**0.25 J**	0.091	0.0054 J	0.014 J	0.020 U	0.034	0.024 U	**0.53**	0.11
Dibenzo[a,h]anthracene[b]	0.12	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.024
Benzo[g,h,i]perylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.097
Pentachlorophenol	0.22	2.2	0.47 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TTEC[b]	0.012	0.12	0.0022	0.0092	**0.0152**	**0.6211**	**0.4579**	**0.1391**	0.0021	**0.0231**	NA	**0.0664**	**0.0212**	**0.7454**	**0.166**

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**97-6.B**											**TMW-01**	
Date Collected			**9/23/2009**	**3/16/2010**	**9/8/2010**	**3/9/2011**	**9/20/2011**	**3/14/2012**	**9/20/2012**	**3/14/2013**	**9/18/2013**	**3/7/2014**	**9/30/2014**	**9/25/2008**	**3/18/2009**
Remedial System Status:			*System Shutdown*											*System Shutdown*	
QAQC:			**Filtered**												
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	NA	NA	0.28 U	0.29 U	0.37 *	0.27 *	0.35 *	0.28 *	0.43 *	0.39 *	0.34 *	0.25 U	NA
Residual Range Organics[a]	0.5	0.5	NA	NA	0.56 U	0.57 U	0.56 U	0.50 U	0.52 U	0.50 U	0.54 UJ	0.18 J	0.39 *	0.50 U	NA
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.014	0.18	0.0098 J	0.0047 U	30	0.0044	1.7	0.49	0.87	5.0	0.039 J	0.078	0.013 U
2-Methylnaphthalene	32	70	0.0034 U	0.025	0.0026 J	NA	0.31	0.0036 U	2.8	0.055	0.74	0.63	0.0046 J+	0.013 J	0.0036 U
Acenaphthylene	NE	NE	0.0089	NA	NA	NA	0.082	NA	NA	0.030	NA	NA	NA	0.020 J	0.015
Acenaphthene	960	2,100	0.03 U	NA	NA	NA	4.4	NA	NA	3.9	NA	NA	NA	7.8	5.4
Dibenzofuran	16	35	0.0028 J	0.012	0.0029 J	NA	0.79	0.0055	0.0094	0.073	0.0090	1.2	0.25	0.012 J	0.0038
Fluorene	640	1,400	0.0046	NA	NA	NA	0.82	NA	NA	0.024	NA	NA	NA	3.3	1.6
Phenanthrene	NE	NE	0.015	NA	NA	NA	0.43	NA	NA	0.045	NA	NA	NA	0.043	0.010
Anthracene	4,800	11,000	0.081	NA	NA	NA	0.17	NA	NA	0.089	NA	NA	NA	0.15	0.11
Fluoranthene	640	1,400	0.045	NA	NA	NA	0.12	NA	NA	0.022	NA	NA	NA	0.036	0.029
Pyrene	480	1,100	0.034 J	NA	NA	NA	0.083	NA	NA	0.017	NA	NA	NA	0.0070 J	0.0077
Benzo[a]anthracene[b]	0.12	1.2	0.024	0.038	0.050	0.021	0.033	0.015	0.0080	0.0038	0.0089	0.038	0.021	0.022 U	0.0034 U
Chrysene[b]	1.2	12	0.028	0.045	0.060	0.018	0.025	0.014	0.0084	0.0049	0.010	0.035	0.0095	0.022 U	0.0034 UJ
Benzo[b]fluoranthene[b]	0.12	1.2	0.047	0.074	0.099	0.040	0.056	0.025	0.013	0.0036	0.012	0.015	0.017	0.022 U	0.0018 J
Benzo[k]fluoranthene[b]	1.2	12	0.015	0.023	0.029	0.013	0.018	0.0079	0.0051	0.0013 J	0.0046	0.0053	0.0064	0.022 U	0.00062 J
Benzo[a]pyrene[b]	0.012	0.12	**0.031**	**0.053**	**0.067**	**0.025**	**0.039**	**0.020**	0.010	0.0031 J	0.0086	0.010	**0.013**	0.022 U	0.0010 J
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.028	0.044	0.071	0.022	0.032	0.017	0.0077	0.0023 J	0.0070	0.0054 J+	0.013	0.022 U	0.00093 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0065	0.013	0.013	0.0046	0.0066	0.0030 J	0.0016 J	0.00045 J	0.0015 J	0.0013 J	0.0024 J	0.022 U	0.0034 U
Benzo[g,h,i]perylene	NE	NE	0.025	NA	NA	NA	0.030	NA	NA	0.0022 J	NA	NA	NA	0.022 U	0.00094 J
Pentachlorophenol	0.22	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TTEC[b]	0.012	0.12	**0.043**	**0.073**	**0.0938**	**0.0352**	**0.0538**	**0.026**	**0.0136**	0.0043	**0.012**	**0.017**	**0.019**	NA	0.0013

Table 3-3
Summary of Groundwater Analytical Results
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Sample ID	**MTCA Method B Groundwater Cleanup Levels**	**MTCA Method C Groundwater Cleanup Levels**	**TMW-02[c]**			**TMW-03**		**TMW-04**		**TMW-05**		**TMW-06**		**TMW-07**	
Date Collected			**9/23/2008**	**3/18/2009**		**9/25/2008**	**3/18/2009**	**9/23/2008**	**3/18/2009**	**9/23/2008**	**3/18/2009**	**9/25/2008**	**3/18/2009**	**9/24/2008**	**3/17/2009**
Remedial System Status:			*System Shutdown*			*System Shutdown*		*System Shutdown*		*System Shutdown*		*System Shutdown*		*System Shutdown*	
QAQC:					Filtered										
Total Petroleum Hydrocarbons (mg/L)															
Diesel Range Organics[a]	0.5	0.5	0.16 J	NA	NA	0.25 U	NA	0.13 J	NA	0.019 J	NA	0.30 U	NA	0.27 U	NA
Residual Range Organics[a]	0.5	0.5	0.52 U	NA	NA	0.50 U	NA	0.52 U	NA	0.52 U	NA	0.59 U	NA	0.53 U	NA
Polycyclic Aromatic Hydrocarbons (µg/L)															
Naphthalene	160	350	0.074	0.010 U	0.011 U	0.069	0.0086 U	0.052	0.017 U	0.020 U	0.005 U	0.018 J	0.0042 U	0.057 J	0.0034 U
2-Methylnaphthalene	32	70	0.032	0.0044 U	0.0034 U	0.022 J	0.0034 U	0.024	0.0037 U	0.020 U	0.0034 U	0.0037 J	0.0034 U	0.027 J	0.0011 J
Acenaphthylene	NE	NE	0.23	0.020	0.0099	0.039	0.017	0.039	0.017	NA	0.0034 U	0.021 U	0.0034 U	0.020 UJ	0.0034 U
Acenaphthene	960	2,100	13	7.9	6.4	5.7	3.7000	7.3	4.7	NA	0.0022 J	0.037	0.0017 J	0.066 J	0.0033 J
Dibenzofuran	16	35	0.0089 J	0.0019 J	0.0012 J	0.0073 J	0.0034 U	0.0083 J	0.0022 J	0.0056	0.00072 J	0.021 U	0.0034 U	0.033 J	0.0034 U
Fluorene	640	1,400	0.48	0.11	0.072	0.066	0.0034 U	1.5	0.93	NA	0.0034 U	0.0092 J	0.00340 U	0.031 J	0.00067 J
Phenanthrene	NE	NE	0.015 J	0.0071 U	0.0034 U	0.017 J	0.0049 U	0.020	0.0059 U	NA	0.0034 U	0.015 J	0.0034 U	0.072 J	0.0034 U
Anthracene	4,800	11,000	0.069	0.017	0.013	0.034	0.012	0.032	0.013	NA	0.004	0.0039 J	0.0046	0.017 J	0.012
Fluoranthene	640	1,400	0.023	0.0080	0.0034 U	0.022 U	0.0034 U	0.0098 J	0.0045	NA	0.0034 U	0.013 J	0.0034 U	0.025 J	0.0034 U
Pyrene	480	1,100	0.020 J	0.0089	0.0034 U	0.022 U	0.0034 U	0.0087 J	0.0034 U	NA	0.0034 U	0.011 J	0.0034 U	0.012 J	0.0034 U
Benzo[a]anthracene[b]	0.12	1.2	0.020 J	0.0051	0.0034 U	0.022 U	0.0034 U	0.0088 J	0.0034 U	0.020 U	0.0034 U	0.021 U	0.0034 U	0.0050 J	0.0011 J
Chrysene[b]	1.2	12	0.016 J	0.0067 J	0.0034 UJ	0.022 U	0.0034 UJ	0.0063 J	0.0027 J	0.020 U	0.0034 UJ	0.0062 J	0.0034 UJ	0.0049 J	0.00045 J
Benzo[b]fluoranthene[b]	0.12	1.2	0.025	0.010	0.0034 U	0.022 U	0.0034 U	0.0069 J	0.0033 J	0.020 U	0.00064 J	0.021 U	0.0034 U	0.020 UJ	0.00099 J
Benzo[k]fluoranthene[b]	1.2	12	0.0088 J	0.0030 J	0.0034 UJ	0.022 U	0.0034 UJ	0.020 U	0.0011 J	0.020 U	0.00030 J	0.021 U	0.0034 UJ	0.020 UJ	0.00036 J
Benzo[a]pyrene[b]	0.012	0.12	**0.019 J**	0.0044	0.0034 U	0.022 U	0.0034 U	0.0054 J	0.0022 J	0.020 U	0.0034 U	0.021 U	0.0034 U	0.020 UJ	0.00067 J
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.018 J	0.0048	0.00030 J	0.022 U	0.0034 U	0.0061 J	0.0014 J	0.020 UJ	0.0034 U	0.021 U	0.0034 U	0.020 UJ	0.00049 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.0043 J	0.0011 J	0.0034 U	0.022 U	0.0034 U	0.020 UJ	0.00048 J	NA	0.0034 U	0.021 U	0.0034 U	0.020 UJ	0.00030 J
Benzo[g,h,i]perylene	NE	NE	0.017 J	0.0052	0.00033 J	0.022 U	0.0034 U	0.0054 J	0.0015 J	NA	0.00040 J	0.021 U	0.0034 U	0.020 UJ	0.00074 J
Pentachlorophenol	0.22	2.2	1.1 UJ	0.5 U	NA	0.053 J	0.5 U	0.96 U	0.5 U	NA	NA	NA	NA	NA	NA
TTEC[b]	0.012	0.12	**0.0282**	0.0069	0.00003	NA	NA	0.0076	0.0029	NA	0.00009	0.00006	NA	0.0005	0.0010

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Sample ID	MTCA Method B Groundwater Cleanup Levels	MTCA Method C Groundwater Cleanup Levels	TMW-08		TMW-09		TMW-10		TMW-11			TMW-12		
Date Collected			9/24/2008	3/17/2009	9/24/2008	3/17/2009	9/24/2008	3/17/2009	9/24/2008	3/19/2009		9/25/2008		3/17/2009
Remedial System Status:			*System Shutdown*		*System Shutdown*		*System Shutdown*		*System Shutdown*			*System Shutdown*		
QAQC:											Filtered		DUP	
Total Petroleum Hydrocarbons (mg/L)														
Diesel Range Organics[a]	0.5	0.5	0.28 U	NA	0.28 U	NA	0.30 U	NA	0.30 U	NA	NA	0.28 U	0.27 U	NA
Residual Range Organics[a]	0.5	0.5	0.56 U	NA	0.56 U	NA	0.59 U	NA	0.59 U	NA	NA	0.56 U	0.53 U	NA
Polycyclic Aromatic Hydrocarbons (µg/L)														
Naphthalene	160	350	0.011 J	0.010	0.015 J	0.0091	0.018 J	0.0033 U	0.18	0.07 U	0.043 U	0.036	0.072	0.0036 U
2-Methylnaphthalene	32	70	0.0046 J	0.0026 J	0.0094 J	0.0022 J	0.0095 J	0.0014 J	0.022	0.022	0.01	0.011 J	0.021 J	0.0014 J
Acenaphthylene	NE	NE	0.015 J	0.0099	0.022 U	0.0036 U	0.0037 J	0.00092 J	0.20	0.00096 J	0.028	0.022 U	0.045	0.00084 J
Acenaphthene	960	2,100	5.1	3.4	0.44	0.016	0.15	0.10	0.10	0.013	0.011	0.36	5.7	0.046
Dibenzofuran	16	35	0.095	0.073	0.022 U	0.00088 J	0.022 U	0.0033 U	0.12	0.0096	0.0037	0.0099 J	0.0061 J	0.0036 U
Fluorene	640	1,400	0.0041 J	0.0054 U	0.022 U	0.0009 J	0.022 U	0.0011 J	0.21	0.0075	0.0027 J	0.013 J	0.063	0.0008 J
Phenanthrene	NE	NE	0.0064 J	0.0025 J	0.0067 J	0.003 J	0.0088 J	0.0021 J	3.2	0.011 U	0.0036 U	0.041	0.015 J	0.0035 J
Anthracene	4,800	11,000	0.015 J	0.018	0.022 U	0.0049	0.010 J	0.0045	0.60	0.0025 J	0.0022 J	0.032	0.034	0.015
Fluoranthene	640	1,400	0.012 J	0.0036 U	0.0057 J	0.0053	0.013 J	0.0044	12	0.016	0.0036 U	0.032	0.022 U	0.006
Pyrene	480	1,100	0.0087 J	0.0036 U	0.0042 J	0.0036 U	0.010 J	0.0033 U	8.3	0.012	0.0036 U	0.021 J	0.0037 J	0.0052
Benzo[a]anthracene[b]	0.12	1.2	0.0053 J	0.0036 U	0.0045 J	0.0017 J	0.022 U	0.0014 J	**1.2**	0.0035 U	0.0036 U	0.0054 J	0.022 U	0.0017 J
Chrysene[b]	1.2	12	0.0046 J	0.0036 UJ	0.0051 J	0.0022 J	0.022 U	0.0010 J	**3.5**	0.0056 J	0.0036 UJ	0.022 U	0.022 U	0.0015 J
Benzo[b]fluoranthene[b]	0.12	1.2	0.0036 J	0.0036 U	0.022 U	0.0016 J	0.022 U	0.0011 J	**2.0**	0.0041	0.0036 U	0.022 U	0.022 U	0.0014 J
Benzo[k]fluoranthene[b]	1.2	12	0.022 U	0.0036 UJ	0.022 U	0.00054 J	0.022 U	0.0033 UJ	0.68	0.0016 J	0.0036 UJ	0.022 U	0.022 U	0.00046 J
Benzo[a]pyrene[b]	0.012	0.12	0.022 U	0.0036 U	0.022 U	0.00059 J	0.022 U	0.00061 J	**0.56**	0.0017 J	0.0036 U	0.022 U	0.022 U	0.00083 J
Indeno[1,2,3-cd]pyrene[b]	0.12	1.2	0.022 U	0.0036 U	0.022 U	0.00056 J	0.022 U	0.00031 J	**0.42**	0.0016 J	0.0036 U	0.022 U	0.022 U	0.00063 J
Dibenzo[a,h]anthracene[b]	0.12	1.2	0.022 U	0.0036 U	0.022 U	0.0036 U	0.022 U	0.0033 U	0.075	0.0035 U	0.0036 U	0.022 U	0.022 U	0.0036 U
Benzo[g,h,i]perylene	NE	NE	0.022 U	0.0036 U	0.022 U	0.00056 J	0.022 U	0.00047 J	0.29	0.0035 U	0.0036 U	0.022 U	0.022 U	0.0006 J
Pentachlorophenol	0.22	2.2	NA	NA	NA	NA	1.1 U	0.5 U	0.99 UJ	0.5 U	NA	0.046 J	0.056 J	0.5 U
TTEC[b]	0.012	0.12	0.0009	NA	0.0005	0.0011	NA	0.0009	**1.0325**	0.0025	NA	0.0005	NA	0.0013

Table 3-3
Summary of Groundwater Analytical Results
RI/FS Port of Longview MFA – International Paper

Notes:

Numbers in **bold** indicate the detected analyte meets or exceeds the MTCA Method B cleanup level.

MTCA Cleanup Regulation (WAC 173-340) Method B groundwater values are from Ecology website CLARC tables downloaded as of August 2015 (https://fortress.wa.gov/ecy/clarc/reporting/CLARCReporting.aspx).

* Pattern profile does not match the laboratory standard pattern.

[a] Total petroleum hydrocarbon cleanup levels are based on MTCA Method A values.

[b] cPAH cleanup levels under MTCA are based on the calculated total toxicity of the mixture using the Toxicity Equivalency Methodology in WAC 173-340-780 (8). The mixture of cPAHs shall be considered a single hazardous substance and compared to the applicable MTCA Method B cleanup levels for benzo(a)pyrene. TTEC was calculated using only results reported as detected.

[c] Sample TMW-02 collected September 23, 2008 was also analyzed for RCRA 8 metals and volatile organic compounds. Carbon disulfide, toluene, isopropylbenzene, and naphthalene were detected in the samples at concentrations below the MTCA Method B cleanup levels. No other analytes were detected.

[d] The laboratory integrated and reported the results for benzo[b]fluoranthene and benzo[k]fluoranthene as benzo[b]fluoranthene.

[e] Monitoring well 97-6A was damaged, decommissioned, and replaced by monitoring well 04-6A in 2004.

CLARC - Cleanup Levels and Risk Calculation
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DUP - field duplicate
Filtered - dissolved
ft bgs - feet below ground surface
ID - identification
J - result is an estimated value
MFA - Maintenance Facility Area
µg/L - micrograms per liter
mg/L - milligrams per liter
MTCA - Model Toxics Control Act
NA - not analyzed (analyte not included in analyte list)
NE - not established
QAQC - quality assurance quality control
RCRA - Resource Conservation and Recovery Act
RI/FS - remedial investigation/feasibility study
TTEC - total toxicity equilivancy concentration
U - compound was analyzed for but not detected above the reporting limit shown
UJ - the associated quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample
WAC - Washington Administrative Code

Table 3-4
Additional Investigation Sampling Rationale
RI/FS Port of Longview MFA – International Paper

Area	Purpose	Reasons for Additional Sampling	Boring/Monitoring Well Location
North-south line through PB-58	Determine western extent of soil contamination in the Upper Sand	No detections above MTCA Method B or C soil cleanup levels, but detections of diesel and cPAHs in groundwater above MTCA Method B cleanup levels in PB-58; detection of free product and detections of diesel and cPAHs above MTCA Method C soil cleanup levels in PB-46; no soil sampling directly west of PB-46	PB-64, PB-65, TMW-06 and TMW-08
North of PB-46	Determine northern extent of soil contamination in the Upper Sand	Detection of free product and detections of diesel and cPAHs above MTCA Method C soil cleanup levels in PB-46; closest soil sampling to the north greater than 125 feet away (99-EA3A)	PB-66 and TMW-09
South of PB-46	Determine southern extent of soil contamination in the Upper Sand	Detection of free product and detections of diesel and cPAHs above MTCA Method C soil cleanup levels in PB-46; closest soil sampling to the north greater than 125 feet away (99-EA3A)	PB-63
North of PB-31	Determine northern extent of soil contamination in the Upper Sand	Detection of free product and detection of diesel above MTCA Method C soil cleanup levels in PB-31; no soil sampling directly north of PB-31	PB-67 and PB-68
Vicinity of PB-40	Determine southern extent	Detection of free product and detection of diesel above MTCA Method C soil cleanup levels in PB-31; no soil sampling directly north of PB-31	PB 69
Vicinity and north of PB-38	Determine northern extent of soil contamination in the Upper Sand	Detections of free product in PB-22 and PB-24; soil samples taken from PB-38 not analyzed	PB-70 and PB-71
North of BV-13	Determine northern extent of soil contamination in the Upper Sand	Detection of DNAPL in BV-13	PB-72 and PB-73
South of PB-19, PB-15, PB-16, and PB-18	Determine southern extent of soil contamination in the Upper Sand; determine whether contamination extends under maintenance building	Detections of free product in PB-18 and PB-20; detections of diesel above MTCA Method C soil cleanup levels in PB-15, PB-18, and PB-20; high detection limits for cPAHs in soil samples from PB-15	PB-59, PB-60, PB-61, and TMW-02
East of PB-51	Determine western extent of soil contamination in the Upper Sand;	Detections of free product in PB-18 and PB-20; detections of diesel above MTCA Method C soil cleanup levels in PB-15, PB-18, and PB-20; high detection limits for cPAHs in soil samples from PB-15	PB-62
West and south of PB-51	Determine southern and western extent of soil contamination in the Upper Sand; determine whether contamination extends under maintenance building	Detection of oil above MTCA Method C soil cleanup levels in PB-51; detection of cPAHs above MTCA Method B soil cleanup levels; closest soil sampling to the south more than 75 feet away (PB-56); no soil sampling directly west of PB-51	TMW-03 and TMW-04

Table 3-4
Additional Investigation Sampling Rationale
RI/FS Port of Longview MFA – International Paper

Area	Purpose	Reasons for Additional Sampling	Boring/Monitoring Well Location
Vicinity and north of PB-38	Determine northern extent of groundwater contamination in Aquifer A	No groundwater samples taken from PB-38; no groundwater sampling directly north of PB-38; detections of cPAHs above MTCA Method B groundwater cleanup levels to the northeast in PB-44	TWM-11 and TMW-12
North of PB-44	Determine northern extent of groundwater contamination in Aquifer A	No groundwater sampling directly north of PB-44; detections of cPAHs above MTCA Method B groundwater cleanup levels in PB-44	TMW-11
North of PB-40	Determine northern extent of groundwater contamination in Aquifer A	No groundwater sampling directly north of PB-40; suspended DNAPL in AV-10; detections of cPAHs in PB-44 and detection of diesel in PB-45 above MTCA Method B groundwater cleanup levels	TMW-10 and TMW-11
North of PB-45	Determine northern extent of groundwater contamination in Aquifer A	No groundwater sampling directly north of PB-45; detection of diesel above MTCA Method B groundwater cleanup levels in PB-45	TMW-10
North of PB-43	Determine northern extent of groundwater contamination in Aquifer A	No groundwater sampling directly north of PB-43; detection of diesel above MTCA Method B groundwater cleanup levels in PB-43	TMW-09 and TMW-10
North, west, and south of PB-58	Determine western extent of groundwater contamination in Aquifer A	No groundwater sampling directly north, west, or south of PB-58; detection of diesel above MTCA Method B groundwater cleanup levels in PB-58	TMW-06, TMW-07, and TMW-08 Groundwater data in the vicinity of PB-58 also available from existing wells AV-12, AV-13, and 99-EA3A.
West of PB-51 and south of PB-42	Determine western and southern extent of groundwater contamination in Aquifer A	No groundwater sampling directly west of PB-51; no groundwater sampling directly south of PB-42; detections of diesel about MTCA Method B groundwater cleanup levels in both PB-51 and PB-42	TMW-04 and TMW-05
South of PB-51 and PB-21	Determine southern extent of groundwater contamination in Aquifer A	No groundwater sampling directly south of PB-21 and PB-51; detections of diesel above MTCA Method B groundwater cleanup levels in both boring.	TMW-02 and TMW-03

Notes:
cPAHs - carcinogenic polycyclic aromatic hydrocarbons
DNAPL - dense non-aqueous phase liquid
MFA - Maintenance Facility Area
MTCA - Model Toxics Control Act
RI/FS - remedial investigation/feasibility study

Table 3-5
Summary of VOC and Metals Analytical Results for TMW-02
RI/FS Port of Longview MFA – International Paper

Sample ID	**MTCA Soil Cleanup Levels**				**TMW-02**		**MTCA Groundwater Cleanup Levels**			**TMW-02**
Date Collected					**9/10/2008**	**9/10/2008**				**9/23/2008**
Sample Depth (ft bgs)	**Method A**	**Method B**	**Method C Direct Contact**	**Method C Protection of Groundwater**[a]	**8**	**11**	**Method A**	**Method B**	**Method C**	**NA**
VOCs	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
1,2,4-Trimethylbenzene	NE	NE	NE	NE	1.4 J	7.6 J	NE	NE	NE	2.0 U
1,3,5-Trimethylbenzene	NE	800,000	35,000,000	5,500	34 U	0.17 J	NE	80	175	2.0 U
2-Butanone (methyl ethyl ketone)	NE	48,000,000	2,100,000,000	43,000	55	9.5 J	NE	4,800	10,500	20 U
4-Isopropyltoluene	NE	NE	NE	NE	0.78 J	0.12 J	NE	NE	NE	2.0 U
Acetone	NE	72,000,000	3,150,000,000	63,000	190	44	NE	7,200	15,800	20 U
Carbon Disulfide	NE	8,000,000	350,000,000	12,000	0.42 J	0.22 J	NE	800	1,750	0.19 J
Ethylbenzene	6,000	8,000,000	350,000,000	15,000	0.48 J	0.86 J	700	800	1,750	0.50 U
Isopropylbenzene (cumene)	NE	8,000,000	350,000,000	170,000	34 U	0.77 J	NE	800	1,750	0.060 J
m,p-Xylenes	9,000[b]	16,000,000[b]	700,000,000[b]	30,000	0.76 J	0.92 J	1,000[b]	1,600[b]	3,500[b]	0.50 U
Naphthalene	5,000	1,600,000	70,000,000	9,700	9.7 J	3.1 J	160	160	350	0.37 J
o-Xylene	9,000[b]	16,000,000[b]	700,000,000[b]	32,000	0.61 J	2.9 J	1,000[b]	1,600[b]	3,500[b]	0.50 U
Toluene	7,000	6,400,000	280,000,000	10,000	1.9 J	1.1 J	1,000	640	1,400	0.050 J
Metals	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Arsenic	20	0.67	87.5	0.34	2.8	2.7	5	0.058	0.583	5.0 U
Barium	NE	16,000	700,000	5,800	59.1	66.1	NE	3,200	7,000	35
Cadmium	2	NE	NE	4.80	0.10 J	0.07 J	5	16	35	5.0 U
Chromium	2,000 (CrIII) 19 (CrVI)	120,000 (CrIII) 240 (CrVI)	5,250,000 (CrIII) 10,500 (CrVI)	1,100,000 (CrIII) 40 (CrIV)	9.2	13.3	50 (total)	24,000 (CrIII) 48 (CrVI)	52,500 (CrIII) 105 (CrVI)	5.0 U
Lead	250 (R) 1,000 (I)	NE	NE	NE	18.5	4.3	15	NE	NE	2.0 U
Mercury	2	NE	NE	NE	0.175 J	0.054 J	2	NE	NE	0.2 U
Selenium	NE	400	17,500	18	2.5 U	2.0 U	NE	80	175	5.0 U
Silver	NE	400	17,500	30	0.4 U	0.3 U	NE	80	175	10 U

Notes:

Numbers in **bold** indicate the result meets or exceeds the MTCA Method C (protection of groundwater) cleanup level for soil or MTCA Method A/B for groundwater.
MTCA Cleanup Regulation, WAC 173-340. MTCA Method A and B soil values are from Ecology website CLARC tables downloaded as of August 2015 (https://fortress.wa.gov/ecy/clarc/reporting/CLARCReporting.aspx).

[a] Calculated using MTCA defaults for sand soil type.

[b] MTCA level for xylenes is based on total xylenes.

CLARC - Cleanup Levels and Risk Calculation
ft bgs - feet below ground surface
I - industrial land use
ID - identification
J - result is an estimated value
MFA - Maintenance Facility Area
µg/kg - micrograms per kilogram
µg/L - micrograms per liter
mg/kg - milligrams per kilogram

MTCA - Model Toxics Control Act
NA - not applicable
NE - not established
R - unrestricted land use
RI/FS - remedial investigation/feasibility study
U - compound was analyzed for but not detected above the reporting limit shown
VOCs - volatile organic compounds
WAC - Washington Administrative Code

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
RI/FS Port of Longview MFS - International Paper

Sample ID	MTCA C		PB-59		PB-60		PB-61		PB-62	PB-63		PB-64	
Date Collected	Soil Cleanup Levels		9/11/2008	9/11/2008	9/11/2008	9/11/2008	9/11/2008	9/11/2008	9/15/2008	9/15/2008	9/15/2008	9/8/2008	9/8/2008
Sample Depth (ft bgs)	Direct Contact	Protection of Groundwater	8	10	8	11	6.5	8	5.5	6.5	8	6	11
Field QC													
Total Petroleum Hydrocarbons (mg/kg)													
Diesel Range Organics[a]	2,000	2,000	**14,000 J**	77	**3,300 ***	18 J	16 *	**5,100 ***	22 *	37 *	20 *	17 *	13 U
Residual Range Organics[a]	2,000	2,000	**2,000 J**	33 J	260 *	80 J	67 *	370 *	73 *	49 *	66 *	84 *	32 U
Polycyclic Aromatic Hydrocarbons (µg/kg)													
Pentachlorophenol	330,000	35	10,000 UJ	200 UJ	**290 J**	200 UJ	200 UJ	**290 J**	NA	NA	NA	NA	NA
Naphthalene	70,000,000	9,700	**1,700,000**	4,700	**140,000**	4,600	3,800	**190,000**	170	1,800	930	65	5.1
Acenaphthylene	NE	NE	4,800	21	1,600	1.2 J	50	1,800	6.6	19	0.57 J	21	5.0 U
Acenaphthene	210,000,000	210,000	**390,000**	2,500	170,000	41	450 J	200,000	1,600	1,800	130	6.7	3.1 J
Fluorene	140,000,000	220,000	**330,000**	3,000	90,000	25	90 J	110,000	260	820	2.7 J	5.6	1.8 J
Phenanthrene	NE	NE	860,000	7,400	160,000	38	110	190,000	14	450	4.6 J	57	2.5 J
Anthracene	1,100,000,000	5,000,000	96,000	770	12,000	3.6 J	170	12,000	9.6	30	5.0 U	160	5.0 U
Fluoranthene	140,000,000	1,400,000	340,000	2,100	54,000	16	85	69,000	13	390	3.4 J	94	5.0 U
Pyrene	110,000,000	1,400,000	210,000	1,300	31,000	16	59	38,000	17	280	3.3 J	85	0.44 J
Benzo[a]anthracene[b]	180,000	8,600	4,400	270	6,300	2.4 J	46	7,600	13	88	1.6 J	59	5.0 U
Chrysene[b]	1,800,000	96,000	37,000	220	5,500	4.0 J	65	6,800	17	92	1.9 J	36	5.0 U
Benzo[b]fluoranthene[b]	180,000	30,000	18,000	110	2,900	4.5 J	150	3,500	14	62	1.3 J	190	5.0 U
Benzo[k]fluoranthene[b]	180,000	30,000	6,800	41	1,100	1.3 J	39	1,300	9.4	24	0.73 J	48	5.0 U
Benzo[a]pyrene[b]	18,000	2,300	**12,000**	77	1,600	2.4 J	36	2,000	15	49	0.70 J	70	5.0 U
Indeno[1,2,3-cd]pyrene[b]	180,000	83,000	4,700 J	26 J	760 J	3.6 J	100 J	1,000 J	13 J	27 J	0.93 J	200 J	5.0 UJ
Dibenzo[a,h]anthracene[b]	180,000	43,000	1,200 J	7.3 J	220 J	4.9 UJ	21 J	270 J	8.3 J	6.3 J	0.52 J	31 J	5.0 UJ
Benzo[g,h,i]perylene	NE	NE	3,200	79	620	16	76	740	14	22	1.1 J	160	5.0 U
2-Methylnaphthalene	14,000,000	3,800	**720,000**	2,500	**240,000**	180	2,600	**680,000**	320	560	220	28	4.4 J
Dibenzofuran	3,500,000	6,500	**300,000**	2,800	**120,000**	25	250 J	**160,000**	290	1,400	2.1 J	17	2.9 J
TTEC[b]	18,000	2,300	**15,880**	125	**2,783**	3.6	72	**3,435**	21	71	1.2	123	NA

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
RI/FS Port of Longview MFS - International Paper

Sample ID	MTCA C		PB-65		PB-66		PB-67		PB-68		PB-69		PB-70	
Date Collected	Soil Cleanup Levels		9/8/2008	9/8/2008	9/8/2008	9/8/2008	9/8/2008	9/8/2008	9/15/2008	9/15/2008	9/8/2008	9/8/2008	9/15/2008	
Sample Depth (ft bgs)	Direct Contact	Protection of Groundwater	10.5	11	2	7	7	9	6	8.5	3	7	6	
Field QC														DUP
Total Petroleum Hydrocarbons (mg/kg)														
Diesel Range Organics[a]	2,000	2,000	14 U	15 U	35 *	13 U	**2,700 ***	24 *	1,700 *	21 *	12 J	16 *	36 J	28 *
Residual Range Organics[a]	2,000	2,000	34 U	40 *	170 *	45 *	310 *	87 *	240 *	61 *	60 *	83 *	79 J	55 *
Polycyclic Aromatic Hydrocarbons (µg/kg)														
Pentachlorophenol	330,000	35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	200 UJ	NA
Naphthalene	70,000,000	9,700	18	25	35	610	**94,000**	8,900	130	720	140	300	1,900	1,300
Acenaphthylene	NE	NE	5.0 U	4.9 U	0.93 J	0.96 J	2,300	0.64 J	750	2.7 J	0.77 J	0.46 J	6.9	3.9 J
Acenaphthene	210,000,000	210,000	1.4 J	1.9 J	6.4	73	160,000	30	38,000	580	20	7.4	1,300	1,000
Fluorene	140,000,000	220,000	0.84 J	0.94 J	3.5 J	17	79,000	6.5	19,000	140	8.3	2.4 J	290	230
Phenanthrene	NE	NE	1.0 J	1.7 J	9.7	4.7 J	120,000	8.6	27,000	45	11	6.4	93	77
Anthracene	1,100,000,000	5,000,000	5.0 U	4.9 U	2.0 J	2.1 J	14,000	1.8 J	3,500	4.6 J	2.6 J	0.86 J	9.6	9.8
Fluoranthene	140,000,000	1,400,000	5.0 U	4.9 U	9.7	4.3 J	60,000	7.5	19,000	11	11	3.3 J	9.1	6.6
Pyrene	110,000,000	1,400,000	0.46 J	0.48 J	7.3	5.1	36,000	5.7	18,000	8.3	12	4.0 J	7.2	5.5
Benzo[a]anthracene[b]	180,000	8,600	0.52 J	0.71 J	1.9 J	1.0 J	7,400	2.3 J	2,400	5.1	3.1 J	1.2 J	5.0 U	1.5 J
Chrysene[b]	1,800,000	96,000	0.37 J	0.31 J	3.8 J	1.5 J	6,800	2.6 J	2,700	5.9	6.6	1.3 J	5.0 U	2.3 J
Benzo[b]fluoranthene[b]	180,000	30,000	5.0 U	4.9 U	4.6 J	1.2 J	3,000	2.2 J	1,300	5.1	5.2	1.2 J	5.0 U	1.3 J
Benzo[k]fluoranthene[b]	180,000	30,000	5.0 U	4.9 U	1.3 J	5.0 U	1,200	1.4 J	430	4.7 J	1.7 J	5.0 U	5.0 U	0.37 J
Benzo[a]pyrene[b]	18,000	2,300	5.0 U	4.9 U	1.4 J	0.54 J	1,600	1.3 J	640	3.6 J	2.6 J	1.0 J	5.0 U	0.72 J
Indeno[1,2,3-cd]pyrene[b]	180,000	83,000	5.0 UJ	4.9 UJ	2.4 J	0.72 J	630 J	1.6 J	310 J	5.9 J	2.5 J	0.98 J	5.0 UJ	1.0 J
Dibenzo[a,h]anthracene[b]	180,000	43,000	5.0 UJ	4.9 UJ	5.0 UJ	1.8 J	140 J	0.92 J	79 J	5.6 J	0.66 J	5.0 UJ	5.0 UJ	5.0 UJ
Benzo[g,h,i]perylene	NE	NE	5.0 U	4.9 U	3.6 J	0.93 J	460	1.9 J	230	6.1	3.2 J	1.1 J	5.0 U	1.2 J
2-Methylnaphthalene	14,000,000	3,800	7.7	5.9	15	200	**180,000**	550	**5,500**	490	93	15	**3,900**	3,400
Dibenzofuran	3,500,000	6,500	1.8 J	1.5 J	5.7	12	**120,000**	9.7	**16,000**	310	17	3.1 J	270	220
TTEC[b]	18,000	2,300	0.056	0.074	2.5	1.0	**2,905**	2.2	1,119	6.3	4.0	1.4	NA	1.2

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
RI/FS Port of Longview MFS - International Paper

Sample ID	MTCA C Soil Cleanup Levels		PB-71	PB-72	PB-73			PB-74	PB-75	PB-76		PB-77		PB-78	
Date Collected			9/15/2008	9/15/2008	9/15/2008		9/15/2008	12/9/2011	12/9/2011	12/7/2011		12/7/2011		12/7/2011	
Sample Depth (ft bgs)	Direct Contact	Protection of Groundwater	6.5	8.5	5		6.5	6	6	8	10.5	8	10.5	8	10.5
Field QC						DUP									
Total Petroleum Hydrocarbons (mg/kg)															
Diesel Range Organics[a]	2,000	2,000	11 J	20 *	3.9 J	10 J	6.3 J	23 J	10 J	42 *	36 U	19 J	68 *	**4,200** *	180 *
Residual Range Organics[a]	2,000	2,000	55 *	210 *	9.4 J	20 J	28 J	160 *	120 U	140 U	150 U	120 U	190 *	1,100 *	230 *
Polycyclic Aromatic Hydrocarbons (µg/kg)															
Pentachlorophenol	330,000	35	NA	200 UJ	200 UJ	NA	200 UJ	5.8 UJ	NA	NA	NA	NA	NA	NA	NA
Naphthalene	70,000,000	9,700	330	380	84	67	110	61	21	960	1,400	25	3,600	740	11
Acenaphthylene	NE	NE	2.6 J	0.49 J	1.1 J	0.97 J	1.6 J	4.9 J	6.1	7.1 J	10 U	4.5 J	9.9 U	590	9.6 U
Acenaphthene	210,000,000	210,000	550	32	35	35	440	11	3.2 J	750	580	42	36	36,000	360
Fluorene	140,000,000	220,000	49	4.9 J	29	26	92	15	4.3	1,100	140	26	9.9 U	48,000	190
Phenanthrene	NE	NE	12	22	55	48	3.3 J	76	26	1,600	39	70	22	150,000	580
Anthracene	1,100,000,000	5,000,000	3.0 J	5.0 U	16	14	1.3 J	24	24	150	5.3 J	38	2.1 J	25,000	95
Fluoranthene	140,000,000	1,400,000	4.9 J	6.0	85	76	7.5	85	55	140	6.6 J	280	11	76,000	290
Pyrene	110,000,000	1,400,000	5.1	7.9	56	55	5.0 U	57	37	73	5.3 J	210	12	48,000	170
Benzo[a]anthracene[b]	180,000	8,600	1.5 J	5.0 U	5.0 U	3.8 J	5.0 U	22	25	3 J	1.6 J	83	2.7 J	**11,000**	46
Chrysene[b]	1,800,000	96,000	1.5 J	5.9 U	5.4 U	1.9 J	5.0 U	33	29	2.8 J	1.7 J	78	3.3 J	11,000	46
Benzo[b]fluoranthene[b]	180,000	30,000	1.2 J	5.0 U	7.5 U	7.2	5.0 U	75	82	4.9 J	10 U	120	4.5 J	5,600	23
Benzo[k]fluoranthene[b]	180,000	30,000	5.0 U	5.0 U	5.0 U	2.5 J	5.0 U	19	27	10 U	10 U	40	9.9 U	2,100	7.9 J
Benzo[a]pyrene[b]	18,000	2,300	0.67 J	5.0 U	6.9	6.8	5.0 U	18	27	2.9 J	10 U	59	6.8 J	**3,400**	16
Indeno[1,2,3-cd]pyrene[b]	180,000	83,000	0.93 J	5.0 UJ	7.9 UJ	8.2 J	5.0 UJ	28	43	2 J	10 U	45	2.3 J	1,100	6.3 J
Dibenzo[a,h]anthracene[b]	180,000	43,000	5.0 UJ	5.0 UJ	5.0 UJ	1.9 J	5.0 UJ	7.7	9.3	10 U	10 U	10	9.9 U	360	9.6 U
Benzo[g,h,i]perylene	NE	NE	1.0 J	8.1 U	7.6 U	8.5	5.0 U	25	35	10 U	10 U	36	3.4 J	970	5.5 J
2-Methylnaphthalene	14,000,000	3,800	42	350	4.2 J	3.4 J	44	25	10	880	1,500	8.3	200	**8,700**	980
Dibenzofuran	3,500,000	6,500	21	2.5 J	36	33	2.5 J	20	6.6	960	200	31	9.9 U	**27,000**	140
TTEC[b]	18,000	2,300	1.0	NA	6.9	9.2	NA	34	46	3.9	0.18	90	7.8	**5,526**	25

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
RI/FS Port of Longview MFS - International Paper

Sample ID	MTCA C		PB-79		PB-80		PB-81		PB-82			PB-83		PB-84	
Date Collected	Soil Cleanup Levels		12/7/2011		12/7/2011		12/7/2011		12/7/2011			12/7/2011		12/7/2011	
Sample Depth (ft bgs)	Direct Contact	Protection of Groundwater	8	10.5	8	10.5	8	10.5	8	10.5		8	10.5	8	10.5
Field QC										DUP					
Total Petroleum Hydrocarbons (mg/kg)															
Diesel Range Organics[a]	2,000	2,000	57 *	260 *	2.1 J	160 *	53 *	36 *	30 U	36 U	38 U	**5,900 ***	1,000 *	23 J	64 *
Residual Range Organics[a]	2,000	2,000	140 U	150 *	130 U	160 U	130 U	140 U	120 U	150 U	150 U	1,500 *	300 *	160 U	150 U
Polycyclic Aromatic Hydrocarbons (µg/kg)															
Pentachlorophenol	330,000	35	NA	NA	NA	NA	NA	NA	5.9 U	7.1 U	7.4 U	NA	NA	NA	NA
Naphthalene	70,000,000	9,700	990	**22,000**	6.4	**23,000**	560	88	470	1,000 J	86 J	750	7,400	270	3,200
Acenaphthylene	NE	NE	10 U	20	5 U	10 U	5.5 U	5 U	13	5 U	5 U	450 U	80 U	5 U	10 U
Acenaphthene	210,000,000	210,000	970	3,800	9.6	1,100	770	860	15	46	58	54,000	13,000	870	2,200
Fluorene	140,000,000	220,000	1,000	1,600	10	160	1,400	300	24	6.8 J	2.5 J	58,000	14,000	200	950
Phenanthrene	NE	NE	1,100	4,200	10	340	390	240	190	17	22	200,000	41,000	47	130
Anthracene	1,100,000,000	5,000,000	83	720	11	51	57	11	55	3.7 J	5.9	36,000	7,100	16	4.7 J
Fluoranthene	140,000,000	1,400,000	200	2,400	13	140	79	4.9 J	230	4 J	4 J	91,000	20,000	18	3.9 J
Pyrene	110,000,000	1,400,000	120	1,400	10	89	47	4 J	120	3.5 J	3.4 J	58,000	12,000	10	3.7 J
Benzo[a]anthracene[b]	180,000	8,600	36	380	1.3 J	21	2.8 J	1.4 J	69	0.94 J	1.3 J	**14,000**	2,900	1.8 J	1.7 J
Chrysene[b]	1,800,000	96,000	38	320	5 U	23	4.3 J	1.3 J	88	1.4 J	1.3 J	12,000	2,300	1.6 J	10 U
Benzo[b]fluoranthene[b]	180,000	30,000	54	190	2.2 J	12	3.4 J	1.2 J	230	1.5 J	1.3 J	6,500	1,300	1.6 J	10 U
Benzo[k]fluoranthene[b]	180,000	30,000	13	76	5 U	4.6 J	1.3 J	5 U	62	5 U	5 U	2,700	460	5 U	10 U
Benzo[a]pyrene[b]	18,000	2,300	15	110	1.5 J	7.6 J	1.5 J	5 U	140	5 U	5 U	**4,000**	770	0.87 J	10 U
Indeno[1,2,3-cd]pyrene[b]	180,000	83,000	16	40	1.3 J	3.6 J	1.7 J	5 U	110	5 U	5 U	1,300	290	0.89 J	10 U
Dibenzo[a,h]anthracene[b]	180,000	43,000	3.6 J	8.7 J	5 U	10 U	5 U	5 U	25	5 U	5 U	440	79	5 U	10 U
Benzo[g,h,i]perylene	NE	NE	13	33	1.2 J	4.1 J	2.4 J	0.87 J	91	1.2 J	0.85 J	1,200	210	1.1 J	10 U
2-Methylnaphthalene	14,000,000	3,800	1,600	**7,600**	1.4 J	**4,400**	560	1,500	59	310	250	**15,000**	**8,900**	380	2,000
Dibenzofuran	3,500,000	6,500	1,000	1,200	21	160	1,300	110	78	9.6 J	5 U	**37,000**	**11,000**	88	1,200
TTEC[b]	18,000	2,300	28	183	2	11.95	2.5	0.27	190	0.26	0.27	**6,614**	1,296	1.3	0.17

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
RI/FS Port of Longview MFS - International Paper

Sample ID	MTCA C		PB-85			PB-86	PB-87		TP-01		TP-02		TMW-01	
Date Collected	Soil Cleanup Levels		12/8/2011			12/8/2011	12/9/2011		8/22/2011		8/22/2011		9/10/2008	9/10/2008
Sample Depth (ft bgs)	Direct	Protection of	9		10.5	6	7	10.5	2.0-7.5	7.5	2.0-6.5	6.5	7	13.5
Field QC	Contact	Groundwater		DUP										
Total Petroleum Hydrocarbons (mg/kg)														
Diesel Range Organics[a]	2,000	2,000	4 J	2.7 J	27 J	67 J*	72 *	99 *	45	56	**9,000**	**9,300**	13 U	18 U
Residual Range Organics[a]	2,000	2,000	130 U	120 U	140 U	460 *	480 *	150 U	390	160 J	1,800 J	**2,000 J**	31 U	46 *
Polycyclic Aromatic Hydrocarbons (µg/kg)														
Pentachlorophenol	330,000	35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	70,000,000	9,700	7.5 J	2.7 J	610	92	790	8,600	110	220	**35,000**	**46,000**	6.0	17
Acenaphthylene	NE	NE	5 U	5 U	5 U	9.5	10	10 U	2	5.7	1,100	1,200	0.48 J	0.54 J
Acenaphthene	210,000,000	210,000	47 J	8.3 J	690	14	21	760	200	430	81,000	82,000	15	1.6 J
Fluorene	140,000,000	220,000	220 J	11 J	370	12	24	570	84	130	85,000	90,000	21	1.4 J
Phenanthrene	NE	NE	58	5 U	110	78	140	1,200	44	110	240,000	240,000	15	9.2
Anthracene	1,100,000,000	5,000,000	3.9 J	0.71 J	4.4 J	40	55	170	4.3	35	45,000	77,000	3.2 J	1.3 J
Fluoranthene	140,000,000	1,400,000	5 U	5 U	6.9	280	210	540	7.7	380	120,000	130,000	5.4 U	7.8
Pyrene	110,000,000	1,400,000	5 U	5 U	7.1	220	130	330	5.4	260	74,000	77,000	5.4 U	7.1
Benzo[a]anthracene[b]	180,000	8,600	5 U	5 U	1.8 J	110	82	85	1.9	80	**17,000**	**20,000**	1.2 J	1.8 J
Chrysene[b]	1,800,000	96,000	5 U	5 U	1.9 J	140	90	85	3.1	130	14,000	17,000	5.4 U	2.1 J
Benzo[b]fluoranthene[b]	180,000	30,000	5 U	5 U	2.2 J	200	280	50	4.7	170	7,900	10,000	5.4 U	2.9 J
Benzo[k]fluoranthene[b]	180,000	30,000	5 U	5 U	5 U	70	73	21	1.1 J	46	2,700	3,000	5.4 U	4.9 U
Benzo[a]pyrene[b]	18,000	2,300	5 U	5 U	1.4 J	72	59	33	6.1	160	**4,400**	**5,400**	5.4 U	1.1 J
Indeno[1,2,3-cd]pyrene[b]	180,000	83,000	5 U	5 U	0.95 J	62	100	16	5.8	180	1,300	1,800	5.4 UJ	4.9 UJ
Dibenzo[a,h]anthracene[b]	180,000	43,000	5 U	5 U	5 U	15	24	3 J	1.8 U	27	310	420	5.4 UJ	4.9 UJ
Benzo[g,h,i]perylene	NE	NE	5 U	5 U	1.3 J	47	76	13	6.1	170	1,100	1,500	5.4 U	4.9 U
2-Methylnaphthalene	14,000,000	3,800	2 J	0.75 J	260	39	70	1,500	45	79	**48,000**	**38,000**	1.7 J	1.2 J
Dibenzofuran	3,500,000	6,500	6.5 J	0.88 J	210	25	41	560	96	150	**60,000**	**58,000**	2.2 J	0.87 J
TTEC[b]	18,000	2,300	NA	NA	1.9	119	116	51	7.1	212	**7,461**	**9,092**	0.12	1.6

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
RI/FS Port of Longview MFS - International Paper

Sample ID	MTCA C		TMW-02		TMW-03	TMW-04	TMW-05	TMW-06		TMW-07	TMW-08	TMW-09	TMW-10	TMW-11
Date Collected	Soil Cleanup Levels		9/10/2008	9/10/2008	9/11/2008	9/12/2008	9/12/2008	9/12/2008		9/9/2008	9/9/2008	9/9/2008	9/9/2008	9/12/2008
Sample Depth (ft bgs)	Direct Contact	Protection of Groundwater	8	11	9	7.5	6	7		11.5	10	9.5	7	7.5
Field QC									DUP					
Total Petroleum Hydrocarbons (mg/kg)														
Diesel Range Organics[a]	2,000	2,000	180 *	7.2 J	6.4 J	6.6 J	10 J	5.6 J	4.9 J	12 U	12 U	13 U	12 U	8.6 J
Residual Range Organics[a]	2,000	2,000	920 *	31 J	19 J	19 J	44 *	36 *	29 J	28 U	59 *	31 U	29 U	42 *
Polycyclic Aromatic Hydrocarbons (µg/kg)														
Pentachlorophenol	330,000	35	200 UJ	200 UJ	200 UJ	200 UJ	NA	NA	NA	NA	NA	NA	200 UJ	200 UJ
Naphthalene	70,000,000	9,700	670	100	65	41	65	55 J	30 J	1.7 J	6.8	4.9 J	16	130
Acenaphthylene	NE	NE	190	0.75 J	0.30 J	3.1 J	0.50 J	0.59 J	0.58	5.0 U	7.7	5.0 U	0.45 J	0.99 J
Acenaphthene	210,000,000	210,000	78	9.0	9.2	15	22	8.2	5.7	0.24 J	5.9	5.0 U	9.5	23
Fluorene	140,000,000	220,000	98	2.0 J	5.0	7.7	9.6	4.0 J	2.6 J	5.0 U	11	5.0 U	1.8 J	13
Phenanthrene	NE	NE	530	7.6	6.6	17	12	7.0	5.5	1.7 J	120	4.9 J	3.0 J	18
Anthracene	1,100,000,000	5,000,000	1,000	2.5 J	0.82 J	14	0.96 J	0.81 J	0.81 J	5.0 U	23	0.69 J	0.90 J	3.6 J
Fluoranthene	140,000,000	1,400,000	1,200	5.3	1.7 J	22	3.1 J	3.0 J	3.4 J	5.0 U	95	5.2	5.0 U	9.3
Pyrene	110,000,000	1,400,000	740	6.3	1.9 J	13	3.0 J	3.5 J	3.2 J	5.0 U	130	4.0 J	5.0 U	6.3
Benzo[a]anthracene[b]	180,000	8,600	400	2.2 J	5.0 U	8.7	5.0 U	5.0 U	4.9 U	0.95 J	54	1.7 J	1.0 J	5.0 U
Chrysene[b]	1,800,000	96,000	480	2.2 J	5.0 U	20	5.0 U	5.0 U	2.9 J	5.0 U	64	2.4 J	5.0 U	2.2 J
Benzo[b]fluoranthene[b]	180,000	30,000	1,300	2.6 J	0.82 J	24	5.0 U	5.0 U	2.6 J	5.0 U	39	2.0 J	5.0 U	2.9 J
Benzo[k]fluoranthene[b]	180,000	30,000	260	0.92 J	5.0 U	6.5	5.0 U	5.0 U	0.76 J	5.0 U	14	5.0 U	5.0 U	0.79 J
Benzo[a]pyrene[b]	18,000	2,300	240	1.5 J	5.0 U	6.5	5.0 U	5.0 U	0.76 J	0.71 J	40	5.0 U	5.0 U	0.71 J
Indeno[1,2,3-cd]pyrene[b]	180,000	83,000	450 J	5.0 UJ	5.0 UJ	16 J	5.0 UJ	5.0 UJ	2.0 J	5.0 UJ	22 J	5.0 UJ	5.0 UJ	5.0 UJ
Dibenzo[a,h]anthracene[b]	180,000	43,000	170 J	5.0 UJ	5.00 UJ	3.5 J	5.0 UJ	5.0 UJ	4.9 UJ	5.0 UJ	5.4 J	5.0 UJ	5.0 UJ	5.0 UJ
Benzo[g,h,i]perylene	NE	NE	280	5.0 U	6.3	11	5.0 U	0.86 J	2.0 J	5.0 U	22	5.0 U	5.0 U	1.2 J
2-Methylnaphthalene	14,000,000	3,800	240	7.3	27	69	130	43	29	0.62 J	5.0 J	1.1 J	14	72
Dibenzofuran	3,500,000	6,500	170	2.3 J	7.7	15	19	6.9	5.1	5.0 U	3.7 J	0.65 J	2.3 J	17
TTEC[b]	18,000	2,300	503	2.1	0.082	13	NA	NA	1.3	0.81	54	0.39	0.11	1.1

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
RI/FS Port of Longview MFS - International Paper

Sample ID	MTCA C		TMW-12	EASB4		EASB5	EASB6	EASB7
Date Collected	Soil Cleanup Levels		9/12/2008	10/14/2008	10/14/2008	10/14/2008	10/14/2008	10/14/2008
Sample Depth (ft bgs)	Direct	Protection of	6.5	7.0	8.5	6.5	8.5	8.0
Field QC	Contact	Groundwater						
Total Petroleum Hydrocarbons (mg/kg)								
Diesel Range Organics[a]	2,000	2,000	5.5 J	11 U	1.7 J	1.9 J	3 J	13 U
Residual Range Organics[a]	2,000	2,000	76 *	4.6 J	8.1 J	19 J	32 J	10 J
Polycyclic Aromatic Hydrocarbons (µg/kg)								
Pentachlorophenol	330,000	35	200 UJ	98 U	99 U	98 U	100 U	99 U
Naphthalene	70,000,000	9,700	40	9.8 U	22	5.8 J	10 U	9.9 U
Acenaphthylene	NE	NE	0.41 J	9.8 U	9.9 U	9.8 U	10 U	9.9 U
Acenaphthene	210,000,000	210,000	9.1	9.8 U	10	2.3 J	10 U	9.9 U
Fluorene	140,000,000	220,000	2.5 J	9.8 U	11	9.8 U	10 U	9.9 U
Phenanthrene	NE	NE	5.3	3.8 J	20	3 J	2.9 J	9.9 U
Anthracene	1,100,000,000	5,000,000	0.85 J	9.8 U	5.4 J	9.8 U	10 U	9.9 U
Fluoranthene	140,000,000	1,400,000	4.8 J	3.2 J	19	1.6 J	5.6 J	2 J
Pyrene	110,000,000	1,400,000	4.8 J	2.3 J	14	9.8 U	5.3 J	2 J
Benzo[a]anthracene[b]	180,000	8,600	5.0 U	9.8 U	5.5 J	9.8 U	3.8 J	9.9 U
Chrysene[b]	1,800,000	96,000	3.6 J	2.6 J	4.8 J	9.8 U	5.2 J	9.9 U
Benzo[b]fluoranthene[b]	180,000	30,000	3.1 J	3 J	10	9.8 U	8.3 J	9.9 U
Benzo[k]fluoranthene[b]	180,000	30,000	1.1 J	9.8 U	3.5 J	9.8 U	2.9 J	9.9 U
Benzo[a]pyrene[b]	18,000	2,300	1.2 J	9.8 U	6 J	9.8 U	4.3 J	9.9 U
Indeno[1,2,3-cd]pyrene[b]	180,000	83,000	2.5 J	1.7 J	6.1 J	9.8 U	4.4 J	9.9 U
Dibenzo[a,h]anthracene[b]	180,000	43,000	5.0 UJ	9.8 U	9.9 U	9.8 U	10 U	9.9 U
Benzo[g,h,i]perylene	NE	NE	2.7 J	1.6 J	5.9 J	9.8 U	3.7 J	9.9 U
2-Methylnaphthalene	14,000,000	3,800	21	9.8 U	8 J	9.8 U	10 U	9.9 U
Dibenzofuran	3,500,000	6,500	4.3 J	9.8 U	6.7 J	9.8 U	10 U	9.9 U
TTEC[b]	18,000	2,300	1.9	13	9.5	15	7.3	15

Table 3-6
Supplemental Investigation Soil Analytical Results (2008 and 2011)
Maintenance Facility Area

Notes:

Numbers in **bold** indicate the detected analyte meets or exceeds the MTCA Method C soil cleanup levels (protection of groundwater)
MTCA Cleanup Regulation (WAC 173-340) Method C soil values are from Ecology website, CLARC tables downloaded as of August 2015 (https://fortress.wa.gov/ecy/clarc/reporting/CLARCReporting.aspx).
* Pattern profile does not match the laboratory standard pattern.

[a] Total petroleum hydrocarbon cleanup levels are based on MTCA Method A values.
[b] cPAH cleanup levels under MTCA are based on the calculated total toxicity of the mixture using the Toxicity Equivalency Methodology in WAC 173-340-780 (8). The mixture of cPAHs shall be considered a single hazardous substance and compared to the applicable MTCA Method C cleanup levels for benzo(a)pyrene. TTEC was calculated using only results reported as detected.

CLARC - Cleaning Levels and Risk Calculation
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DUP - field duplicate
ft bgs - feet below ground surface
J - result is an estimated value
MFA - Maintenance Facility Area
µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
MTCA - Model Toxics Control Act
NE - not established
QC - quality control
RI/FS - remedial investigation/feasibility study
TTEC - total toxicity equilivancy concentration
U - compound was analyzed for but not detected above the reporting limit shown
UJ - the associated quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample
WAC - Washington Administrative Code

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-01	0	N	N	N	
	1.5	N	N	N	
	3	N	N	**Y**	
	4.5	N	N	**Y**	
	6	**Y**	N	N	Sheen
	7.5	N	N	N	
PB-02	1.5	N	N	N	
	3	N	N	N	
	4.5	N	N	N	
	6	**Y**	N	N	Sheen
	7.5	N	N	**Y**	
PB-03	1.5	N	N	N	
	3	N	N	N	
	4.5	N	N	N	
	6	N	N	**Y**	
	7.5	N	N	**Y**	
PB-04	1.5	N	N	N	
	4.5	N	N	**Y**	
	6	**Y**	N	**Y**	Sheen
	7.5	N	N	N	
PB-05	3	N	N	**Y**	
	4.5	N	N	**Y**	
PB-06	1.5	N	N	**Y**	
	3	N	N	**Y**	
	4.5	N	N	N	
	6	N	N	N	
PB-07	1.5	N	N	N	
	3	N	N	**Y**	
	4.5	N	N	**Y**	
PB-08	1.5	N	N	N	
	3	N	N	**Y**	
	4.5	N	N	**Y**	
PB-09	1.5	N	N	N	
	3	N	N	**Y**	
	4.5	N	N	**Y**	
PB-10	1.5	N	N	N	
	3	N	N	**Y**	
	4.5	N	N	**Y**	
PB-11	4.5	N	N	N	
	6	**Y**	N	**Y**	Sheen on cuttings
	7.5	**Y**	N	**Y**	Sheen
	10.5	**Y**	N	**Y**	Sheen
PB-12	4.5	N	N	N	
	6	**Y**	N	N	Slight odor, sheen during drilling
	7.5	N	N	N	
	9	N	N	**Y**	

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-13	4.5	N	N	N	
	6	N	N	N	No sheen, slight odor
	7.5	N	N	**Y**	
PB-14	4.5	N	N	N	
	6	N	N	N	
	7.5	N	N	N	
	9	N	N	N	
PB-15	3	N	N	**Y**	Faint odor
	5	N	N	**Y**	
	7	N	N	**Y**	
PB-16	3	N	N	N	Odor
	5	N	N	N	
	7	N	N	N	Faint odor
PB-17	3	N	N	**Y**	Faint to no odor
	5	N	N	**Y**	No odor
	7	N	N	**Y**	No odor
	9	N	N	N	No odor
	11	N	N	N	No odor
PB-18	3	N	N	**Y**	Odor
	5	**Y**	**Y**	**Y**	Zone of free product (about 2" thick)
	7	N	N	N	
PB-19	3	N	N	N	Odor
	5	N	N	N	Faint odor
	7	N	N	N	Faint odor
PB-20	3.5	N	N	**Y**	
	5.5	**Y**	**Y**	**Y**	2" lense of product from 5' to 5.5' bgs
	7.5	N	N	**Y**	Faint odor
PB-21	3.5	N	N	**Y**	No odor
	5.5	N	N	**Y**	No odor
	7.5	N	N	**Y**	No odor
	9.5	N	N	N	No odor
PB-22	3.5	N	N	N	
	5.5	**Y**	**Y**	N	2" thick product at 5' bgs/sheen at 5.5' bgs
PB-23	3.5	N	N	N	No odor
	5.5	N	N	**Y**	No odor
	7.5	N	N	**Y**	No odor
	9.5	N	N	N	No odor
PB-24	3.5	N	N	**Y**	
	5.5	**Y**	**Y**	**Y**	2" thick product at 5' bgs
PB-25	3.5	N	N	N	Slight odor
	5.5	**Y**	**Y**	**N**	5" of product from 6'7" to 7'
PB-26	3.5	N	N	**Y**	
	5.5	**Y**	N	**Y**	Slight sheen
PB-27	3.5	N	N	**Y**	Faint odor
	5.5	N	N	**Y**	No odor
PB-28	3.5	N	N	**Y**	Product in tip of spoon
	5.5	**Y**	**Y**	**Y**	Based on note above

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-29	3.5	N	N	N	No odor
	5.5	N	N	**Y**	No odor
PB-30	3.5	N	N	N	Faint odor
	6.5	**Y**	N	N	Slight sheen and odor
PB-31	3.5	**Y**	N	**Y**	Slight odor and sheen present
	7.5	N	N	N	No sheen
	8	**Y**	N	N	Sheen present; sheen and odor
PB-32	3.5	N	N	N	No odor
	5.5	N	N	N	No odor
PB-33	3.5	N	N	**Y**	No odor
	5.5	N	N	**Y**	Faint odor
	7.5	N	N	N	
PB-34	5	N	N	**Y**	No odor
	7	N	N	**Y**	Slight odor
	9	N	N	**Y**	Slight odor
	11	N	N	**Y**	No odor
PB-35	5	N	N	N	No odor
	7	N	N	**Y**	
	9	N	N	**Y**	
	11	N	N	**Y**	No odor
	13	N	N	N	
PB-36	3.5	N	N	N	Slight odor
	5.5	N	N	**Y**	
	7.5	N	N	**Y**	Slight odor
PB-37	3.5	N	N	N	Faint odor
	5.5	N	N	**Y**	No odor
PB-38	3.5	N	N	N	
	5.5	N	N	N	
PB-39	3.5	N	N	**Y**	Faint odor
	5.5	N	N	**Y**	No odor
PB-40	3.5	N	N	N	Faint septic odor
	5.5	N	N	**Y**	Faint odor
	7.5	N	N	**Y**	
PB-41	3.5	N	N	N	Faint odor
	5.5	N	N	**Y**	
PB-42	3.5	N	N	**Y**	No odor
	5.5	N	N	**Y**	No odor
	7.5	N	N	N	No odor
PB-43	3.5	N	N	**Y**	No odor
	5.5	N	N	**Y**	No odor
	7.5	N	N	N	Faint odor
	9.5	N	N	N	
PB-44	3	N	N	N	
	5	N	N	**Y**	
	6	N	N	**Y**	
	7	N	N	N	No odor

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-45	3	N	N	N	
	5	N	N	**Y**	Slight odor
	7	N	N	**Y**	Slight odor
	9	N	N	N	Slight odor
	11	N	N	N	No odor
PB-46	3	N	N	N	Slight odor
	5	**Y**	N	**Y**	Staining, odor
PB-47	3	N	N	N	Slight odor
	5	N	N	**Y**	
	7	N	N	**Y**	Slight odor
	9	N	N	N	
PB-48	3	N	N	N	
	5	N	N	N	
	7	N	N	**Y**	
PB-49	3	N	N	N	
	5	N	N	N	
	7	N	N	**Y**	
	9	N	N	**Y**	
	11	N	N	N	No odor
PB-50	3	N	N	**Y**	
	5	N	N	**Y**	No odor
	7	N	N	N	No odor
PB-51	3	N	N	**Y**	
	5	N	N	**Y**	
	7	N	N	N	
	9	N	N	N	
PB-52	5	N	N	N	
	7	N	N	**Y**	
	9	N	N	**Y**	
	11	N	N	N	No odor
	13	N	N	N	
PB-53	5	N	N	N	
	7	N	N	**Y**	
	9	N	N	**Y**	
	11	N	N	N	
	13	N	N	N	
PB-54	5	N	N	N	
	7	N	N	N	No odor
PB-55	5	N	N	**Y**	
	7	N	N	**Y**	
	9	N	N	N	
	11	N	N	N	
	13	N	N	N	
	15	N	N	N	

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-56	3	N	N	N	
	5	N	N	N	
	7	N	N	**Y**	
	9	N	N	**Y**	
	11	N	N	N	
PB-57	5	N	N	N	No odor
	7	N	N	**Y**	
PB-58	3	N	N	N	
	5	N	N	**Y (5.5)**	No odor
	7	N	N	**Y**	
	9	N	N	N	
	11	N	N	N	No odor
PB-59	3	N	N	N	No odor
	4	N	N	N	No odor, no sheen
	5	N	N	N	Slight odor (creosote), no sheen
	7	N	N	N	Strong odor
	7.5	**Y**	**Y**	N	Strong odor, heavy staining/free product
	8	**Y**	**Y**	**Y**	Strong odor, heavy staining/free product
	10	**Y**	**Y**	**Y**	Strong odor, heavy staining/free product
PB-60	3	N	N	N	No odor
	5	N	N	N	No odor
	6	N	N	N	Some odor, no sheen
	7	N	N	N	No odor
	8	N	N	**Y**	Slight odor, no sheen
	10	N	N	N	Slight hydrocarbon odor, no stain or sheen
	11	N	N	**Y**	Slight hydrocarbon odor, no stain or sheen
PB-61	4	N	N	N	No odor, no sheen
	5	N	N	N	Slight odor
	6	**Y**	N	**Y (6.5)**	Hydrocarbon odor, slight sheen
	7	**Y**	N	N	Strong hydrocarbon odor, visible (diesel?) stain and sheen
	8	**Y**	N	**Y**	Odor and sheen
	10	**Y**	N	N	Odor and slight sheen
PB-62	3	N	N	N	No odor, no sheen
	4	N	N	N	No odor, no sheen
	5	N	N	N	Slight hydrocarbon odor
	6	N	N	**Y (6.5)**	Slight hydrocarbon odor
	7	N	N	N	Slight hydrocarbon odor, no sheen
	8	N	N	N	No odor, no sheen
PB-63	3	N	N	N	No odor
	5	N	N	N	No odor
	6	N	N	**Y (6.5)**	Slightly sour organic odor, no sheen
	7	N	N	N	Hydrocarbon odor, no sheen, Hanby kit indicates possible diesel 6.5' bgs
	8	N	N	**Y**	Slight hydrocarbon odor, no sheen

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-64	5	N	N	N	No odor, no sheen
	7	N	N	N	No odor
	8	N	N	N	No odor, no sheen
	11	N	N	**Y**	No odor, no sheen
PB-65	4	N	N	N	No hydrocarbon odor
	6	N	N	N	No sheen
	9	N	N	N	No odor, no sheen, no stain
	11	N	N	**Y**	No sheen
PB-66	5	N	N	N	No odor, no sheen
	6	N	N	N	No odor, no sheen
	7	N	N	**Y**	No odor, no sheen
PB-67	7	**Y**	N	**Y**	Hydrocarbon odor, slight sheen
	9	**Y**	N	**Y**	Hydrocarbon odor, slight sheen, Hanby indicates hydrocarbon contamination
PB-68	3	N	N	N	No odor
	5	N	N	N	No odor, no sheen
	7	N	N	N	Slight hydrocarbon odor
	8-9	**Y**	N	**Y (8.5)**	Hydrocarbon odor and slight sheen
PB-69	3	N	N	**Y**	No odor
	4	N	N	N	No odor, no sheen
	6	N	N	N	No odor, no sheen
PB-70	4	N	N	N	No odor, no sheen
	6	N	N	**Y**	Slight odor
	7	N	N	N	Slight odor
	8	N	N	N	No odor, no sheen
PB-71	3	N	N	N	No odor, no sheen
	5	N	N	N	No odor
	6.5	N	N	**Y**	Very slight odor
	7	N	N	N	No odor
	8	N	N	N	No odor, no sheen
PB-72	3	N	N	N	No odor, no sheen
	5	N	N	N	No odor, no sheen
	9	N	N	N	No odor, no sheen
PB-73	3	N	N	N	Slight hydrocarbon odor, no sheen
	5	N	N	**Y**	Slight odor
	8	N	N	N	Slight odor, no sheen
PB-74	3.5	N	N	N	No odor, no sheen
	5	N	N	N	No odor, no sheen
	6	N	N	**Y**	Refusal @ 6' bgs, likely due to woody debris
PB-75	3.5	N	N	N	No odor, no sheen
	5	N	N	N	No odor, no sheen
	6	N	N	**Y**	No odor, no sheen Refusal @ 6' bgs, likely due to woody debris
PB-76	5	N	N	N	No odor, no sheen
	8	N	N	**Y**	Moderate creosote odor, no sheen
	9	N	N	N	Moderate creosote odor, no sheen
	10.5	N	N	**Y**	
	11	N	N	N	Slight creosote odor, no sheen

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-77	3.5	N	N	N	No odor, no sheen
	5	N	N	N	No odor, no sheen
	6	N	N	N	No odor, no sheen
	8	N	N	**Y**	Slight odor, no sheen
	9	N	N	N	Slight creosote odor, no sheen
	10	N	N	**Y (10.5)**	No odor, no sheen
PB-78	2.5	N	N	N	No odor, no sheen
	4	N	N	N	No odor, no sheen
	5	N	N	N	
	6.5	N	N	N	Moderate odor
	7.5	**Y**	**Y**	N	Strong cresosote odor, heavy sheen, some staining
	8	N	N	**Y**	
	9.5	**Y**	N	N	Strong odor, slight sheen, no staining
	11	N	N	**Y**	Moderate odor, no sheen, no staining
PB-79	3.5	N	N	N	No odor, no sheen
	5	N	N	N	Slight creosote odor, no sheen
	8.5	**Y**	**Y**	**Y (8)**	Staining, NAPL @ 8.5 to 9' bgs
	9.5	**Y**	**Y**	N	Strong creosote odor, moderate sheen, slight staining
	10	N	N	**Y (10.5)**	Moderate odor, no sheen
PB-80	3.5	N	N	N	No odor, no sheen
	5	N	N	N	Moderate creosote odor, no sheen
	6	N	N	N	
	7	**Y**	**Y**	**Y(8.0)**	NAPL from 7 to 9' bgs
	9	**Y**	N	N	Strong creosote odor, slight sheen
	10	N	N	**Y (10.5)**	Strong odor
PB-81	3	N	N	N	No odor, no sheen
	4	N	N	N	No odor, no sheen
	6	N	N	N	No odor, no sheen
	7	N	N	N	
	8	N	N	**Y**	Slight odor, no sheen
	9	N	N	N	Slight odor, no sheen
	10.5	N	N	**Y (10.5)**	Slight odor, no sheen
PB-82	2.5	N	N	N	No odor, no sheen
	4	N	N	N	No odor, no sheen
	5.5	N	N	N	
	6	N	N	N	No odor, no sheen
	7.5	N	N	N	
	8.5	N	N	**Y (8)**	Moderate odor, no sheen
	9.5	N	N	N	Moderate odor, no sheen
	10.5	N	N	**Y**	
	11	N	N	N	Slight odor, no sheen
PB-83	2	N	N	N	No odor, no sheen
	3.5	N	N	N	No odor, no sheen
	5	N	N	N	No odor, no sheen

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
PB-83	6	N	N	N	
	8	N	N	**Y**	Strong creosote odor, no sheen
	9	**Y**	**Y**	N	NAPL at 9' bgs
	9.5	**Y**	**Y**	N	Strong odor, heavy sheen, heavy staining
	10.5	**Y**	**Y**	**Y**	Strong odor, heavy sheen, moderate staining
PB-84	4	N	N	N	No odor, no sheen
	6	N	N	N	No odor, no sheen
	7	N	N	N	
	8	N	N	**Y**	Slight creosote odor, no sheen
	10	N	N	**Y (10.5)**	Slight odor
PB-85	3.5	N	N	N	No odor, no sheen
	4.5	N	N	N	
	5.5	N	N	N	No odor, no sheen
	6	N	N	N	
	7.5	N	N	N	
	8.5	N	N	**Y (9)**	No odor, no sheen
	10	N	N	**Y (10.5)**	
	11	N	N	N	No odor, no sheen
PB-86	2	N	N	N	No odor, no sheen
	3	N	N	N	
	4	N	N	N	No odor, no sheen
	6	N	N	**Y**	No odor, no sheen Refusal @ 6', likely due to woody debris
PB-87	2	N	N	N	No odor, no sheen
	4	N	N	N	No odor, no sheen
	5.5	N	N	N	No odor, no sheen
	7	**Y**	N	**Y**	Moderate odor, moderate sheen
	8	**Y**	**Y**	N	NAPL from 8 to 9' bgs
	9.5	N	N	N	Moderate odor, no sheen
	10.5	N	N	**Y**	Moderate odor, no sheen
TMW-01	3	N	N	N	No odor
	5	N	N	N	No odor
	7	N	N	**Y**	Slight hydrocarbon odor
	8	N	N	**Y**	Slight odor
	10	N	N	**Y**	No odor, no sheen
	13	N	N	**Y (13.5)**	No odor, no sheen
	15	N	N	N	No odor
	18	N	N	N	No odor, no stain
	25	N	N	N	No odor
	28	N	N	N	No odor, no sheen

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
TMW-02	5	N	N	N	No odor
	7	N	N	N	No odor
	12	N	N	N	Slight odor, no stain
	15	N	N	N	No odor, no stain
	16	N	N	N	No odor, no sheen
	18	N	N	N	No odor
	20	N	N	N	No odor
	22	N	N	N	No odor
	25	N	N	N	No odor
TMW-03	5	N	N	N	No odor
	8	N	N	N	No odor
	10	N	N	N	No odor
	19	N	N	N	No odor
	23	N	N	N	No odor
	27	N	N	N	No odor, no sheen
TMW-04	2	N	N	N	No odor, no sheen
	5	N	N	N	No odor, no sheen
	8	N	N	**Y (7.5)**	No odor, no sheen
	10	N	N	N	No odor, no stain
	12	N	N	N	No odor, no sheen
	13	N	N	N	No odor
	16	N	N	N	No odor
	22	N	N	N	No odor
TMW-05	3	N	N	N	No odor
	5	N	N	N	No odor, no sheen
TMW-05	7	N	N	N	No odor, no sheen
	9	N	N	N	No odor, no sheen
	12	N	N	N	No odor
	14	N	N	N	No odor, no sheen
	16	N	N	N	No odor, no sheen
	18	N	N	N	No odor, no sheen
	19	N	N	N	No odor
	20	N	N	N	No odor, no sheen
TMW-06	4	N	N	N	No odor, no sheen
	7	N	N	**Y**	No odor
	10	N	N	N	No odor, no sheen
	14	N	N	N	No odor
	16	N	N	N	No odor
	20	N	N	N	No odor, no stain
TMW-07	6	N	N	N	No odor, no sheen
	8	N	N	N	No odor
	11	N	N	N	No odor
	13	N	N	N	No odor
	18	N	N	N	No odor, no sheen
	20	N	N	N	No odor, no sheen
	22	N	N	N	No odor, no sheen
	23	N	N	N	No odor, no sheen
	25	N	N	N	No odor, no sheen

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
TMW-08	5	N	N	N	No odor, no sheen
	7	N	N	N	No odor, no sheen
	10	N	N	N	No odor, no sheen
	13	N	N	N	No odor, no sheen
	14	N	N	N	No odor
	17	N	N	N	No odor, no sheen
	19	N	N	N	No odor, no sheen
	20	N	N	N	No odor, no sheen
	25	N	N	N	No odor
TMW-09	5	N	N	N	No odor, no sheen
	7	N	N	N	No odor
	8	N	N	N	No odor, no sheen
	10	N	N	N	No odor, no sheen
	12	N	N	N	No odor, no sheen
	14	N	N	N	No odor, no sheen
	17	N	N	N	No odor
	19	N	N	N	No odor
	23	N	N	N	No odor, no sheen
TMW-10	5	N	N	N	No odor, no sheen
	7	N	N	N	No odor, no sheen
	9	N	N	N	Slight hydrocarbon odor, no sheen
	11	N	N	N	No odor
	13	N	N	N	Slight odor, no sheen
	14.5	N	N	N	Slight hydrocarbon odor, no sheen
	16	N	N	N	No odor, no sheen
	18	N	N	N	No odor, no sheen
	19	N	N	N	No odor, no sheen
	22	N	N	N	No odor, no sheen
TMW-11	3	N	N	N	No odor (slight organic odor)
	5	N	N	N	No odor
	7	N	N	**Y (7.5)**	No odor, no sheen
	9	N	N	N	No odor
	10	N	N	N	No odor, no sheen
	12	N	N	N	No odor, no sheen
	14	N	N	N	No odor, no sheen
	17	N	N	N	No odor
	18	N	N	N	No odor, no sheen
	20	N	N	N	No odor, no sheen
	22	N	N	N	No odor, no sheen
TMW-12	3	N	N	N	No odor, no sheen
	7	N	N	**Y (6.5)**	No odor
	10	N	N	N	No odor, no sheen
	14	N	N	N	No odor, no sheen
	18	N	N	N	No odor, no sheen

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
AV-9	5	N	N	N	
	8.5	N	N	N	No odor
	10	N	N	N	
	11.5	N	N	N	No odor
	13	N	N	N	No odor
	17.5	N	N	N	No odor
AV-10	4	**Y**	N	N	Sheen on sample spoon
	6	N	N	N	Slight odor
	7.5	**Y**	N	N	Sheen on spoon
	9	N	N	N	
	10.5	N	N	N	No odor
	13.5	N	N	N	No odor
AV-11	4.5	N	N	N	
	6	N	N	N	
	7.5	N	N	N	
	9	N	N	N	
	10.5	N	N	N	
	14	N	N	N	
AV-12	4.5	N	N	N	No odor
	6	N	N	N	Peat odor
	7.5	N	N	N	No odor
	9	N	N	N	No odor
	10.5	N	N	N	
	12	N	N	N	
	13.5	N	N	N	
AV-13	2.5	N	N	N	Peaty odor
	5	N	N	N	
	7.5	N	N	N	Organic odor
	10	N	N	N	No odor
	11.5	N	N	N	
	13.5	N	N	N	Peat odor
BV-12	5	N	N	N	
	6.5	**Y**	**Y**	N	Product at 7 feet
BV-13	5	**Y**	**Y**	N	Product at 5 feet
	6.5	**Y**	**Y**	N	Product at 7 feet
BV-14	5	**Y**	N	N	Diesel odor, sheen at 6 feet
	6.5	**Y**	N	N	Sheen (no sheen at 7.5 feet)
BV-15	5	**Y**	N	N	Product sheen
	6.5	N	N	N	Slight odor
	8	N	N	N	Slight odor
97-6A	NA	NA	NA	N	No samples collected

Table 3-7
Summary of Sheen and DNAPL Occurence Noted During Drilling
RI/FS Port of Longview MFA – International Paper

Boring ID	Sample Depth (feet bgs)	Sheen	DNAPL	Lab Analysis	Comments
97-6B	5	N	N	N	Slight petroleum odor
	6	**Y**	N	N	Slight sheen, slight petroleum odor
	8	N	N	**Y (7.5)**	Slight petroleum odor
	10	N	N	**Y**	
	11	**Y**	N	**Y**	Slight sheen, slight petroleum odor
	13	**Y**	N	N	Slight petroleum odor, slight sheen on water
	14	N	N	N	Strong petroleum odor
	20	N	N	N	
	30	**Y**	N	N	Slight petroleum odor, slight sheen
	36	**Y**	N	N	Slight petroleum odor, slight sheen
	37	**Y**	N	N	Slight petroleum odor, slight sheen
	39	N	N	N	No odor
	40	N	N	N	No odor
TP-02	2.0 - 6.5	N	N	Y	Strong creosote odor at 5 feet
	6.5	**Y**	**Y**	Y	Product at 6 feet, staining, strong creosote odor

Notes:

Blank indicates parameter was not measured

🟧 staining/sheen present

🟨 (NAPL) product present

bgs - below ground surface
DNAPL - dense non-aqueous phase liquid
ID - identification
MFA - Maintenance Facility Area
mg/kg - milligrams per kilogram
NAPL - non-aqueous phase liquid
PPM - parts per million
RI/FS - remedial investigation/feasibility study
N - not observed
Y - yes (was observed)

Table 3-8
Summary of DNAPL Measurements and Recovery
RI/FS Port of Longview MFA – International Paper

Well Identification	DNAPL Thickness (feet)			Cumulative Volume of DNAPL Recovered (gallons)		
	BV-13	AV-10	04-6A*	BV-13	AV-10	04-6A*
Date						
06/19/02	NM	NM	NM	NM	NM	NM
09/11/02	NM	NM	NM	NM	NM	NM
12/02/02	0.7	NM	NM	1.0	NM	NM
03/04/03	<0.5	NM	NM	1.0	NM	NM
06/12/03	1.0	NM	NM	2.0	NM	NM
7/10/2003	0.8	NM	NM	2.5	NM	NM
8/27/2003	NM	NM	NM	2.5	NM	NM
9/10/2003	NM	NM	NM	2.5	NM	NM
10/14/2003	0.8	NM	NM	3.5	NM	NM
11/12/2003	0.8	NM	NM	4.5	NM	NM
12/11/2003	0.5	NM	1.2	5.3	NM	1.5
1/15/2004	0.0	NM	NA	5.3	NM	1.5
2/10/2004	0.8	NM	NA	6.3	NM	1.5
3/11/2004	Trace	NM	0.8	6.3	NM	2.3
4/26/2004	0.8	0.5	0.8	6.8	0.4	2.8
5/11/2004	0.5	0.5	0.0	6.8	0.8	2.8
6/1/2004	0.0	0.5	0.0	6.8	1.2	2.8
7/14/2004	0.0	0.4	0.0	6.8	1.5	2.8
8/10/2004	0.0	0.4	0.0	6.8	1.7	2.8
9/8/2004	NM	0.0	0.0	6.8	1.7	2.8
10/12/2004	NM	0.0	0.0	6.8	1.7	2.8
11/19/2004	Trace	0.0	0.0	6.9	1.7	2.8
12/13/2004	0.5	NM	0.0	9.9	2.2	2.8
1/20/2005	0.5	NM	0.0	10.9	2.2	2.8
2/18/2005	0.5	0.0	0.0	11.9	2.2	2.8
3/15/2005	0.5	NM	0.0	11.9	2.2	2.8
4/6/2005	0.4	0.0	0.0	12.5	2.2	2.8
5/11/2005	0.7	ND	0.0	13.0	2.2	2.8
6/21/2005	0.6	0.0	0.0	14.0	2.2	2.8
7/13/2005	0.6	0.0	0.0	15.0	2.2	2.8
8/12/2005	0.5	0.0	0.0	16.0	2.2	2.8
9/20/2005	0.5	0.0	NM	17.0	2.2	2.8
10/20/2005	0.4	0.0	0.0	18.0	2.2	2.8
11/16/2005	NA	NA	NA	18.0	2.2	2.8
12/7/2005	0.7	0.0	0.0	18.5	2.2	2.8
1/4/2006	0.1	0.0	0.0	18.6	2.2	2.8
2/6/2006	0.5	0.0	0.0	18.9	2.2	2.8
3/13/2006	Trace	0.0	0.0	19.0	2.2	2.8
4/5/2006	0.1	0.0	0.0	19.3	2.2	2.8
5/16/2006	Trace	0.0	0.0	19.4	2.2	2.8
6/13/2006	Trace	0.0	0.0	19.5	2.2	2.8
7/17/2006	0.1	0.0	0.0	19.6	2.2	2.8
8/2/2006	Trace	0.0	0.0	19.7	2.2	2.8

Table 3-8
Summary of DNAPL Measurements and Recovery
RI/FS Port of Longview MFA – International Paper

Well Identification	DNAPL Thickness (feet)			Cumulative Volume of DNAPL Recovered (gallons)		
	BV-13	AV-10	04-6A*	BV-13	AV-10	04-6A*
9/26/2006	0.5	0.0	0.0	19.7	2.2	2.8
10/27/2006	0.5	0.0	0.0	20.2	2.2	2.8
11/28/2006	0.5	NM	NM	20.7	2.2	2.8
12/28/2006	0.4	NM	NM	21.2	2.2	2.8
1/31/2007	0.5	NM	NM	21.7	2.2	2.8
2/28/2007	0.2	NM	NM	21.9	2.2	2.8
3/7/2007	NM	NM	NM	21.9	2.2	2.8
4/17/2007	0.1	NM	NM	22.2	2.2	2.8
5/25/2007	0.1	NM	NM	22.4	2.2	2.8
6/8/2007	0.1	NM	NM	22.7	2.2	2.8
7/24/2007	0.1	NM	NM	23.0	2.2	2.8
8/23/2007	0.1	NM	NM	23.1	2.2	2.8
9/20/2007	0.75	NM	NM	23.6	2.2	2.8
10/18/2007	0.3	0.0	0.0	23.7	2.2	2.8
11/29/2007	Trace	NM	NM	23.8	2.2	2.8
12/19/2007	NM	NM	NM	23.8	2.2	2.8
1/31/2008	Trace	NM	NM	23.8	2.2	2.8
2/29/2008	Trace	0	NM	23.8	2.2	2.8
3/26/2008	Trace	0	NM	24.0	2.2	2.8
4/17/2008	Trace	NM	NM	24.2	2.2	2.8
5/20/2008	Trace	NM	NM	24.2	2.2	2.8
6/30/2008	Trace	NM	NM	24.3	2.2	2.8
7/15/2008	0.25	NM	NM	24.3	2.2	2.8
8/26/2008	0.5	NM	NM	24.5	2.2	2.8
9/25/2008	0.5	0	0	25.0	2.2	2.8
10/15/2008	0.4	NM	NM	25.4	2.2	2.8
11/7/2008	0.25	NM	NM	25.7	2.2	2.8
12/16/2008	0.1	NM	NM	25.9	2.2	2.8
1/21/2009	0.5	NM	NM	26.0	2.2	2.8
3/18/2009	0.25	0	NM	26.1	2.2	2.8
4/29/2009	NM	NM	NM	26.1	2.2	2.8
5/27/2009	Trace	NM	NM	26.1	2.2	2.8
6/12/2009	0	0	0	26.1	2.2	2.8
8/31/2009	0.1	0	NM	26.2	2.2	2.8
9/23/2009	0.1	0	Sheen	26.4	2.2	2.8
10/20/2009	0.1	NM	NM	26.6	2.2	2.8
11/20/2009	0.1	NM	NM	26.6	2.2	2.8
12/5/2009	0.05	NM	NM	26.6	2.2	2.8
1/20/2010	0.25	NM	NM	26.7	2.2	2.8
2/26/2010	0.1	NM	NM	26.8	2.2	2.8
3/16/2010	Trace	NM	NM	26.8	2.2	2.8
4/29/2010	Trace	NM	NM	26.8	2.2	2.8
5/28/2010	0.1	NM	NM	26.9	2.2	2.8
7/29/2010	0.1	NM	NM	27.0	2.2	2.8

Table 3-8
Summary of DNAPL Measurements and Recovery
RI/FS Port of Longview MFA – International Paper

Well Identification	DNAPL Thickness (feet)			Cumulative Volume of DNAPL Recovered (gallons)		
	BV-13	**AV-10**	**04-6A***	**BV-13**	**AV-10**	**04-6A***
8/31/2010	Trace	NM	NM	27.0	2.2	2.8
9/9/2010	0.1	NM	NM	27.3	2.2	2.8
10/12/2010	0.1	NM	NM	27.4	2.2	2.8
11/29/2010	0.02	NM	NM	27.4	2.2	2.8
12/22/2010	0.1	NM	NM	27.4	2.2	2.8
1/21/2011	0.01	NM	NM	27.5	2.2	2.8
2/23/2011	Sheen	NM	NM	27.5	2.2	2.8
3/9/2011	0.01	NM	NM	27.6	2.2	2.8
4/14/2011	Trace	NM	NM	27.6	2.2	2.8
5/16/2011	0.001	NM	NM	27.6	2.2	2.8
6/7/2011	0.01	NM	NM	27.6	2.2	2.8
7/19/2011	0.01	NM	NM	27.6	2.2	2.8
8/23/2011	0.04	NM	NM	27.6	2.2	2.8
9/20/2011	0.01	NM	NM	27.6	2.2	2.8
10/28/2011	0.4	NM	NM	27.8	2.2	2.8
12/2/2011	0.02	NM	NM	27.9	2.2	2.8
2/1/2012	0.05	NM	NM	27.9	2.2	2.8
2/16/2012	Trace	NM	NM	27.9	2.2	2.8
3/14/2012	Trace	NM	NM	27.9	2.2	2.8
4/26/2012	Trace	NM	NM	27.9	2.2	2.8
5/15/2012	Trace	NM	NM	27.9	2.2	2.8
6/27/2012	0.2	NM	NM	28.1	2.2	2.8
7/20/2012	Sheen	NM	NM	28.1	2.2	2.8
8/10/2012	0	NM	NM	28.1	2.2	2.8
9/19/2012	0	NM	NM	28.1	2.2	2.8
11/13/2012	Trace	NM	NM	28.1	2.2	2.8
12/27/2012	0	NM	NM	28.1	2.2	2.8
1/30/2013	Trace	NM	NM	28.1	2.2	2.8
2/25/2013	Trace	NM	NM	28.1	2.2	2.8
3/14/2013	0.02	NM	NM	28.1	2.2	2.8
4/25/2013	0.15	NM	NM	28.1	2.2	2.8
5/31/2013	Trace	NM	NM	28.1	2.2	2.8
6/18/2013	Trace	NM	NM	28.1	2.2	2.8
8/26/2013	Trace	NM	NM	28.1	2.2	2.8
9/17/2013	0.00	NM	NM	28.1	2.2	2.8
10/15/2013	Trace	NM	NM	28.1	2.2	2.8
11/27/2013	Trace	NM	NM	28.1	2.2	2.8
12/27/2013	Trace	NM	NM	28.1	2.2	2.8
1/23/2014	0.29	NM	NM	28.4	2.2	2.8
2/5/2014	0.19	NM	NM	28.4	2.2	2.8
3/7/2014	0.08	NM	NM	28.5	2.2	2.8
4/24/2014	0.05	NM	NM	28.5	2.2	2.8
5/22/2014	0.06	NM	NM	28.5	2.2	2.8
6/20/2014	0.04	NM	NM	28.5	2.2	2.8

Table 3-8
Summary of DNAPL Measurements and Recovery
RI/FS Port of Longview MFA – International Paper

Well Identification	**DNAPL Thickness (feet)**			**Cumulative Volume of DNAPL Recovered (gallons)**		
	BV-13	**AV-10**	**04-6A***	**BV-13**	**AV-10**	**04-6A***
7/9/2014	0.05	NM	NM	28.6	2.2	2.8
8/13/2014	0.11	NM	NM	28.6	2.2	2.8
9/30/2014	0.01	NM	NM	28.6	2.2	2.8
10/15/2014	0.34	NM	NM	28.8	2.2	2.8
11/4/2014	0.04	NM	NM	28.9	2.2	2.8
12/3/2014	0.04	NM	NM	28.9	2.2	2.8

Notes:
*Replacement well for 97-6A

DNAPL - dense non-aqueous phase liqiuid
MFA - Maintenance Facility Area
NA - not available
NM - not measured
RI/FS - remedial investigation/feasibility study

Table 3-9
Summary of Soil Constituents within DNAPL Occurrence Area
RI/FS Port of Longview MFA - International Paper

Sample ID	Date Collected	Sample Depth (ft bgs)	Diesel Range Organics[a]	Residual Range Organics[a]	Pentachlorophenol	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene
			TPH (mg/kg)		PAHs (µg/kg)							
MTCA Method C Soil Cleanup Levels, Direct Contact			2,000	2,000	330,000	70,000,000	NE	210,000,000	140,000,000	NE	1,100,000,000	140,000,000
MTCA Method C Soil Cleanup Levels, Protection of Groundwater			2,000	2,000	35	9,700	NE	210,000	220,000	NE	5,000,000	1,400,000
PB-01	7/14/1998	3-4.5	**3,300**	50 U	10,000 U	**532,000**	3,250	**225,000**	177,000	465,000	132,000	234,000
PB-02	7/15/1998	7.5-9	**3,300**	50 U	10,000 U	**137,000**	1,000 U	47,500	37,000	94,100	17,500	52,300
PB-04	7/15/1998	4.5-6	1,800	50 U	10,000 U	**245,000**	1,000 U	44,400	39,800	133,000	33,200	40,700
PB-11	7/17/1998	6-7.5	**13,000**	50 U	1,000,000 U	**4,060,000**	100,000 U	**691,000**	**537,000**	1,360,000	161,000	474,000
PB-12	7/17/1998	7.5 - 9	100	50 U	10,000 U	8,130	NA	1,000 U	1,000 U	NA	NA	1,000 U
PB-12	7/17/1998	9 - 10.5	25 U	50 U	1,000 U	6,700	NA	100 U	100 U	NA	NA	100 U
PB-15	7/19/1998	3-5	**9,600**	500 U	200,000 U	**4,580,000**	200,000 U	**260,000**	200,000 U	351,000	200,000 U	200,000 U
PB-18	7/19/1999	3-5	**5,000**	500 U	100,000 U	**845,000**	NA	143,000	113,000	NA	NA	128,000
PB-20	7/20/1999	3.5 - 5.5	75	50 U	1,000 U	969	NA	2,500	2,150	NA	NA	427
PB-20	7/20/1999	5.5 - 7.5	**5,000**	500 U	100,000 U	**845,000**	NA	143,000	113,000	NA	NA	128,000
PB-24	7/20/1999	3.5 - 5.5	38	50 U	10,000 U	**10,700**	NA	1,000 U	1,000 U	NA	NA	1,000 U
PB-26	7/20/1999	3.5 - 5.5	25 U	50 U	1,000 U	100 U	NA	563	218	NA	NA	100 U
PB-28	7/21/1998	5.5-7.5	**26,000**	2,500 U	200,000 U	**3,080,000**	200,000 U	**576,000**	**323,000**	801,000	200,000 U	308,000
PB-31	7/21/1999	3.5 - 5.5	**26,000**	2,500 U	200,000 U	**3,080,000**	NA	**576,000**	**323,000**	NA	NA	308,000
PB-46	2/23/2000	5 - 7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PB-59	9/11/2008	8	**14,000 J**	**2,000 J**	10,000 U	**1,700,000**	4,800 U	**390,000**	**330,000**	860,000	96,000	340,000
PB-61	9/11/2008	8	**5,100 ***	370 *	**290 J**	**190,000**	1,800	200,000	110,000	190,000	12,000	69,000
PB-67	9/8/2008	7	**2,700 ***	310 *	NA	**94,000**	2,300	160,000	79,000	120,000	14,000	60,000
PB-68	9/15/2008	6	1,700 *	240 *	NA	130	750	38,000	19,000	27,000	3,500	19,000
PB-78	12/7/2011	8	**4,200 ***	1,100 *	NA	740	590	36,000	48,000	150,000	25,000	76,000
PB-79	12/7/2011	10.5	260 *	150 *	NA	**22,000**	20	3,800	1,600	4,200	720	2,400
PB-80	12/8/2011	10.5	160 *	160 U	NA	**23,000**	10 U	1,100	160	340	51	140
PB-83	12/7/2011	8	**5,900 ***	1,500 *	NA	750	450 U	54,000	58,000	200,000	36,000	91,000
PB-87	12/9/2011	11	99 *	150 U	NA	8,600	10 U	760	570	1,200	170	540
97-6.B	7/23/1998	10.5 - 12	1,900	500 U	10,000 U	**245,000**	NA	55,500	53,800	NA	NA	47,500
TP-02	8/22/2011	2.0 - 6.5	**9,000**	1,800 J	NA	**35,000**	1,100	81,000	85,000	240,000	45,000	120,000
TP-02	8/22/2011	6.5	**9,300**	**2000 J**	NA	**46,000**	1,200	82,000	90,000	240,000	77,000	130,000

Table 3-9
Summary of Soil Constituents within DNAPL Occurrence Area
RI/FS Port of Longview MFA - International Paper

Sample ID	Date Collected	Sample Depth (ft bgs)	Pyrene	Benzo[a]anthracene[b]	Chrysene[b]	Benzo[b]fluoranthene[b]	Benzo[k]fluoranthene[b]	Benzo[a]pyrene[b]	Indeno[1,2,3-cd]pyrene[b]	Dibenzo[a,h]anthracene[b]	Benzo[g,h,i]perylene	2-Methylnaphthalene	Dibenzofuran	TTEC[b]
			PAHs (µg/kg)											
MTCA Method C Soil Cleanup Levels, Direct Contact			110,000,000	180,000	1,800,000	180,000	180,000	18,000	180,000	180,000	NE	14,000,000	3,500,000	18,000
MTCA Method C Soil Cleanup Levels, Protection of Groundwater			1,400,000	8,600	96,000	30,000	30,000	2,300	83,000	43,000	NE	3,800	6,500	2,300
PB-01	7/14/1998	3-4.5	139,000	**29,500**	26,200	11,900	3,740	**6,820**	1,530	1,000 U	1,540	NA	NA	**11,749**
PB-02	7/15/1998	7.5-9	30,600	8,050	7,120	3,510	1,170	1,930	1,000 U	1,000 U	1,000 U	NA	NA	**3,274**
PB-04	7/15/1998	4.5-6	24,600	6,240	5,470	2,890	1,000 U	1,670	1,000 U	1,000 U	1,000 U	NA	NA	NA
PB-11	7/17/1998	6-7.5	340,000	100,000 U	100,000 U	100,000 U	100,000 U	100,000 U	100,000 U	100,000 U	100,000 U	NA	NA	NA
PB-12	7/17/1998	7.5 - 9	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	NA	NA	NA
PB-12	7/17/1998	9 - 10.5	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	NA	NA	NA	NA
PB-15	7/19/1998	3-5	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	NA	NA	NA
PB-18	7/19/1999	3-5	76,400	**20,200**	17,100	11,900	10,000 U	10,000 U	10,000 U	10,000 U	NA	NA	NA	**3,381**
PB-20	7/20/1999	3.5 - 5.5	192	100 U	100 U	100 U	100 U	100 U	100 U	100 U	NA	NA	NA	NA
PB-20	7/20/1999	5.5 - 7.5	76,400	**20,200**	17,100	11,900	10,000 U	10,000 U	10,000 U	10,000 U	NA	NA	NA	**3,381**
PB-24	7/20/1999	3.5 - 5.5	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	NA	NA	NA	NA
PB-26	7/20/1999	3.5 - 5.5	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	NA	NA	NA	NA
PB-28	7/21/1998	5.5-7.5	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	NA	NA	NA
PB-31	7/21/1999	3.5 - 5.5	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	200,000 U	NA	NA	NA	NA
PB-46	2/23/2000	5 - 7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PB-59	9/11/2008	8	210,000	**44,000**	37,000	18,000	6,800	**12,000**	4,700	1,200	3,200	**720,000**	**300,000**	**158,880**
PB-61	9/11/2008	8	38,000	7,600	6,800	3,500	1,300	2,000	1,000	270	740	**680,000**	**160,000**	**3,435**
PB-67	9/8/2008	7	36,000	7,400	6,800	3,000	1,200	1,600	630 J	140 J	460	**180,000**	**120,000**	**2,905**
PB-68	9/15/2008	6	18,000	2,400	2,700	1,300	430	640	310 J	79 J	230	**5,500**	**16,000**	1,119
PB-78	12/7/2011	8	48,000	**11,000**	11,000	5,600	2,100	**3,400**	1,100	360	970	**8,700**	**27,000**	**5,526**
PB-79	12/7/2011	10.5	1,400	380	320	190	76	110	40	8.7 J	33	**7,600**	1,200	183
PB-80	12/8/2011	10.5	89	21	23	12	4.6 J	7.6 J	3.6 J	10 U	4.1 J	**4,400**	160	12
PB-83	12/7/2011	8	58,000	**14,000**	12,000	6,500	2,700	**4,000**	1,300	440	1,200	**15,000**	**37,000**	**6,614**
PB-87	12/9/2011	11	330	85	85	50	21	33	16	3.0 J	13	1,500	560	51
97-6.B	7/23/1998	10.5 - 12	31,800	7,900	7,320	3,950	1,320	2,210	1,000 U	1,000 U	NA	NA	NA	**3,600**
TP-02	8/22/2011	2.0 - 6.5	74,000	**17,000**	14,000	7,900	2,700	**4,400**	1,300	310	1,100	**48,000**	**60,000**	**7,461**
TP-02	8/22/2011	6.5	77,000	**20,000**	17,000	10,000	3,000	**5,400**	1,800	420	1,500	**38,000**	**58,000**	**9,092**

Table 3-9
Summary of Soil Constituents within DNAPL Occurrence Area
RI/FS Port of Longview MFA - International Paper

Notes:

Numbers in **bold** indicate the result meets or exceeds the MTCA Method C soil cleanup levels, protection of groundwater.
MTCA Cleanup Regulation, WAC 173-340. MTCA Method C soil values are from Ecology website CLARC tables downloaded as of August 2015 (https://fortress.wa.gov/ecy/clarc/reporting/CLARCReporting.aspx).
* Pattern profile does not match the laboratory standard pattern.

[a] TPH cleanup levels are based on MTCA Method A values.

[b] cPAH cleanup levels under MTCA are based on the calculated total toxicity of the mixture using the Toxicity Equivalency Methodology in WAC 173-340-780 (8). The mixture of cPAHs shall be considered a single hazardous substance and compared to the applicable MTCA Method C cleanup levels for benzo(a)pyrene. TTEC was calculated using only results reported as detected.

CLARC - Cleanup Levels and Risk Calculation
cPAH - carcinogenic polycyclic aromatic hydrocarbon
DNAPL - dense non-aqueous phase liquid
DUP - field duplicate
ft bgs - feet below ground surface
ID - identification
J - result is an estimated value
MFA - Maintenance Facility Area
µg/kg - micrograms per kilogram
mg/kg - milligrams per kilogram
MTCA - Model Toxics Control Act
NA - not analyzed
NE - not established
PAHs - polycyclic aromatic hydrocarbons
RI/FS - remedial investigation/feasibility study
TTEC - total toxicity equilivancy concentration
TPH - total petroleum hydrocarbons
U - compound was analyzed for but not detected above the reporting limit shown
UJ - the associated quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure
WAC - Washington Administrative Code

Table 4-1
Initial Evaluation of Cleanup Action Alternatives
RI/FS Port of Longview MFA – International Paper

Cleanup Action Alternative	Technical	Environmental	Human Health	Institutional	Costs	Overall	Direct Costs	Total Costs
Impacted Soil in Upper Sand Unit								
1. Excavation and engineered cover	4	5	4	5	6	24	$1,264,000	$1,643,200
2. Excavation and off-site incineration	2	10	2	10	9	33	$3,287,000	$4,273,100
3. Excavation and off-site landfill/incin	3	10	3	10	8	34	$2,595,000	$3,373,500
4. In-situ solidification	4	5	4	5	4	22	$682,000	$886,600
5. In-situ thermal treatment (6-phase)	4	6	5	6	7	28	$1,473,000	$1,914,900
6. Passive venting	5	2	6	2	3	18	$358,000	$465,400
7. Active venting	5	1	6	1	4	17	$386,000	$501,800
8. Engineered cover, institutional controls	2	3	6	3	1	**15**	$320,000	$416,000
Impacted Groundwater in Lower Sand Unit								
9. In-situ thermal treatment (6-phase)	4	6	5	6	7	28	$1,118,000	$1,453,400
10. Passive venting and ORC injection	5	3	6	3	2	19	$447,000	$581,100
11. Passive venting and air sparging	5	2	6	2	3	**18**	$492,000	$639,600
12. Active Venting and air sparging	5	1	6	1	5	18	$560,000	$728,000
13. Engineered cover, institutional controls	2	10	6	10	1	29	$320,000	$416,000

Notes:
Alternatives were evaluated in each of these five criteria, and then ranked in numerical order. An alternative that scores a 1 would be estimated to be a better alternative than an alternative that scored a 2 for that paricular criterion. All alternatives for groundwater in Lower Sand Unit include 3 years of O&M and PCMP monitoring. Total costs include a 30% contingency added to direct costs.

MFA - Maintenance Facility Area
O&M - operation and maintenance
ORC - oxygen release compound
PCMP - post construction monitoring program
RI/FS - remedial investigation/feasibility study

Table 5-1
Input Parameters for Johnson and Ettinger (1991) Model for Predicting Vapor Intrusion from Soil Vapor
RI/FS Port of Longview MFA - International Paper

Input Parameter/Units	Parameter Value	Source
Initial Soil Concentration (mg/kg)	Chemical specific	Maximum detected concentration measured in PB-59 at 8 feet bgs (Table 3-4)
Average Soil Temperature (°C)	10	EPA default value for Washington State (EPA 2004a)
Depth below grade to bottom of enclosed space floor (cm)	15	EPA default value for slab-on-grade (EPA 2004a)
Time Step Parameters		EPA (2004a) recommended values for soil concentrations that moderately exceed saturated soil conditions
Initial Time Step (days)	2	
Maximum Change in Mass (%)	7	
Minimum Change in Mass (%)	4	
Width of Contamination (cm)	766	Dimensions equivalent to the enclosed space (the lunch room) evaluated in the building in the MFA (approximately 25 by 20 feet)
Length of Contamination (cm)	610	
Thickness of Contamination (cm)	76.2	Site-specific value based on soil boring log for PB-59 (approximately 2.5 feet)
Thickness of soil stratum A (cm)	122	Site-specific value based on soil boring for PB-59
Soil type	Sand	Site-specific value based on soil boring for PB-59
Dry bulk density (g/cm^3)	1.66	Recommended average value for specific soil type from EPA (2004a)
Total soil porosity (unitless)	0.375	Recommended average value for specific soil type from EPA (2004a)
Soil water-filled porosity (cm^3/cm^3)	0.054	Recommended average value for specific soil type from EPA (2004a)
Thickness of soil stratum B (cm)	46	Site-specific value based on soil boring for PB-59
Soil type	Loamy Sand	Site-specific value based on soil boring for PB-59
Dry bulk density (g/cm^3)	1.62	Recommended average value for specific soil type from EPA (2004a)
Total soil porosity (unitless)	0.39	Recommended average value for specific soil type from EPA (2004a)
Soil water-filled porosity (cm^3/cm^3)	0.076	Recommended average value for specific soil type from EPA (2004a)
Thickness of soil stratum C (cm)	76	Site-specific value based on soil boring for PB-59
Soil type	Sand	Site-specific value based on soil boring for PB-59
Dry bulk density (g/cm^3)	1.66	Recommended average value for specific soil type from EPA (2004a)
Total soil porosity (unitless)	0.375	Recommended average value for specific soil type from EPA (2004a)
Soil water-filled porosity (cm^3/cm^3)	0.054	Recommended average value for specific soil type from EPA (2004a)
Floor-wall seam gap (cm)	0.1	Default value (EPA 2004a)

Table 5-1
Input Parameters for Johnson and Ettinger (1991) Model for Predicting Vapor Intrusion from Soil Vapor
RI/FS Port of Longview MFA - International Paper

Input Parameter/Units	Parameter Value	Source
Building air exchange rate per hour	2	Default value for industrial buildings (MDEQ 1998)
Soil-building pressure differential (g/cm-s^2)	40	EPA default value (EPA 2004a)
Average vapor flow rate into building (L/min)	5	EPA default value (EPA 2004a)
Enclosed space floor thickness (cm)	10	Default value for slab-on-grade (EPA 2004a)
Enclosed space floor length (cm)	766	Dimensions of the lunch room (approximately 25 by 20 feet with a ceiling height of 12 feet), which was selected for evaluation because this part of the building is located over the DNAPL, is regularly occupied, and is an enclosed space within the larger structure.
Enclosed space floor width (cm)	610	
Enclosed space height (cm)	366	

Notes:

% - percent
bgs - below ground surface
°C - degrees Celsius
cm - centimeter
cm^3/cm^3 - cubic centimeters per cubic centimeter
DNAPL - dense non-aqueous phase liquid
EPA - US Environmental Protection Agency
g/cm^3 - grams per cubic centimeter
g/cm-s^2 - grams per centimeter per second squared
L/min - liters per minute
MDEQ - Michigan Department of Environmental Quality
MFA - Maintenance Facility Area
mg/kg - milligrams per kilogram
RI/FS - remedial investigation/feasibility study

Table 5-2
Summary of Initial Soil Concentrations and Modeled Indoor Air Concentrations
RI/FS Port of Longview MFA – International Paper

Chemical	Initial Soil Concentration (mg/kg)	Modeled Indoor Air Concentration (µg/m^3)
Naphthalene	1,700	30.2
Fluorene	330	0.0217
2-Methylnaphthalene	720	7.7
Pyrene	210	0.0000581
Acenaphthene	390	0.126

Notes:
MFA - Maintenance Facility Area
µg/m^3 - micrograms per cubic meter
mg/kg - milligrams per kilogram
RI/FS - remedial investigation/feasibility study

Table 5-3
Calculation of MTCA Method C Industrial Air Cleanup Levels
RI/FS Port of Longview MFA – International Paper

Equations:

$$\text{Noncancer Method C CUL } (\mu g/m^3) = \frac{\text{RfD x THQ x BW x AT x CF}}{\text{BR x ABS x ED x EF}} \quad \text{(WAC 173-340-750 Equation 750-1)}$$

$$\text{Cancer Method C CUL } (\mu g/m^3) = \frac{\text{TCR x BW x AT x CF}}{\text{CPF x BR x ABS x ED x EF}} \quad \text{(WAC 173-340-750 Equation 750-2)}$$

Parameter	Definition	Value	Units	Source
THQ	Target hazard quotient	1	unitless	WAC 173-340-750
TCR	Target cancer risk	1×10^{-5}	unitless	WAC 173-340-750
RfD	Inhalation reference dose	chemical-specific	mg/kg-day	See Section 5.3.2
CPF	Inhalation slope factor	chemical-specific	$(\text{mg/kg-day})^{-1}$	See Section 5.3.2
CF	Conversion factor	1,000	µg/mg	Not applicable
BR	Breathing rate	20	m^3/day	WAC 173-340-750
ABS	Inhalation absorption fraction	1	unitless	WAC 173-340-750
EF	Exposure frequency	1	unitless	WAC 173-340-750
ED	Exposure duration			
	noncancer	6	years	WAC 173-340-750
	cancer	30	years	WAC 173-340-750
BW	Body weight	70	kg	WAC 173-340-750
AT	Averaging time			
	noncancer	6	years	WAC 173-340-750
	cancer	75	years	WAC 173-340-750

Notes:

CUL - cleanup level
kg - kilogram
m^3/day - cubic meters per day
MFA - Maintenance Facility Area
µg/m^3 - micrograms per cubic meter
µg/mg - micrograms per milligram
mg/kg - milligrams per kilogram
mg/kg-day - milligrams per kilogram per day
MTCA - Model Toxics Control Act
RI/FS - remedial investigation/feasibility study
WAC - Washington Administrative Code

Table 5-4
Comparison of Modeled Indoor Air Concentrations to MTCA Method C Industrial Air Cleanup Levels
RI/FS Port of Longview MFA – International Paper

Chemical	**Modeled Indoor Air Concentration ($\mu g/m^3$)**	**MTCA Method C Air Cleanup Level, Noncancer ($\mu g/m^3$)**	**MTCA Method C Air Cleanup Level, Cancer ($\mu g/m^3$)**
Naphthalene	**30.2**	3.0	0.74
Fluorene	0.0217	--	--
2-Methylnaphthalene	**7.7**	3.0	--
Pyrene	0.0000581	--	--
Acenaphthene	0.126	--	--

Notes:
Bolded values indicate an exceedance over the MTCA Method C air cleanup level

MFA - Maintenance Facility Area
$\mu g/m^3$ - micrograms per cubic meter
MTCA - Model Toxics Control Act
RI/FS - remedial investigation/feasibility study

Table 6-1
Maintenance Facility Area Preliminary Cleanup Levels
RI/FS Port of Longview MFA – International Paper

Chemicals of Concern	Groundwater MTCA Method B[a] (µg/L)	Groundwater MTCA Method C[a] (µg/L)	Soil MTCA Method C[a] Direct Contact (mg/kg)	Soil MTCA Method C[b] Protection of Groundwater (mg/kg)
Polycyclic Aromatic Hydrocarbons				
cPAHs[c]	0.012	0.12	18	2.3
2-Methylnaphthalene	32	70	14,000	3.8[e]
Naphthalene	160	350	70,000	9.7
Petroleum Compounds				
TPH – diesel/oil[d]	500	500	2,000	2,000[f]
Semivolatile Organic Compounds				
Dibenzofuran	16	35	3,500	6.6[e]
Pentachlorophenol	0.22	2.2	330	0.035

Notes:

[a] Cleanup levels obtained from Ecology's CLARC database in August 2015 (last update August 2015).

[b] Values calculated using MTCA workbook tools for calculating cleanup levels. MTCA default parameters were used in the calculations. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html).

[c] Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, chrysene, benzo(k)fluoranthene, benzo(b)fluoranthene, benzo(a)anthracene, with the TTEC of these compounds compared to the cleanup level using the Toxicity Equivalency Factor methodology of WAC 173-340-708(8)(e) and values listed in Table 708-2 (MTCA 2013).

[d] TPH preliminary cleanup levels are based on the MTCA Method A groundwater cleanup values in Table 720-1 and industrial soil cleanup values in Table 745-1.

[e] The chemical specific properties used in the migration to groundwater calculations were obtained from EPA (2015).

[f] TPH Cleanup level are based on the MTCA Method A industrial cleanup standards

CLARC - Cleanup Levels and Risk Calculation
cPAHs - carcinogenic polycyclic aromatic hydrocarbons
MFA - Maintenance Facility Area
mg/kg - micrograms per kilogram
µg/L - micrograms per liter
MTCA - Model Toxics Control Act
TPH - total petroleum hydrocarbons
RI/FS - remedial investigation/feasibility study
WAC - Washington Administrative Code

Table 6-2
Chemical-Specific ARARs
RI/FS Port of Longview MFA – International Paper

	Groundwater		Soil			Air
Chemicals of Concern	**MTCA Method B[b] (µg/L)**	**MTCA Method C[b] (µg/L)**	**MTCA Method C[b] – Direct Contact (mg/kg)**	**MTCA Method C[c] – Protection of Groundwater (mg/kg)**	**MTCA Method B[c,g] – Protection of Groundwater (mg/kg)**	**MTCA Method C[b] ($\mu g/m^3$)**
Polycyclic Aromatic Hydrocarbons						
cPAHs[a]	0.012	0.12	18	2.3	0.23	NA[d]
Anthracene	4,800	11,000	1,100,000	5,000	2300	NA[h]
Acenaphthene	960	2,100	210,000	210	98	NA[h]
Acenaphthylene[j]	960	2,100	210,000	210	98	NA[h]
Benzo(g,h,i)perylene[j]	480	1,100	110,000	1,400	650	NA[d]
Fluoranthene	640	1,400	140,000	1,400	630	NA[d]
Fluorene	640	1,400	140,000	220	100	NA[h]
2-Methylnaphthalene	32	70	14,000	3.8[i]	1.7[i]	0.74[e]
Naphthalene	160	350	70,000	9.7	4.5	0.74
Phenanthrene[j]	4,800	11,000	1,100,000	5,000	2300	NA[d]
Pyrene	480	1,100	110,000	1,400	650	NA[h]
Petroleum Compounds						
TPH – heavy oils	500[f]	500[f]	2,000[f]	2,000[f]	2,000[f]	NA[d]
TPH – diesel/oil	500[f]	500[f]	2,000[f]	2,000[f]	2,000[f]	NA[d]
Semivolatile Organic Compounds						
Dibenzofuran	16	35	3,500	6.6[i]	3.0[i]	NA[d]
Pentachlorophenol	0.22	2.2	330	0.035	0.016[k]	NA[d]

Notes:

[a] Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, chrysene, benzo(k)fluoranthene, benzo(b)fluoranthene, benzo(a)anthracene, with the total concentration of these compounds compared to the cleanup level using the Toxicity Equivalency Factor methodology of WAC 173-340-708(8)

[b] Values obtained from CLARC database accessed on August 2015 (last updated May 2014) (https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx)

[c] Values calculated using MTCA workbook tools for calculating cleanup levels. MTCA default parameters were used in the calculations. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html).

[d] These chemicals are not volatile; therefore, the vapor intrusion pathway is incomplete for these chemicals and no ARARs are necessary.

[e] No Method C air cleanup level is available for 2-methylnaphthalene. The cleanup level for naphthalene is used as a surrogate.

[f] TPH Cleanup level are based on the MTCA Method A industrial cleanup standards

[g] These values are provided for discussion purposes only. The area of impacted soil is limited to on site, where Method C groundwater cleanup levels are applicable.

[h] Although these chemicals are considered volatile and exposures through the vapor intrusion pathway would be complete, no inhalation toxicity criteria are available to calculate air cleanup levels.

[i] The chemical specific properties used in the migration to groundwater calculations were obtained from EPA (2015).

Table 6-2
Chemical-Specific ARARs
RI/FS Port of Longview MFA – International Paper

[j] No toxicity criteria are available to calculate cleanup levels for these chemicals. The cleanup levels for the following surrogate chemicals were used and are presented on the table:

Chemical	Surrogate
Acenaphthylene	Acenaphthene
Benzo(g,h,i)perylene	Pyrene
Phenanthrene	Anthracene

[k] Cleanup level based on the MCL.

ARARs - applicable, relevant, and appropriate requirements
CLARC - Cleanup Levels and Risk Calculations
cPAHs - carcinogenic polycyclic aromatic hydrocarbons
EPA - U.S. Environmental Protection Agency
MFA - Maintenance Facility Area
µg/m^3 - micrograms per cubic meter
mg/kg - micrograms per kilogram
µg/L - micrograms per liter
MTCA - Model Toxics Control Act
NA - no value available
RI/FS - remedial investigation/feasibility study
TPH - total petroleum hydrocarbons
WAC - Washington Administrative Code

Table 6-3
Potential Applicability of Action- and Location-Specific ARARs to Soil Alternatives
RI/FS Port of Longview MFA – International Paper

ARAR[1]	Soil Alternatives									
	S1	**S2**	**S3**	**S4**	**S5**	**S5A**	**S5B**	**S5C**	**S6**	**S7**
Action-Specific										
Institutional Controls, WAC 173-340-440	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Compliance Monitoring Requirements, WAC 173-340-410	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stormwater Permit Program, 40 CFR 122.26, Chapter 173-226 WAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
RCRA and Washington Hazardous Waste Management Act (RCW 70.105) and Dangerous Waste Regulations; 40 CFR 260, 261, 262, 263, and 268; Chapter 173-303 WAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Federal EPA and Washington State "Contained-In" Policy (EPA 1986, Ecology 1993); FR preambles; EPA memos and correspondences; Hazardous Waste	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LDRs, 40 CFR 268, WAC 173-303-140	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AOC Policy, National Contingency Plan (55 FR 8758-8760, March 8, 1990), EPA guidance memorandum (EPA 1996), Ecology AOC Policy (Ecology 1993)	✓	✓	✓	✓	✓	✓	✓	✓	○	✓
CAMUs, 40 CFR 264.555, WAC 173-303-646910	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Treatment by Generator, 40 CFR 262.34, WAC 173-303-200 and -201	✓	✓	✓	✓	○	○	✓	✓	✓	✓
Washington Solid Waste Management Handling Standards Regulations, Chapter 173-350 WAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clean Water Act Pretreatment Regulations, 40 CFR 503.5	✓	✓	✓	✓	○	○	✓	✓	✓	✓
Washington Clean Air Act and Implementing Regulations, Chapter 173-400 and 173-460 WAC, Southwest Clean Air Agency Regulation 400	○	○	○	○	✓	✓	✓	✓	✓	✓
Washington Water Well Construction Act Regulations, Chapter 173-160 WAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Regulation and Licensing of Well Contractors and Operators, Chapter 173-162 WAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State Environmental Policy Act, RCW 43.21.036, WAC 197-11-250 through 268	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Location-Specific (City of Longview)										
Special Flood Hazard Area Development Permit (Chapter 17.24 LMC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Critical Areas Permit (Chapter 17.10 LMC, Ordinance 2821, passed January 8, 2009)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stormwater Runoff and Erosion Controls (Chapter 17.80 LMC, Ordinance 3079, passed January 8, 2009)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Building Permits (Chapter 16 LMC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Standard Plans and Specifications for Sanitary Sewers, Storm Sewers, and Water (Chapter 14.06 LMC)	✓	✓	✓	✓	○	○	✓	✓	✓	✓

Table 6-3
Potential Applicability of Action- and Location-Specific ARARs to Soil Alternatives

Notes:

[1] The applicability of the following regulations were evaluated and they were determined not to be applicable to the soil alternatives: Monitored Natural Attenuation, Expectations for Cleanup Action Alternatives, WAC 173-340-370; State Waste Discharge Permit Program, Chapter 173-216 WAC; Submission of Plans and Reports for Construction of Wastewater Facilities, Chapter 173-240 WAC; Longview Shoreline Development Permit (Chapter 17.60 LMC, Ordinance 2786, passed 2000); Longview Historic Preservation Ordinance (Chapter 16.12 LMC); Cowlitz County Floodplain Management Permit (Chapter16.25 CCC); Cowlitz County Shoreline Development Permit (Chapter 19.20 CCC); Cowlitz County Critical Areas Permit (Chapter 19.15 CCC); and Cowlitz County Grading Ordinance (Chapter 16.35 CCC).

✓ - applicable
○ - not applicable
AOC - area of contamination
ARAR - applicable, relevant, and appropriate requirement
CAMU - corrective action management unit
CCC - Cowlitz County Code
CFR - Code of Federal Regulations
DNAPL - dense non-aqueous phase liquid
EPA - U.S. Environmental Protection Agency
ERH - electrical resistance heating
FR - Federal Register
LDR - land disposal restriction
LMC - Longview Municipal Code
MFA - Maintenance Facility Area
RCRA - Resources Conservation Recovery Act
RCW - Revised Code of Washington
RI/FS - remedial investigation/feasibility study
WAC - Washington Administrative Code

S1 - Comprehensive Excavation
S2 - Comprehensive Excavation Outside Building Footprint
S3 - DNAPL Excavation Outside Building Footprint
S4 - DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
S5 - Solidification Outside Building Footprint
S5A - Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
S5B - Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
S5C - Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
S6 - DNAPL Treatment by ERH
S7 - DNAPL Excavation and ERH

Table 6-4
Potential Applicability of Action- and Location-Specific ARARs to Groundwater Alternatives
RI/FS Port of Longview MFA – International Paper

ARAR[1]	Baseline Alternative GW1: ERH and Enhanced Biodegradation	Alternative GW2: Chemical Oxidation and Monitored Natural Attenuation	Alternative GW3: Active Biosparging	Alternative GW4: Monitored Natural Attenuation
Action-Specific				
Monitored Natural Attenuation, Expectations for Cleanup Action Alternatives, WAC 173-340-370	✓	✓	✓	✓
Institutional Controls, WAC 173-340-440	✓	✓	✓	✓
Compliance Monitoring Requirements, WAC 173-340-410	✓	✓	✓	✓
Stormwater Permit Program, 40 CFR 122.26, Chapter 173-226 WAC	✓	✓	✓	
RCRA and Washington Hazardous Waste Management Act (RCW 70.105) and Dangerous Waste Regulations; 40 CFR 260, 261, 262, 263, and 268; Chapter 173-303 WAC	✓	✓	✓	✓
Federal EPA and Washington State "Contained-In" Policy (EPA 1986, Ecology 1993); Federal Register preambles; EPA memos and correspondences; Hazardous Waste	✓	✓	✓	✓
LDRs, 40 CFR 268, WAC 173-303-140	✓	✓	✓	✓
CAMUs, 40 CFR 264.555, WAC 173-303-646910	✓	✓	✓	✓
Treatment by Generator, 40 CFR 262.34, WAC 173-303-200 and -201	✓	○	○	○

Table 6-4
Potential Applicability of Action- and Location-Specific ARARs to Groundwater Alternatives
RI/FS Port of Longview MFA – International Paper

ARAR[1]	Baseline Alternative GW1: ERH and Enhanced Biodegradation	Alternative GW2: Chemical Oxidation and Monitored Natural Attenuation	Alternative GW3: Active Biosparging	Alternative GW4: Monitored Natural Attenuation
Action-Specific (Continued)				
Washington Solid Waste Management Handling Standards Regulations, Chapter 173-350 WAC	✓	✓	✓	✓
Clean Water Act Pretreatment Regulations, 40 CFR 503.5	✓	○	○	○
Washington Clean Air Act and Implementing Regulations, Chapter 173-400 and 173-460 WAC, Southwest Clean Air Agency Regulation 400	✓	○	✓	○
Washington Underground Injection Control Program, Chapter 173-218 WAC	✓	✓	✓	
Location-Specific (City of Longview)				
Special Flood Hazard Area Development Permit (Chapter 17.24 LMC)	✓	✓	✓	✓
Critical Areas Permit (Chapter 17.10 LMC, Ordinance 2821, passed January 8, 2009)	✓	✓	✓	✓
Stormwater Runoff and Erosion Controls (Chapter 17.80 LMC, Ordinance 3079, passed January 8, 2009)	✓	✓	✓	○
Building Permits (Chapter 16 LMC)	✓	○	○	○
Standard Plans and Specifications for Sanitary Sewers, Storm Sewers, and Water (Chapter 14.06 LMC)	✓	○	○	○

Table 6-4
Potential Applicability of Action- and Location-Specific ARARs to Groundwater Alternatives
RI/FS Port of Longview MFA – International Paper

Notes:

[1] The applicability of the following regulations were evaluated and they were determined not to be applicable to the groundwater alternatives: AOC Policy, National Contingency Plan (55 FR 8758-8760, March 8, 1990), EPA guidance memorandum (EPA 1996), Ecology AOC Policy (Ecology 1993); State Waste Discharge Permit Program, Chapter 173-216 WAC; Submission of Plans and Reports for Construction of Wastewater Facilities, Chapter 173-240 WAC; Longview Shoreline Development Permit (Chapter 17.60 LMC, Ordinance 2786, passed 2000); Longview Historic Preservation Ordinance (Chapter 16.12 LMC); Cowlitz County Floodplain Management Permit (Chapter16.25 CCC); Cowlitz County Shoreline Development Permit (Chapter 19.20 CCC); Cowlitz County Critical Areas Permit (Chapter 19.15 CCC); and Cowlitz County Grading Ordinance (Chapter 16.35 CCC).

✓ - applicable
○ - not applicable
AOC - area of contamination
ARAR - applicable, relevant, and appropriate requirement
CAMU - corrective action management unit
CCC - Cowlitz County Code
CFR - Code of Federal Regulations
EPA - U.S. Environmental Protection Agency
ERH - electrical resistance heating
FR - Federal Register
LDR - land disposal restriction
LMC - Longview Municipal Code
MFA - Maintenance Facility Area
RCRA - Resources Conservation Recovery Act
RCW - Revised Code of Washington
RI/FS - remedial investigation/feasibility study
WAC - Washington Administrative Code

Table 7-1
Soil and Groundwater Cleanup Action Alternatives
RI/FS Port of Longview MFA – International Paper

Media	Alternative Number	Alternative Name
Soil	S1	Comprehensive Excavation
	S2	Comprehensive Excavation Outside Building Footprint
	S3	DNAPL Excavation Outside Building Footprint
	S4	DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
	S5	Solidification Outside Building Footprint
	S5A	Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
	S5B	Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
	S5C	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
	S6	DNAPL Treatment by ERH
	S7	DNAPL Excavation and ERH
Groundwater	GW1	ERH and Enhanced Biodegradation
	GW2	Chemical Oxidation and Monitored Natural Attenuation
	GW3	Active Biosparging
	GW4	Monitored Natural Attenuation

Notes:
DNAPL - dense non-aqueous phase liquid
ERH - electrical resistance heating
MFA - Maintenance Facility Area
RI/FS - remedial investigation/feasibility study

Table 7-2
Comparison of Soil Alternative Components
RI/FS Port of Longview MFA – International Paper

Soil Alternative Component	Soil Alternatives									
	S1	S2	S3	S4	S5	S5A	S5B	S5C	S6	S7
Conceptual Details										
Disruption of Port's use of Building and Yard	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Remove Asphalt Paving	✓	✓	✓	✓	✓	✓	✓	✓	○	✓
Remove Retaining Wall	✓	✓	✓	✓	✓	✓	✓	○	○	✓
Rebuild Retaining Wall	✓	✓	✓	✓	✓	✓	○	○	○	✓
Partial Building Demolition	✓	○	○	○	○	○	✓	○	○	○
Building Walls Remain Intact	○	✓	✓	○	✓	✓	○	✓	✓	✓
Install Shoring to Protect Building	✓	✓	✓	✓	○	○	○	○	○	✓
Install Shoring to Protect Slurry Wall	✓	✓	✓	✓	○	○	○	○	○	✓
Prevent water from entering Treatment Area	✓	✓	✓	✓	○	○	○	○	○	✓
Treat or Remove Soil under the Building	✓	○	○	✓	○	✓ (DNAPL only)	✓	✓	✓	✓
In Situ Soil Treatment	○	○	○	○	✓	✓	✓	✓	✓	✓
Excavation of Clean Soil would be Necessary	✓	✓	✓	✓	✓	✓	✓	✓	○	✓
Excavation of Contaminated Soil would be Necessary	✓	✓	✓	✓	○	○	✓	○	○	✓
Off-Site Disposal of Contaminated Materials	✓	✓	✓	✓	○	✓	○	✓	✓	✓
Contaminated Soil would Remain in the Upper Sand Unit on Site	○	✓	✓	✓	✓	✓	✓	✓	✓	✓
Alternative Details										
Length of Retaining Wall Removed (FT)	220	220	220	220	220	220	220	0	0	220
Depth of Clean Overburden (FT)	3	3	3	3	3	3	3	3	3	3
Depth of Treatment (FT)	8	8	8	8	9	9	9	8 to 9	9	8 to 9
DNAPL Area Treated										
DNAPL Area outside Building (SF)	12,800	12,800	12,800	12,800	12,800	12,800	12,800	12,800	12,800	12,800
DNAPL Area under Building (SF)	900	0	0	900	0	900	900	900	900	900
Total DNAPL Area Treated (SF)	**13,700**	**12,800**	**12,800**	**13,700**	**12,800**	**13,700**	**13,700**	**13,700**	**13,700**	**13,700**
Treatment Area										
Treatment Area outside Building (SF)	32,600	32,600	24,900	24,900	32,600	32,600	32,600	32,600	24,900	24,900
Treatment Area under Building (SF)	2,100	0	0	1,500	0	0	2,100	2,100	2,100	2,100
Total Treatment Area (SF)	**34,700**	**32,600**	**24,900**	**26,400**	**32,600**	**32,600**	**34,700**	**34,700**	**27,000**	**27,000**
Area with COCs or DNAPL Not Treated by Alternative (SF)	0	2,100	9,800	8,300	2,100	2,100	0	0	7,700	7,700
Estimated Implementation Time										
Construction/Mob/Demob (Months)	10	4	3	5	5	6	7	9	8	7
System Operations (Months)	0	0	0	0	0	36	0	6	6	6
LTM of Groundwater after Treatment (Years)	2	2	2	2	10	10	10	10	2	2
Total Time (Years)	**1.0**	**2.3**	**2.3**	**2.4**	**10.4**	**13.5**	**10.6**	**11.3**	**3.2**	**3.1**

Table 7-2
Comparison of Soil Alternative Components
RI/FS Port of Longview MFA – International Paper

Soil Alternative Component	Soil Alternatives									
	S1	**S2**	**S3**	**S4**	**S5**	**S5A**	**S5B**	**S5C**	**S6**	**S7**
Treatment Details										
Target Treatment Volumes[2]										
Targeted Non-DNAPL Soil Volume (CY)	6,300	5,900	4,500	4,700	5,900	5,900	6,300	6,300	4,800	4,800
Targeted DNAPL Soil Volume (CY)	170	160	160	170	160	170	170	170	170	170
Total Targeted Treatment Volume (CY)	**6,470**	**6,060**	**4,660**	**4,870**	**6,060**	**6,070**	**6,470**	**6,470**	**4,970**	**4,970**
Excavation Volumes										
Total Excavation Volume (CY)	10,370	9,660	7,460	7,770	3,600	3,600	5,550	3,000	0	7,460
Overburden Excavation Volume (CY)	3,900	3,600	2,800	2,900	3,600	3,600	3,900	3,000	0	2,800
Treatment Volume Excavated (CY)	**6,470**	**6,060**	**4,660**	**4,870**	**0**	**0**	**1,650**	**0**	**0**	**4,660**
Mass of COCs Targeted (LBS)[2,3]	176,000	167,000	152,000	156,000	167,000	167,000	176,000	165,000	113,000	157,000
Untreated Targeted Mass of COCs Remaining On Site (LBS)[2,3]	0	9,000	24,000	20,000	9,000	9,000	0	11,000	63,000	19,000
DNAPL Volume Treated (Gallons)[3]	1,550	1,450	1,450	1,550	1,450	1,500	1,550	1,430	1,160	1,520
Untreated DNAPL Volume Remaining On Site (Gallons)[3]	0	100	100	0	100	50	0	120	390	30
In Situ Soil Treatment (CY)	0	0	0	0	7,260	7,260	7,470	8,550	5,970	490
Untreated DNAPL Soil Remaining on Site (CY)[2]	0	10	10	0	10	0	0	0	0	0
Total Untreated Soil Remaining on Site (CY)[2]	0	410	1,810	1,600	410	400	0	0	1,500	1,500
Off-Site Disposal Volumes[4]										
Non-DNAPL Soil Disposal (CY)	6,000	5,600	4,200	4,400	0	0	0	5	30	4,200
DNAPL Soil Disposal needing Stabilization (CY)	510	480	480	510	0	0	0	1	5	480
CAMU-Eligible Disposal (TN)	9,000	8,400	6,300	6,600	0	0	0	8	45	6,300
DNAPL Soil Disposal (TN)	770	720	720	770	0	0	0	2	8	720
DNAPL Contaminated Liquid Disposal (Gallons)	3,100	2,900	2,900	3,100	0	50	0	1,000	2,300	3,100

Notes:

[1] Treatment depths indicate estimated average over treatment areas, with additional treatment depth into the upper silt for solidification and ERH alternatives.

[2] Target treatment volume and mass only includes quantities above the Upper Silt layer (in the Upper Sand layer). Excavation alternatives leave additional unquantified untreated mass in the Upper Silt.

[3] Contaminant removal efficiencies for ERH (Alternatives S5C, S6, and S7) are based on the results of the treatability study, and are assumed to be 50 percent for cPAHs and 75 percent for DRO and DNAPL.

[4] To account for practical construction considerations, off-site disposal volumes differ from excavation volumes. The off-site disposal volumes are used in the cost estimates (Appendix J) to estimate disposal costs.

✓- included
○ - not included
CAMU - corrective action management unit
CY - cubic yards
cPAHs - carcinogenic polycyclic aromatic hydrocarbons
DNAPL - dense non-aqueous phase liquid
DRO - diesel range organics
ERH - electrical resistance heating
FT - feet
LBS - pounds
LTM - long-term monitoring
MFA - Maintenance Facility Area
RI/FS - remedial investigation/feasibility study

SF - square feet
TN - tons

S1 - Comprehensive Excavation
S2 - Comprehensive Excavation Outside Building Footprint
S3 - DNAPL Excavation Outside Building Footprint
S4 - DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
S5 - Solidification Outside Building Footprint
S5A - Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
S5B - Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
S5C - Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
S6 - DNAPL Treatment by ERH
S7 - DNAPL Excavation and ERH

Table 7-3
Comparison of GroundwaterAlternative Components
RI/FS Port of Longview MFA – International Paper

	Components Used in Cleanup Action Alternatives			
Groundwater Alternative Component	**Baseline Alternative GW1: ERH and Enhanced Biodegradation**	**Alternative GW2: Chemical Oxidation and Monitored Natural Attenuation**	**Alternative GW3: Active Biosparging**	**Alternative GW4: Monitored Natural Attenuation**
Conceptual Details				
Active Treatment of Groundwater	✓	✓	✓	○
Disruption of Port's use of Building and Yard	✓	✓	○	○
Remove Asphalt Paving	○	○	○	○
Treat Groundwater under the Building	✓	✓	✓	✓
Treatment Equipment Enclosure Needed	✓	○	✓	○
Would additional wells be Necessary	✓	✓	✓	✓
Off-Site Disposal of Contaminated Materials	✓	✓	✓	✓
Would Contaminated Materials Remain on Site	✓	✓	✓	✓
Alternative Details				
Top Depth of Treatment (FT)	**15**	**12**	**15**	NA
Bottom Depth of Treatment (FT)	**50**	**50**	**50**	NA
Thickness of Treatment Zone (FT)	**35**	**38**	**35**	NA
Groundwater Treatment Area (SF)	**55,000**	**55,000**	**55,000**	NA
Natural Attenuation Area (SF)	**240,000**	**240,000**	**240,000**	**240,000**
Number of points drilled (EA)	**250**	**145**	**13**	**6**
Active Treatment Time (years)	**2**	**2**	**16**	**0**
Long Term Monitoring after Treatment (years)	**4**	**6**	**4**	**30**
Total Alternative Time including LTM (years)	**6**	**8**	**20**	**30**
Treatment Details				
Active Groundwater Treatment Volume (CY)	**71,000**	**77,000**	**71,000**	**0**
Off-Site Disposal Volumes				
Non-DNAPL Soil Disposal (TN)	**40**	**2**	**1**	**1**
DNAPL Soil Disposal needing Stabilization (TN)	**10**	**6**	**2**	**1**

Notes:
✓- included
○ - not included
CY - cubic yards
DNAPL - dense non-aqueous phase liquid
EA - each
ERH - electrical resistance heating
FT - feet
GW - groundwater
LTM - long-term monitoring
MFA - Maintenance Facility Area
NA - not applicable
RI/FS - remedial investigation/feasibility study
SF - square feet
TN - tons

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
Soil Alternatives						
Baseline Alternative S1: Comprehensive Excavation	• Excavates and landfills/treats off site all soil located above the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels • Uses the restrictive environmental covenant to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt • Removes sources in the Upper Sand including liquid wastes and media with high concentrations of hazardous substances	• Complies by eliminating all soil sources located above the Upper Silt containing DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from residual COC concentrations located in the Upper Silt	• Complies with ARARs for demolition, excavation, disposal, and site restoration	• Uses post-excavation sampling to demonstrate that soil remaining on site following implementation of the action meets the cleanup standards	• Removes all soil sources located above the Upper Silt containing DNAPL or COC concentrations exceeding cleanup levels within approximately 2 years of approval of the CAP (timeframe does not including long-term groundwater monitoring)	• Partially addresses Port of Longview's preference for excavation of all soil containing DNAPL or COCs at concentrations exceeding the cleanup levels (soil containing COCs at concentration exceeding cleanup levels will still be present in the Upper Silt)
Alternative S2: Comprehensive Excavation Outside Building Footprint	• Excavates and landfills/treats off site soil located above the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels except soils beneath the building footprint • Uses the restrictive environmental covenant to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the building for the direct contact pathway (note: no risks for the vapor intrusion pathway)	• Complies by removing or containing soil exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from residual COC concentrations in the Upper Silt and beneath the building	• Complies with ARARs for demolition, excavation, disposal, and site restoration	• Uses post-excavation sampling to demonstrate that soil remaining on site following implementation of the action meets the cleanup standards	• Removes or contains soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 2 years of approval of the CAP not including long-term groundwater monitoring	• Partially addresses Port of Longview's preference for excavation of all soil containing DNAPL or COCs at concentrations exceeding the cleanup levels (soil containing DNAPL and/or COCs at concentration exceeding cleanup levels will still be present in the Upper Silt and beneath the building)

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
	• Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand to maximize protection of groundwater given that the building would contain the residual source by significantly limiting water infiltration					• Concerns include loss of property value due to the reliance on containment to address contaminants beneath the building
Alternative S3: DNAPL Excavation Outside Building Footprint	• Excavates and landfills/treats off site soil located above the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels except soils beneath the building footprint and beneath the asphalt pavement in the northern portion of the site • Uses the restrictive environmental covenant to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the building and the asphalt pavement for the direct contact pathway (note: no risks for the vapor intrusion pathway)	• Complies by removing or containing soil exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from residual COC concentrations in the Upper Silt and beneath the building and the asphalt pavement	• Complies with ARARs for demolition, excavation, disposal, and site restoration	• Uses post-excavation sampling to demonstrate that soil remaining on site following implementation of the action meets the cleanup standards	• Removes or contains soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 2 years of approval of the CAP not including long-term groundwater monitoring	• Concerns include loss of property value due to the reliance on containment to address contaminants beneath the building and beneath the asphalt pavement in the northern portion of the site

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
	• Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand to maximize protection of groundwater given that the building and asphalt pavement would contain the residual source by limiting water infiltration					
Alternative S4: DNAPL Excavation Outside Building Footprint, Limited Excavation Inside	• Excavates and landfills/treats off site soil located above the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels except inaccessible soils beneath the building footprint and soil beneath the asphalt pavement in the northern portion of the site • Uses the restrictive environmental covenant to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the building and the asphalt pavement for the direct contact pathway (note: no risks for the vapor intrusion pathway)	• Complies by removing or containing soil exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from residual COC concentrations in the Upper Silt and beneath the building and the asphalt pavement	• Complies with ARARs for demolition, excavation, disposal, and site restoration	• Uses post-excavation sampling to demonstrate that soil remaining on site following implementation of the action meets the cleanup standards	• Removes or contains soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 2 years of approval of the CAP not including long-term groundwater monitoring	• Concerns include loss of property value due to the reliance on containment to address contaminants beneath the building and beneath the asphalt pavement in the northern portion of the site

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
	• Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand to maximize protection of groundwater given that the building and asphalt pavement would contain the residual source by limiting water infiltration					
Alternative S5: Solidification Outside Building Footprint	• Solidifies soil located in the Upper Sand and the top foot of the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels except soils beneath the building footprint • Uses the restrictive environmental covenant to protect human health and the environment from the solidified soil and the residual COC concentrations in soil remaining below the top foot of the Upper Silt and beneath the building for the direct contact pathway (note: no risks for the vapor intrusion pathway)	• Complies by solidifying or containing soil exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from the solidified soil and residual COC concentrations below the top foot of the Upper Silt and beneath the building	• Complies with ARARs for demolition, solidification and site restoration	• Uses long-term monitoring of leachate and physical performance testing of solidified soil following implementation of the action	• Solidifies soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 2 years of approval of the CAP not including long-term groundwater monitoring	• Concerns include: ○ Loss of property value due to the reliance on containment to address contaminants beneath the building ○ Impacts to the topography of the site due to bulking of soil during the solidification process ○ Potential removal of the 2 to 3-foot clean gravel layer beneath asphalt pavement

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
	• Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand and the top foot of the Upper Silt to maximize protection of groundwater given that the building would contain the residual source by significantly limiting water infiltration					
Alternative S5A: Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop	• Solidifies soil located in the Upper Sand and the top foot of the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels except soils beneath the building footprint • Recovers DNAPL from beneath the building footprint • Uses the restrictive environmental covenant to protect human health and the environment from the solidified soil and the residual COC concentrations in soil remaining below the top foot of the Upper Silt and beneath the building for the direct contact pathway (note: no risks for the vapor intrusion pathway)	• Complies by solidifying or containing soil exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from the solidified soil and residual COC concentrations below the top foot of the Upper Silt and beneath the building	• Complies with ARARs for demolition, DNAPL recovery, solidification, waste disposition, and site restoration	• Uses long-term monitoring of leachate and physical performance testing of solidified soil following implementation of the action	• Recovers DNAPL and solidifies soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 5 years of approval of the CAP not including long-term groundwater monitoring	• Concerns include: ○ Loss of property value due to the partial reliance on containment to address contaminants beneath the building ○ Impacts to the topography of the site due to bulking of soil during the solidification process ○ Potential removal of the 2 to 3-foot clean gravel layer beneath asphalt pavement

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
	• Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand and the top foot of the Upper Silt to maximize protection of groundwater given that the building would contain the residual source by significantly limiting water infiltration					
Alternative S5B: Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks	• Solidifies soil located in the Upper Sand and the top foot of the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels • Uses the restrictive environmental covenant to protect human health and the environment from the solidified soil and the residual COC concentrations in soil remaining below the top foot of the Upper Silt for the direct contact pathway (note: no risks for the vapor intrusion pathway) • Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand and the top foot of the Upper Silt to maximize protection of groundwater	• Complies by solidifying soil located in the Upper Sand and the top foot of the Upper Silt exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from the solidified soil	• Complies with ARARs for demolition, solidification, and site restoration	• Uses long-term monitoring of leachate and physical performance testing of solidified soil following implementation of the action	• Solidifies soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 2 years of approval of the CAP not including long-term groundwater monitoring	• Addresses Port of Longview's preference for treating all soil containing DNAPL or COCs at concentrations exceeding the cleanup levels • Concerns include: ○ Impacts to the topography of the site due to bulking of soil during the solidification process ○ Potential removal of the 2 to 3-foot clean gravel layer beneath asphalt pavement

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
Alternative S5C: Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop	• Solidifies soil located in the Upper Sand and the top foot of the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels except soils beneath and adjacent to the building footprint • Removes, captures, and destroys COCs from DNAPL-contaminated soil located in the Upper Sand and the Upper Silt using in situ thermal treatment for soils beneath and adjacent to the building footprint • Uses the restrictive environmental covenant to protect human health and the environment from the solidified soil for the direct contact pathway (note: no risks for the vapor intrusion pathway) • Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand and the Upper Silt to maximize protection of groundwater	• Complies by solidifying soil or by removing COCs from DNAPL-contaminated soil located in the Upper Sand and the Upper Silt exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from the solidified soil and residual COC concentrations remaining in the Upper Silt	• Complies with ARARs for demolition, solidification, ERH, COC capture and treatment, waste disposition, and site restoration	• Uses long-term monitoring of leachate and physical performance testing of solidified soil following implementation of the action • Uses post-treatment verification soil sampling to demonstrate that ERH-treated soil meets the cleanup standards	• Solidifies or treats soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 3 years of approval of the CAP not including long-term groundwater monitoring	• Addresses Port of Longview's preference for treating all soil containing DNAPL or COCs at concentrations exceeding the cleanup levels • Concerns include: o Impacts to the topography of the site due to bulking of soil during the solidification process o Potential removal of the 2 to 3-foot clean gravel layer beneath asphalt pavement

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
Alternative S6: DNAPL Treatment by ERH	• Removes, captures, and destroys COCs from DNAPL-contaminated soil located in the Upper Sand and the Upper Silt using in situ thermal treatment, except soils beneath the asphalt pavement in the northern portion of the site • Uses the restrictive environmental covenant to protect human health and the environment from the residual COC concentrations in soil remaining beneath the asphalt pavement for the direct contact pathway • Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand and the Upper Silt to maximize protection of groundwater	• Complies by removing COCs from DNAPL-contaminated soil or containing soil exhibiting DNAPL or COC concentrations exceeding cleanup levels • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from residual COC concentrations beneath the asphalt pavement	• Complies with ARARs for demolition, ERH, COC capture and treatment, waste disposition, and site restoration	• Uses post-treatment verification soil sampling to demonstrate that soil remaining on site following implementation of the action meets the cleanup standards	• Treats or contains soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 3 years of approval of the CAP not including long-term groundwater monitoring	• Concerns include loss of property value due to the reliance on containment to address contaminants beneath the asphalt pavement in the northern portion of the site

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
Alternative S7: DNAPL Excavation and ERH	• Excavates and landfills/treats off site soil located above the Upper Silt containing DNAPL or COCs at concentrations exceeding the cleanup levels except soils beneath the building footprint and beneath the asphalt pavement in the northern portion of the site • Removes, captures, and destroys COCs from DNAPL-contaminated soil located in the Upper Sand and the Upper Silt using in situ thermal treatment for soils beneath the building footprint • Uses the restrictive environmental covenant to protect human health and the environment from the residual COC concentrations in soil remaining in the Upper Silt and beneath the asphalt pavement for the direct contact pathway • Makes a reasonable effort to remove sources (liquid wastes or media with high concentrations of hazardous substances) in the Upper Sand (and the Upper Silt beneath the building footprint) to maximize protection of groundwater	• Complies by removing or containing soil exhibiting DNAPL or COC concentrations exceeding cleanup levels outside the building footprint • Complies by removing COCs from DNAPL-contaminated soil beneath the building footprint • Relies on institutional controls to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property and to protect human health and the environment from residual COC concentrations in the Upper Silt and beneath the asphalt pavement	• Complies with ARARs for demolition, excavation, ERH, COC capture and treatment, waste disposition, and site restoration	• Uses post-excavation and post-treatment verification soil sampling to demonstrate that soil remaining on site following implementation of the action meets the cleanup standards	• Removes, treats, or contains soil containing DNAPL or COC concentrations exceeding cleanup levels within approximately 3 years of approval of the CAP not including long-term groundwater monitoring	• Concerns include loss of property value due to the reliance on containment to address contaminants beneath the asphalt pavement in the northern portion of the site

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
Groundwater Alternatives						
Baseline Alternative GW1: ERH and Enhanced Biodegradation	• Treats groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup levels using in situ treatment (ERH and enhanced biodegradation)	• Complies by treating COCs within the conditional POC boundary in groundwater exhibiting COC concentrations exceeding cleanup levels • Relies on institutional controls only to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property	• Complies with ARARs for demolition, ERH, COC capture and treatment, waste disposition, underground injection, and site restoration	• Uses long-term monitoring of groundwater to demonstrate the action meets the cleanup standards	• Treats groundwater containing COC concentrations exceeding cleanup levels within approximately 6 years of approval of the CAP	• Addresses Port of Longview's preference for active treatment of groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup levels
Alternative GW2: Chemical Oxidation and MNA	• Treats groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup levels using in situ treatment (chemical oxidation and MNA)	• Complies by treating COCs within the conditional POC boundary in groundwater exhibiting COC concentrations exceeding cleanup levels • Relies on institutional controls only to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property	• Complies with ARARs for underground injection, MNA, and associated activities	• Uses long-term monitoring of groundwater to demonstrate the action meets the cleanup standards	• Treats groundwater containing COC concentrations exceeding cleanup levels within approximately 8 years of approval of the CAP	• Addresses Port of Longview's preference for active treatment of groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup levels
Alternative GW3: Active Biosparging	• Treats groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup levels using in situ treatment (biosparging)	• Complies by treating COCs within the conditional POC boundary in groundwater exhibiting COC concentrations exceeding cleanup levels • Relies on institutional controls only to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property	• Complies with ARARs for underground injection	• Uses long-term monitoring of groundwater to demonstrate the action meets the cleanup standards	• Treats groundwater containing COC concentrations exceeding cleanup levels within approximately 20 years of approval of the CAP	• Concerns include: ○ The inability of the existing biosparging system to reduce groundwater concentrations to below the cleanup levels

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Alternative	Protect Human Health and the Environment	Comply with Cleanup Standards	Comply with Applicable State and Federal Regulations	Provide for Compliance Monitoring	Provide for a Reasonable Restoration Timeframe	Consider Public Concerns
						○ Loss of property value due to the reliance on monitoring to address groundwater contamination for a long time (20 years)
Alternative GW4: MNA	• Treats groundwater beneath the MFA containing COCs at concentrations exceeding the cleanup levels using in situ treatment (MNA) and a contingent remedy of chemical oxidation, if needed.	• Complies by treating COCs within the conditional POC boundary in groundwater exhibiting COC concentrations exceeding cleanup levels • Relies on institutional controls only to the extent that use of Method C cleanup levels would require a restrictive environmental covenant on the property	• Complies with ARARs for MNA	• Uses long-term monitoring of groundwater to demonstrate the action meets the cleanup standards	• Treats groundwater containing COC concentrations exceeding cleanup levels within approximately 30 years of approval of the CAP	• Concerns include: ○ MNA would not decrease groundwater concentrations to below the cleanup levels in a reasonable timeframe (<30 years) ○ Loss of property value due to the reliance on monitoring to address groundwater contamination for a long time (30 years)

Table 8-1
Evaluation of Soil and Groundwater Alternatives Using MTCA Criteria[1]
RI/FS Port of Longview MFA – International Paper

Notes:

[1] The criteria, use permanent solutions to the maximum extent practicable, is evaluated in Section 9, and not included in this table.

ARAR - applicable, relevant, and appropriate requirement
CAP - corrective action plan
COC - contaminant of concern
DNAPL - dense non-aqueous phase liquid
ERH - electrical resistance heating
MFA - Maintenance Facility Area
MNA - monitored natural attenuation
MTCA - Model Toxics Control Act
POC - point of compliance
RI/FS - remedial investigation/feasibility study

Table 9-1
Comparison of Soil Alternative Costs
RI/FS Port of Longview MFA – International Paper

Task	Soil Alternatives									
	S1	S2	S3	S4	S5	S5A	S5B	S5C	S6	S7
Subtotals										
Capital Direct Costs	$4,770,000	$4,210,000	$3,650,000	$3,830,000	$2,030,000	$2,130,000	$2,380,000	$2,820,000	$3,860,000	$4,910,000
Contractor Contingency Assumed (%) [a]	20%	20%	20%	20%	20%	20%	20%	20%	30%	25%
Capital Indirect Costs	$692,000	$624,000	$586,000	$610,000	$558,000	$581,000	$620,000	$697,000	$673,000	$691,000
Total Capital Costs	**$5,460,000**	**$4,830,000**	**$4,240,000**	**$4,440,000**	**$2,590,000**	**$2,710,000**	**$3,000,000**	**$3,520,000**	**$4,530,000**	**$5,600,000**
O&M Totals										
Total O&M Costs	$630,000	$630,000	$630,000	$630,000	$893,000	$1,210,000	$893,000	$893,000	$675,000	$653,000
Total Capital and O&M Costs	$6,090,000	$5,460,000	$4,870,000	$5,070,000	$3,480,000	$3,920,000	$3,890,000	$4,410,000	$5,210,000	$6,250,000
Years of O&M	30	30	30	30	30	30	30	30	30	30
Annualized O&M Costs	$21,000	$21,000	$21,000	$21,000	$29,800	$40,300	$29,800	$29,800	$22,500	$21,800
PW O&M Costs [b]	**$431,000**	**$431,000**	**$431,000**	**$431,000**	**$649,000**	**$920,000**	**$649,000**	**$649,000**	**$476,000**	**$454,000**
Other Costs										
Sales Tax	$382,000	$337,000	$292,000	$306,000	$162,000	$170,000	$190,000	$226,000	$309,000	$393,000
Site Inspection and Oversight	$164,000	$145,000	$127,000	$133,000	$78,000	$81,000	$90,000	$106,000	$136,000	$168,000
Project Totals										
Total Capital and PW O&M Costs	**$5,890,000**	**$5,260,000**	**$4,670,000**	**$4,870,000**	**$3,240,000**	**$3,630,000**	**$3,650,000**	**$4,170,000**	**$5,010,000**	**$6,050,000**
Total Project PW [b]	**$6,440,000**	**$5,740,000**	**$5,090,000**	**$5,310,000**	**$3,480,000**	**$3,880,000**	**$3,930,000**	**$4,500,000**	**$5,460,000**	**$6,610,000**
Total Project Cost	**$6.4M**	**$5.7M**	**$5.1M**	**$5.3M**	**$3.5M**	**$3.9M**	**$3.9M**	**$4.5M**	**$5.5M**	**$6.6M**

[a] ERH alternatives assume greater contractor contingency due to additional cost uncertainties associated with ERH technology.

[b] Present worth costs were calculated using a 3% discount rate.

Notes:

✓- included
○ - not included
Discount Rate (3%) = Interest Rate (6%) - Inflation (3%)
DNAPL - dense non-aqueous phase liquid
ERH - electrical resistance heating
LTM - long-term monitoring
M - million
MFA - Maintenance Facility Area
O&M - operation and maintenance
PW - present worth
RI/FS - remedial investigation/feasibility study

S1 - Comprehensive Excavation
S2 - Comprehensive Excavation Outside Building Footprint
S3 - DNAPL Excavation Outside Building Footprint
S4 - DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
S5 - Solidification Outside Building Footprint
S5A - Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
S5B - Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
S5C - Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
S6 - DNAPL Treatment by ERH
S7 - DNAPL Excavation and ERH

Table 9-2
Soil Disproportionate Cost Analysis Summary
RI/FS Port of Longview MFA – International Paper

		Volume Removed or Treated		Mass Removed or Treated		Cost ($)	
Alternative No.	**Description**	**DNAPL Removed (gallons)**	**Relative Benefit**	**COC Mass Removed (pounds)**	**Relative Benefit**	**Total Estimated Project Cost**	**Relative Cost**
S1	Comprehensive Excavation (Baseline)	**1,550**	1.00	**176,000**	1.00	$6,440,000	0.95
S2	Comprehensive Excavation Outside Building Footprint	1,450	0.74	167,000	0.86	$5,740,000	0.72
S3	DNAPL Excavation Outside Building Footprint	1,450	0.74	152,000	0.62	$5,090,000	0.51
S4	DNAPL Excavation Outside Building Footprint, Limited Excavation Inside	**1,550**	1.00	156,000	0.68	$5,310,000	0.58
S5	Solidification Outside Building Footprint	1,450	0.74	167,000	0.86	**$3,480,000**	0.00
S5A	Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop	1,500	0.87	167,000	0.86	$3,880,000	0.13
S5B	Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks	**1,550**	1.00	**176,000**	1.00	$3,930,000	0.14
S5C	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop	1,430	0.69	165,000	0.83	$4,500,000	0.33
S6	DNAPL Treatment by ERH	1,160	0.00	113,000	0.00	$5,460,000	0.63
S7	DNAPL Excavation and ERH	1,520	0.92	157,000	0.70	$6,610,000	1.00
	Minimum:	1,160	NA	113,000	NA	$3,480,000	NA
	Maximum:	1,550	NA	176,000	NA	$6,610,000	NA

Notes:

Bolded values represent maximum relative benefit and minimum relative cost.

COC - chemical of concern
DNAPL - dense non-aqueous phase liquid
ERH - electrical resistance heating
MFA - Maintenance Facility Area
RI/FS - remedial investigation/feasibility study

Table 9-3
Soil and DNAPL Long-Term Effectiveness Percentage Calculations
RI/FS Port of Longview MFA – International Paper

Alternative	Soil[1]												
	Total Area Remediated (sqft)	Thickness Remediated (ft)	Volume Remediated (CY)	Off-Site Disposal		On-Site Containment		On-Site Solidification		On-Site ERH Treatment		Totals	
				Volume (CY)	%	Volume (CY)	%	Volume (CY)	%	Volume (CY)	%	Volume (CY)	%
S1	34,700	5	6,400	6,400	100%	0	0%	0	0%	0	0%	6,400	100%
S2	34,700	5	6,400	6,000	94%	400	6%	0	0%	0	0%	6,400	100%
S3	34,700	5	6,400	4,600	72%	1,800	28%	0	0%	0	0%	6,400	100%
S4	34,700	5	6,400	4,900	77%	1,500	23%	0	0%	0	0%	6,400	100%
S5	34,700	5	6,400	0	0%	400	6%	6,000	94%	0	0%	6,400	100%
S5A[2]	34,700	5	6,400	0	0%	400	6%	6,000	94%	0	0%	6,400	100%
S5B	34,700	5	6,400	0	0%	0	0%	6,400	100%	0	0%	6,400	100%
S5C[3]	34,700	5	6,400	0	0%	0	0%	5,070	79%	1,350	21%	6,400	100%
S6	34,700	5	6,400	0	0%	1,400	22%	0	0%	5,000	78%	6,400	100%
S7	34,700	5	6,400	4,600	72%	1,400	22%	0	0%	400	6%	6,400	100%

Table 9-3
Soil and DNAPL Long-Term Effectiveness Percentage Calculations
RI/FS Port of Longview MFA – International Paper

	DNAPL										
	Total Volume Remediated	Off-Site Disposal[4]		On-Site Containment		On-Site Solidification		Off-Site Incineration[5]		Totals	
Alternative	(gal)	Volume (gal)	%	Volume (gal)	%	Volume (gal)	%	Volume (gal)	%	Volume (gal)	%
S1	1,550	1,030	66%	0	0%	0	0%	520	34%	1,550	100%
S2	1,550	970	63%	100	6%	0	0%	480	31%	1,550	100%
S3	1,550	970	63%	100	6%	0	0%	480	31%	1,550	100%
S4	1,550	1,030	66%	0	0%	0	0%	520	34%	1,550	100%
S5	1,550	0	0%	100	6%	1,450	94%	0	0%	1,550	100%
S5A[2]	1,550	0	0%	50	3%	1,450	94%	50	3%	1,550	100%
S5B	1,550	0	0%	0	0%	1,550	100%	0	0%	1,550	100%
S5C[3]	1,550	0	0%	120	8%	1,090	70%	340	22%	1,550	100%
S6	1,550	0	0%	390	25%	0	0%	1,160	75%	1,550	100%
S7	1,550	970	63%	30	2%	0	0%	550	35%	1,550	100%

Notes:

[1] The soil volumes shown on this table are calculated from the area and thickness assumed for remediation.

[2] Free-product recovery will occur beneath the building. However, soil will not be treated or removed beneath the building. Thus, this alternative relies on containment of soil beneath the building.

[3] ERH treatment area extends beyond the building footprint to the north and east.

[4] Estimated volume of DNAPL contained within the soil which will be managed via off-site stabilization/treatment with landfill disposal.

[5] Assumes one third of DNAPL excavated with soil can be separated from the soil and incinerated (Alternatives S1, S2, S3, S4, and S7), and that 75% of DNAPL will be removed and incinerated during ERH treatment (Alternatives S5C, S6, and S7).

CY - cubic yards
ERH - electrical resistance heating
ft - feet
gal - gallons
MFA - Maintenance Facility Area
RI/FS - remedial investigation/feasibility study
sqft - square feet

Table 9-4
Comparison of Groundwater Alternative Costs
RI/FS Port of Longview MFA – International Paper

Task	Baseline Alternative GW1: ERH and Enhanced Biodegradation [a]	Alternative GW2: Chemical Oxidation and Monitored Natural Attenuation	Alternative GW3: Active Biosparging	Alternative GW4: Monitored Natural Attenuation
Subtotals				
Capital Direct Costs	$9,090,000	$3,270,000	$345,000	$134,000
Contractor Contingency Assumed (%) [b]	25%	20%	20%	20%
Capital Indirect Costs	$890,000	$610,000	$214,000	$140,000
Total Capital Costs	**$9,980,000**	**$3,880,000**	**$559,000**	**$274,000**
O&M Totals				
Total O&M Costs	$224,000	$343,000	$1,840,000	$1,710,000
Total Capital and O&M Costs	$10,200,000	$4,220,000	$2,400,000	$1,980,000
Years of O&M	4	8	20	30
Annualized O&M Costs	$56,000	$42,900	$92,000	$57,000
PW O&M Costs [c]	**$211,000**	**$301,000**	**$1,400,000**	**$1,120,000**
Other Costs				
Sales Tax	$727,000	$262,000	$27,600	$10,700
Site Inspection and Oversight	$299,000	$116,000	$16,800	$8,220
Project Totals				
Total Capital and PW O&M Costs	**$10,200,000**	**$4,180,000**	**$1,960,000**	**$1,390,000**
Total Project PW [c]	**$11,200,000**	**$4,560,000**	**$2,000,000**	**$1,410,000**
Total Project Cost	**$11.2M**	**$4.6M**	**$2.0M**	**$1.4M**

Notes:

[a] Costs would be less for this alternative, if it were paired with a soil alternative that included ERH.

[b] ERH alternatives assume greater contractor contingency due to additional cost uncertainties associated with ERH technology.

[c] Present worth costs were calculated using a 3% discount rate. Discount Rate (3%) = Interest Rate (6%) - Inflation (3%).

ERH - electrical resistance heating
M - million
MFA - Maintenance Facility Area
O&M - operation and maintenance
PW - present worth
RI/FS - remedial investigation/feasibility study

Table 9-5
Groundwater Disproportionate Cost Analysis Summary
RI/FS Port of Longview MFA – International Paper

Alternative No.	Description	Estimated Restoration Time (Years)	Groundwater Restoration		Cost ($)	
			Restoration Rate (cubic feet/year)	Relative Benefit	Total Estimated Project Cost	Relative Cost
GW1	ERH and Enhanced Biodegradation	6	**96,300**	1.00	$11,200,000	1.00
GW2	Chemical Oxidation and Monitored Natural Attenuation	8	72,200	0.69	$4,560,000	0.32
GW3	Active Biosparging	20	28,900	0.12	$2,000,000	0.06
GW4	Monitored Natural Attenuation	30	19,300	0.00	**$1,410,000**	0.00
	Minimum:	6	19,300	NA	$1,410,000	NA
	Maximum:	30	96,300	NA	$11,200,000	NA

Notes:
Bolded values represent maximum relative benefit and minimum relative cost.

ERH - electrical resistance heating
GW - groundwater
MFA - Maintenance Facility Area
NA - not applicable
RI/FS - remedial investigation/feasibility study

Table 9-6
MTCA Criteria Rankings Summary for Soil Alternatives
RI/FS Port of Longview MFA – International Paper

Alternative	Protectiveness Rank	Permanence Rank	Cost (PW) Rank	Long-Term Effectiveness Rank	Short-Term Risk Rank	Implementability Rank	Public Concerns Rank	Sum of Individual Ranks	Combined Rank
S1	1	6	9	7	8	6	1	77	10
S2	4	7	8	9	6	3	2	39	5
S3	9	3	5	10	6	2	9	44	7
S4	8	9	6	8	8	6	9	54	8
S5	4	10	1	5	1	1	5	27	4
S5A	4	3	2	4	2	4	5	24	2
S5B	1	2	3	3	5	6	3	**23**	**1**
S5C	3	1	4	2	4	8	3	25	3
S6	10	5	7	1	3	8	7	41	6
S7	7	8	10	6	10	8	7	56	9

Notes:
DNAPL - dense non-aqueous phase liquid
ERH - electrical resistance heating
MFA - Maintenance Facility Area
MTCA - Model Toxics Control Act
PW - present worth
RI/FS - remedial investigation/feasibility study
S1 - Comprehensive Excavation
S2 - Comprehensive Excavation outside Building Footprint
S3 - DNAPL Excavation Outside Building Footprint
S4 - DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
S5 - Solidification Outside Building Footprint
S5A - Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
S5B - Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
S5C - Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
S6 - DNAPL Treatment by ERH
S7 - DNAPL Excavation and ERH

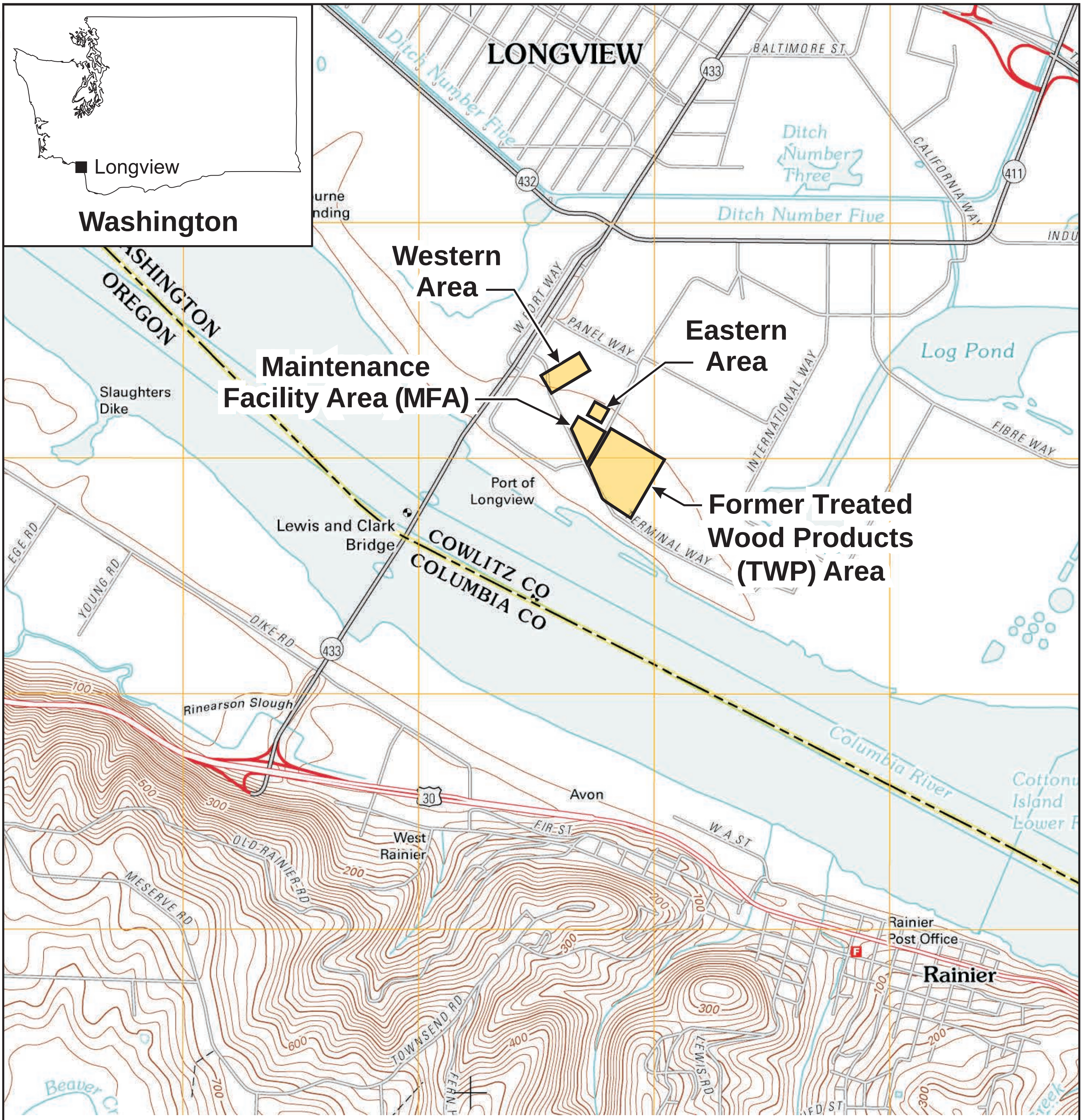
Table 9-7
MTCA Criteria Rankings Summary for Groundwater Alternatives
RI/FS Port of Longview MFA – International Paper

Alternative	Protectiveness Rank	Permanence Rank	Cost (PW) Rank	Long-Term Effectiveness Rank	Short-Term Risk Rank	Implementability Rank	Public Concerns Rank	Sum of Individual Ranks	Combined Rank
GW1	1	2	4	2	4	4	2	19	3
GW2	2	2	3	2	3	3	2	17	2
GW3	3	3	2	3	2	2	4	19	3
GW4	4	3	1	3	1	1	3	**16**	**1**

Notes:
MFA - Maintenance Facility Area
MTCA - Model Toxics Control Act
PW - present worth
RI/FS - remedial investigation/feasibility study
GW1 - Electrical Resistance Heating and Enhanced Biodegradation
GW2 - Chemical Oxidation and Monitored Natural Attenuation
GW3 - Active Biosparging
GW4 - Monitored Natural Attenuation

Figures

60395232_01.ai



Source: USGS 7.5-minute topographic quadrangle, Rainier, Washington, 2011

N

0 0.5 1

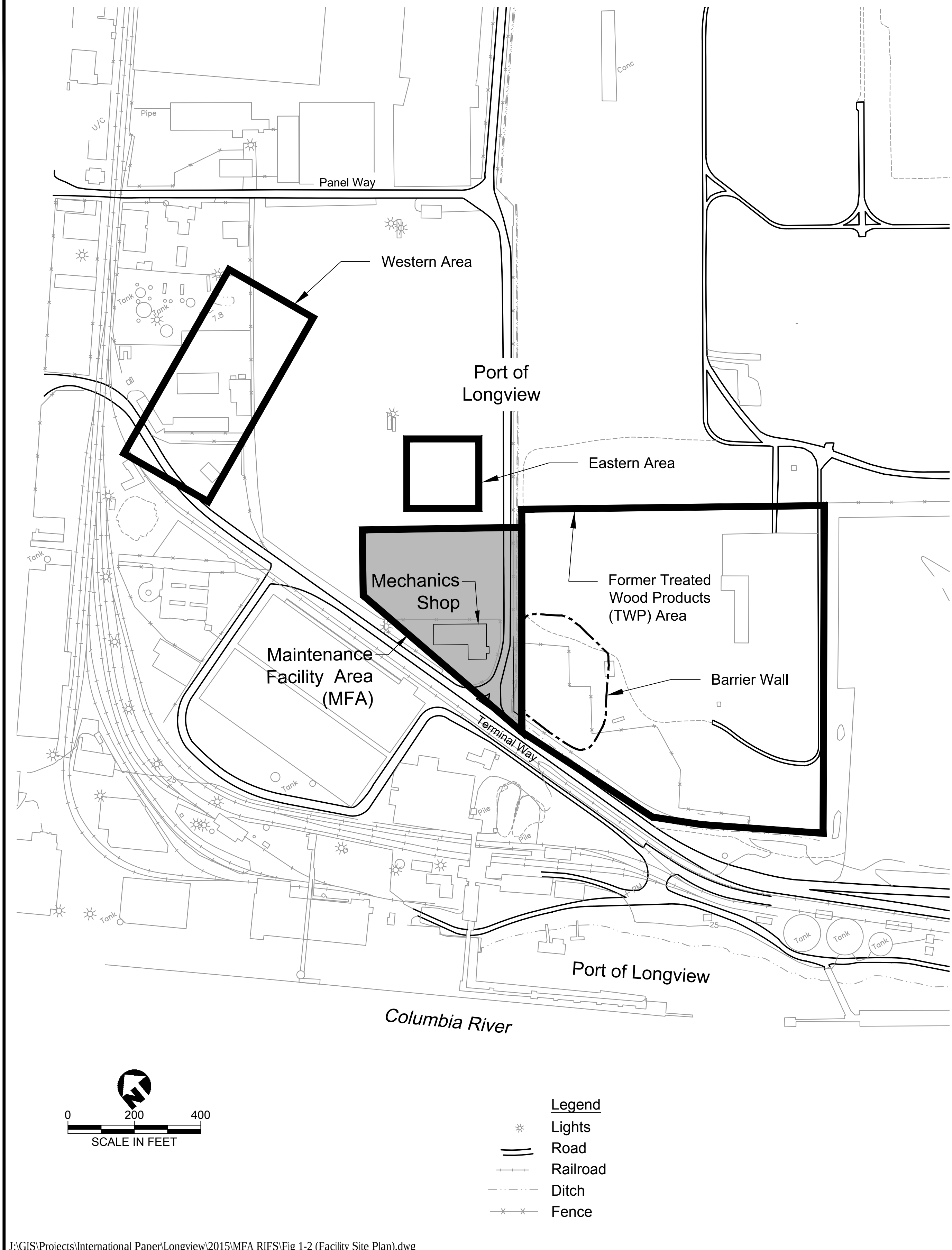
Scale in Miles

International Paper Longview, WA	Project No. 60395232

AECOM

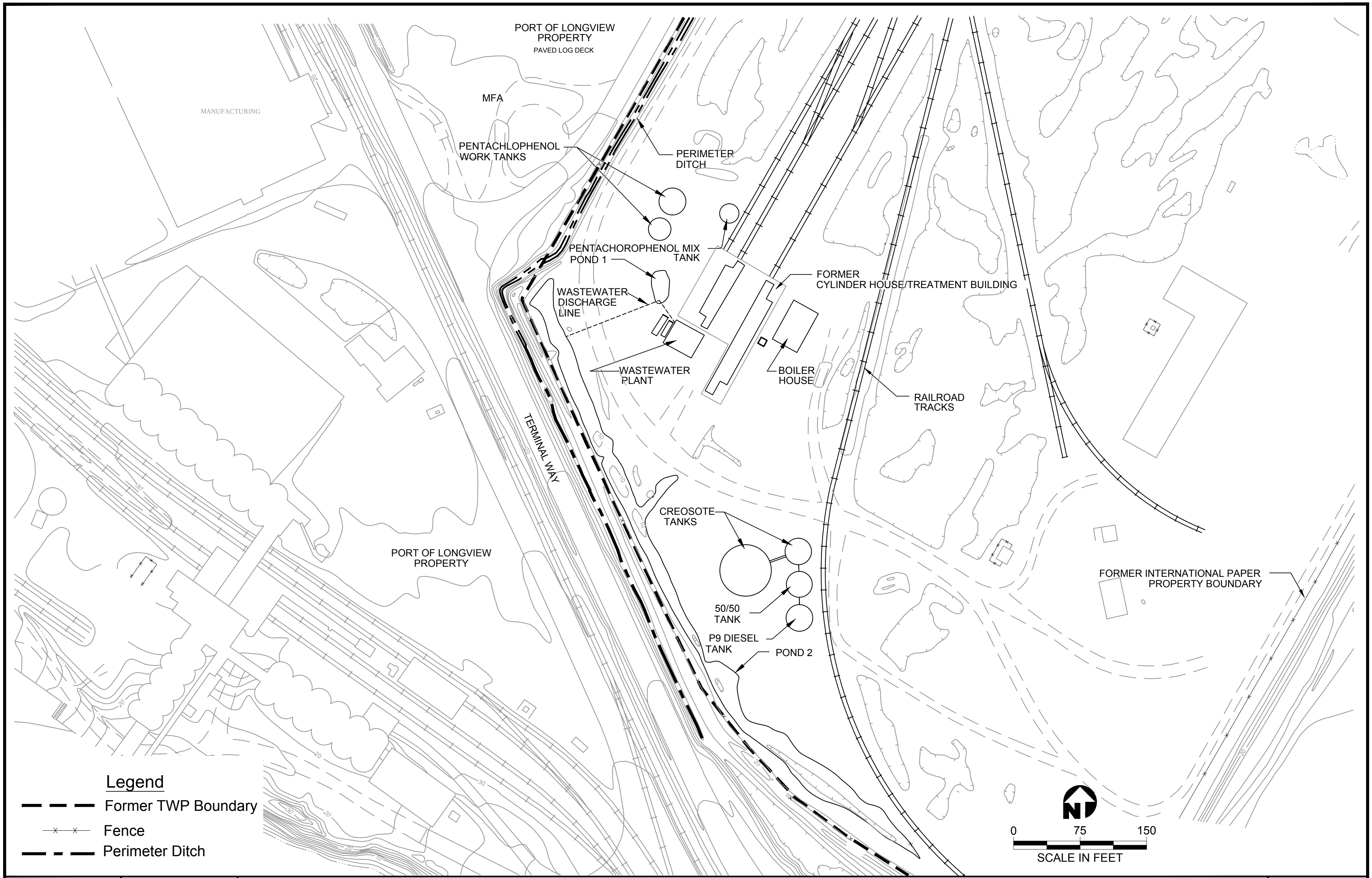
Former International Paper Longview Facility
Site Location Map

Figure
1-1



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 1-2 (Facility Site Plan).dwg
Mod: 10/07/2015, 10:39 | Plotted: 10/07/2015, 10:40 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Former International Paper Facility Site Plan	Figure 1-2
AECOM			



International Paper
Longview, WA

Project No.
60395232

AECOM

Previous Features - Former TWP Area

Figure
1-3

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 1-3 (Former TMP).dwg
Mod: 09/15/2015, 08:18 | Plotted: 09/15/2015, 08:19 | JOHN_KNOBBS

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 1-4 (Aerial Site Plan).dwg
Mod: 09/15/2015, 08:20 | Plotted: 09/15/2015, 08:20 | JOHN_KNOBBS

Aerial Source: 2010 Bing (Microsoft Corp)

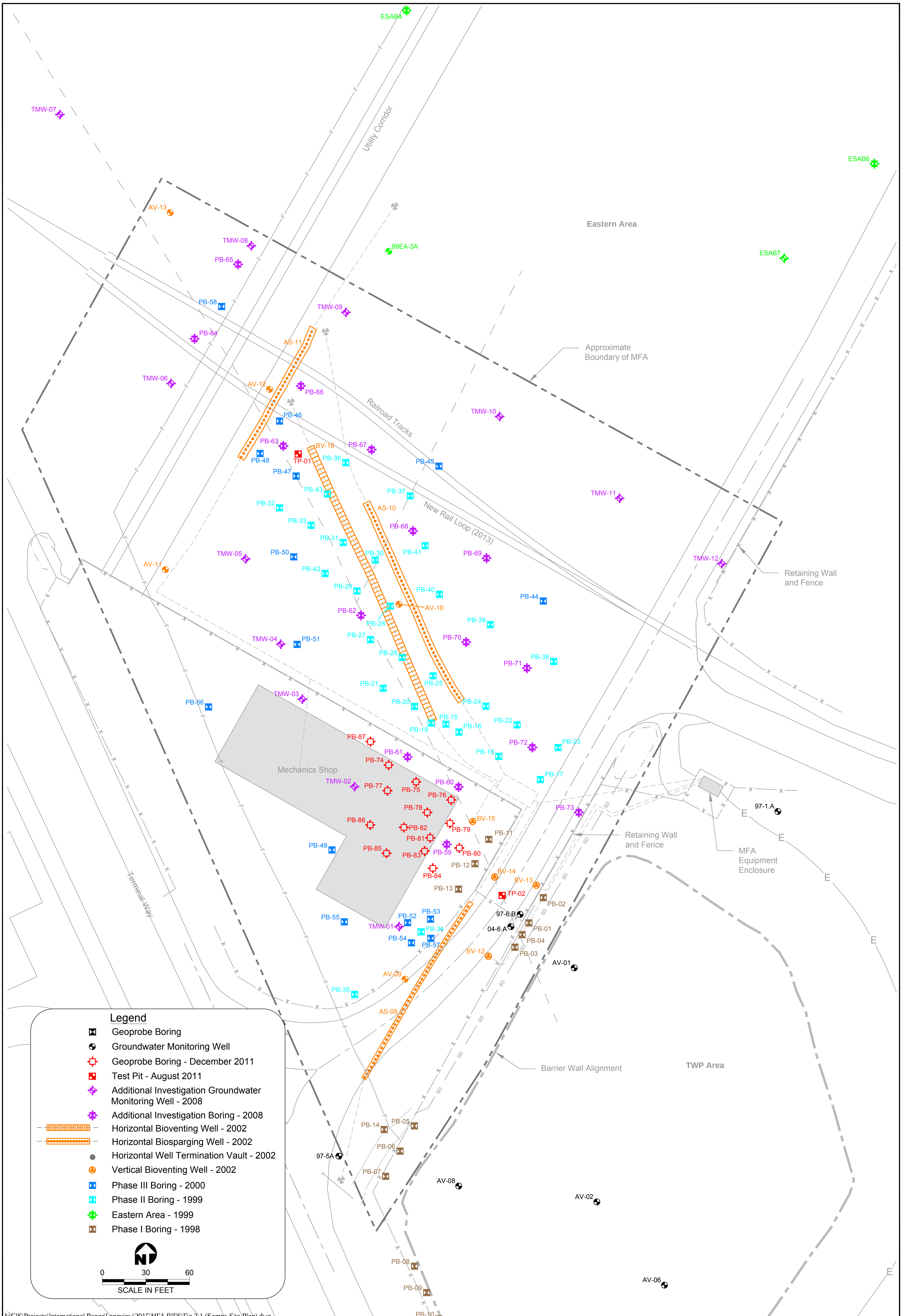
International Paper
Longview, WA

Project No.
60395232

AECOM

Former International Paper Facility
Current MFA Site Plan

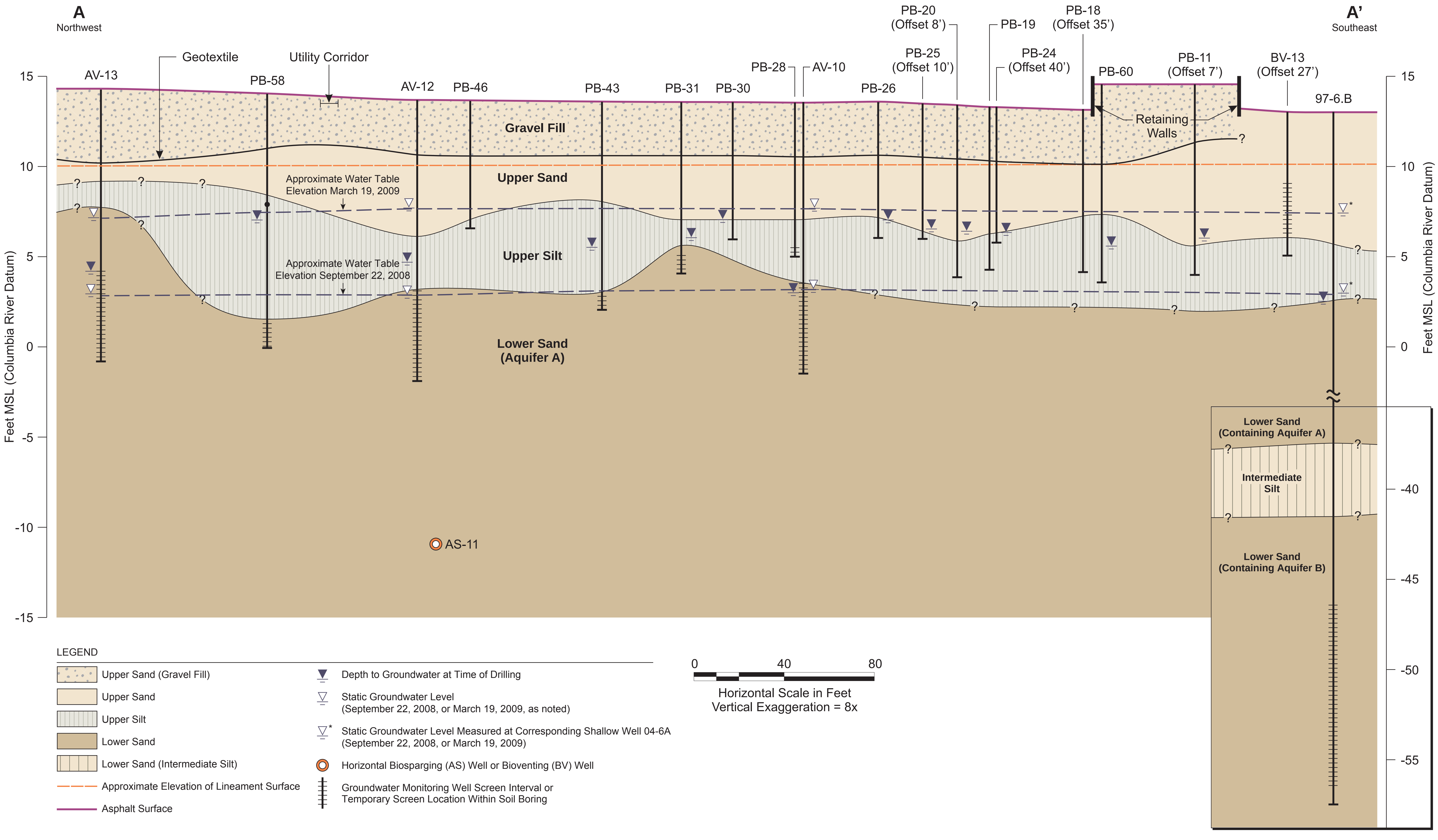
Figure
1-4



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 2-1 (Samps Site Plan).dwg
Mod: 08/19/2015, 11:21 | Plotted: 09/15/2015, 08:32 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Boring and Monitoring Well Locations Maintenance Facility Area	Figure 2-1
AECOM			

603952232_02.ai

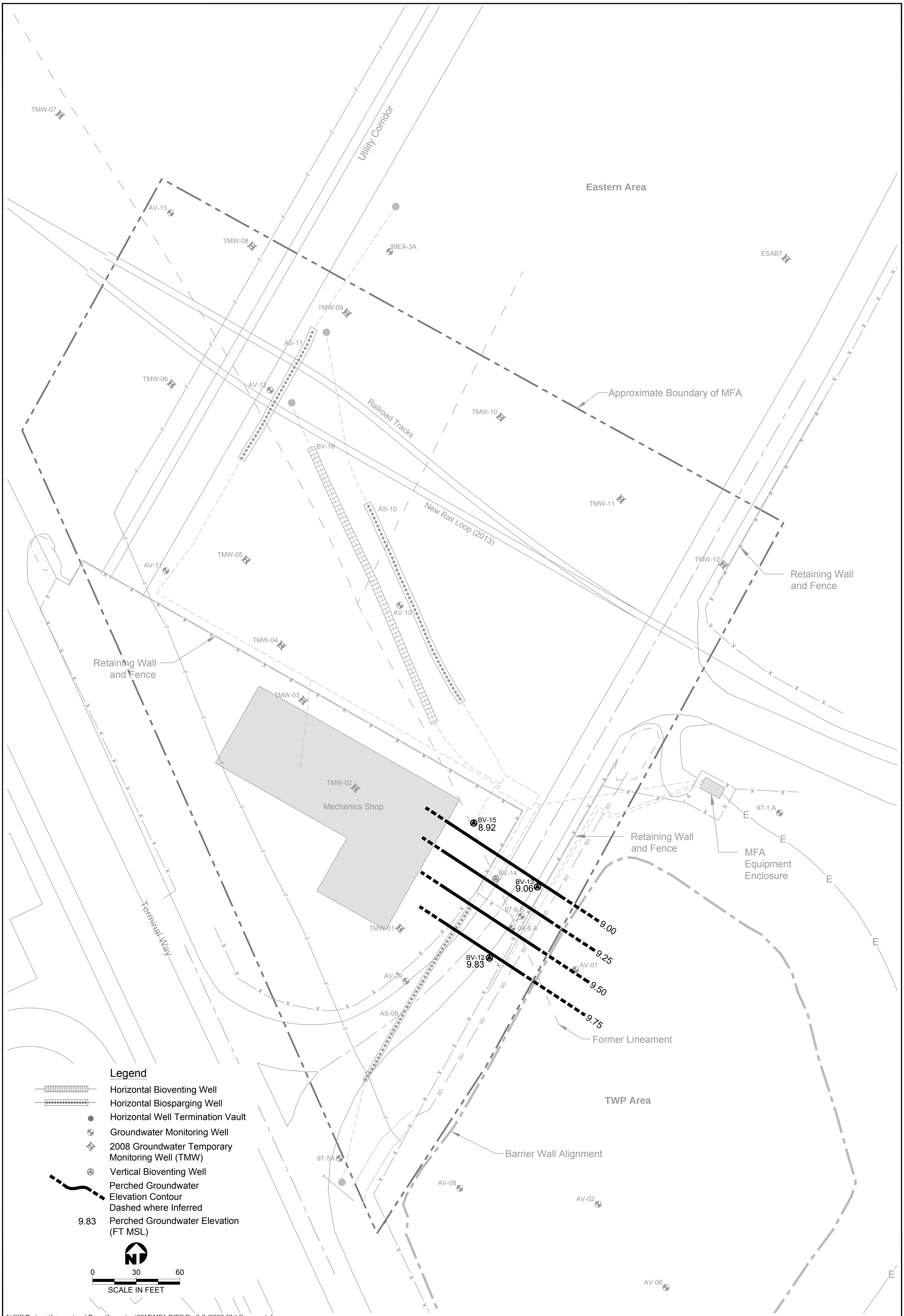


International Paper Longview, WA	Project No. 60395232

AECOM

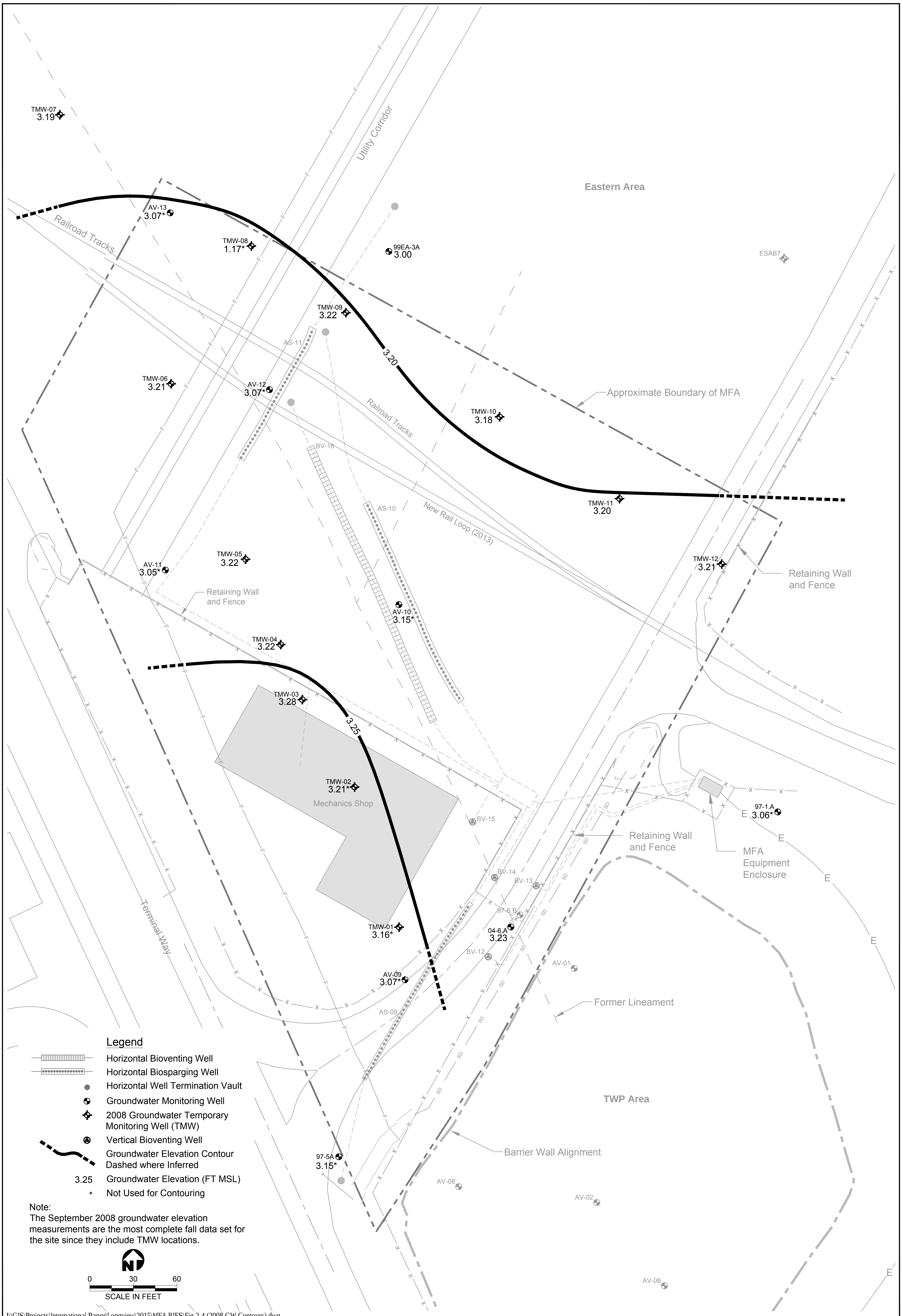
Site Stratigraphy
Maintenance Facility Area

Figure
2-2



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 2-3 (2003 GW Contours).dwg
Mod: 09/15/2015, 08:36 | Plotted: 09/15/2015, 08:37 | JOHN_KNOBBS

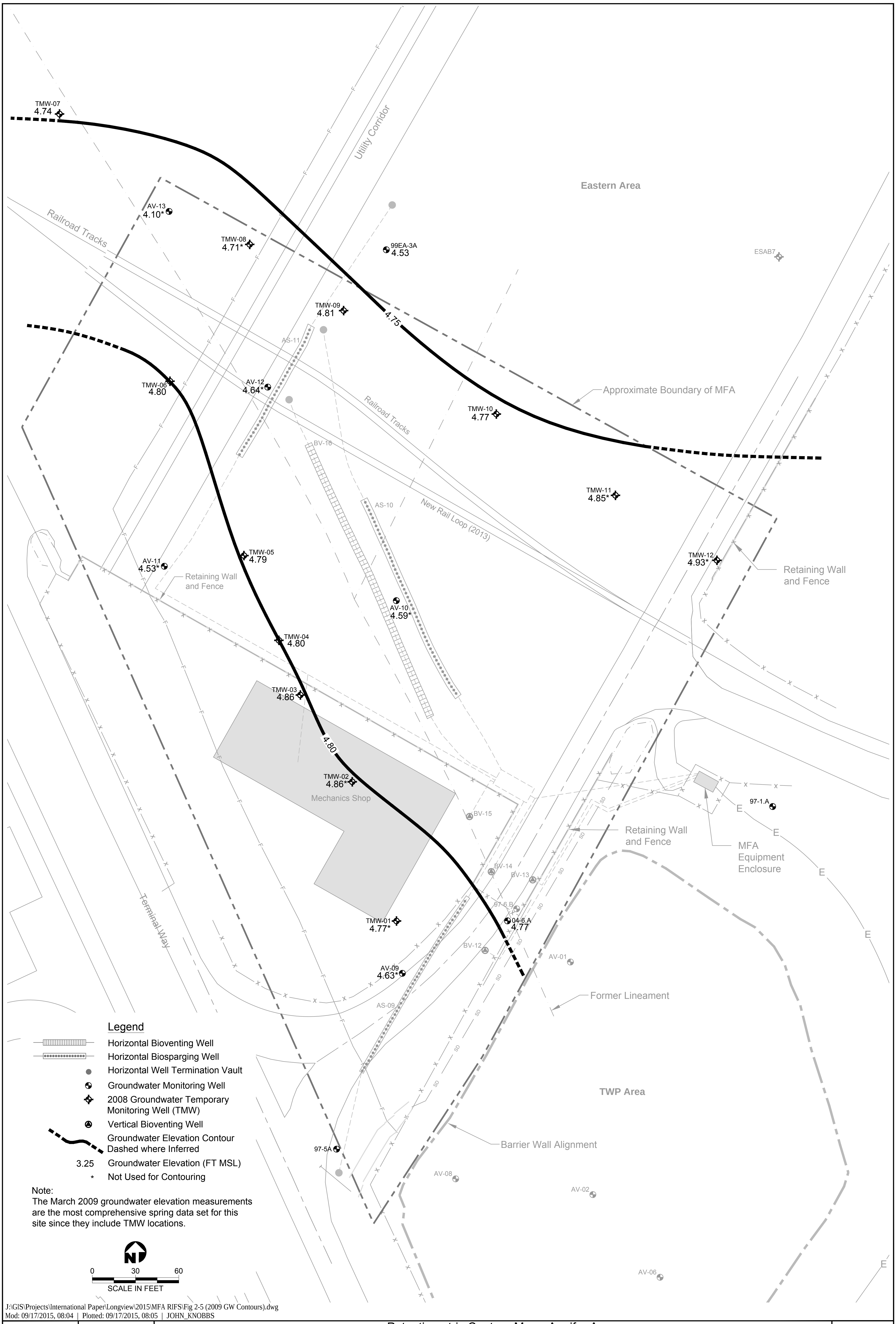
International Paper Longview, WA	Project No. 60395232	Perched Groundwater Elevation Contours December 11, 2003 Maintenance Facility Area	Figure 2-3
AECOM			



Note:
The September 2008 groundwater elevation measurements are the most complete fall data set for the site since they include TMW locations.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 2-4 (2008 GW Contours).dwg
Mod: 09/15/2015, 08:48 | Plotted: 09/15/2015, 08:48 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Potentiometric Contour Map - Aquifer A September 22, 2008 Maintenance Facility Area	Figure 2-4
AECOM			



Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- Groundwater Monitoring Well
- 2008 Groundwater Temporary Monitoring Well (TMW)
- Vertical Bioventing Well
- Groundwater Elevation Contour Dashed where Inferred
- 3.25 Groundwater Elevation (FT MSL)
- * Not Used for Contouring

Note:
The March 2009 groundwater elevation measurements are the most comprehensive spring data set for this site since they include TMW locations.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 2-5 (2009 GW Contours).dwg
Mod: 09/17/2015, 08:04 | Plotted: 09/17/2015, 08:05 | JOHN_KNOBBS

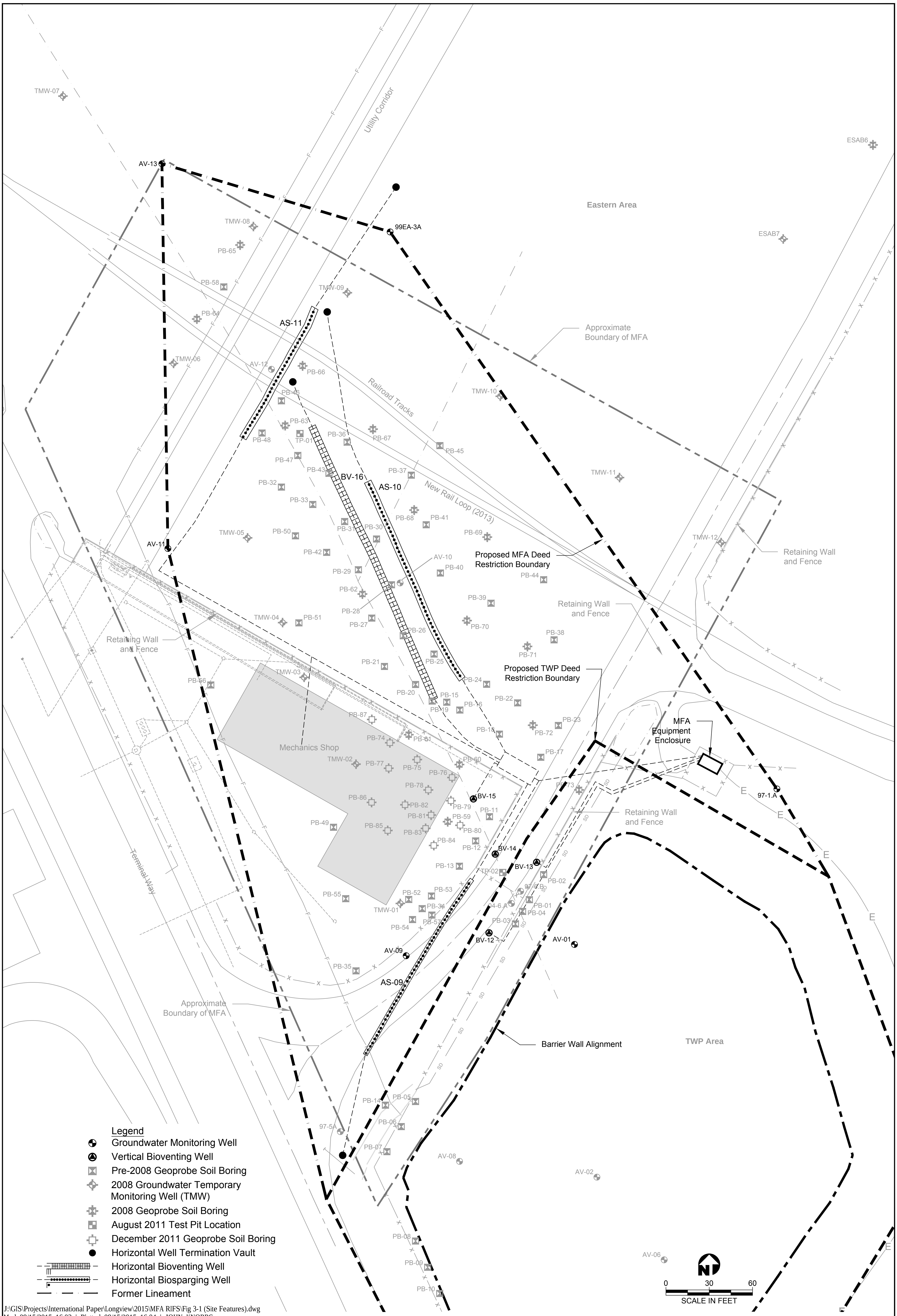
International Paper
Longview, WA

Project No.
60395232

AECOM

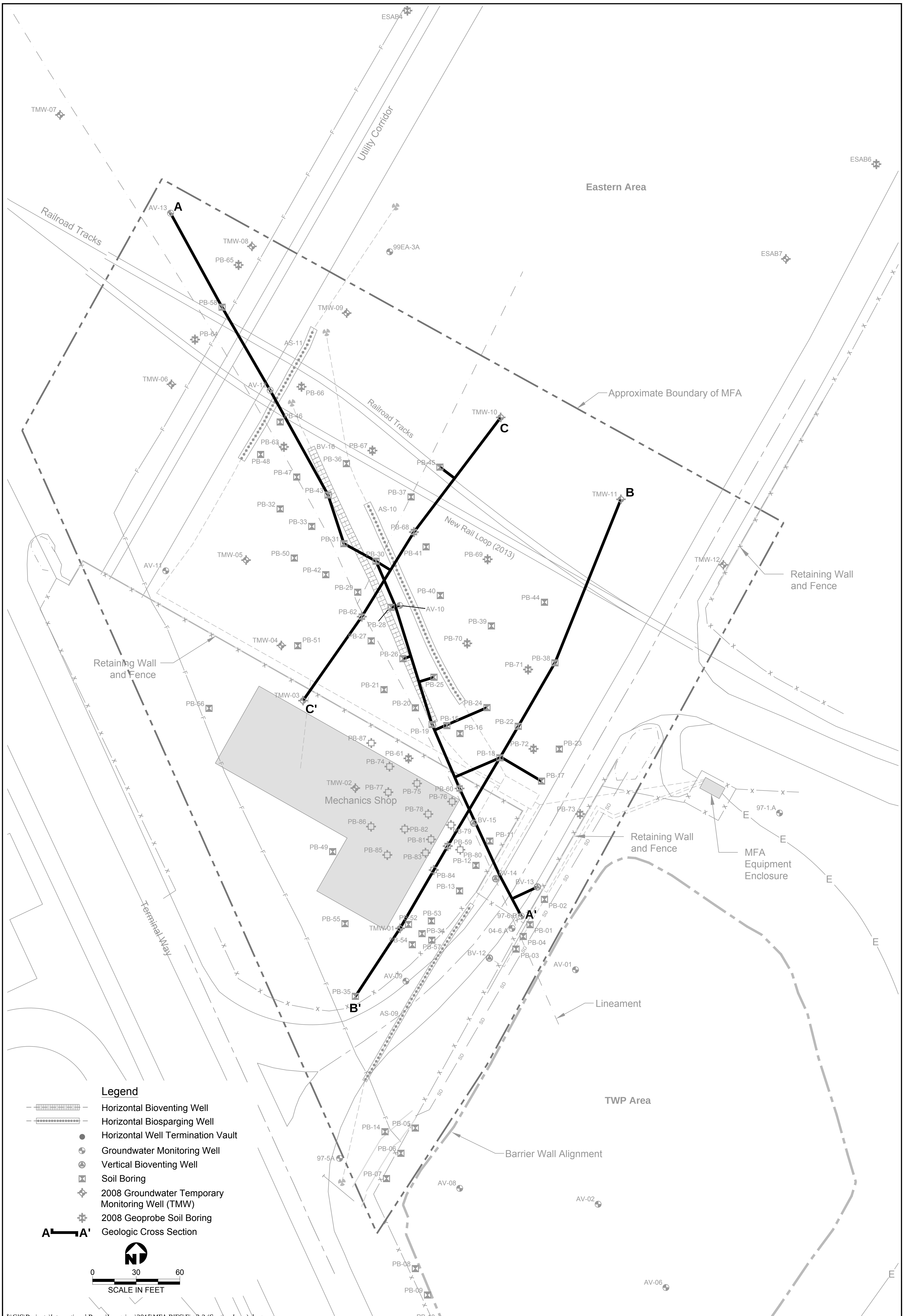
Potentiometric Contour Map - Aquifer A
March 19, 2009
Maintenance Facility Area

Figure
2-5



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-1 (Site Features).dwg
Mod: 09/15/2015, 16:03 | Plotted: 09/15/2015, 16:04 | JOHN_KNOBBS

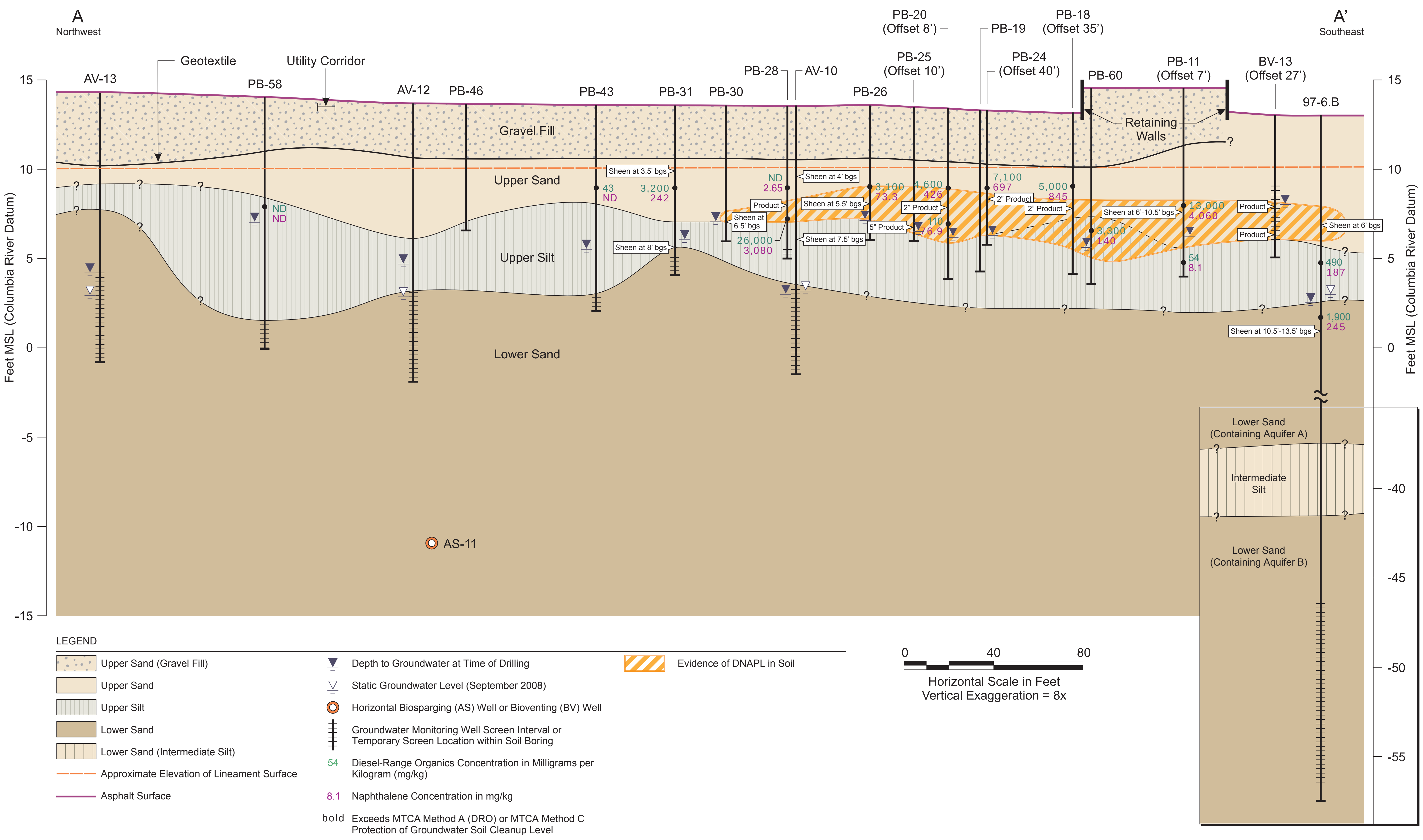
International Paper Longview, WA	Project No. 60395232	Existing Remediation System Features Maintenance Facility Area	Figure 3-1
AECOM			



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-2 (Section Locs).dwg
Mod: 09/15/2015, 09:16 | Plotted: 10/02/2015, 07:54 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Geologic Cross-Section Locations Maintenance Facility Area	Figure 3-2
AECOM			

603952232_03.ai



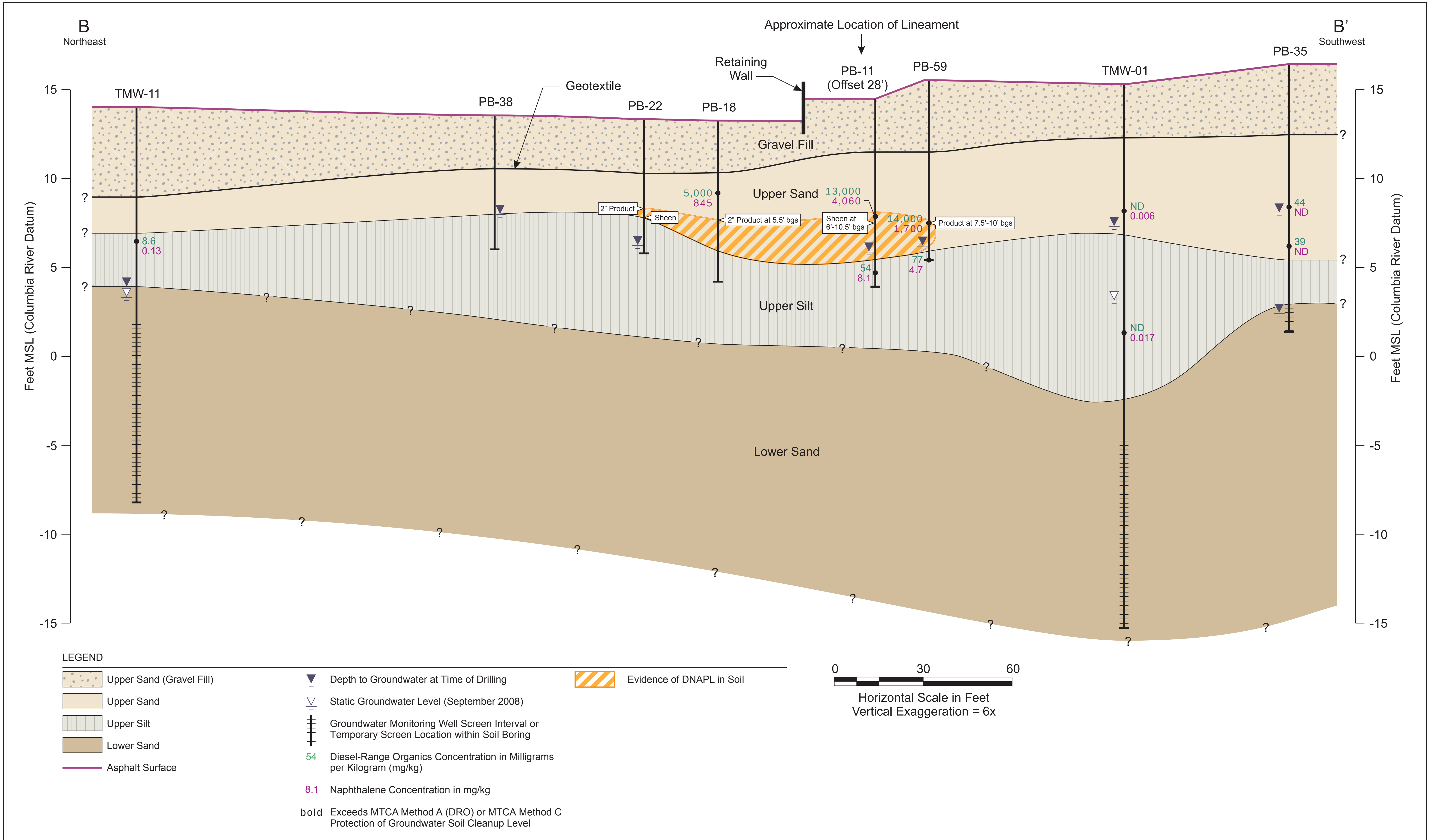
International Paper Longview, WA	Project No. 60395232

AECOM

Geologic Cross Section A-A'
Maintenance Facility Area

Figure
3-3

603952232_06.ai



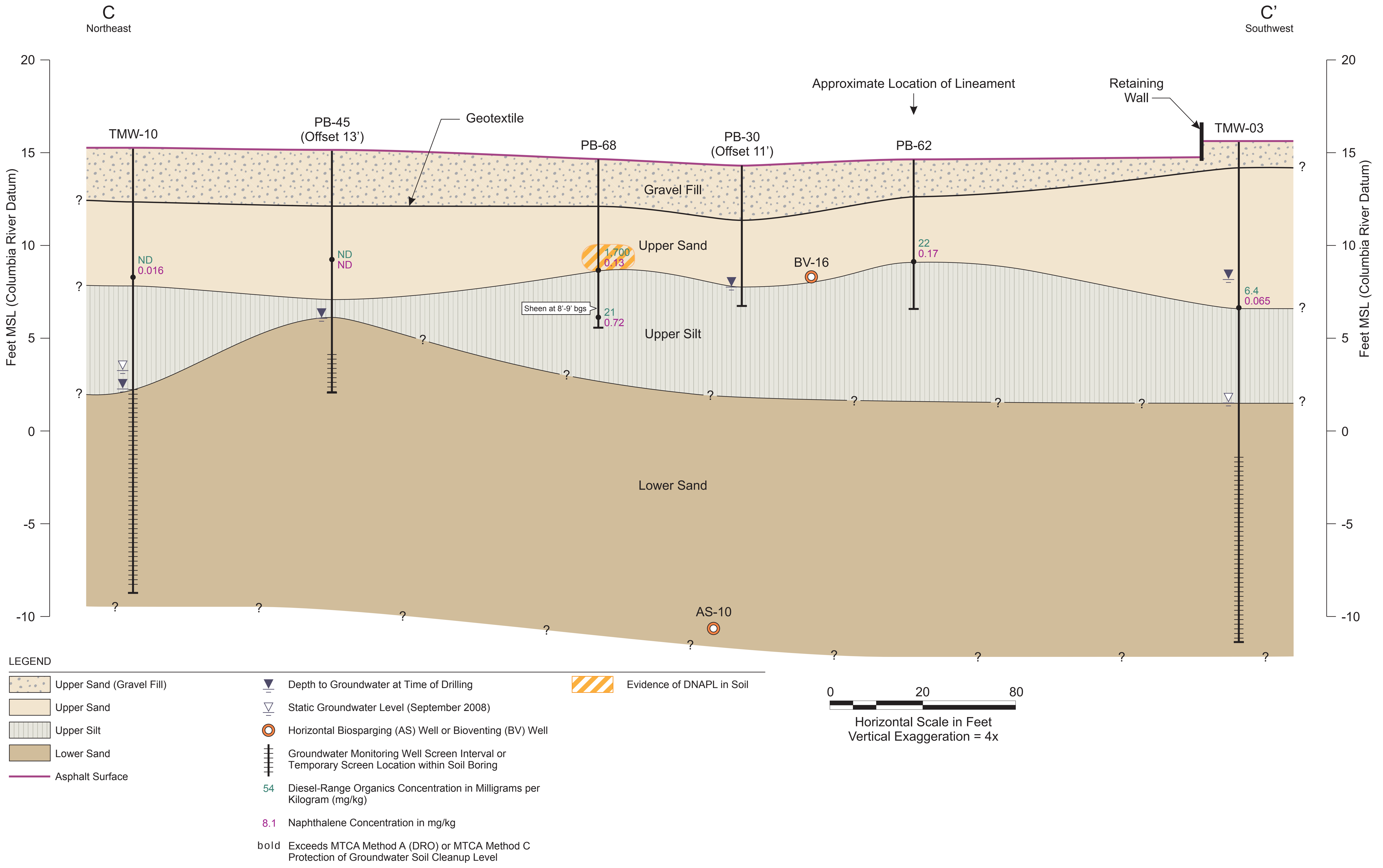
International Paper
Longview, WA

Project No.
60395232

AECOM

Geologic Cross Section B-B'
Maintenance Facility Area

Figure
3-4



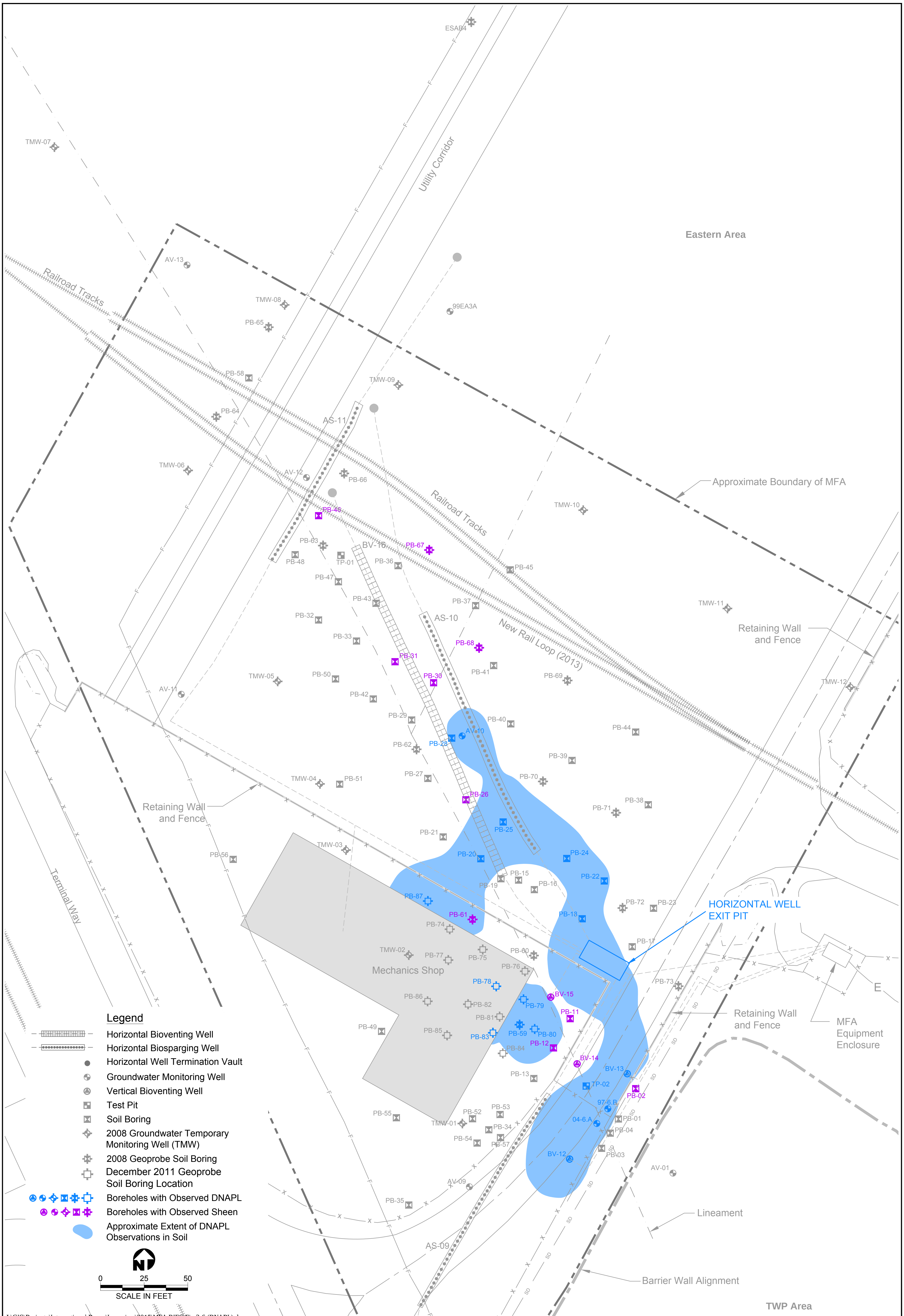
International Paper
Longview, WA

Project No.
60395232

AECOM

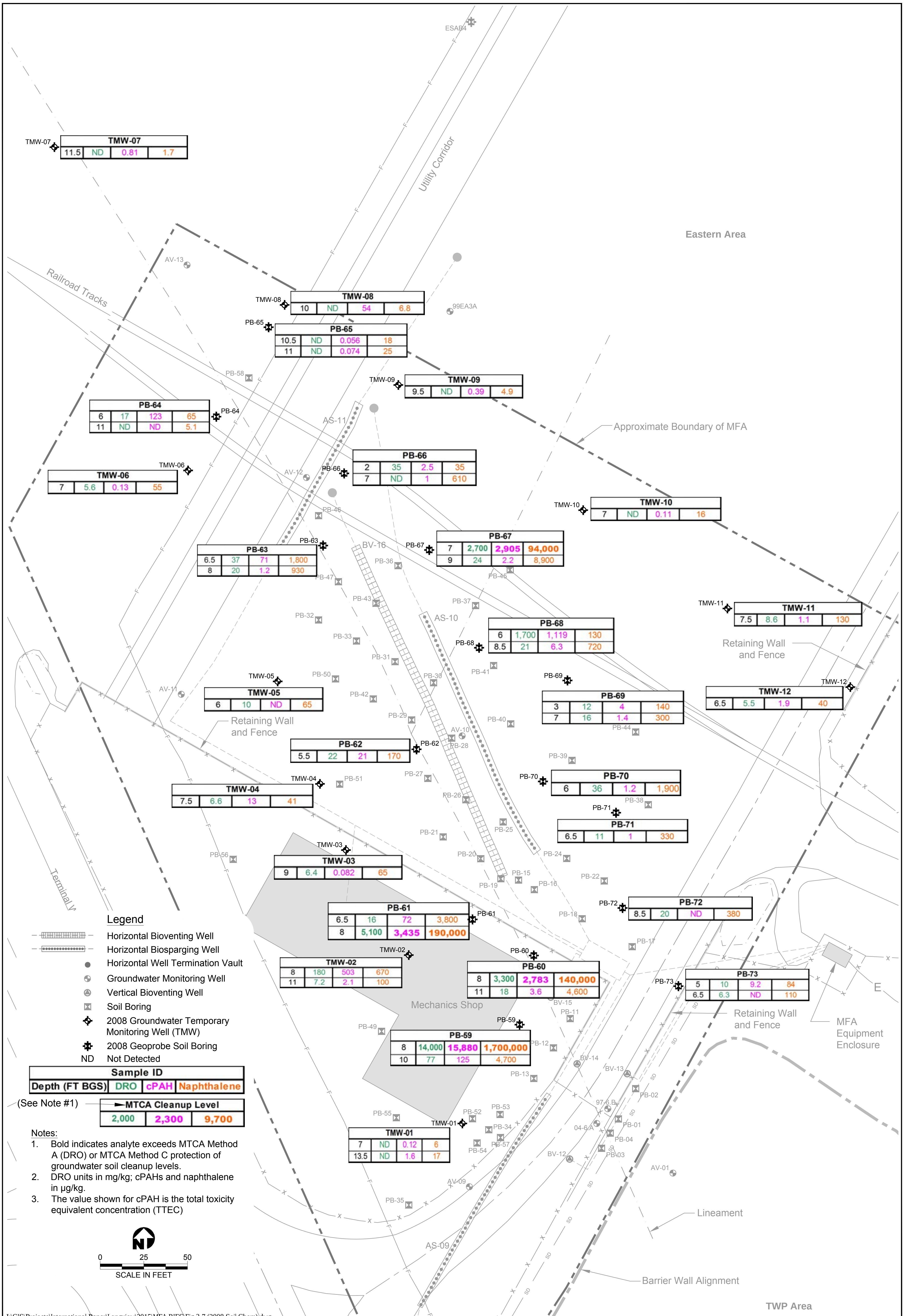
Geologic Cross Section C-C'
Maintenance Facility Area

Figure
3-5



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-6 (DNAPL).dwg
Mod: 10/07/2015, 09:45 | Plotted: 10/07/2015, 14:36 | powellb

International Paper Longview, WA	Project No. 60395232	Extent of Sheen and DNAPL Occurrence in Soil Maintenance Facility Area	Figure 3-6
AECOM			

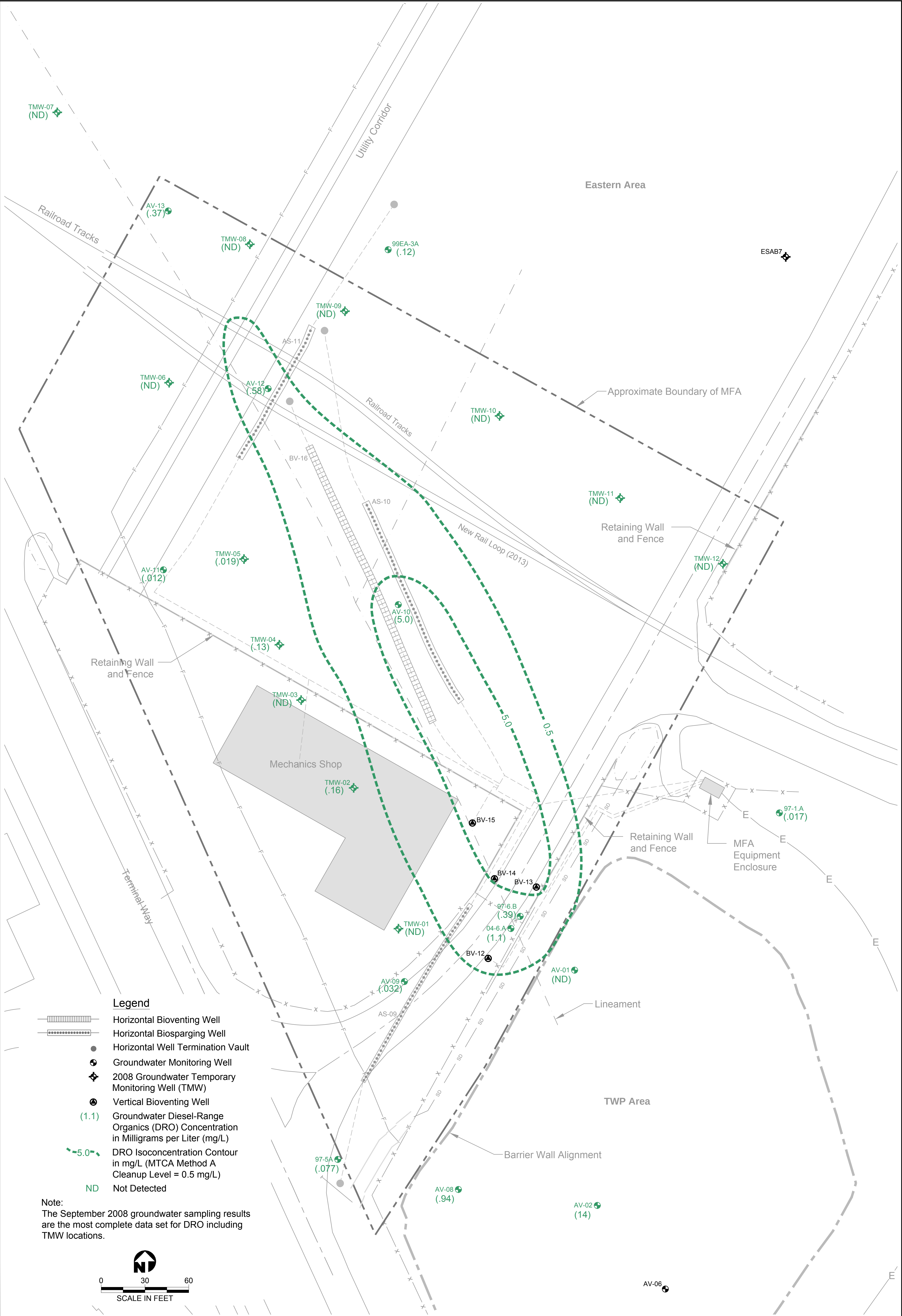


Notes:

1. Bold indicates analyte exceeds MTCA Method A (DRO) or MTCA Method C protection of groundwater soil cleanup levels.
2. DRO units in mg/kg; cPAHs and naphthalene in µg/kg.
3. The value shown for cPAH is the total toxicity equivalent concentration (TTEC)

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-7 (2008 Soil Chem).dwg
Mod: 09/15/2015, 09:12 | Plotted: 09/15/2015, 09:13 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Summary of Soil DRO, cPAHs, and Naphthalene Results September 2008 Maintenance Facility Area	Figure 3-7
AECOM			



Note:
The September 2008 groundwater sampling results are the most complete data set for DRO including TMW locations.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-8 (GW DRO).dwg
Mod: 09/15/2015, 09:59 | Plotted: 09/15/2015, 10:00 | JOHN_KNOBBS

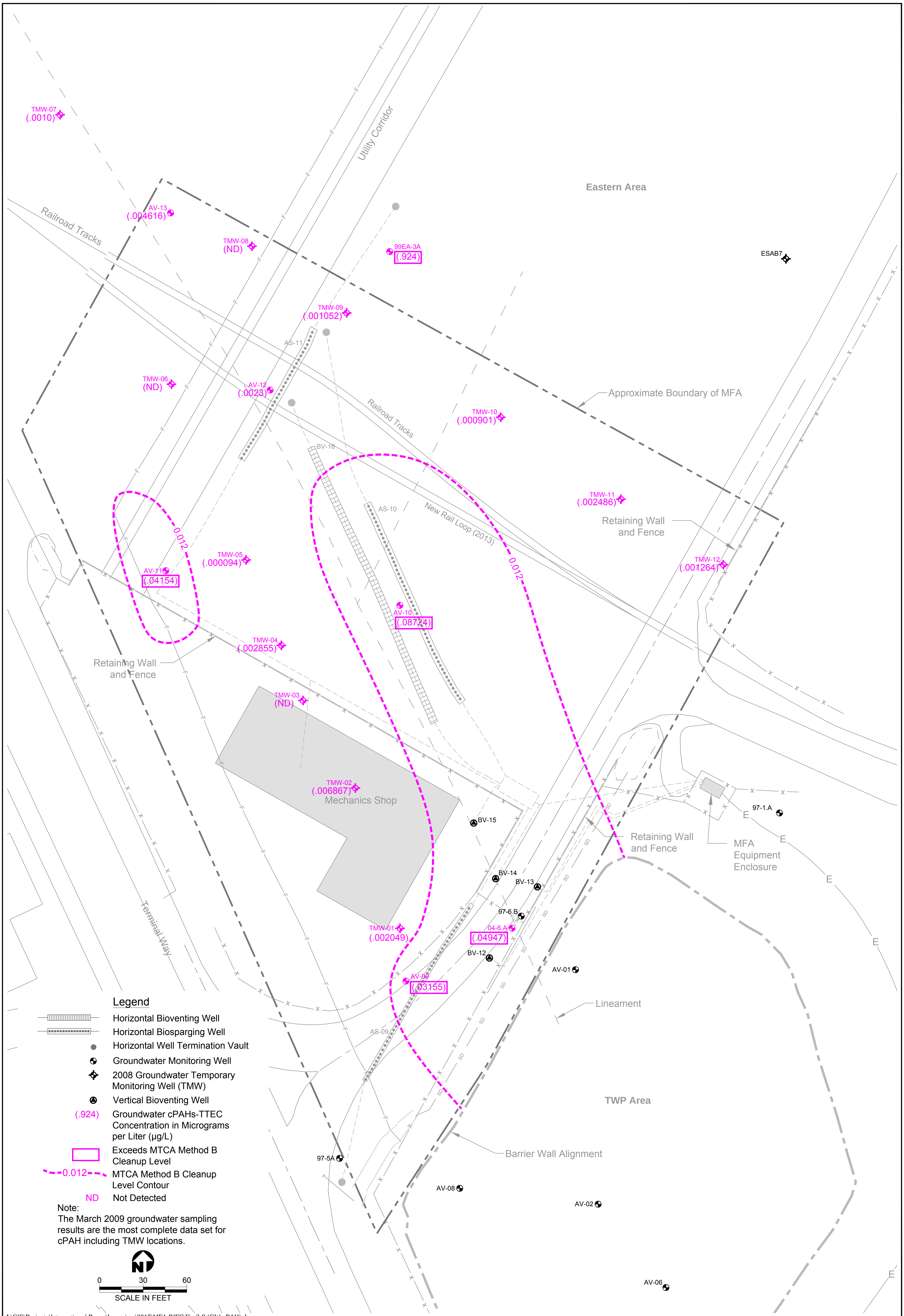
International Paper
Longview, WA

Project No.
60395232

AECOM

Groundwater Diesel-Range Organics Concentrations
September 2008
Maintenance Facility Area

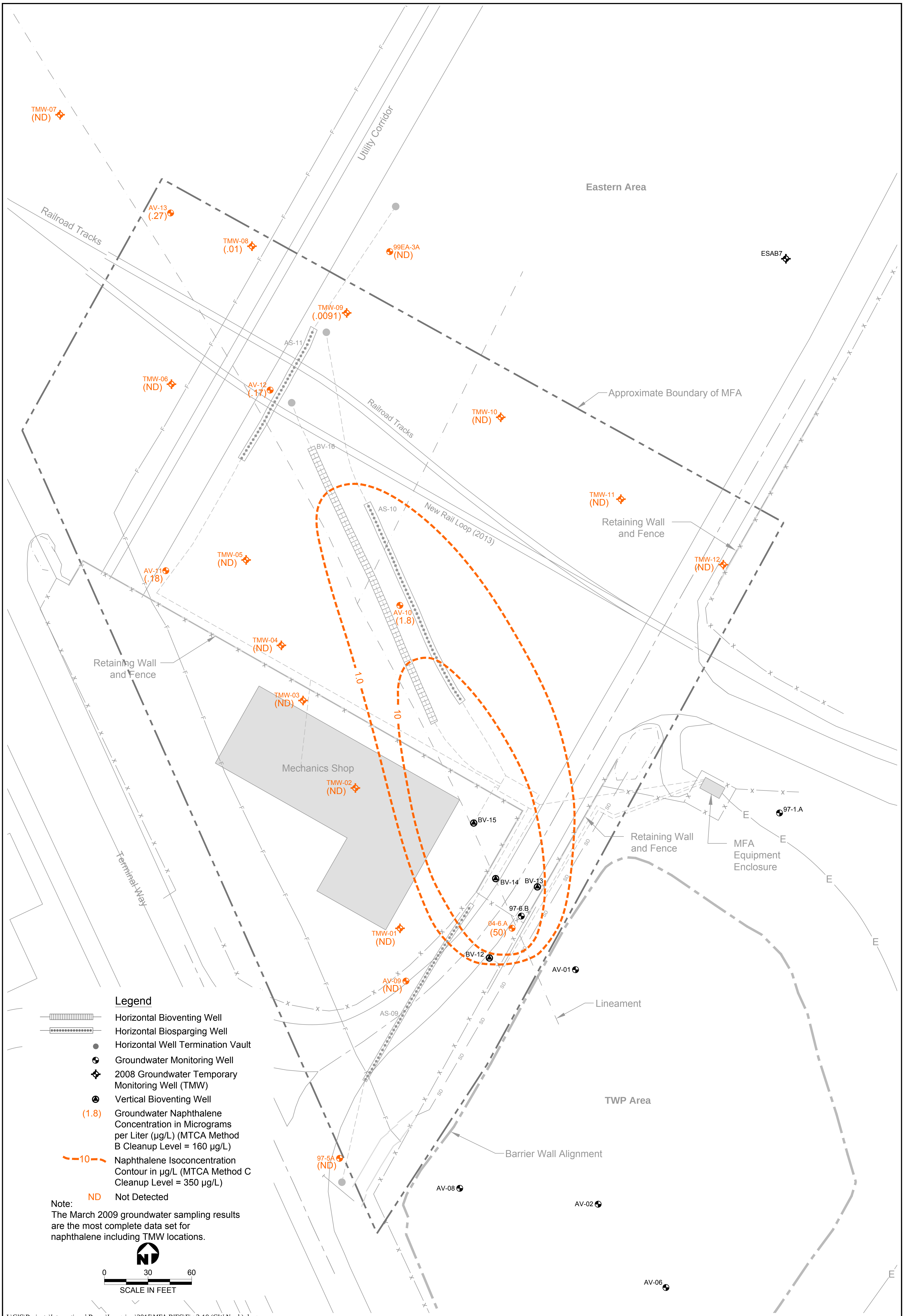
Figure
3-8



Note:
The March 2009 groundwater sampling results are the most complete data set for cPAH including TMW locations.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-9 (GW cPAH).dwg
Mod: 09/17/2015, 08:07 | Plotted: 09/17/2015, 08:07 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Groundwater cPAH Concentrations March 2009 Maintenance Facility Area	Figure 3-9
AECOM			



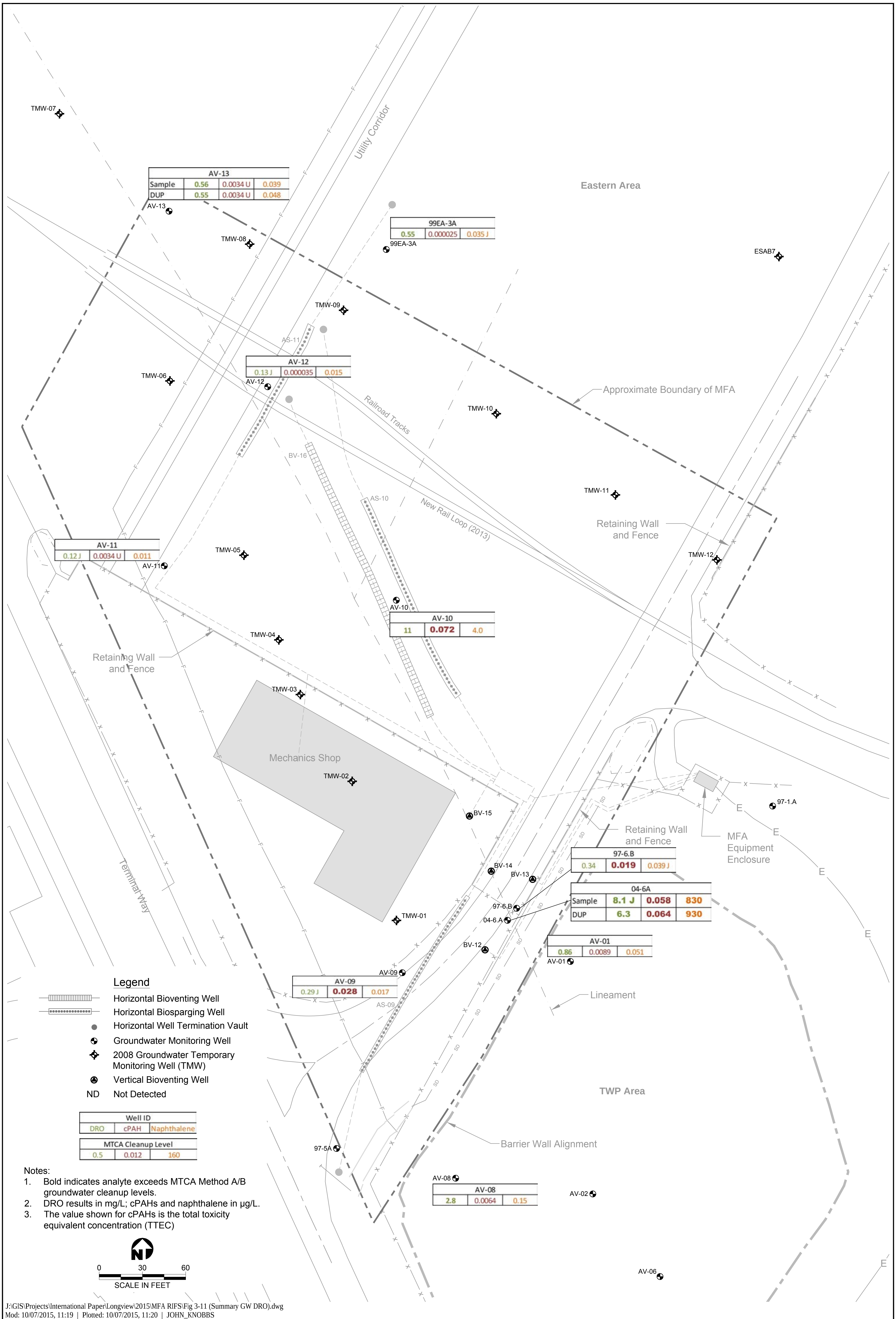
Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- Groundwater Monitoring Well
- 2008 Groundwater Temporary Monitoring Well (TMW)
- Vertical Bioventing Well
- (1.8) Groundwater Naphthalene Concentration in Micrograms per Liter (μg/L) (MTCA Method B Cleanup Level = 160 μg/L)
- 10 Naphthalene Isoconcentration Contour in μg/L (MTCA Method C Cleanup Level = 350 μg/L)
- ND Not Detected

Note:
The March 2009 groundwater sampling results are the most complete data set for naphthalene including TMW locations.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-10 (GW Naph).dwg
Mod: 09/15/2015, 10:29 | Plotted: 09/17/2015, 08:10 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Groundwater Naphthalene Concentrations March 2009 Maintenance Facility Area	Figure 3-10
AECOM			

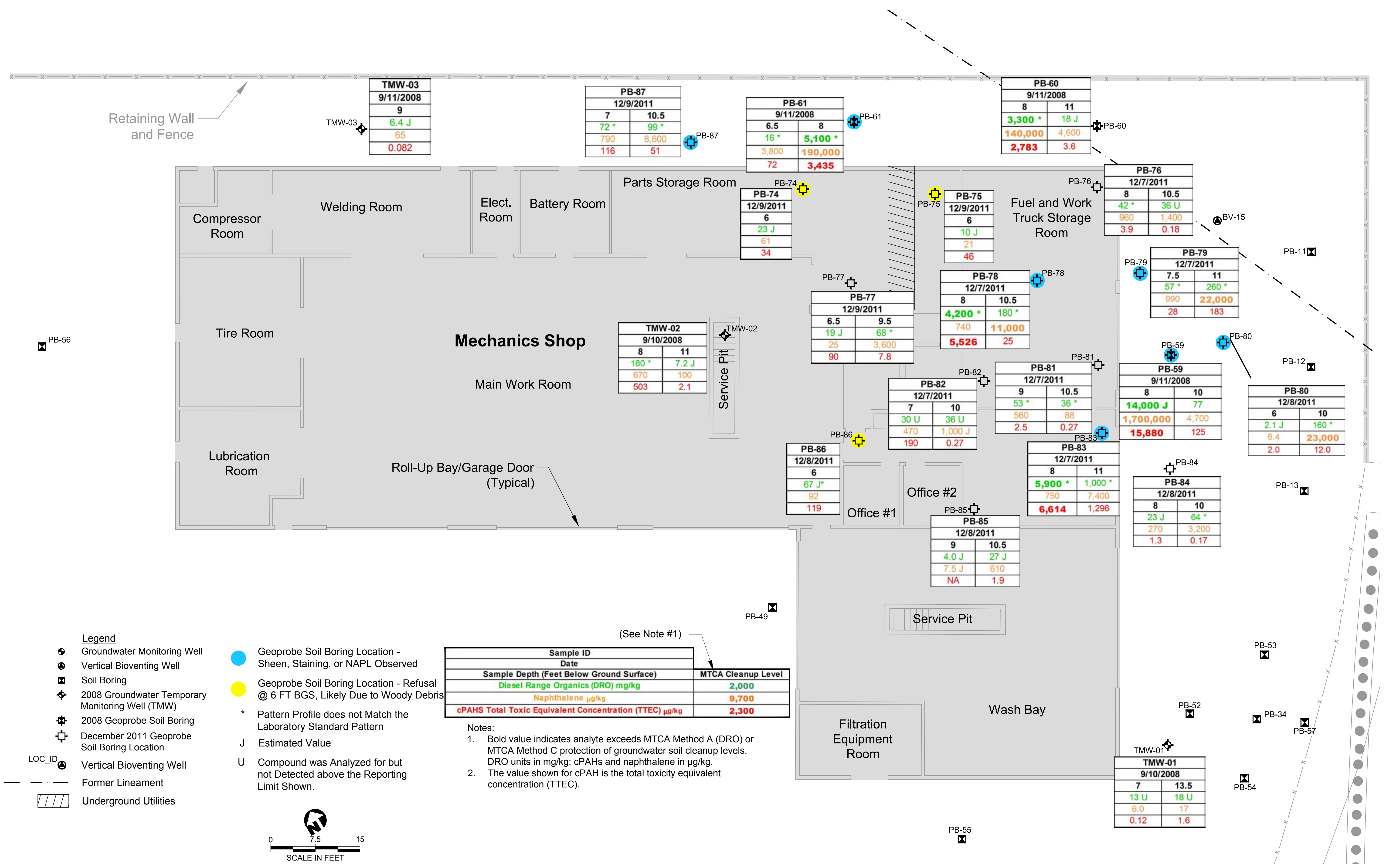


Notes:

1. Bold indicates analyte exceeds MTCA Method A/B groundwater cleanup levels.
2. DRO results in mg/L; cPAHs and naphthalene in μg/L.
3. The value shown for cPAHs is the total toxicity equivalent concentration (TTEC)

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-11 (Summary GW DRO).dwg
Mod: 10/07/2015, 11:19 | Plotted: 10/07/2015, 11:20 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Summary of Groundwater DRO, cPAHs, and Naphthalene Results September 2014 Maintenance Facility Area	Figure 3-11
AECOM			



Legend

- Groundwater Monitoring Well
- Vertical Bioventing Well
- ☒ Soil Boring
- 2008 Groundwater Temporary Monitoring Well (TMW)
- 2008 Geoprobe Soil Boring
- December 2011 Geoprobe Soil Boring Location
- LOC_ID Vertical Bioventing Well
- Former Lineament
- Underground Utilities

- ● Geoprobe Soil Boring Location - Sheen, Staining, or NAPL Observed
- ● Geoprobe Soil Boring Location - Refusal @ 6 FT BGS, Likely Due to Woody Debris
- * Pattern Profile does not Match the Laboratory Standard Pattern
- J Estimated Value
- U Compound was Analyzed for but not Detected above the Reporting Limit Shown.

Sample ID	
Date	
Sample Depth (Feet Below Ground Surface)	MTCA Cleanup Level
Diesel Range Organics (DRO) mg/kg	2,000
Naphthalene µg/kg	9,700
cPAHS Total Toxic Equivalent Concentration (TTEC) µg/kg	2,300

Notes:
1. Bold value indicates analyte exceeds MTCA Method A (DRO) or MTCA Method C protection of groundwater soil cleanup levels. DRO units in mg/kg; cPAHs and naphthalene in µg/kg.
2. The value shown for cPAH is the total toxicity equivalent concentration (TTEC).

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-12 Mechanic Shop Soil.dwg
Mod: 10/07/2015, 11:21 | Plotted: 10/07/2015, 11:22 | JOHN_KNOBBS

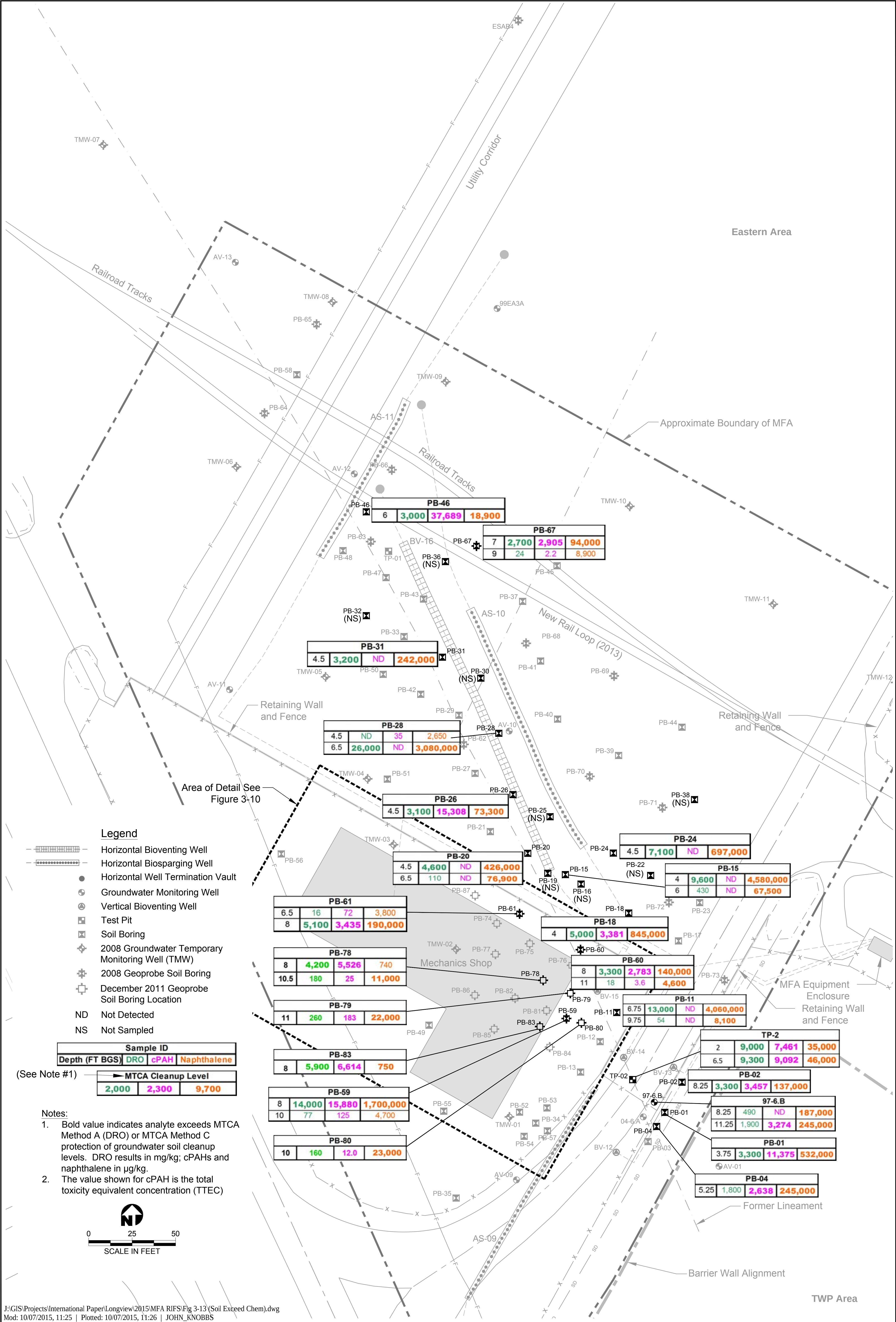
International Paper
Longview, WA

Project No.
60395232

AECOM

Summary of Mechanic Shop Soil DRO, cPAH, and Naphthalene Results (September 2008 and December 2011)
Maintenance Facility Area

Figure
3-12



Notes:

1. Bold value indicates analyte exceeds MTCA Method A (DRO) or MTCA Method C protection of groundwater soil cleanup levels. DRO results in mg/kg; cPAHs and naphthalene in µg/kg.
2. The value shown for cPAH is the total toxicity equivalent concentration (TTEC)

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-13 (Soil Exceed Chem).dwg
Mod: 10/07/2015, 11:25 | Plotted: 10/07/2015, 11:26 | JOHN_KNOBBS

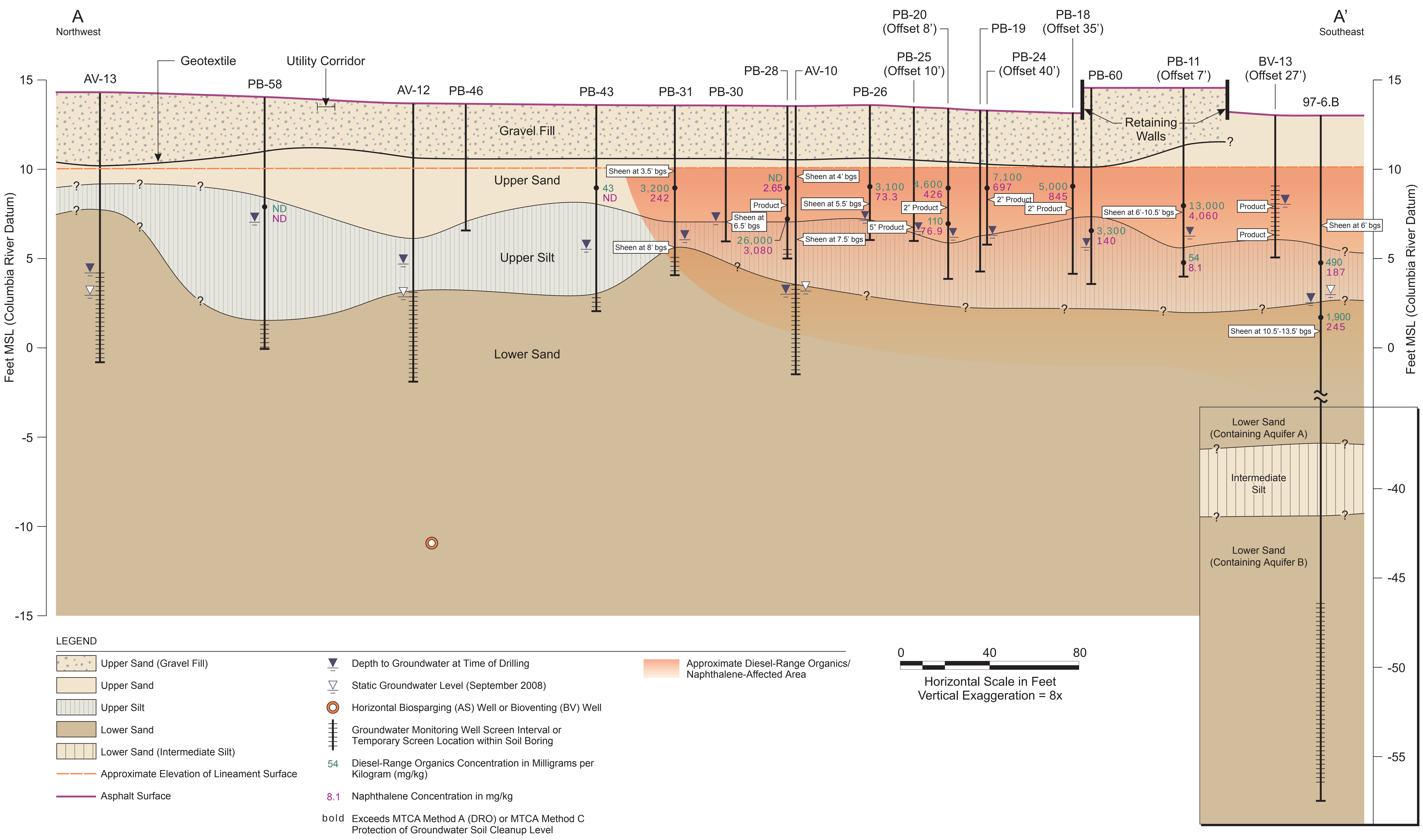
International Paper
Longview, WA

Project No.
60395232

AECOM

Summary of Locations with Soil DRO, cPAH, or Naphthalene Exceeding MTCA Method C Cleanup Levels Maintenance Facility Area

Figure
3-13



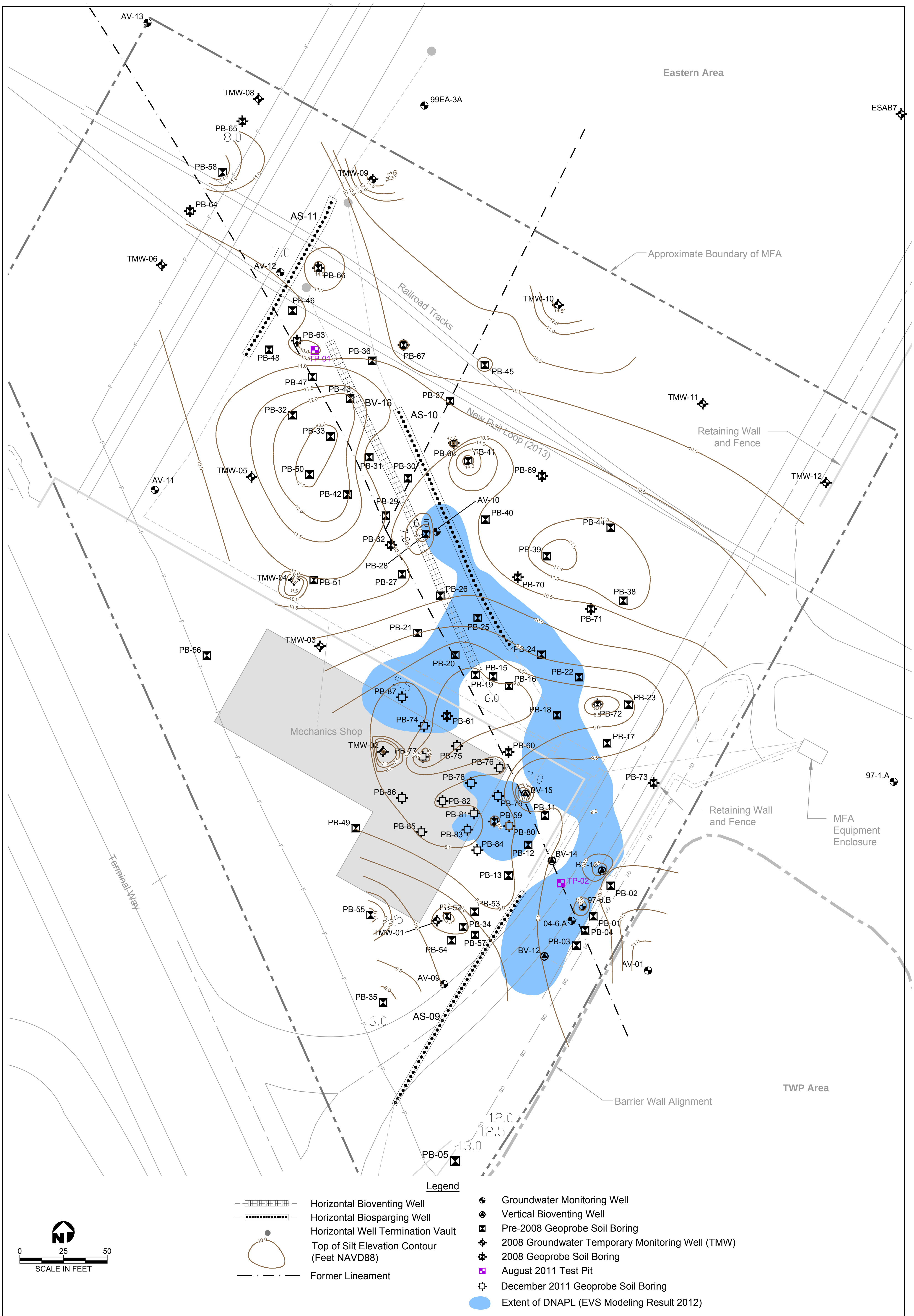
International Paper
Longview, WA

Project No.
60395232

AECOM

Physiochemical Conceptual Site Model – Maintenance Facility Area

Figure
3-14



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 3-15 (DNAPL_Silt).dwg
Mod: 08/20/2015, 08:29 | Plotted: 09/18/2015, 13:45 | JOHN_KNOBBS

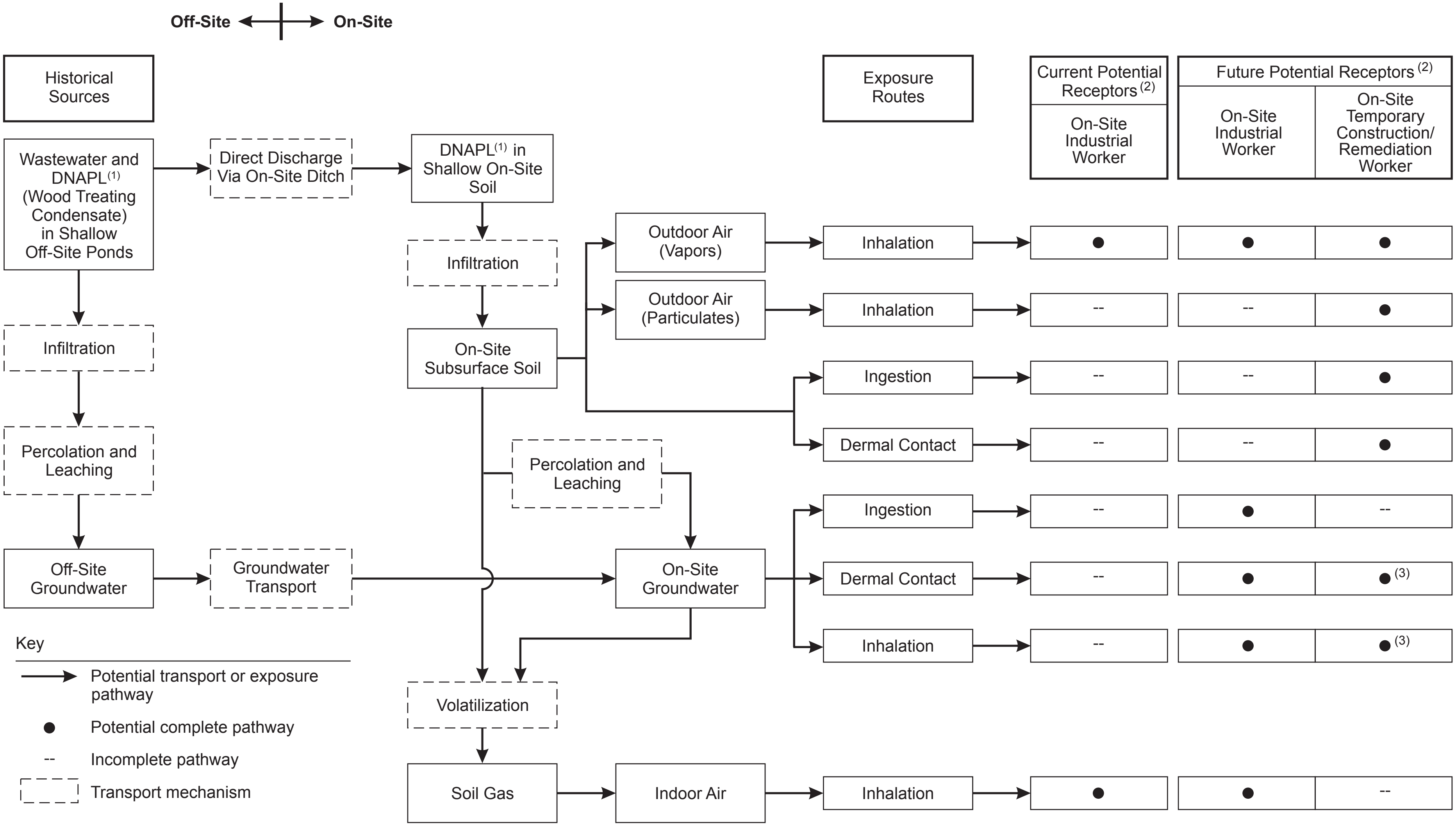
International Paper
Longview, WA

Project No.
60395232

AECOM

DNAPL Distribution Relative to
Upper Silt Surface Contour

Figure
3-15



[1] DNAPL = Dense non-aqueous phase liquid

[2] Additional pathways only complete if soil beneath cap is disturbed and/or a groundwater supply well is installed.

[3] Construction workers might have limited contact via dermal exposure and inhalation of volatiles if they encounter shallow groundwater.

International Paper
Longview, WA

Project No.
33759250

URS

Potential Exposure Pathways
Maintenance Facility Area

Figure
5-1

Note:
Excavation will occur to the top of the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the excavation depth will vary across the site. On average, the excavation depth will be to 8 ft bgs.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-1 Alt S-1 Baseline.dwg
Mod: 09/17/2015, 08:49 | Plotted: 09/17/2015, 08:49 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Alternative S1 - Baseline Alternative for Soil - Comprehensive Excavation	Figure 7-1
AECOM			

Legend

Horizontal Bioventing Well	Vertical Bioventing Well	Shoring System for Foundation/Barrier Wall Protection	
Horizontal Biosparging Well	Pre-2008 Geoprobe Soil Boring Location	Estimated Limits of Excavation	
● Horizontal Well Termination Vault	2008 Groundwater Monitoring Well	🟦 Extent of DNAPL	
Groundwater Monitoring Well	2008 Geoprobe Soil Boring Location	🟩 Extent of DRO in Soil > MTCA Method A	
	August 2011 Test Pit Location	🟧 Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level	
	December 2011 Geoprobe Soil Boring Location		

Note:
Excavation will occur to the top of the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the excavation depth will vary across the site. On average, the excavation depth will be to 8 ft bgs.

N

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-2 Alt S-2 Outside Bldg.dwg
Mod: 09/17/2015, 08:54 | Plotted: 09/17/2015, 08:54 | JOHN_KNOBBS

International Paper
Longview, WA

Project No.
60395232

AECOM

Alternative S2 - Comprehensive Excavation
Outside Building Footprint

Figure
7-2

Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- Horizontal Well Termination Vault
- Groundwater Monitoring Well
- Vertical Bioventing Well
- Pre-2008 Geoprobe Soil Boring Location
- 2008 Groundwater Monitoring Well
- 2008 Geoprobe Soil Boring Location
- August 2011 Test Pit Location
- December 2011 Geoprobe Soil Boring Location
- Shoring System for Foundation/Barrier Wall Protection
- Estimated Limits of Excavation
- Extent of DNAPL
- Extent of DRO in Soil > MTCA Method A
- Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level

Note:
Excavation will occur to the top of the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the excavation depth will vary across the site. On average, the excavation depth will be to 8 ft bgs.

N

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-3 Alt S3 DNAPL.dwg
Mod: 09/17/2015, 08:56 | Plotted: 09/17/2015, 08:57 | JOHN_KNOBBS

International Paper
Longview, WA

Project No.
60395232

AECOM

Alternative S3 - DNAPL Excavation
Outside Building Footprint

Figure
7-3

Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- Groundwater Monitoring Well
- Vertical Bioventing Well
- ☒ Pre-2008 Geoprobe Soil Boring Location
- 2008 Groundwater Monitoring Well
- 2008 Geoprobe Soil Boring Location
- August 2011 Test Pit Location
- December 2011 Geoprobe Soil Boring Location
- Shoring System for Foundation/Barrier Wall Protection
- Estimated Limits of Excavation
- Extent of DNAPL
- Extent of DRO in Soil > MTCA Method A
- Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level

Note:
Excavation will occur to the top of the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the excavation depth will vary across the site. On average, the excavation depth will be to 8 ft bgs.

N

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-4 Alt S4 Out_In Limited.dwg
Mod: 09/17/2015, 10:31 | Plotted: 09/17/2015, 10:33 | JOHN_KNOBBS

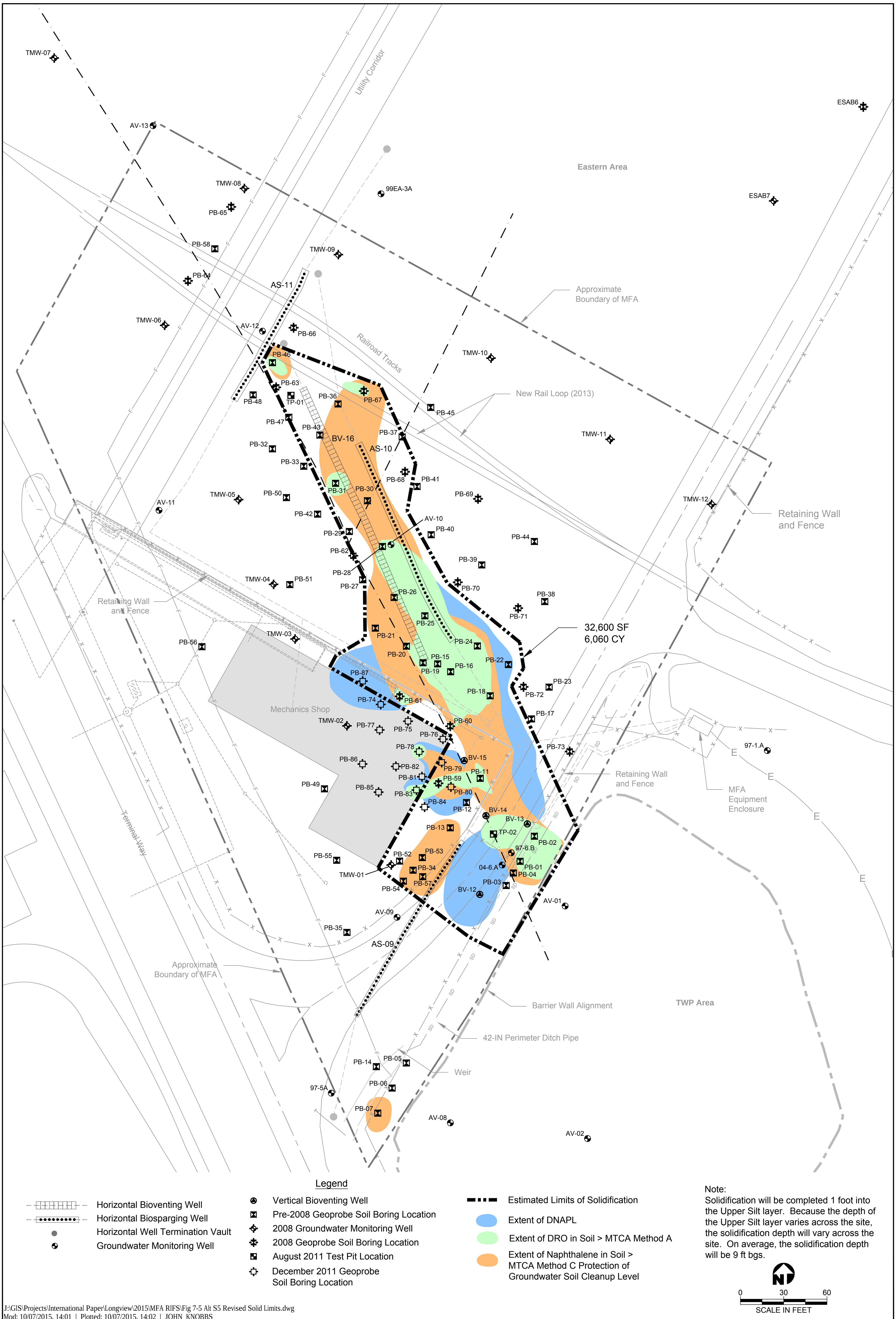
International Paper
Longview, WA

Project No.
60395232

AECOM

Alternative S4 - DNAPL Excavation
Outside Building Footprint, Limited Excavation Inside

Figure
7-4



Note:
Solidification will be completed 1 foot into the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the solidification depth will vary across the site. On average, the solidification depth will be 9 ft bgs.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-5 Alt S5 Revised Solid Limits.dwg
Mod: 10/07/2015, 14:01 | Plotted: 10/07/2015, 14:02 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232

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Alternative S5 - Solidification Outside Building Footprint

Figure
7-5

Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- Horizontal Well Termination Vault
- Groundwater Monitoring Well
- Vertical Bioventing Well
- Pre-2008 Geoprobe Soil Boring Location
- 2008 Groundwater Monitoring Well
- 2008 Geoprobe Soil Boring Location
- August 2011 Test Pit Location
- December 2011 Geoprobe Soil Boring Location
- Estimated Limits of Solidification
- 🟦 Extent of DNAPL
- 🟩 Extent of DRO in Soil > MTCA Method A
- 🟧 Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level

Note:
Solidification will be completed 1 foot into the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the solidification depth will vary across the site. On average, the solidification depth will be 9 ft bgs.

N

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-6 Alt S5A Solid with DNAPL Recovery.dwg
Mod: 10/07/2015, 14:04 | Plotted: 10/07/2015, 14:05 | JOHN_KNOBBS

International Paper
Longview, WA

Project No.
60395232

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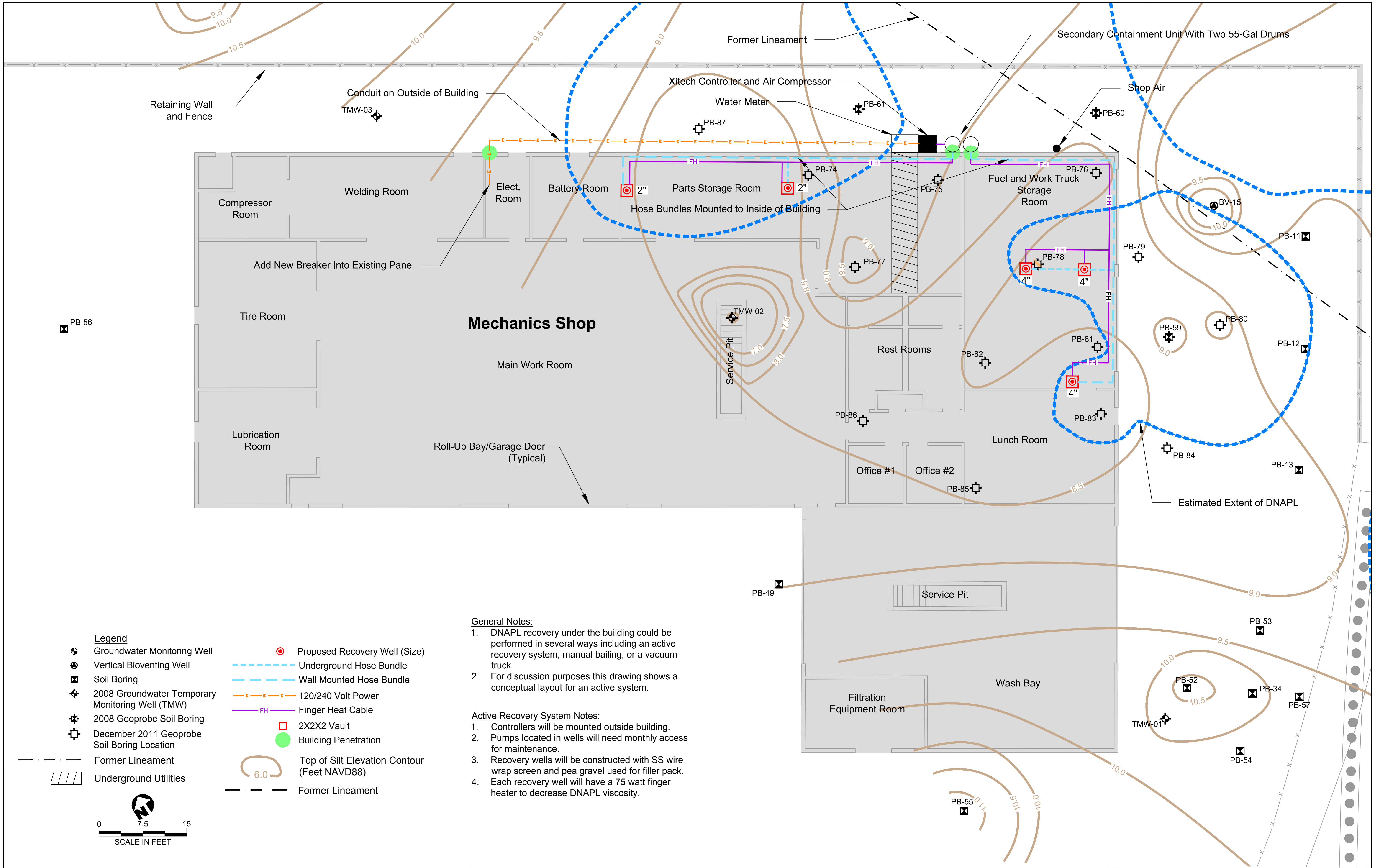
Alternative S5A - Solidification Outside Building Footprint, DNAPL Recovery Under Mechanics Shop

Figure
7-6



Legend
- Groundwater Monitoring Well
- Vertical Bioventing Well
- Soil Boring
- 2008 Groundwater Temporary Monitoring Well (TMW)
- 2008 Geoprobe Soil Boring
- December 2011 Geoprobe Soil Boring Location
- Former Lineament
- Underground Utilities
- ◉ Proposed Recovery Well (Size)
- Underground Hose Bundle
- Wall Mounted Hose Bundle
- 120/240 Volt Power
- FH Finger Heat Cable
- ☐ 2X2X2 Vault
- ● Building Penetration
- 6.0 Top of Silt Elevation Contour (Feet NAVD88)
- Former Lineament

General Notes:
1. DNAPL recovery under the building could be performed in several ways including an active recovery system, manual bailing, or a vacuum truck.
2. For discussion purposes this drawing shows a conceptual layout for an active system.

Active Recovery System Notes:
1. Controllers will be mounted outside building.
2. Pumps located in wells will need monthly access for maintenance.
3. Recovery wells will be constructed with SS wire wrap screen and pea gravel used for filler pack.
4. Each recovery well will have a 75 watt finger heater to decrease DNAPL viscosity.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-7 Alt S5A Concept DNAPL.dwg
Mod: 09/16/2015, 13:58 | Plotted: 09/17/2015, 09:10 | JOHN_KNOBBS

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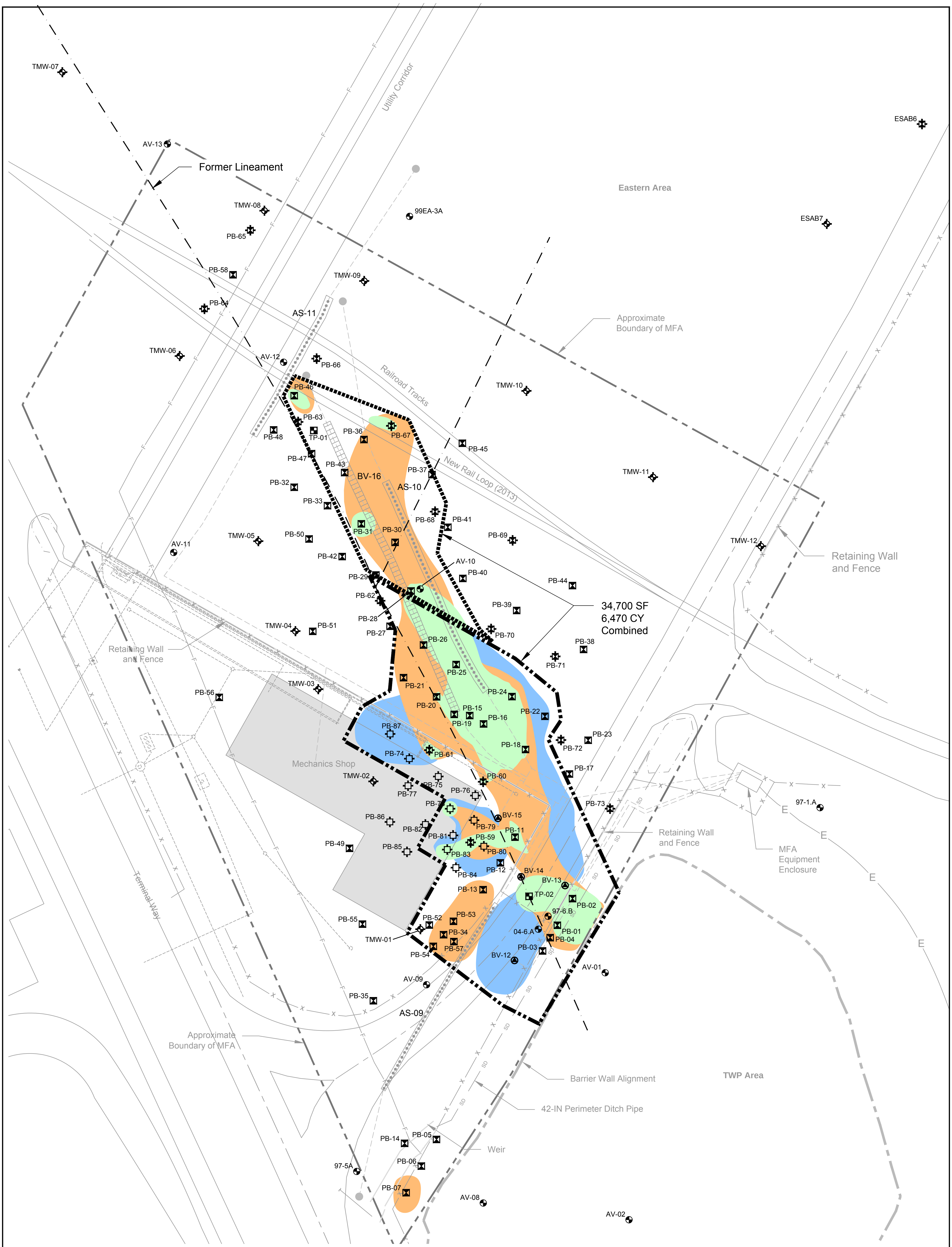
Alternative S5A - Conceptual DNAPL Recovery System Layout

Figure
7-7



Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- Groundwater Monitoring Well
- Vertical Bioventing Well
- Pre-2008 Geoprobe Soil Boring Location
- 2008 Groundwater Monitoring Well
- 2008 Geoprobe Soil Boring Location
- August 2011 Test Pit Location
- December 2011 Geoprobe Soil Boring Location
- 🟦 Extent of DNAPL
- 🟩 Extent of DRO in Soil > MTCA Method A
- 🟧 Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level
- Estimated Limits of Solidification
- Estimated Limits of Excavation

Note:
Solidification will be completed 1 foot into the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the solidification depth will vary across the site. On average, the solidification depth will be 9 ft bgs.

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-8 (Alt S5B Site Plan).dwg
Mod: 10/07/2015, 11:39 | Plotted: 10/07/2015, 14:12 | JOHN_KNOBBS

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60395232

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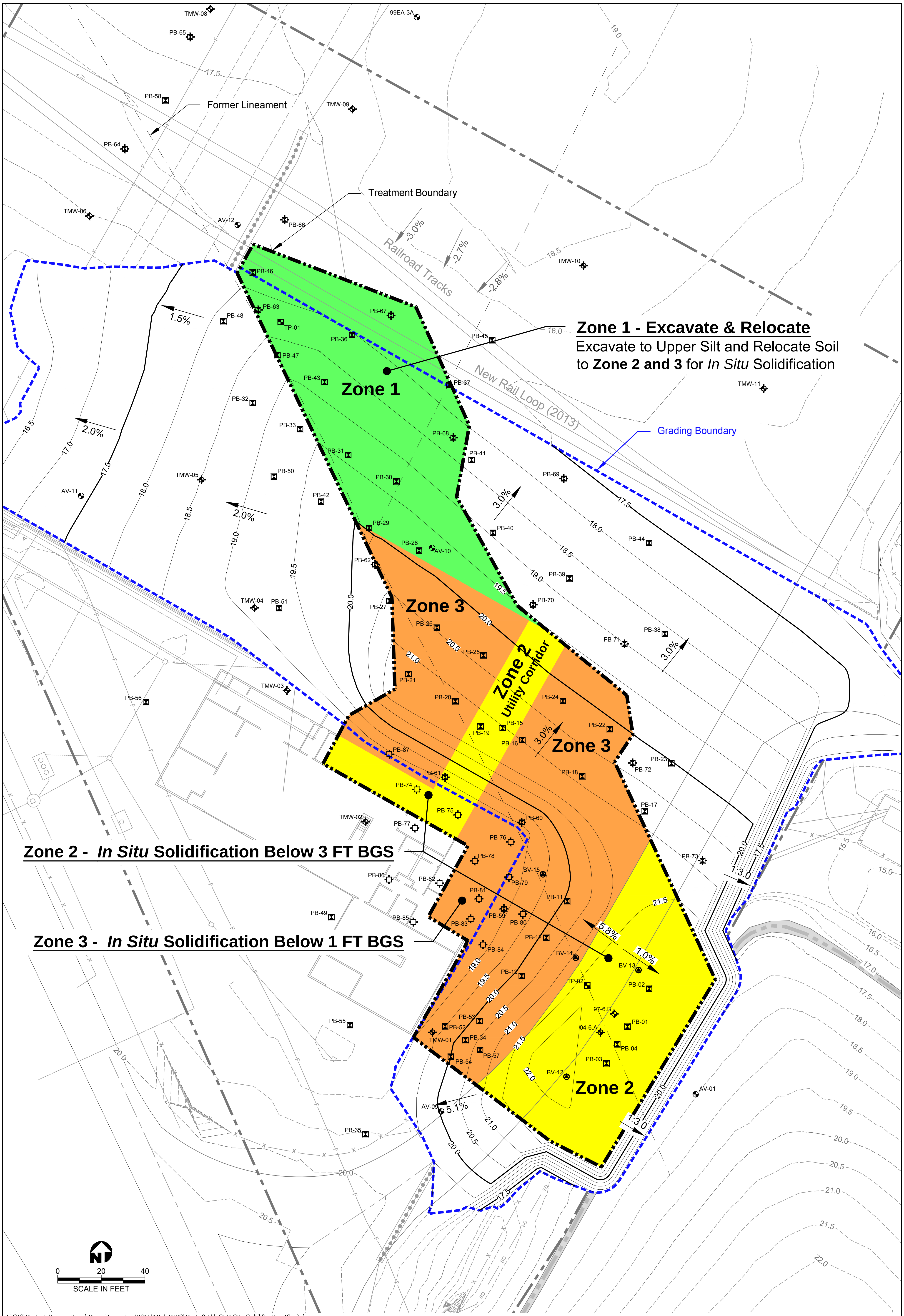
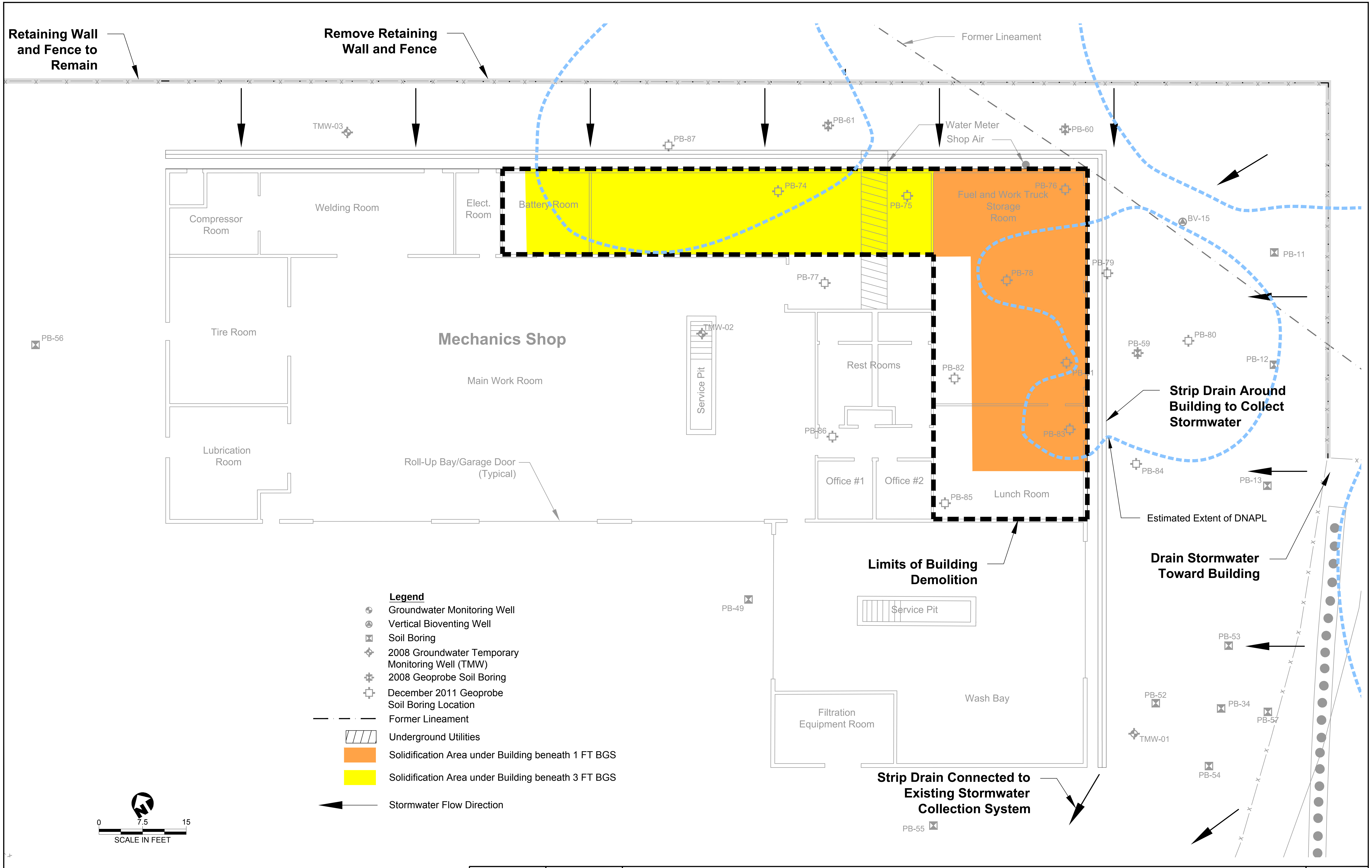
Alternative S5B
Solidification Outside and Inside Building Footprint with Relocation of Soil Near Railroad Tracks

Figure
7-8



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-9 (Alt S5B Site Solidification Plan).dwg
Mod: 09/15/2015, 13:43 | Plotted: 09/15/2015, 13:44 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Alternative S5B Proposed Treatment Area Zones and Post Remediation Site Grades	Figure 7-9
AECOM			

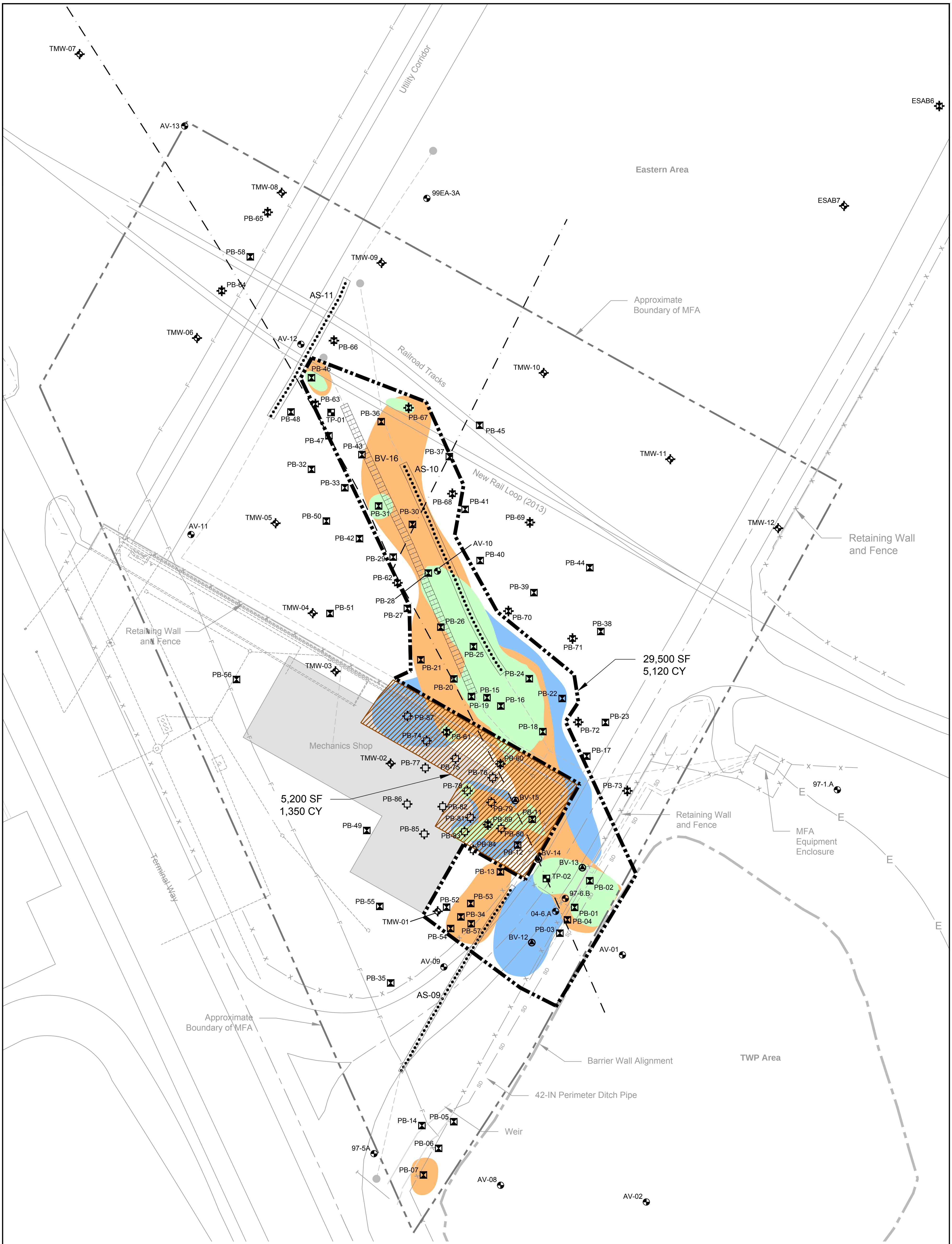


J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-10 (Alt S5B Bldg Solidification Plan).dwg
Mod: 09/17/2015, 08:44 | Plotted: 09/17/2015, 08:45 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232
AECOM	

Alternative S5B
Conceptual Building Solidification Layout

Figure
7-10



Legend

⊞⊞⊞⊞	Horizontal Bioventing Well
·······	Horizontal Biosparging Well
●	Horizontal Well Termination Vault
◉	Groundwater Monitoring Well
◉	Vertical Bioventing Well
⊠	Pre-2008 Geoprobe Soil Boring Location
✣	2008 Groundwater Monitoring Well
✣	2008 Geoprobe Soil Boring Location
◘	August 2011 Test Pit Location
⌖	December 2011 Geoprobe Soil Boring Location
━ · · ━	Estimated Limits of Solidification
🟦	Extent of DNAPL
🟩	Extent of DRO in Soil > MTCA Method A
🟧	Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level
▨	Estimated Area of ERH Treatment

Note:
Solidification will be completed 1 foot into the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the solidification depth will vary across the site. On average, the treatment depth will be 9 ft bgs.

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-11 Alt S5C Solid with ERH.dwg
Mod: 09/17/2015, 08:46 | Plotted: 09/17/2015, 08:48 | JOHN_KNOBBS

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Longview, WA

Project No.
60395232

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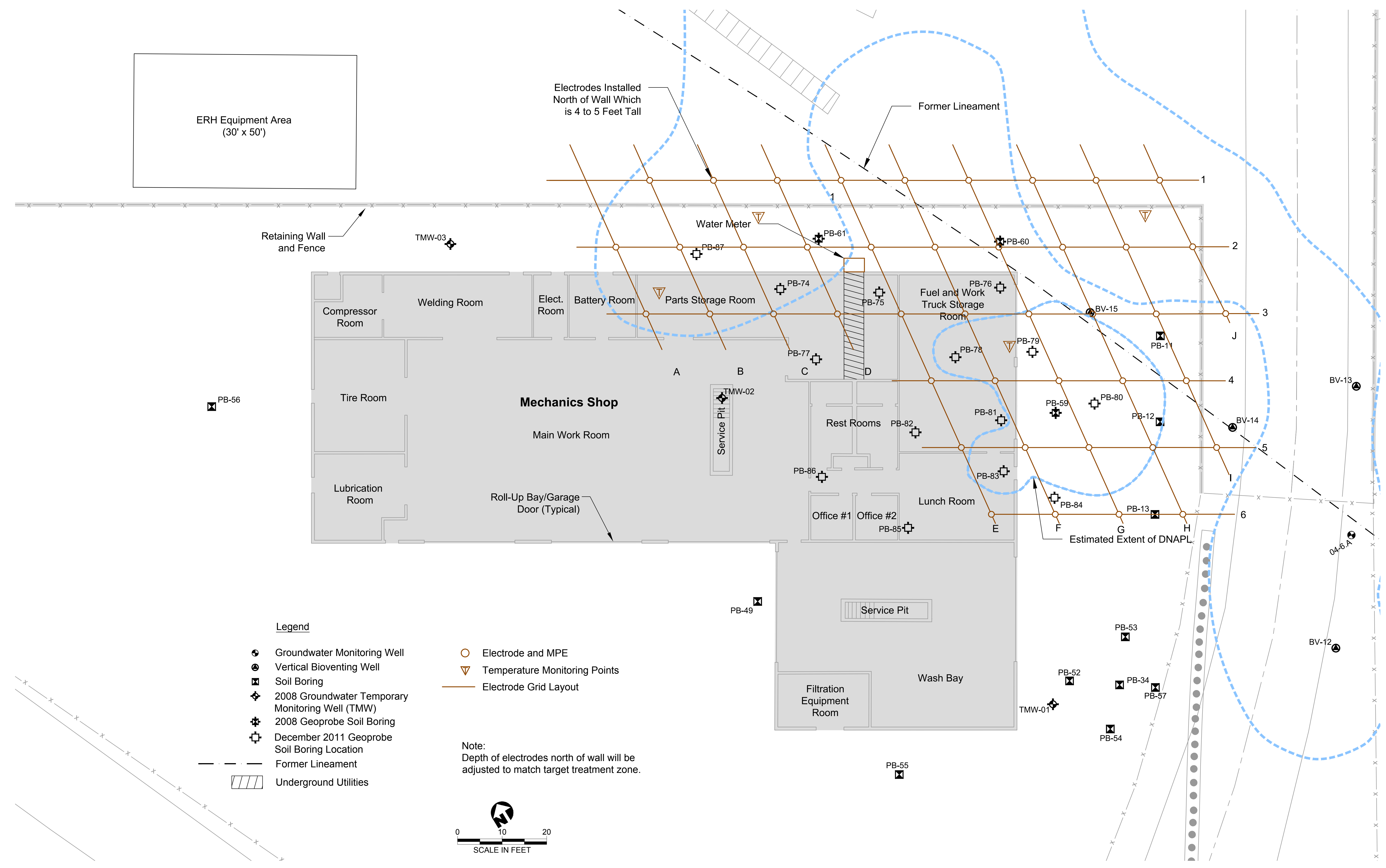
Alternative S5C - Solidification Outside Building
Footprint, ERH Treatment Under Mechanics Shop

Figure
7-11



Note:
Depth of electrodes north of wall will be adjusted to match target treatment zone.

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-12 Alt S5C Build Solid.dwg
Mod: 09/15/2015, 14:46 | Plotted: 09/15/2015, 14:47 | JOHN_KNOBBS

International Paper
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60395232

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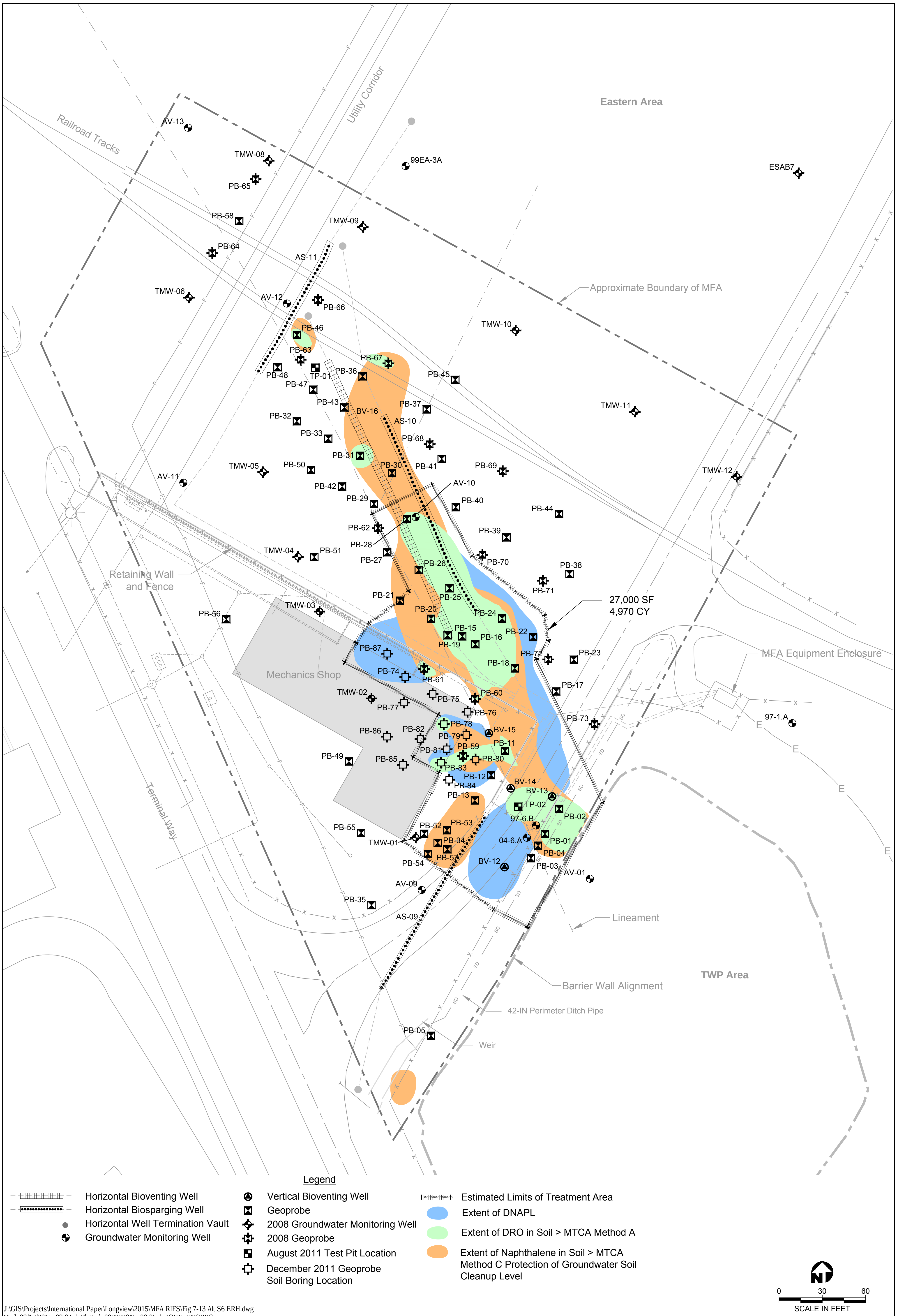
Alternative S5C - Conceptual Building ERH System Layout

Figure
7-12



J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-13 Alt S6 ERH.dwg
Mod: 09/17/2015, 09:04 | Plotted: 09/17/2015, 09:05 | JOHN_KNOBBS

International Paper
Longview, WA

Project No.
60395232

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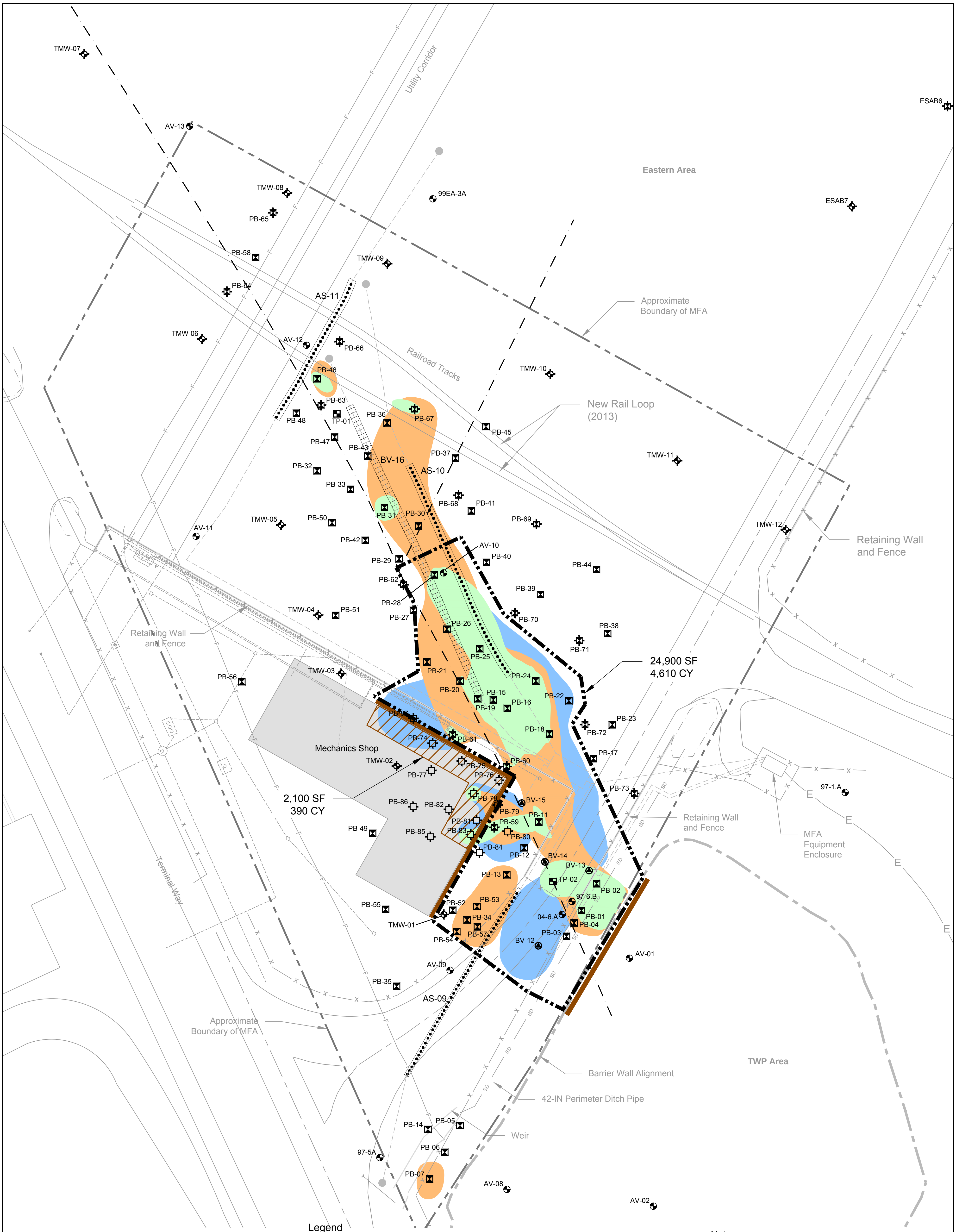
Alternative S6 - DNAPL
Treatment by Electrical Resistance Heating

Figure
7-13



Legend

⊞⊞⊞	Horizontal Bioventing Well	◉	Vertical Bioventing Well	▨	Estimated Area of Treatment by Electrical Resistance Heating
•••••	Horizontal Biosparging Well	☒	Pre-2008 Geoprobe Soil Boring Location	▬	Shoring System for Foundation/Barrier Wall Protection
●	Horizontal Well Termination Vault	✣	2008 Groundwater Monitoring Well	▬ ▪ ▬	Estimated Limits of Excavation
◉	Groundwater Monitoring Well	✣	2008 Geoprobe Soil Boring Location	🟦	Extent of DNAPL
		◘	August 2011 Test Pit Location	🟩	Extent of DRO in Soil > MTCA Method A
		✧	December 2011 Geoprobe Soil Boring Location	🟧	Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level

Note:
Excavation will occur to the top of the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the excavation depth will vary across the site. On average, the excavation depth will be to 8 ft bgs.

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-14 Alt S7 DNAPL Excav_ERH.dwg
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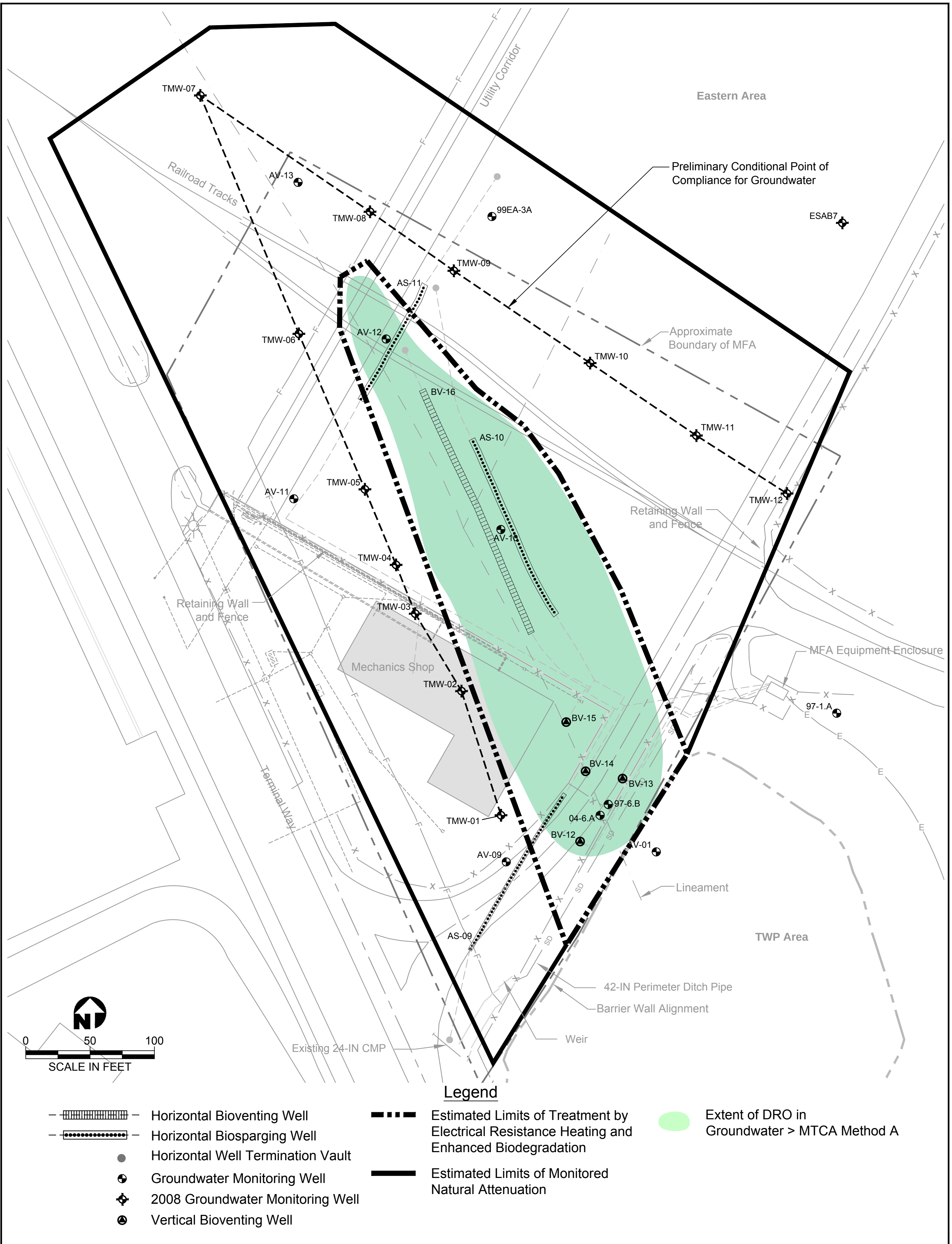
International Paper
Longview, WA

Project No.
60395232

AECOM

Alternative S7 - DNAPL Excavation
and Electrical Resistance Heating

Figure
7-14



International Paper Longview, WA	Project No. 60395232	Alternative GW1 - Baseline Alternative for Groundwater - Electrical Resistance Heating and Enhanced Biodegradation	Figure 7-15
AECOM			

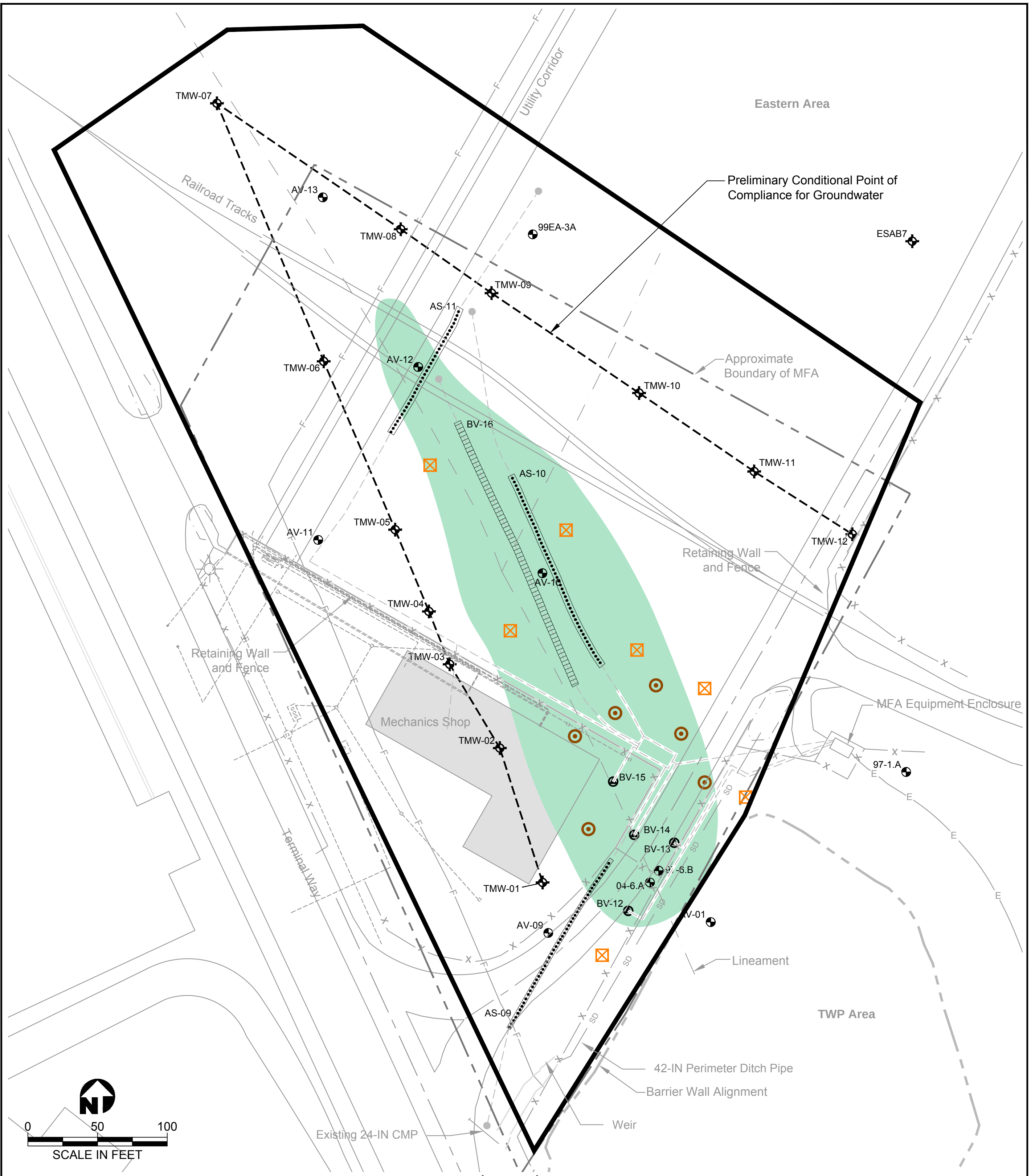
J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-15 Alt GW1 Baseline.dwg
Mod: 09/15/2015, 15:23 | Plotted: 09/15/2015, 15:24 | JOHN_KNOBBS

Legend

- ▥ Horizontal Bioventing Well
- ⁘ Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- ◑ Groundwater Monitoring Well
- ⊕ 2008 Groundwater Monitoring Well
- ▲ Vertical Bioventing Well
- ▬ · ▬ Estimated Limits of Treatment by Chemical Oxidation
- ▬ Estimated Limits of Monitored Natural Attenuation
- 🟩 Extent of DRO in Groundwater > MTCA Method A
- ◆ Chemical Oxidation Injection Point (Assumes 20-FT Radius of Influence)
- ▼ Chemical Oxidation Monitoring Well

International Paper Longview, WA	Project No. 60395232	Alternative GW2 - Chemical Oxidation and Monitored Natural Attenuation	Figure 7-16
AECOM			

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-16 4 Alt GW2 Chem Ox.dwg
Mod: 09/17/2015, 09:17 | Plotted: 09/17/2015, 09:17 | JOHN_KNOBBS



Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- Groundwater Monitoring Well
- 2008 Groundwater Monitoring Well
- Vertical Bioventing Well
- Estimated Limits of Monitored Natural Attenuation
- ☒ Additional Active Biosparging Monitoring Wells
- 🟩 Extent of DRO in Groundwater > MTCA Method A
- ◉ Additional Vertical Biosparging Injection Wells
- Biosparging Piping and Infrastructure Requiring Replacement Following Soil Alternative Implementation

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Project No.
60395232

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Alternative GW3 - Active Biosparging

Figure
7-17

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-17 Alt GW3 Active Bio.dwg
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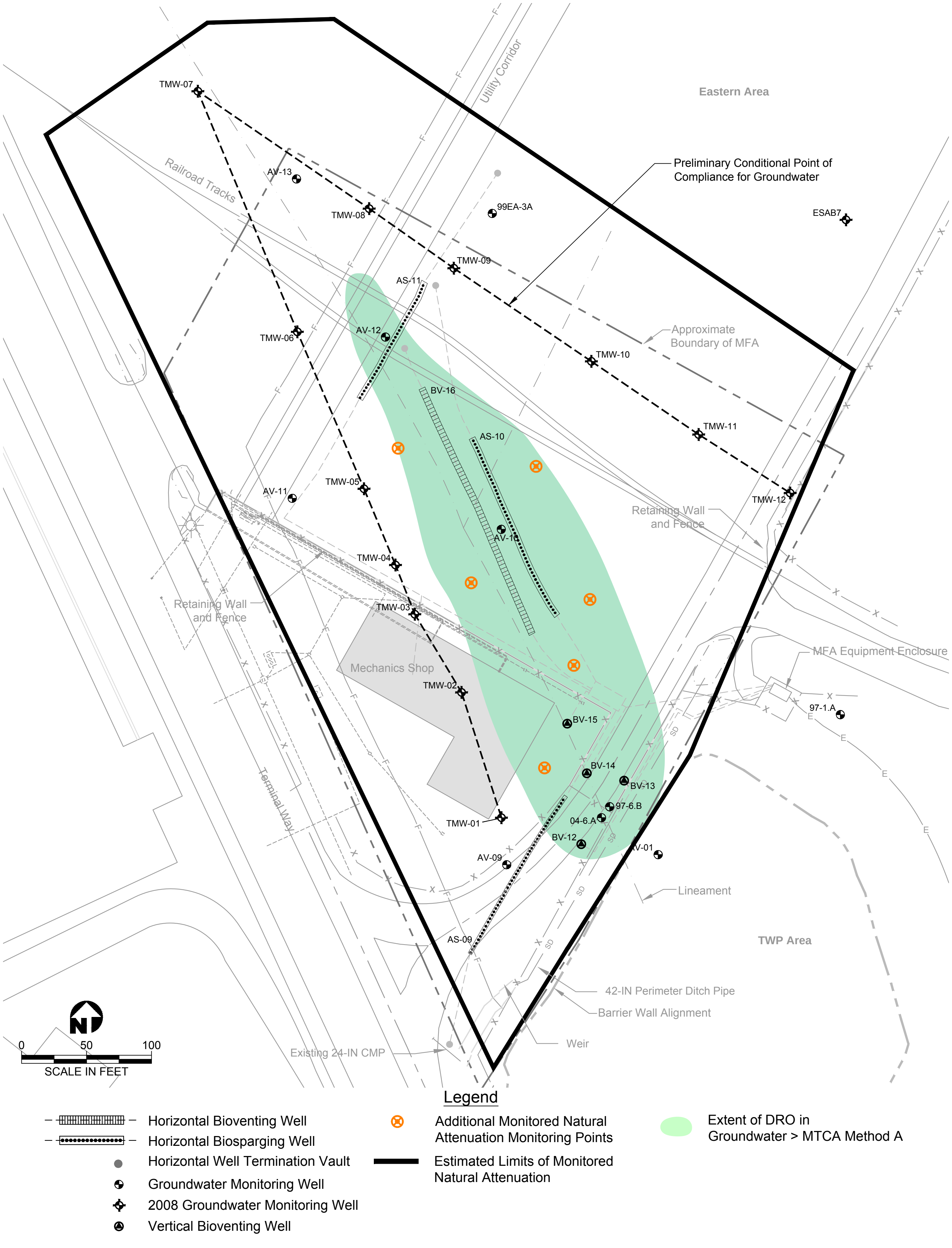
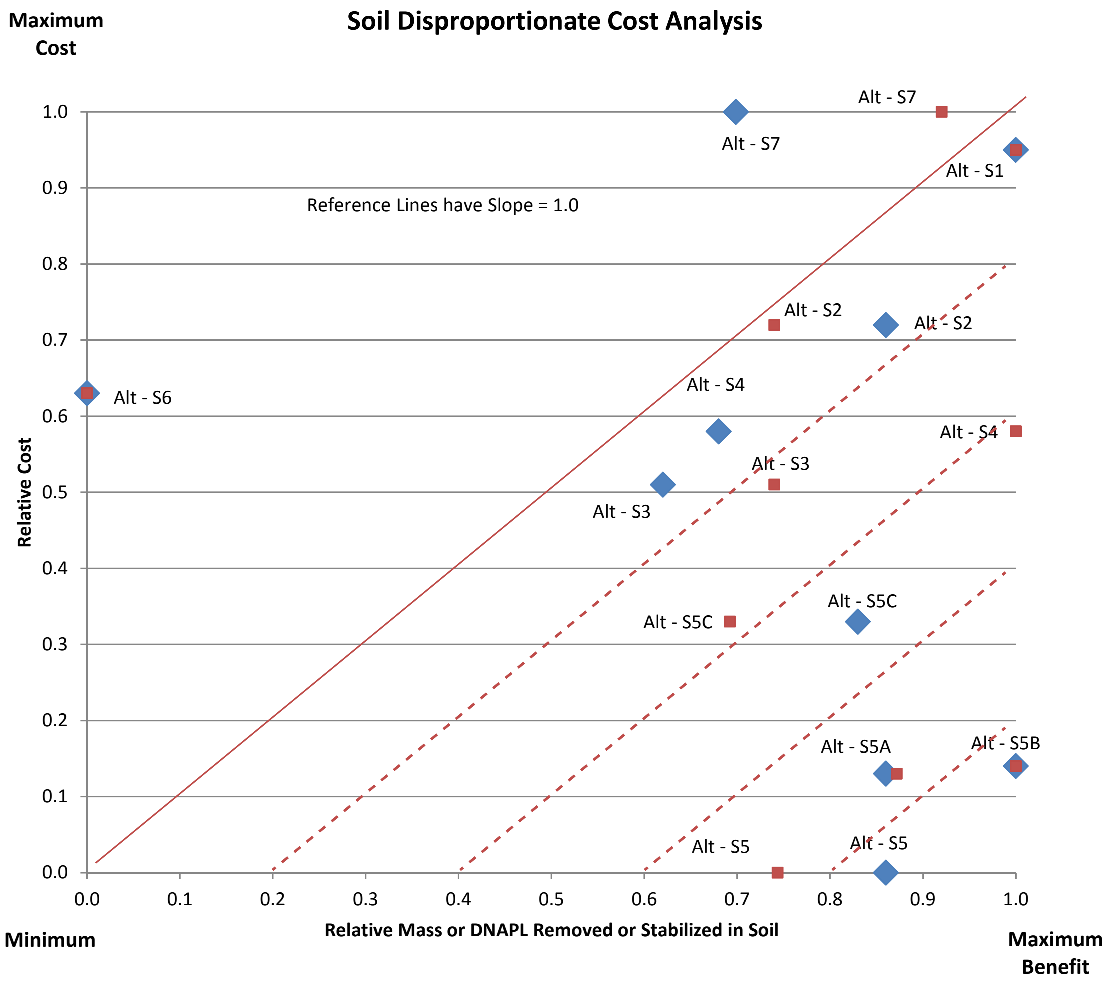


J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-18 Mon Natural.dwg
Mod: 09/17/2015, 09:22 | Plotted: 09/17/2015, 09:23 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Alternative GW4 - Monitored Natural Attenuation	Figure 7-18
AECOM			



Titles of Alternatives

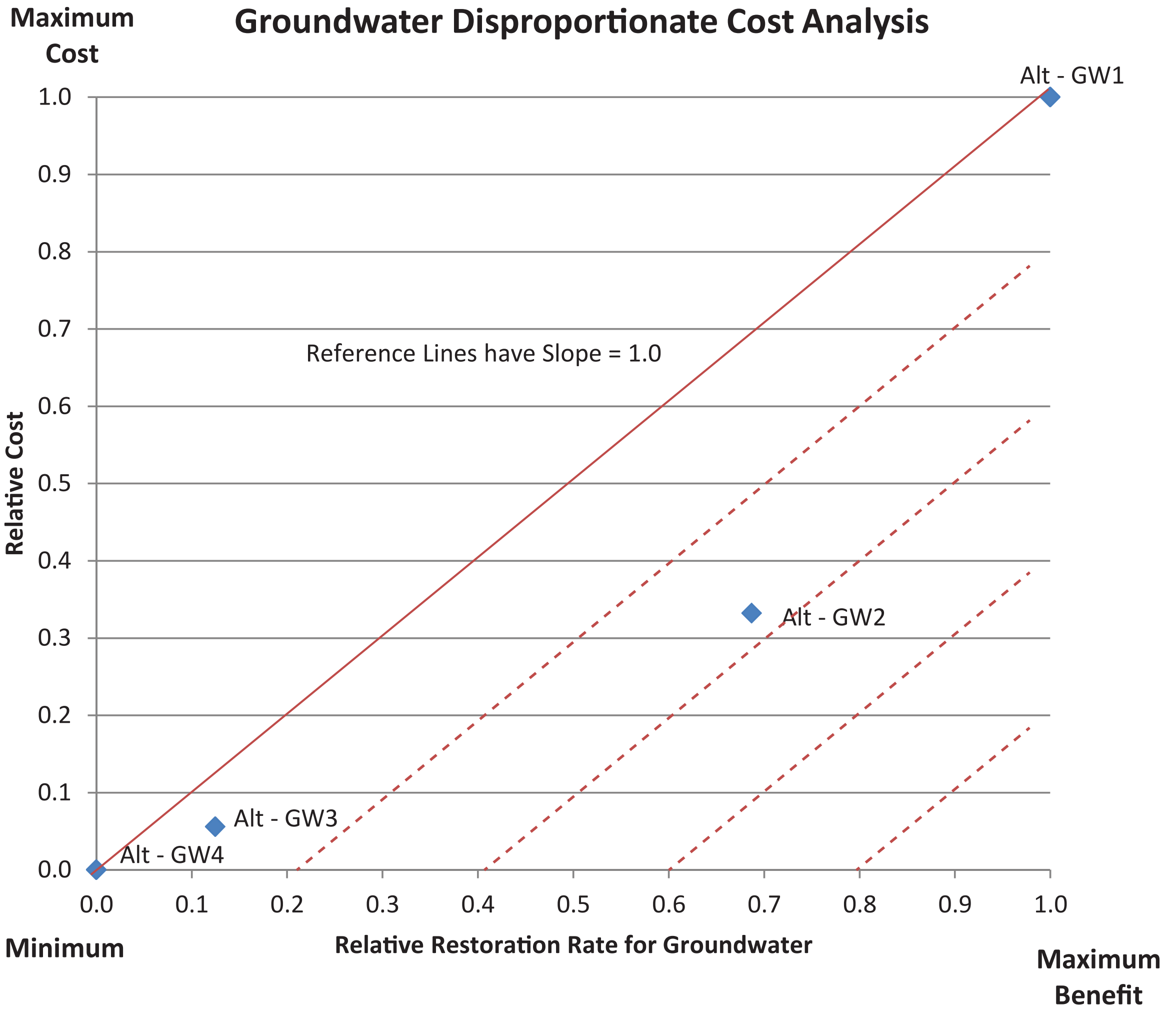
S1	Comprehensive Excavation (Baseline)
S2	Comprehensive Excavation Outside Building Footprint
S3	DNAPL Excavation Outside Building Footprint
S4	DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
S5	Solidification Outside Building Footprint
S5A	Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop
S5B	Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks
S5C	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
S6	DNAPL Treatment by ERH
S7	DNAPL Excavation and ERH

◆ Relative Mass

■ Relative DNAPL Volume

Figure 9-1

Disproportionate Cost Analysis for Soil Alternatives



Titles of Alternatives

GW1	ERH and Enhanced Biodegradation (Baseline)
GW2	Chemical Oxidation and Monitored Natural Attenuation
GW3	Active Biosparging
GW4	Monitored Natural Attenuation

Job No. 60395232

Figure 9-2

Disproportionate Cost Analysis for Groundwater Alternatives

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Appendix A

General Facility Information

APPENDIX A General Facility Information

This appendix presents general facility information related to the Maintenance Facility Area Remedial Investigation / Feasibility Study as required by the Model Toxics Control Act Cleanup Regulation in WAC 173-340-350(7)(c)(i).

Project Title:
Port of Longview Maintenance Facility Area – Remedial Investigation / Feasibility Study

Project Coordinator:
Kaia Petersen
Hydrogeologist
Department of Ecology
Southwest Regional Office
Hazardous Waste and Toxics Reduction
P.O. Box 47775 / 300 Desmond Drive
Olympia, WA 98504-77775
(360) 407-6359 Phone
(360) 407-6305 Fax
kpet461@ecy.wa.gov

Facility Location Legal Description:
Reserved

Facility Dimensions:
Reserved

Present Owner:
Port of Longview
10 Port Way
Longview, WA 98632-7739
360-425-3305

Present Operator:
International Paper Company
6400 Poplar Avenue
Memphis, TN 38197
(901) 419-9000

Other Information:
Reserved

Appendix B

MFA Boring Logs and Monitoring Well Construction Diagrams

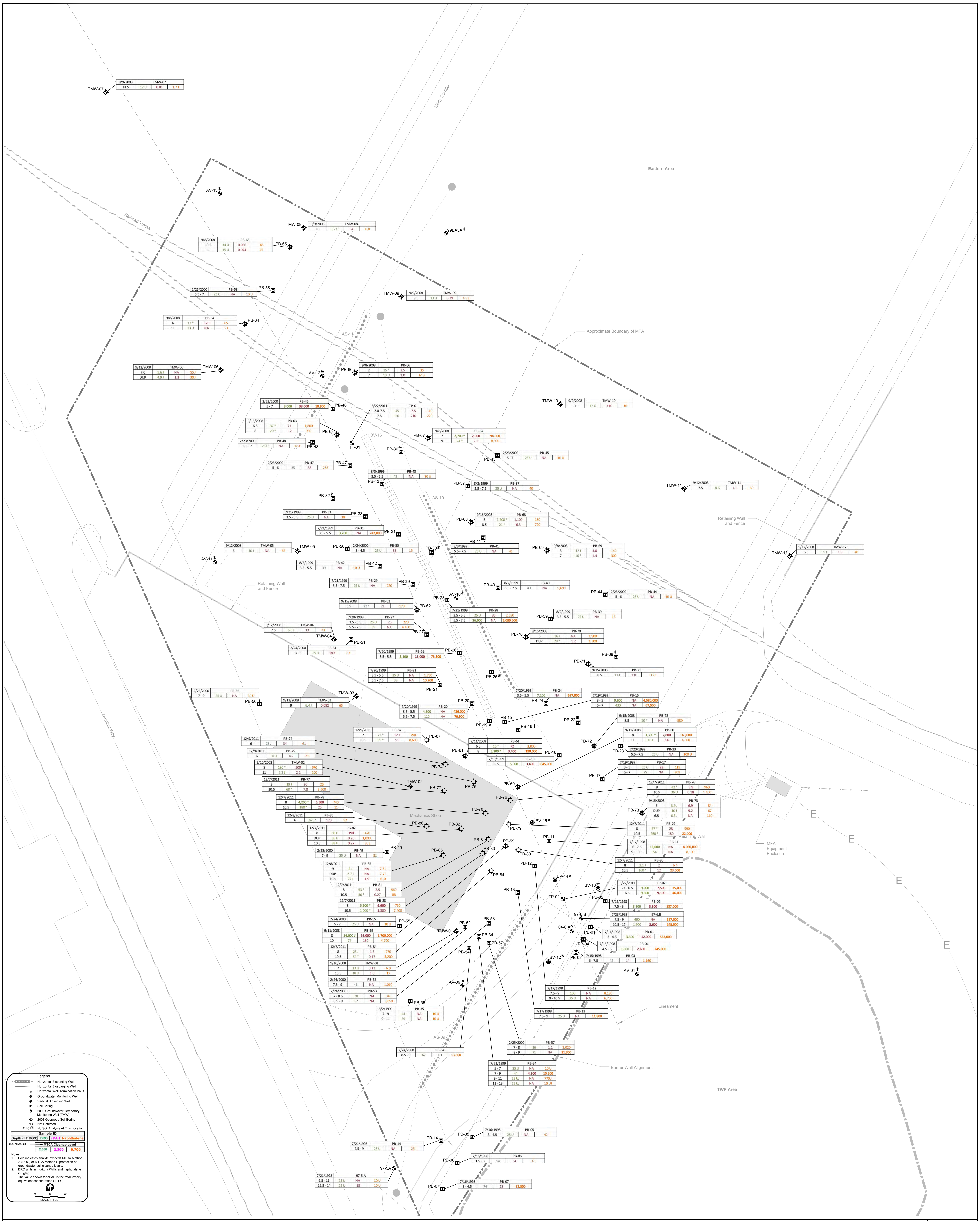
Summary of Soil DRO, cPAH, and Naphthalene Results Figure (1997-2011)

APPENDIX B

TABLE OF CONTENTS

FIGURE

BORING LOGS



Notes:

1. Bold indicates analyte exceeds MTCA Method A (DRO) or MTCA Method C protection of groundwater soil cleanup levels.
2. DRO units in mg/kg; cPAHs and naphthalene in µg/kg.
3. The value shown for cPAH is the total toxicity equivalent concentration (TTEC)

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60395232

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Summary of Soil DRO, cPAH, and Naphthalene Results
1997 - 2011

Figure B-1

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\XXFig B-1 (Summary of Soil DRO, cPAH, and Naphthalene Results).dwg
Mod: 10/08/2015, 10:44 | Plotted: 10/08/2015, 10:49 | powellb

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-01

Sheet 1 of 1

Date(s) Drilled	**7/14/1998 - 7/15/1998**	Logged By	**TMM**	Checked By	**RS**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc**	Total Depth Drilled (feet bgs)	**9.0**
Drill Rig Type	**Trackmount CME75**	Sampler Type	**18" Split Spoon**	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	**NA**	Top of PVC Elevation	**NA**
Diameter of Hole (inches)	**6** Diameter of Well (inches) **NA**	Type of Well Casing	**NA**	Screen Perforation	**NA**
Type of Sand Pack	**NA**	Type and Depth of Seal(s)	**Bentonite cement grout to surface**		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0	☒			75	▨	Reddish brown, moist, coarse sand and gravel (FILL)		18.43	1.75	1405	
		☒			75	▨			12.2	1.75	1410	
		☒			75	░	Dark brown, moist, fine to medium SAND (SP-SM) with trace silt and gravel		1025	1.81	1415	
	5	☒			75	░	Finer with depth		135	1.75	1420	
		☒			90	▥	Saturated Gray brown, uniform SILT (ML) with trace of wood and plastic		68.5	1.81	1425	Sheen
		☒			90	▥					0815	7/15/98
	10						End of hole at 9'					
	15											
	20											
	25											
	30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-02

Sheet 1 of 1

Date(s) Drilled	7/15/1998	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 ; Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Reddish brown, moist, coarse sand and gravel (FILL)				0830	
		☒			75		Dark brown, medium SAND (SP-SM) grades to uniform fine and medium sand		5	0	0835	
		☒			75				101	0	0840	
	5	☒			75				96.8	0	0845	
		☒			75		Saturated Uniform fine SILT (ML) with trace of wood		928	0	0850	Sheen
		☒			90		Loose sand (1")		1568	0	0900	
	10						End of hole at 9'					
	15											
	20											
	25											
	30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-03

Sheet 1 of 1

Date(s) Drilled	7/15/1998	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 ; Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0					▩	Reddish brown, moist, coarse sand and gravel (FILL)				0920	
		☒			75	▩			6.26	.69	0930	
		☒			75	░	Medium brown, moist to wet SAND (SP-SM)		106	.69	0935	
	5	☒			75	░	Becoming finer grained		178	.69	0940	
		☒			75	░	Saturated		71.96	.69	0942	
		☒			90	▥	Fine, pinkish color, uniform, moist to wet SILT (ML)		523	.69	0945	
	10						End of hole at 9'					
	15											
	20											
	25											
	30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-04

Sheet 1 of 1

Date(s) Drilled	7/15/1998	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches) 6	Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Reddish brown, moist, coarse sand and gravel (FILL)				1000	
		☒			75				3.69	.51	1010	
							Gray, fine to medium SAND (SP-SM) with trace of gravel and roots				1015	
	5	☒			75				864	.51	1020	
		☒			90		Grades to fine sand with trace of silt and trace of wood		132	.51	1025	Sheen
		☒			90		Gray, moist, uniform, plastic SILT (ML) with trace of fine sand and wood		843	.51	1030	
	10						End of hole at 9'					
	15											
	20											
	25											
	30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-05

Sheet 1 of 1

Date(s) Drilled	**7/16/98**	Logged By	**TMM**	Checked By	**RS**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc**	Total Depth Drilled (feet bgs)	**6.0**
Drill Rig Type	**Trackmount CME75**	Sampler Type	**18" Split Spoon**	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	**NA**	Top of PVC Elevation	**NA**
Diameter of Hole (inches)	**6** Diameter of Well (inches) **NA**	Type of Well Casing	**NA**	Screen Perforation	**NA**
Type of Sand Pack	**NA**	Type and Depth of Seal(s)	**Bentonite cement grout to surface**		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0					▩	Reddish brown, moist, medium to coarse sand with trace of fine sand and roots (FILL)				0810	
		☒			75	▩			264	0	0820	
		☒			75	▥	Grades to gray brown, moist to wet, fine SILT (ML)		466	0	0822	
	5	☒			90	▥	Gray brown, saturated, plastic SILT (ML) with uniform trace of wood		821	0	0825	
							End of hole at 6'					
	10											
	15											
	20											
	25											
	30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-06

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	7.5
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 / Diameter of Well (inches): NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Gray, moist, coarse sand and gravel (FILL)				0845	
		☒			75		Dark gray, moist, fine to medium SAND (SP-SM)		20.57	0	0850	
		☒			75		Saturated, trace of wood		29.32	0	0855	
	5	☒			75				194	0	0905	
		☒			90		Moist to wet, uniform, fine SILT (ML) with trace of sand and wood		954	0	0910	
							End of hole at 7.5'					
	10											
	15											
	20											
	25											
	30											

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URS Greiner Woodward Clyde

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-07

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 Diameter of Well (inches): NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Dark gray, moist, coarse SAND (SP-SM) with trace of gravel				0925	
		☒			75		Grades to fine SAND with trace of silt		38.8	0	0930	
		☒			75				448	0	0932	
							Saturated at 4.5'					
	5	☒			90		Wet, fine SILT (ML) with trace of fine sand and wood		1149	0	0935	
							End of hole at 6'					
	10											
	15											
	20											
	25											
	30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper **Project Location:** Longview WA **Project Number:** 91C0796B	**Log of Boring PB-08** Sheet 1 of 1

Date(s) Drilled	**7/16/98**	Logged By	**TMM**	Checked By	**RS**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc**	Total Depth Drilled (feet bgs)	**6.0**
Drill Rig Type	**Trackmount CME75**	Sampler Type	**18" Split Spoon**	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	**NA**	Top of PVC Elevation	**NA**
Diameter of Hole (inches)	**6** ; Diameter of Well (inches) **NA**	Type of Well Casing	**NA**	Screen Perforation	**NA**
Type of Sand Pack	**NA**	Type and Depth of Seal(s)	**Bentonite cement grout to surface**		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Dark gray, medium to coarse SAND (SP-SM) with trace of gravel				0950	
		☒			75				67.73	0	0955	
		☒			75				186	0	1000	
	5	☒			90		Grades to fine to medium sand with trace of silt Saturated at 4.5' Moist to wet, fine SILT (ML) with trace of fine sand and wood		1058	0	1005	
							End of hole at 6'					
	10											
	15											
	20											
	25											
	30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-09

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Dark gray, moist, coarse to medium SAND (SP-SM)				1030	
					75				12.86	0	1035	
					75		Grades to fine sand with trace of silt		21.73	0	1040	
							Saturated at 4.5'					
	5				90		Dark brown, moist, plastic SILT (ML) with trace of fine sand and wood		1746	0	1045	
							End of hole at 6'					
	10											
	15											
	20											
	25											
	30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-10

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches) 6	Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Gray, moist, fine to medium SAND (SP-SM)				1225	
		☒			75				24.51	0	1230	
		☒			75				159	0	1235	
	5	☒			90		Gray, moist SILT (ML) with trace of fine sand		1002	0	1240	
							End of hole at 6'					
	10											
	15											
	20											
	25											
	30											

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Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-11

Sheet 1 of 1

Date(s) Drilled	7/17/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	10.5
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 ; Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Asphalt Gravel, boulders and coarse sand (FILL)				0930	
							Brown, fine to medium SAND (SP-SM)					
	5	☒			75				6.7	.2	0945	
		☒			75		Coarse SAND (SP) from 5.5' to 6'		374	.2	0950	Sheen on cuttings
		☒			75		2" layer of silt and fine sand Saturated		193	.2	0955	Sheen
		☒			90		Moist, plastic, fine SILT (ML) with trace of fine sand and wood		44.39	.2	1000	Sheen
	10											
							End of hole at 10.5'					
	15											
	20											
	25											
	30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-12

Sheet 1 of 1

Date(s) Drilled	7/17/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	10.5
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0					■	Asphalt					
						▨	Coarse sand, gravel and boulders (FILL)				1025	
						░	Moist, medium to coarse SAND (SP-SM)					
	5	☒			75	░			1209	.99	1030	Slight odor, sheen during drilling
		☒			75	░			488	.99	1035	
		☒			75	░	Grades to fine sand Saturated		601	.99	1040	
		☒			90	▥	Gray brown, wet, plastic, fine SILT (ML) with trace of fine sand and wood		1735	.99	1045	
	10						End of hole at 10.5'					
	15											
	20											
	25											
	30											

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Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-13

Sheet 1 of 1

Date(s) Drilled	7/17/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 ; Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0					▩	Coarse sand, gravel and boulders (FILL)				1100	
						▒	Medium to coarse SAND (SP-SM) with trace of gravel					
	5	☒			75	▒	Becomes finer with depth		1906	1.01	1110	
		☒			75	▒			790	1.01	1122	No sheen, slight odor
		☒			90	▒	Saturated		1275	1.01	1135	
							Brown, fine, plastic SILT (ML) with trace of fine sand and wood					
	10						End of hole at 9'					
	15											
	20											
	25											
	30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project:	**International Paper**
Project Location:	**Longview WA**
Project Number:	**91C0796B**

Log of Boring PB-14

Sheet 1 of 1

Date(s) Drilled	**7/21/98**	Logged By	**TMM**	Checked By	**RS**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc**	Total Depth Drilled (feet bgs)	**9.0**
Drill Rig Type	**Trackmount CME75**	Sampler Type	**18" Split Spoon**	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	**NA**	Top of PVC Elevation	**NA**
Diameter of Hole (inches)	**6** ; Diameter of Well (inches) **NA**	Type of Well Casing	**NA**	Screen Perforation	**NA**
Type of Sand Pack	**NA**	Type and Depth of Seal(s)	**Bentonite cement grout to surface**		
Comments					

Elevation, feet	Depth, feet	SAMPLES				Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
		Type	Number	Blows per 6-inch Interval	Percent Recovery							
	0						Dark gray, moist, medium to coarse SAND (SP-SM)				1500	
							Grades to fine sand at depth					
	5				75				8.0	0	1515	
					75				24.7	0	1520	
					75				23	0	1525	
					90		Gray brown, wet, plastic, fine SILT (ML) with trace fo fine sand and wood		139	0	1530	
	10											
							End of hole at 10.5'					
	15											
	20											
	25											
	30											

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Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-15

Sheet 1 of 1

Date(s) Drilled	5/19/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	13.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
10			S-1	75%			SAND (SW); medium to fine; becomes finer with depth; dark gray; moist to wet; faint odor	>1000	101/103	
	5		S-2	75%				100	102/37	
							trace of silty sand and wood chips			
			S-3	75%			SAND (SP); fine; trace of silt (as above); saturated at 7.5 ft bgs.	50	102/64	
5							SILT (ML); trace of fine sand and wood chips; tan gray; faint odor	50	102/105	
							BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-16

Sheet 1 of 1

Date(s) Drilled	5/19/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
10			S-1	75%			SAND (SW); medium to fine; gray brown; moist; with odor	>1000	40/80	
	5		S-2	75%			SAND (SP); fine; uniform; gray; moist to wet	50	15/101	
			S-3	75%			Sandy SILT (ML); tan gray; moist; dry at bottom of sample; faint odor	50	12/4	
5										
							BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-17

Sheet 1 of 1

Date(s) Drilled	5/19/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	13.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.2 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	 Number	 Percent Recovery	 Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium to fine; finer with depth; dark gray; moist to wet; faint to no odor	10	8/2	
	5		S-2	75%			trace of silt; no odor	10	7/7	
			S-3	75%			Sandy SILT (ML); more dense with depth; gray brown; dryer with depth; no odor	10	14/33	
5										
			S-4	75%				10	--/31	
	10									
			S-5	75%			SAND (SP); medium; saturated; gray brown; no odor	10	--/102	Water sample collected; screened from 11'-13' bgs.
0							BORING TERMINATED AT 13 FEET BELOW GROUND SURFACE			
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-18

Sheet 1 of 1

Date(s) Drilled	**5/19/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**9.0**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	**–**	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**13.3 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SP); medium; gray; moist; with odor	>1000	33/44	
	5		S-2	75%			fine; uniform; trace of silt zone of free product (about 2" thick)	200	9/36	
			S-3	75%				200	8/33	
							Sandy SILT (ML); gray; moist - becomes dryer with depth			
5										
							BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-19

Sheet 1 of 1

Date(s) Drilled	5/19/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; gray; moist; with odor	>1000	69/96	
	5		S-2	75%			trace of silt; faint odor	100	9/144	
			S-3	75%			Sandy SILT (ML); tan brown; moist; becoming dryer with depth; faint odor	100	7/35	
5										
							BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-20

Sheet 1 of 1

Date(s) Drilled	7/20/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	13.4 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▩	Gravel fill			
10			S-1	75%		░	SAND (SW); medium and fine; gray brown moist	>1000	65/400	
	5					░	2" lense of product from 5' to 5.5' bgs.			
			S-2	75%		░	SAND (SP); fine; trace of silt; moist to wet; faint odor; silt in tip of sample	50	14/900	
5			S-3	75%		▥	Sandy SILT (ML); trace of wood; tan gray; moist; faint odor	10	10/800	
						▥	2" sand lense at 9'			
	10						BORING TERMINATED AT 9.5 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-21

Sheet 1 of 1

Date(s) Drilled	7/20/99	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**11.5**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	–	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**13.4 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES				Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
		Type	Number	Percent Recovery	Blows per 6 inches/ft					
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; gray brown gray; moist to wet; no odor	1	3/500	
	5		S-2	75%			SAND (SP); fine; trace of silt; moist to wet; no odor	10	6/600	
5			S-3	75%			Sandy SILT (ML); moist to wet; no odor	1	8/400	
	10		S-4	75%			SAND (SP); medium; saturated; gray brown; no odor 2" thick silt interbed at 10' bgs	1	7/760	Water sample collected; screen set between 9' and 11.5'
							BORING TERMINATED AT 11.5 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

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Project: IP Longview	**Log of Boring PB-22**
Project Location: Longview, WA	Sheet 1 of 1
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Date(s) Drilled	**7/20/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**7.5**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	--	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**13.3 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
10							SAND (SW); medium and fine; gray brown			
			S-1	75%			moist to wet	>1000	72/550	
	5						2" thick product at 5' bgs			
			S-2	75%			SAND (SP); fine; trace of silt; gray; moist to wet; slight sheen and odor; sandy silt at end of sample	10	17/720	
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-23

Sheet 1 of 1

Date(s) Drilled	**7/20/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**11.5**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	--	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**13.2 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; gray brown moist to wet; no odor	1	8/70	
	5		S-2	75%			SAND (SP); fine; trace of wood; silt in tip; wet to saturated; no odor	1	10/240	
5			S-3	75%			Sandy SILT (ML); tan/gray; dry to moist; no odor; grades to fine sand in tip of sample	1	18/700	
	10		S-4	75%			SAND (SP); fine; saturated; gray; no odor medium	1	15/140	Water sample collected, screen from 11' to 12.5'
0							BORING TERMINATED AT 11.5 FEET BELOW GROUND SURFACE			
	15									
-5										
	20									

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Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-24

Sheet 1 of 1

Date(s) Drilled	7/20/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
10							SAND (SW); medium and fine; gray brown			
			S-1	75%				>1000	174/312	
	5						2" thick product at 5' bgs			
			S-2	75%			SAND (SP); fine; uniform; trace of wood; gray; moist to wet; faint odor	10	10/440	
							Sandy SILT (ML)			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-25

Sheet 1 of 1

Date(s) Drilled	7/20/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.5 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; gray brown trace of wood; slight odor	>1000	116/470	
	5		S-2	75%				>1000	121/423	
							5" of product from 6'7" to 7' bgs.			
							Sandy SILT (ML); moist to wet			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-26

Sheet 1 of 1

Date(s) Drilled	**7/20/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**7.5**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	**--**	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**13.6 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES				Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
		Type	Number	Percent Recovery	Blows per 6 inches/ft					
	0						Asphalt			
							Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; gray brown moist to wet	>1000	63/101	
	5						SAND (SP); fine; moist to wet; slight sheen			
			S-2	75%				10	6/70	Split sample 5.5'-6.5' and 6.5'-7.5'
			S-3	75%			Sandy SILT (ML); trace of wood; moist to wet; no odor	10	8/80	
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-27

Sheet 1 of 1

Date(s) Drilled	7/20/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.7 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown			
10			S-1	75%			dark brown; moist; faint odor	1	6.3/74	
	5									
			S-2	75%				1	14/320	
							Sandy SILT (ML); moist to wet; no odor			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
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Log of Boring PB-28

Sheet 1 of 1

Date(s) Drilled	7/21/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	8.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.9 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown			
10			S-1	75%			trace of wood chips; moist to wet; no odor; product in tip of spoon	10	5/647	
	5									
			S-2	75%				>1000	120/800	
								>1000	130/360	
							Sandy SILT (ML); tan brown; moist			
5							BORING TERMINATED AT 8.5 FEET BELOW GROUND SURFACE			
	10									
0										
	15									
-5										
	20									

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Sheet 1 of 1

Date(s) Drilled	7/21/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.9 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown			
10			S-1	75%			moist to wet; no odor	1	4.4/212	
	5									
			S-2	75%				10	4/470	
							Sandy SILT (ML); tan gray; no odor			
							2" thick sand lense at 7'2" bgs			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

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Project: IP Longview
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Log of Boring PB-30

Sheet 1 of 1

Date(s) Drilled	7/21/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.2 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▨	Gravel fill			
		▮	S-1	75%		░	SAND (SW); medium and fine; gray brown moist to wet; faint odor	10	4.6/67	
10										
	5	▮	S-2	75%		░	saturated; slight sheen and odor	>1000	17/204	
						⁞	Sandy SILT (ML); tan/gray; dry to moist; no odor			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
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Log of Boring PB-31

Sheet 1 of 1

Date(s) Drilled	7/21/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.2 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▩	Gravel fill			
						░	SAND (SW); medium and fine; gray brown			
		▮	S-1	75%		░	dark brown/gray; slight odor and sheen present	>1000	45/260	
10		▮				░				
	5	▮				░				
		▮	S-2	75%		░		>1000	120/413	
		▮				▥	SILT (ML); gray/brown; dry; no sheen			
		▮	S-3	75%		▥	Sandy SILT (ML); saturated; gray/brown; moist; sheen present	>1000	75/260	
		▮				░	SAND (SP); medium; saturated; dark gray; sheen and odor			
5		▮				░				Water sample collected; screen from 8.5' to 9.5'
	10						BORING TERMINATED AT 9.5 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-32

Sheet 1 of 1

Date(s) Drilled	**7/21/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**7.5**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	**--**	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**14.0 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown; dry			
10			S-1	75%				1	2.5/120	
	5						SILT (ML); gray/brown; dry; no odor			
			S-2	75%				1	2.2/300	
							SAND (SW); medium and fine; gray; moist to wet; no odor			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

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Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

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Sheet 1 of 1

Date(s) Drilled	**7/21/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**9.5**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	**--**	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**14.2 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▩	Gravel fill			
10		▮	S-1	75%		░	SAND (SW); medium and fine; gray brown brown; moist	1	2.6/90	
	5	▮	S-2	75%		▥	Sandy SILT (ML); moist; no odor	50	4.2/43	
		▮	S-3	75%		░	SAND (SP); fine; trace medium sand; moist; faint odor	1	2.9/120	
5		▮				░	silty interbed (2") at 8.5 ft; wet to saturated			
	10						BORING TERMINATED AT 9.5 FEET BELOW GROUND SURFACE			
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-34

Sheet 1 of 1

Date(s) Drilled	7/21/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	13.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	15.0 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown			
10	5		S-1	75%			moist to wet; no odor; slightly swampy	1	2.1/260	
			S-2	75%			saturated	10	4.3/500	
							SILT (ML); dark brown; wet; slight odor			
			S-3	75%				1	3.3/ 1000	
5	10						fine sand lense at 10-11 ft; saturated; slight odor			
			S-4	75%				1	2.2/120	
							SAND (SP); medium; saturated; no odor; silty interbed at 13 ft (2" thick)			Water sample collected; screen from 12' to 13'
							BORING TERMINATED AT 13 FEET BELOW GROUND SURFACE			
0	15									
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-35

Sheet 1 of 1

Date(s) Drilled	8/2/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	15.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	16.4 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
15						▩	Gravel fill			
						⁘	SAND (SW); medium and fine; gray brown			
	5	▮	S-1	75%		⁘	moist; no odor	<10	600/46	
10		▮				⁘				
		▮	S-2	75%		⁘		<10	1000/ 1000	
		▮				⁘	2" silty interbeds at 8 ft and 8.5 ft; saturated at 8.5 ft			
		▮	S-3	75%		⁘		<1	450/ 1100	
	10	▮				⁘				
5		▮	S-4	75%		▥	Sandy SILT (ML); moist; becomes dryer and denser with depth; no odor	<1	611/435	
		▮	S-5	75%		▥		<1	685/178	
		▮				⁘	SAND (SP); medium; saturated; gray			Water sample collected; screen from 14' to 15'
	15						BORING TERMINATED AT 15 FEET BELOW GROUND SURFACE			
0										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-36

Sheet 1 of 1

Date(s) Drilled	8/2/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	14.6 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown dry; slight odor			
			S-1	75%				10	20/6	
10	5									
			S-2	75%				10	15/50	
			S-3	75%			SILT (ML); trace of wood chips; sand at 9.5 ft; moist; slight odor	10	8/1	
5										
	10						BORING TERMINATED AT 9.5 FEET BELOW GROUND SURFACE			
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-37

Sheet 1 of 1

Date(s) Drilled	8/2/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	14.7 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Percent Recovery	SAMPLES: Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown dry to moist; faint odor			
			S-1	75%				<1	22/6	
10	5									
			S-2	75%				<1	190/125	
							Sandy SILT (ML); gray brown; moist; faint odor			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5	10									
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-38

Sheet 1 of 1

Date(s) Drilled	8/2/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.6 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▨	Gravel fill			
10		▮	S-1	75%		░	SAND (SW); medium and fine; gray brown trace of geotextile; moist; no odor	<1	17/65	
	5	▮	S-2	75%		▥	SILT (ML); trace of wood chips; wet; becomes dryer and denser with depth	<1	4/460	
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-39

Sheet 1 of 1

Date(s) Drilled	8/2/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.8 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES				Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
		Type	Number	Percent Recovery	Blows per 6 inches/ft					
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown			
10			S-1	75%			piece of wood; moist; faint odor	<1	12/6	
	5									
			S-2	75%			SILT (ML); piece of wood at 7 ft; moist; no odor	<1	13/30	
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-40

Sheet 1 of 1

Date(s) Drilled	8/2/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	11.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.1 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

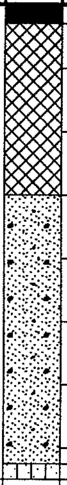
Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
			S-1	75%			SAND (SW); medium and fine; gray brown wood chips at 4 ft; moist; faint septic odor	10	18/30	
10										
	5									
			S-2	75%				<5	10/15	
							Sandy SILT (ML); moist; faint odor			
			S-3	75%			saturated	<5	10/35	
							silty interbed (2") at 8.5 ft; wet to saturated			
5										
							SAND (SP); medium; saturated			Water sample collected; screen pushed from 9' to 11'
	10									
							BORING TERMINATED AT 11 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-41

Sheet 1 of 1

Date(s) Drilled	8/3/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.5 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0									
							Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown trace of gravel; loose dry; faint odor			
			S-1	75%				<1	12/44	
10										
	5									
			S-2	75%				<1	10/160	
							Sandy SILT (ML); piece of wood bark; moist; faint to no odor			
							BORING TERMINATED AT 7.5 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-42

Sheet 1 of 1

Date(s) Drilled	**8/3/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**9.5**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	**–**	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**13.9 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; gray brown dry; no odor	<1	12/120	
	5		S-2	75%			Sandy SILT (ML); dense; gray; dry; no odor sand lense at 6.5 ft	<1	8/65	
5			S-3	75%			SAND (SW); fine and medium; wet to saturated; faint to no odor	<1	6/42	Water sample collected; screen from 7.5' to 9.5'
	10						BORING TERMINATED AT 9.5 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-43

Sheet 1 of 1

Date(s) Drilled	8/3/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	11.5
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.4 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

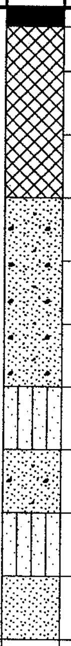
Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
							SAND (SW); medium and fine; gray brown			
			S-1	75%			dry; no odor	<1	10/50	
10										
	5									
			S-2	75%			Sandy SILT (ML); sand lenses; moist to wet; no odor	<1	8/32	
							wood chips at 6.5 ft			
			S-3	75%			wet to saturated; faint odor	<1	6/40	
5										
			S-4	75%				<1	24/39	
	10									
							sand lense to 11 ft			Water sample collected; screen from 10.5' to 11.5'
							SILT (ML)			
							SAND (SP); medium; saturated; gray; faint odor			
							BORING TERMINATED AT 11.5 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-44

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	10.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	13.9 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite



Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					Asphalt			
						Gravel fill			
			S-1	75%		SAND (SW); medium and fine; dark gray/brown; trace of gravel and woodchips; moist	10-50	-4.2/55	
10									
	5		S-2	83%			<1	-4.6/36	
			S-3	83%		SILT (ML) with sand; uniform; gray/brown; moist	<1	-4.4/52	
			S-4	75%		Grades to fine and medium SAND (SW); moist	1-10	-3.79/ 83	
						Back to SILT (ML) with fine sand; saturated; no odor			
5						Medium SAND (SP) at base			Water sample collected; screen from 9' to 10'
	10					BORING TERMINATED AT 10 FEET BELOW GROUND SURFACE			
0									
	15								
-5									
	20								

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-45

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	13.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	15.1 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0					■	Asphalt			
						▩	Gravel fill			
		▌	S-1	75%		░	SAND (SW); medium and fine; dark gray/brown; trace of gravel and woodchips; moist	1-10	2.38/ 289	Alarm
10	5	▌	S-2	75%		░	slight odor	1-10	-3.24/ 2.98	
		▌	S-3	75%		░				
		▌				▥	Grades to dense SILT (ML); gray; with wood roots mottled at tip; slight odor	1-10	2.21/ 271.1	Alarm
		▌	S-4	75%		░	Grades to fine SAND (SP); gray; trace of silt; moist to wet; slight odor	<1	2.76/ 270.1	Alarm
5	10									
		▌	S-5	75%		░	SAND (SW); fine and medium; gray; becoming coarser with depth; saturated; no odor	1-10	-1.09/ 76.5	Water sample collected; screen from 11' to 13'
							BORING TERMINATED AT 13 FEET BELOW GROUND SURFACE			
0	15									
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-46

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.1 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▨	Gravel fill			
		▮	S-1	75%		░	SAND (SW); medium and fine; dark gray/brown; trace of gravel; moist; slight odor	<1	-2.54/ 90.7	
10										
	5	▮	S-2	75%		░		200	75.4/ 38.70	
							staining (2") at 6.5 ft bgs; moist; with odor			
						▥	Grades to SILT (ML) with fine sand			
							BORING TERMINATED AT 7 FEET BELOW GROUND SURFACE			
5										
	10									
0										
	15									
-5										
	20									

Template: GEO_10D Proj ID: LONGVIEW.GPJ

URS Greiner Woodward Clyde

Printed: 8/30/00

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-47

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	12.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.1 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel; moist; slight odor	1-10	-0.03/ 4.6	
10										
	5		S-2	75%				1-10	-0.27/ 30.4	Sample split into 5'-6' and 6'-7'
							Grades to SILT (ML) with fine sand; gray; trace of wood; moist	1-10	-2.24/ 78.2	
			S-3	75%			wet; slight odor	10-50	3.87/ 337	Alarm
5			S-4	75%				1-10	-4.41/ 54.2	
	10									
							Grades to fine SAND (SP); trace of silt; coarse sand lense (2" thick); wet			Water sample collected; screen from 11' to 12'
							BORING TERMINATED AT 12 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Template: GEO_10D Proj ID: LONGVIEW.GPJ **URS Greiner Woodward Clyde** Printed: 8/30/00

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-48

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	14.0 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel	1-10	2.25/1.2	
10										
	5		S-2	75%						Sample collected from 6.5'-7'
			S-3	75%			Grades to SILT (ML) with fine sand; trace of wood; laminated; moist	1-10 1-10	2.57/1.4 4.42/3.2	
5										
							BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
	10									
0										
	15									
-5										
	20									

Project: IP Longview **Project Location:** Longview, WA **Project Number:** 54-09900003	# Log of Boring PB-49 Sheet 1 of 1

Date(s) Drilled	**2/23/00**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Geoprobe**	Drill Bit Size/Type	**1" ID**	Total Depth Drilled (feet)	**14.0**
Drill Rig Type	**Truck Mounted**	Drilling Contractor	**Cascade Drilling**	Sampler Type(s)	**Geoprobe**
Groundwater Level and Date Measured	**–**	Hammer Data	**Pneumatic**	Approximate Surface Elevation	**15.6 MSL**
Comments	**Backfilled with bentonite chips, grouted to surface**			Borehole Backfill	**Bentonite**

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
15							Gravel fill			
			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of wood; FILL?	<1	5.29/ 17.8	
10	5		S-2	75%			plywood in tip	<1	5.61/ 1.53	
			S-3	75%			slightly finer grained at tip	<1	4.82/2.1	
			S-4	75%			Grades to SILT (ML); saturated; trace of fine sand	1-10	3.82/1.4	
5	10									
			S-5	75%				1-10	3.09/ 17.3	
							Grades to SAND (SW); fine and medium; saturated; no odor			Water sample collected; screen from 12.5' to 14'
							BORING TERMINATED AT 14 FEET BELOW GROUND SURFACE			
0	15									
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-50

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	10.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	13.8 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▨	Gravel fill			
10			S-1	75%		░	SAND (SW); medium and fine; dark gray/brown	1-10	10.12/ 26.9	Sample collected from 3'-4.5'
	5		S-2	75%			Grades to SILT (ML); gray/brown; moist; no odor	1-10	9.37/6.6	
								10-50	9.32/9.4	
							becomes coarser grained at base; more sand at base	1-10	11.71/ 10.3	
5			S-3	75%		░	SAND (SW); fine and medium; dark gray; saturated; no odor	10	17.14/ 29.7	Water sample collected; screen from 7' to 10'
	10						BORING TERMINATED AT 10 FEET BELOW GROUND SURFACE			
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-51

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	11.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
						▩	Gravel fill			
10		▮	S-1	75%		░	SAND (SW); medium and fine; dark gray/brown; trace of gravel; becomes gray colored with depth	1-10	12.74/ 103.2	
	5	▮	S-2	75%		░		1-10	25.19/ 388	Alarm
						▥	Grades to SILT (ML) with laminations			
		▮	S-3	75%		▥	saturated	1-10	27.42/ 275	Alarm
5						▒	Grades to fine SAND (SW) interbedded with silt			
		▮	S-4	75%		▒	interbeds of silt saturated	1-10	8.21/ 45.4	Water sample collected; screen from 9' to 11'
	10									
							BORING TERMINATED AT 11 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-52

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	15.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	15.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt			
							Gravel fill			
10	5		S-1	75%			SAND (SW); medium and fine; gray/brown; moist	1-10	7.24/ 32.8	
			S-2	75%			saturated			Sample collected at 7.5'-9'
							Grades to SILT (ML) and fine sand; gray	1-10	11.89/ 275	Alarm
			S-3	75%			2" fine/medium sand at tip; wet	1-10	14.36/ 411	Alarm
5	10									
			S-4	75%			saturated; no odor	1-10	18.89/ 267	Alarm Water sample collected; screen from 11' to 15'
			S-5	75%				1-10	15.69/ 169	
0	15						BORING TERMINATED AT 15 FEET BELOW GROUND SURFACE			
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-53

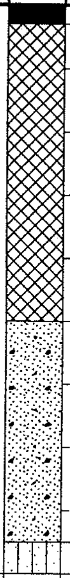
Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	15.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	14.8 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
10	5		S-1	75%			SAND (SW); medium and fine; gray/brown; moist	1-10	10.77/ 29.7	
			S-2	75%				1-10	36.7/ 109	Sample collected at 8.5'-9'
							Grades to SILT (ML) and fine sand; gray	1-10	36.57/ 257	Alarm
			S-3	75%				1-10	24.89/ 346	Alarm
5	10									
			S-4	75%			dryer at base	1-10	50.33/ 429	Alarm
							dry to moist			
			S-5	75%			Grades to SAND (SW); medium and fine; gray/brown; with silty interbeds	1-10	7.89/ 139	Water sample collected; screen from 13' to 15'
							medium sand in tip; saturated			
0	15						BORING TERMINATED AT 15 FEET BELOW GROUND SURFACE			
-5	20									

Project: IP Longview **Project Location:** Longview, WA **Project Number:** 54-09900003	# Log of Boring PB-54 Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	15.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite



Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt			
							Gravel fill			
10	5		S-1	75%			SAND (SW); medium and fine; gray/brown; trace of wood; moist	<1	4.6	
			S-2	75%			wet with piece of wood	<1	0.4	Sample collected at 8.5'-9'
							Grades to SILT (ML) and fine sand; gray/brown; wet; no odor	<1	2.0	
							BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
5	10									
0	15									
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-55

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	17.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	15.5 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt Gravel fill			
							SAND (SW); medium and fine; trace of wood and gravel; moist	<1	1.3	
10	5		S-1	75%			with piece of wood	1-10	2.3	
			S-2	75%						
							Grades to SILT (ML) and fine sand; gray	1-10	9.5	
			S-3	75%			with sandy interbeds; wet	<1	0.6	
5	10									
			S-4	75%				<1	4.7	
			S-5	75%			dryer; with interbeds of sand	<1	1.8	
							Grades to medium SAND (SP) with silty interbeds			
0	15		S-6	75%				<1	3.5	Water sample collected; screen from 14.5' to 17'
							saturated			
							BORING TERMINATED AT 17 FEET BELOW GROUND SURFACE			
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-56

Sheet 1 of 1

Date(s) Drilled	2/25/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	15.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	15.5 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0					■	Asphalt			
15						▨	Gravel fill			
		▮	S-1	75%		░	SAND (SW); medium and fine; gray/brown; trace of wood; moist	1-10	0.6	
10	5	▮	S-2	75%		░		<1	0.6	
						░	finer grained at tip			
		▮	S-3	75%		░		<1	0.4	
						░	saturated at base			
		▮	S-4	75%		▥	Grades to SILT (ML) with fine sand; gray/brown	<1	1.9	
5	10					▥				
		▮	S-5	75%		▥	dryer at tip	1-10	0.6	
						░	Grades to SAND (SW); medium and fine; saturated			Water sample collected; screen from 12.5' to 15'
0	15						BORING TERMINATED AT 15 FEET BELOW GROUND SURFACE			
	20									

Template: GEO_10D Proj ID: LONGVIEW.GPJ

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Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-57

Sheet 1 of 1

Date(s) Drilled	2/25/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	14.8 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES				Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
		Type	Number	Percent Recovery	Blows per 6 inches/ft					
	0					■	Asphalt			
						▩	Gravel fill			
10	5	▮	S-1	75%		░	SAND (SW); medium and fine; gray/brown; moist; no odor	<1	1.1	
		▮	S-2	75%		░	saturated at base	<1	0.1	Sample collected at 8'-9'
		▮				▥	Grades to SILT (ML) with fine sand; gray; wood chip in tip of spoon	1-10	0.1	
							BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
5	10									
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-58

Sheet 1 of 1

Date(s) Drilled	2/25/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	14.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.7 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
			S-1	75%			SAND (SW); medium and fine; gray/brown; moist; silty interbeds	<1	8.2	
10										
	5		S-2	75%						Sample collected at 5.5'-7'
							Grades to SILT (ML) with fine sand; gray; no odor	<1	3.0	
			S-3	75%			saturated	<1	1.0	
5										
			S-4	75%			with sandy interbeds; wet; saturated	<1	1.4	
	10									
			S-5	75%						
							Grades to medium SAND (SP); saturated; no odor	<1	1.1	Water sample collected; screen from 12.5' to 14'
0										
							BORING TERMINATED AT 14 FEET BELOW GROUND SURFACE			
	15									
-5										
	20									

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-59

Sheet 1 of 1

Date(s) Drilled	**9/11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**10 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**18.55 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		Asphalt	
							GP	Gray GRAVEL (dry) (base rock/fill) (no odor)	
	2				60	2/7			
15						0/0			
	4						SM	Gray silty fine SAND (loose) (moist) (no odor, no sheen)	
						13/75			
							SP	Grades to gray fine SAND (loose) (moist) (slight odor, no sheen)	
	6				78				
								Odor at 7' bgs (creosol)	
						300/1050		Strong odor, staining at 7.5' bgs	
	8		S-8 14:20				SM	Black (stained) silty fine SAND, saturated with creosote (significant sheen)	
10						175/1090			
					75	180/220			
							ML	Dark gray SILT with fine sand(soft) (wet) (creosote odor, slight staining)	
	10		S-10 14:30					Boring was completed to 10' bgs. Boring was backfilled with bentonite.	
	12								
5									
	14								
	16								
	18								
0									
	20								

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-60

Sheet 1 of 1

Date(s) Drilled	**9/11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**18.75 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID			Asphalt	
								GP	GRAVEL (base rock/fill)	
	2				67	0/0		SP	Brown fine SAND (loose) (dry to moist) (no odor)	
15	4					5/4		GP	Black GRAVEL/fine GRAVEL (loose) (dry) (no odor)	
						0		ML	Dark brown SILT with fine sand, some organics (stiff) (dry) (some odor, no sheen)	
								SM	Brown/gray mottled fine silty SAND (moist) (no odor)	
	6				67	3/18		SP	Gray fine SAND (loose) (moist to wet) (slight odor, no sheen)	
10	8		S-8 13:10		83	8/380 9/320		SM	Grades to GRAY silty fine SAND (loose) (moist to wet) (slight hydrocarbon odor, no staining, no sheen) Grades to gray silty fine SAND (slightly plastic) (wet) (slight hydrocarbon odor)	
	10		S-11 13:30		100	11/80		ML	Gray SILT with clay (slightly plastic) (medium stiff to soft) (slight odor, no staining, no sheen)	
	12								Boring was completed to 11' bgs. Boring was backfilled with bentonite.	
5	14									
	16									
0	18									
	20									

ENV2 W/O WELL T:\ONEWORLD\33759250 IP LONGVIEW\33759250LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 11/5/08

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-61

Sheet 1 of 1

Date(s) Drilled	**9/11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**10 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**18.94 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		Asphalt	
							GP	GRAVEL (base rock/fill)	
							SP	Brown fine SAND with gravel (fill)	
	2				57		GP	Brown GRAVEL with fine sand (no odor, no sheen)	
15	4					190/8.5	SM	Black silty fine SAND with organics (slight odor)	
							SP	Brown/gray fine SAND (loose) (moist to wet) (hydrocarbon odor, slight sheen)	
	6		S-6.5 12:25		67	350/1200	SM	Gray silty fine SAND (loose to medium dense) (wet) (fines downward) (strong hydrocarbon odor, visible (diesel?) staining/sheen)	Hanby kit indicates heavy hydrocarbon contamination
	8		S-8 12:35		67	300/800			
10								Grades to finer sand, more silt (odor, sheen)	
						15/2200	ML	Gray SILT with fine sand (slightly plastic) (wet to moist) (odor, slight sheen)	
	10							Boring was completed to 10' bgs. Boring was backfilled with bentonite.	
	12								
5	14								
	16								
	18								
0									
	20								

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-62

Sheet 1 of 1

Date(s) Drilled	**9/15/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**8 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.99 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		Asphalt	
							GP	GRAVEL (base rock/fill)	
15	2						ML	Brown/gray mottled silty fine SAND (moist) (no odor, no sheen)	
					63		SP	Brown fine to medium SAND (loose) (moist to dry) (no odor, no sheen)	
	3					0.0			
	4					0.0			
	5		S-5 13:00			6.1	SM	Gray silty fine SAND (dense) (moist) (slight hydrocarbon odor)	
							ML	Gray SILT (slightly plastic) (moist to dry) (slight hydrocarbon odor)	Hanby kit indicates ~1 ppm hydrocarbon present
	6					3.2			
					72			Grades to brown/gray mottled SILT (moist) (no hydrocarbon odor, no sheen)	
10	7					0.0			
							SP	Brown fine to medium SAND (loose) (moist to dry) (no odor, no sheen)	
	8							Boring was completed to 8' bgs. Boring was backfilled with bentonite.	
	10								
5	12								
	14								
	16								
0									
	18								
	20								

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-63

Sheet 1 of 1

Date(s) Drilled	**9/15/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**8 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.30 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID			Asphalt	
								GP	GRAVEL (base rock/fill)	
	2									
15					70			ML	Gray SILT with fine sand (stiff) (moist) (no odor)	
								SM	Brown silty fine SAND (medium dense) (moist) (no odor)	
	4					0.0			Organics at 4' bgs	
						29		SP	Brown fine SAND (loose) (moist) (slightly sour organic odor, no sheen)	
	6					140		SM	Gray silty fine SAND (medium dense) (moist) (hydrocarbon odor, no sheen)	
			S-6.5 14:20		67					Hanby hit at 6.5' indicates possible diesel contamination (~10-50 ppm)
10						34		ML	Gray SILT (slightly plastic) (moist) (slight hydrocarbon odor, no sheen)	
	8		S-8 14:25						Boring was completed to 8' bgs. Boring was backfilled with bentonite.	
	10									
	12									
5										
	14									
	16									
0										
	18									
	20									

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-64

Sheet 1 of 1

Date(s) Drilled	**9/8/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.83 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		GP	Asphalt/GRAVEL (base rock/fill)	
						0/0				
15	2					0/0				
					50			SP	Fine GRAVEL and fine to coarse SAND (loose) (dry) (fill material)	
						0/0				
	4					0/0			Gray fine SAND (loose) (dry) (no odor, no sheen)	
						0/0				
	6		S-6 13:50			0/0				
					67			SM	Brown/gray mottled silty fine SAND (loose) (moist) (no odor)	
10						0/0		ML	Brown/gray mottled SILT with some clay (slightly plastic) (moist)	
	8					0/0		SM	Brown/gray mottled silty SAND (loose) (moist) (no odor, no sheen)	
						0/0		ML	SILT	
					78			SM	Fine SAND with silt	
	10					0/0		SP	Dark brown fine SAND (very loose) (wet) (no odor, no sheen)	
			S-11 14:20						Boring was completed to 11' bgs. Boring was backfilled with bentonite.	
5	12									
	14									
	16									
0										
	18									
	20									

ENV2 W/O WELL T:\ONEWORLD\33759250 IP LONGVIEW\33759250LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 11/5/08

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-65

Sheet 1 of 1

Date(s) Drilled	**9/8/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.16 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

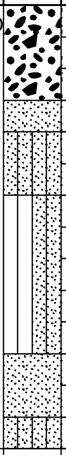
Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		GP	Asphalt/GRAVEL (base rock/fill)	
15	2								GRAVEL, brick fragmants (fill material)	
					57					
						0/0		SP	Brown fine SAND with silt (loose) (moist to dry) (no hydrocarbon odor)	
	4					0/0				
						0/0			2" thick silt layer	
								SM	Brown/gray mottled silty fine SAND (loose) (moist to dry) (no sheen)	
	6					0/0				
					67					
10						0/0				
	8					0/0			Brown/gray mottled silty fine SAND (loose) (moist to wet) (no odor, no stain, no sheen)	
						0/0				
					78					
	10					0/0				
			S-10.5 12:20					ML	Gray SILT with fine sand (slightly to non-plastic) (soft) (wet) (no sheen)	
			S-11 12:30						Boring was completed to 11' bgs. Boring was backfilled with bentonite.	
5	12									
	14									
	16									
0										
	18									
	20									

ENV2 W/O WELL T:\ONEWORLD\33759250 IP LONGVIEW\33759250LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 11/5/08

URS

Project: IP Longview Additional Investigation	**Log of Boring PB-66**
Project Location: Longview, Washington	Sheet 1 of 1
Project Number: 33759250	

Date(s) Drilled	**9/8/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**7 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.63 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			



Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	**MATERIAL DESCRIPTION**	**REMARKS AND OTHER TESTS**
	0					PID/FID 0/0		GP	Asphhalt/GRAVEL	
								SP	GRAVEL/medium to coarse SAND (loose) (dry) (fill)	
15	2		S-2 15:00		80	0/0 50		SM	Dark gray SILT with fine sand (moist)	Hanby test at 2' indicates no contamination
	4					0/0 0/0		ML/ SM	Dark gray SILT with fine sand (medium dense) (moist) (no odor, no sheen) Wood debris at 5' bgs	
	6				75	25		SP	Gray fine SAND (loose) (moist) (no odor, no sheen)	
			S-7 15:05					SM	Gray silty fine SAND (medium dense) (moist) (no odor, no sheen)	
10	8								Boring was completed to 7' bgs. Boring was backfilled with bentonite.	
	10									
5	12									
	14									
	16									
0	18									
	20									

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-67

Sheet 1 of 1

Date(s) Drilled	**9/8/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**9 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**18.02 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		GP	Asphalt/GRAVEL	
	2				67			SP	Gray GRAVEL and coarse sand (fill)	
15						0/0		ML	Gray SILT with fine sand (medium stiff)	
								SM	Brown/gray mottled silty fine SAND Grades to gray SAND with silt (loose) (dry)	
	4					0/0				
						15				
	6				75	90/20				Hanby kit indicates ~10 ppm heavy hydrocarbon contamination
			S-7 16:20			0/0			Gray silty SAND/fine SAND (medium dense) (hydrocarbon odor, slight sheen)	
10	8				83	15/33		ML	Gray SILT with clay (slightly to medium plastic) (slight hydrocarbon odor, sheen)	
			S-9 16:35						Boring was completed to 9' bgs. Boring was backfilled with bentonite.	
	10									
	12									
5										
	14									
	16									
0	18									
	20									

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-68

Sheet 1 of 1

Date(s) Drilled	**9/15/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**9 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.64 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID			Asphalt	
								GP	GRAVEL (base rock/fill)	
	2									
15					57			SM	Dark gray silty fine SAND (stiff) (moist to dry) (no odor)	
						0.0				
	4					0.0				
						83.0		SP	Gray fine SAND (loose) (moist to dry) (no odor, no sheen)	
	6		S-6 13:20		83	26.0		SM	Gray silty fine SAND (loose) (moist to wet) (slight hydrocarbon odor)	Hanby kit indicates possible low level diesel contamination (~10 ppm)
						23.0				
10	8		S-8.5 13:45		100	19.7			Grading finer (slight odor, sheen)	
						42.3		ML	Gray SILT with fine sand (soft) (moist) (hydrocarbon odor, slight sheen)	
									Boring was completed to 9' bgs. Boring was backfilled with bentonite.	
	10									
	12									
5										
	14									
	16									
0										
	18									
	20									

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-69

Sheet 1 of 1

Date(s) Drilled	**9/8/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**7 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.43 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		Asphalt	
15	2		S-3 16:45		83	2/150	SP	Gray GRAVEL with sand (dry) (no odor) (fill)	
	3					2.0 <1	ML	Dark gray SILT with fine sand (stiff) (dry to moist) (no odor, no sheen) Organics at 5' bgs	
	5.5		S-6.5 17:00		67	<1	SP	Gray fine SAND (loose) (dry) (no odor, no sheen)	
	6.5						ML	Gray SILT with fine sand (medium dense) (dry)	
10	7							Boring was completed to 7' bgs. Boring was backfilled with bentonite.	
5	12								
0	17.43								
	20								

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-70

Sheet 1 of 1

Date(s) Drilled	**9/15/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**8 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.00 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID			Asphalt	
								GP	GRAVEL (fill/base rock)	
15	2									
					53	0.0		SP	Brown/gray mottled fine to medium SAND (loose) (moist) (no odor, no sheen)	
						0.0				
	4									
						0.8				
								SM	Gray silty fine SAND (loose to medium dnese) (moist) (slight odor)	
						9.2				
	6		S-6 12:20					ML	Gray SILT (medium stiff) (moist to dry) (slight odor) Grades to brown/gray mottled (slightly plastic) (moist) (no odor, no sheen)	Hanby kit at 6' does not indicate contamination (<1 ppm)
10					83	4.4				
						0.0				
	8								Boring was comlpeted to 8' bgs. Boring was backfilled with bentonite.	
	10									
5	12									
	14									
	16									
0										
	18									
	20									

ENV2 W/O WELL T:\ONEWORLD\33759250 IP LONGVIEW\33759250LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 11/5/08

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-71

Sheet 1 of 1

Date(s) Drilled	**9/15/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**8 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.83 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID	■		Asphalt	
15								GP	GRAVEL (base rock)	
	2				73	0.0		SP	Brown fine to medium SAND (loose) (moist) (no odor, no sheen)	
	4					0.0 0.2			Black organic layer at 4.5' bgs	
	6		S-6.5 12:50		78	3.2		SM	As above (no odor) Gray silty fine SAND (medium dense) (moist) (very slight odor)	
10						1.6		ML	Grades to gray SILT (slightly plastic) (moist) (no odor) Grades to brown/light gray mottled (moist) (no odor, no sheen)	Hanby kit at 6.5' does not indicate contamination
	8								Boring was completed to 8' bgs. Boring was backfilled with bentonite.	
	10									
5	12									
	14									
	16									
0	18									
	20									

ENV2 W/O WELL T:\ONEWORLD\33759250 IP LONGVIEW\33759250LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 11/5/08

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-72

Sheet 1 of 1

Date(s) Drilled	**9/15/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**10 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.56 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID			Asphalt	
								GP	GRAVEL (fill/base rock)	
15						0.0		SP	Brown fine to medium SAND (loose) (moist) (no odor, no sheen)	
	2									
					50	0.0				
						0.0				
	4								As above	
						0.0				
						0.0		SM	Gray silty fine SAND (loose) (wet) (no odor, no sheen)	
	6									
10					61	0.0				
						0.0			As above with slightly larger silt content	
	8		S-8.5 10:50			1.2				First 8'-10' run came back with little recovery but indication of silt - will run again Still no recovery - move 6" and push closed to 8' - open and sample
					83			ML	Gray SILT (medium stiff) (wet) (no odor, no sheen)	
	10								Boring was completed to 10' bgs. Boring was backfilled with bentonite.	
5										
	12									
	14									
	16									
0										
	18									
	20									

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring PB-73

Sheet 1 of 1

Date(s) Drilled	**9/15/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**8 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**15.99 feet MSL**
Groundwater Level (feet bgs)		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		Concrete	
15							GP	GRAVEL (fill/base rock)	
	2				60	0.0	SP	Brown fine to medium SAND (loose) (moist) (slight hydrocarbon odor) (no sheen)	
	4					31.2		Same as above	
			S-5 11:20				SM	Gray silty SAND (loose) (wet) (slight odor)	
10	6		S-6.5 11:30		67	18.3			
						12.1	ML	Grades gray SILT (medium stiff) (moist to dry) (slight odor, no sheen) No odor at 8'	
	8							Boring was completed to 8' bgs. Boring was backfilled with bentonite.	
	10								
5									
	12								
	14								
0	16								
	18								
	20								

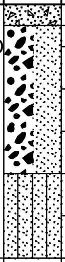
URS

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-74

Sheet 1 of 1

Date(s) Drilled	**12/9/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**6 feet bgs**
Drill Rig Type	**Geoprobe 420M**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)		Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Parts Storage Room**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0								6" Concrete, hand clear to 2' bgs	0830 Start
						PID/FID		GP/SP	Light brown to gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
					50%	0.1/17				
	5		PB74- S-6' @ 0915		100%	0.1/54		SM	Dark gray silty fine SAND (moist) (no odor, no sheen)	Hanby @ 6' 1 PPM PAHs
									Refusal @ 6' bgs, likely due to woody debris Groundwater not encountered Boring backfilled with bentonite, concrete surface seal	0850 Finish
	10									
	15									
	20									
	25									
	30									

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-75

Sheet 1 of 1

Date(s) Drilled	**12/9/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**6 feet bgs**
Drill Rig Type	**Geoprobe 420M**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)		Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Parts Storage Room**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0								8" Concrete, hand clear to 2' bgs	0920 Start
						PID/FID		GP/SP	Dark gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
					60%	0/NA				0940 Not enough weight in rig lifting off ground
	5		PB75-S-6' @ 0945		50%	0/600		SM	Gray silty fine SAND (moist) (no odor, no sheen)	
								SP	Gray fine SAND (moist) (no odor, no sheen)	
									Refusal @ 6' bgs, likely due to woody debris Groundwater not encountered Boring backfilled with bentonite, concrete surface seal	0945 refusal
	10									
	15									
	20									
	25									
	30									

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-76

Sheet 1 of 1

Date(s) Drilled	**12/7/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	**7**	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Work Truck Garage**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0								6" Concrete, hand clear to 2' bgs	1315 Start
						PID/FID		GP/SP	Gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
	5				30%	4.5			Pushed a cobble, little recovery	
			PB76-S-8' @ 1320			0.6 0.7		SP	7 ft ▼ Gray to light brown fine to medium SAND (loose) (wet) (moderate creosote odor, no sheen)	Hanby @ 8' ~5 PPM PAHs
	10		PB76-S-10.5' @ 1330		70%	0.6 0.7		SM	Dark gray silty fine SAND (wet) (moderate creosote odor, no sheen)	Hanby @ 10.5' ~10 PPM PAHs
								ML	Gray SILT with fine sand (wet) (slight cresote odor, no sheen)	
									Boring completed to 11' bgs Groundwater encountered at 7' bgs Boring backfilled with bentonite, concrete surface seal	1340 Finish
	15									
	20									
	25									
	30									

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-77

Sheet 1 of 1

Date(s) Drilled	**12/9/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 420M**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)		Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Parts Storage Room**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0								6" Concrete, hand clear to 2' bgs	0945 Start
						PID/FID		GP/SP	Gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
					50%					
						0.1/150				
					100%			SM	Gray silty fine SAND (moist) (no odor, no sheen)	
	5					0.1/600				
								SP	grades gray fine SAND (moist) (no odor, no sheen) Woody debris at 6' bgs	Hanby @ 6' 1-5 PPM PAHs
			PB77-S-6.5' @ 1020			20/700				
					100%					
						14/600				
									Slight odor at 8' bgs, no sheen	Hanby @ 9' 1-5 PPM PAHs
								SM	Dark gray silty fine SAND (slight creosote odor, no sheen)	
						0.2/350		ML	Gray SILT (moist) (no odor, no sheen)	
	10		PB77-S-9.5' @ 1030		100%	0.3/250				
									Boring completed to 11' bgs Groundwater not encountered Boring backfilled with bentonite, concrete surface seal	1030 Finish
	15									
	20									
	25									
	30									

URS

Project: IP Longview Mechanics Shop Investigation	**Log of Boring PB-78**
Project Location: **Longview, Washington**	Sheet 1 of 1
Project Number: **33763291**	

Date(s) Drilled	**12/7/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	**6**	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Work Truck Garage**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0								6" Concrete, hand clear to 2' bgs	1145 Start
						PID/FID		GP/SP	Dark gray sandy GRAVEL to gravelly sand (dry) (no odor, no sheen) (fill)	
						0				
						0.4				
					80%			SM	Dark gray silty fine SAND (moist) (no odor, no sheen)	
	5					0.6				Hanby @ 5' 5-10 PPM PAHs
									6 ft ▼	
						0.6		SP	Gray fine to medium SAND (wet) (moderate odor)	
						11.7			Grades to strong creosote odor, heavy sheen, some staining	Hanby @ 8' 10-25 PPM PAHs
			PB78-S-8' @ 1150			2.2				
					80%	1.6		SM	Dark gray silty fine SAND (wet) (strong odor, slight sheen, no staining)	
	10		PB78-S-10.5' @ 1155			1.2		ML	Dark gray SILT (wet) (moderate odor, no sheen, no staining)	
									Boring completed to 11' bgs Groundwater encountered at 6' bgs Boring backfilled with bentonite, concrete surface seal	1200 Finish
	15									
	20									
	25									
	30									

URS

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-79

Sheet 1 of 1

Date(s) Drilled	**12/7/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	**7**	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Outside, East of Shop**		

Elevation, feet	Downhole Depth, feet	SAMPLES					Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
		Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)				
	0				70%	PID/FID 0.2		GP/SP	Asphalt surface Dark gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	1455 Start
	5					0.5/2.8		SM	Gray silty fine SAND (moist) (slight creosote odor, no sheen)	Hanby @ 5' 5 PPM PAHs
			PB79-S-7.5' @ 1500		80%	20/240		SP	Gray fine to medium SAND (wet) (strong creosote odor) 7 ft ▼ Staining, NAPL @ 8.5 to 9' bgs	Hanby @ 9' >100 PPM PAH >1000 PPM Diesel
						1.5/560		SM	Gray silty fine SAND (moist to wet) (strong creosote odor, moderate sheen, slight staining)	
	10		PB79-S-11' @ 1505		100%	1.3/800		ML	Gray SILT, trace fine sand (wet) (moderate odor, no sheen)	
									Boring completed to 11' bgs Groundwater encountered at 7' bgs Boring backfilled with bentonite, cold patch surface seal	1505 Finish NAPL noted in slough above 10-11' sample. Water noted in borehole ~ 3'bgs
	15									
	20									
	25									
	30									

URS

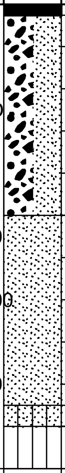
ENV2 W/O WELL Z:\KINDER MORGAN\LAUREL STATION\GINT LOGS\IP LONGVIEW.GPJ URSSEA3B.GLB URSSEA3.GDT 2/16/12

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-80

Sheet 1 of 1

Date(s) Drilled	**12/8/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	7	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Outside, East of Shop**		



Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				50%	PID/FID 0.1		GP/SP	Asphalt surface Dark gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	1440 Start
	5		PB80-S-6' @ 1445		80%	0.1/200 10.5/1000 2.9/600		SP	Gray fine SAND (moist) (moderate creosote odor, no sheen) 7 ft ▼ Grading wet at 7' bgs, NAPL from 7' to 9' bgs	Hanby @ 6' 5 PPM PAHs Hanby @ 9' ~500 PPM Diesel
								SM	Gray silty fine SAND (wet) (strong creosote odor, slight sheen)	
	10		PB80-S-10' @ 1455		100%			ML	Gray SILT (wet) (strong odor)	
									Boring completed to 11' bgs Groundwater encountered at 7' bgs Boring backfilled with bentonite, cold patch surface seal	1455 Finish
	15									
	20									
	25									
	30									

URS

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-81

Sheet 1 of 1

Date(s) Drilled	**12/7/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)		Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Work Truck Garage**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0							6" Concrete, hand clear to 2' bgs	1400 Start
						PID/FID	GP/SP	Dark gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
						0.2			
					80%	0.2	SM	Dark gray silty fine SAND (moist) (no odor, no sheen)	
	5							Grading woody debris @ 5' bgs Cobble @ 6' bgs	
						0.1	SP	Gray fine to medium SAND (moist) (no odor, no sheen)	Hanby @ 7' ~5 PPM PAHs
			PB81-S-9' @ 1405			0.2			
						0.3		Grading slight odor at 8' bgs, no sheen	
					80%		SM	Dark gray silty fine SAND (moist) (slight odor, no sheen)	Hanby @ 9' ~5 PPM PAHs
	10		PB81-S-10.5' @ 1410			0.2			
						0.2	ML	Dark gray SILT with fine sand (moist) (slight odor, no sheen)	
									1415 Finish

Boring completed to 11' bgs
Groundwater not encountered
Boring backfilled with bentonite, concrete surface seal

URS

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-82

Sheet 1 of 1

Date(s) Drilled	**12/7/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	**8.5**	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Work Truck Garage**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0								6" Concrete, hand clear to 2' bgs	0900 Begin coring
						PID/FID		GP/SP	Gray sandy GRAVEL to gravelly sand (dry) (no odor, no sheen) (fill)	
						0/0				
						0.1/25				1030 Begin drilling
					80%			SM	Dark gray silty fine SAND (moist) (no odor, no sheen)	
	5					0/14			Grading 1" of black organics/ charcoal	
			PB82-S-7' @ 1035			0/12		SP	Gray fine to medium SAND (moist) (no odor, no sheen)	Hanby @ 6' <1 PPM Diesel
						0.5/130				
						1.1/240			Grades to wet, moderate odor, no sheen 8.5 ft ▼	
					80%	0.4/250		SM	Dark gray silty fine SAND (wet) (moderate odor, no sheen)	Hanby @ 11' <1 PPM Diesel
	10		PB82-S-10' @ 1040			0.6/240		ML	Dark gray SILT, trace fine sand (wet) (slight odor, no sheen)	
			S-Dup-1 @ 10'						Boring completed to 11' bgs Groundwater encountered at 8.5' bgs Boring backfilled with bentonite, concrete surface seal	1050 Finish
	15									
	20									
	25									
	30									

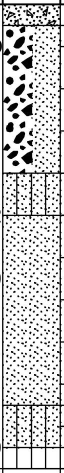
ENV2 W/O WELL Z:\KINDER MORGAN\LAUREL STATION\GINT LOGS\IP LONGVIEW.GPJ URSSEA3B.GLB URSSEA3.GDT 2/16/12

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-83

Sheet 1 of 1

Date(s) Drilled	**12/7/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 420M**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	**7**	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Employee Lunch Room**		



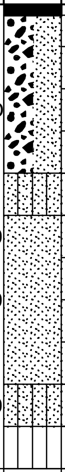
Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0							6" Concrete, hand clear to 2' bgs	1610 Start
						PID/FID	GP/SP	Gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
					80%	0.2/NA			
						0.3/24			
					100%		SM	Gray silty fine SAND (moist) (no odor, no sheen)	
	5					0.6/102	SP	Gray fine to medium SAND (moist) (no odor, no sheen)	
						0.4/160			Hanby @ 6' 5 PPM PAHs
					100%			7 ft ▼ Grading strong creosote odor at 7' bgs, no sheen, wet	
			PB83-S-8' @ 1630			0.5/32			
						22/700		Grading NAPL at 9' bgs	Hanby @ 9' ~1000 PPM Diesel
	10		PB83-S-11' @ 1700		100%		SM	Dark gray silty fine SAND (wet) (strong odor, heavy sheen, heavy staining)	
						8.0/500	ML	Gray SILT, trace fine sand (wet) (strong odor, heavy sheen, moderate staining)	
								Boring completed to 11' bgs Groundwater encountered at 7' bgs Boring backfilled with bentonite, concrete surface seal	1700 Finish
	15								
	20								
	25								
	30								

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-84

Sheet 1 of 1

Date(s) Drilled	**12/8/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	**5.5**	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Outside, East of Shop**		



Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0				80%	PID/FID 0/200		GP/SP	Asphalt surface Dark gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	1500 Start
								SM	Gray silty fine SAND (moist) (no odor, no sheen)	
	5		PB84-S-8' @ 1515		90%	0.1/150 0.2/300		SP	Gray fine SAND (wet) (no odor, no sheen) 5.5 ft▼ Grading slight creosote odor @ 8' bgs, no sheen	Hanby @ 6' ~1 PPM PAHs
						0.4/300		SM	Dark gray silty fine SAND (wet) (slight odor)	Hanby @ 10' 10 PPM PAHs
	10		PB84-S-10' @ 1520		100%			ML	Gray SILT (wet)	
									Boring completed to 11' bgs Groundwater encountered at 5.5' bgs Boring backfilled with bentonite, concrete surface seal	1520 Finish
	15									
	20									
	25									
	30									

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-85

Sheet 1 of 1

Date(s) Drilled	**12/8/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 420M**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)		Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Employee Lunch Room**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0								6" Concrete, hand clear to 2' bgs	1335 Start
						PID/FID		GP/SP	Dark gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
					30%					
						0.1/34		SM	Dark gray silty fine SAND (moist) (no odor, no sheen)	
					90%	0.1/300				
	5					0/350		SP	Gray fine to medium SAND (moist) (no odor, no sheen)	Hanby @ 6' ~5 PPM PAHs
						0/200				
			PB85-S-9' @ 1405		100%	0/500				
						0/1400		SM	Gray silty fine SAND (no odor, no sheen)	
	10		PB85-S-10.5' @ 1430		100%	0/300				Hanby @ 11' ~1 PPM PAHs
								ML	Dark gray SILT, trace fine sand (no odor, no sheen)	
			S-Dup-2 @ 9'						Boring completed to 11' bgs Groundwater not encountered Boring backfilled with bentonite, concrete surface seal	
	15									
	20									
	25									
	30									

URS

Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-86

Sheet 1 of 1

Date(s) Drilled	**12/8/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**6 feet bgs**
Drill Rig Type	**Geoprobe 420M**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)		Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Hall Outside Bathroom**		

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0					PID/FID		GP/SP	4" Concrete, hand clear to 2' bgs Light brown to gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	1100 Start
					60%	0 0.2				
	5		PB86-S-6' @ 1110		100%	0.3		SM	Gray silty fine SAND (dry to moist) (no odor, no sheen) Grades dark gray, no odor, no sheen	Hanby @ 6' ~1 PPM Diesel ~1 PPM PAHs
						0.3			Refusal @ 6' bgs, likely due to woody debris Groundwater not encountered Boring backfilled with bentonite, concrete surface seal	1126 Refusal
	10									
	15									
	20									
	25									
	30									

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Project: IP Longview Mechanics Shop Investigation
Project Location: Longview, Washington
Project Number: 33763291

Log of Boring PB-87

Sheet 1 of 1

Date(s) Drilled	**12/9/11**	Logged By	**IPV**	Checked By	**DRR**
Drilling Method	**Direct Push**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth of Borehole	**11 feet bgs**
Drill Rig Type	**Geoprobe 7720**	Drill Bit Size/Type	**2" OD**	Ground Surface Elevation	
Groundwater Level (feet bgs)	**7**	Sampling Method	**Continuous Macro Core**	Hammer Data	
Borehole Backfill		Location	**Outside, North of Shop**		

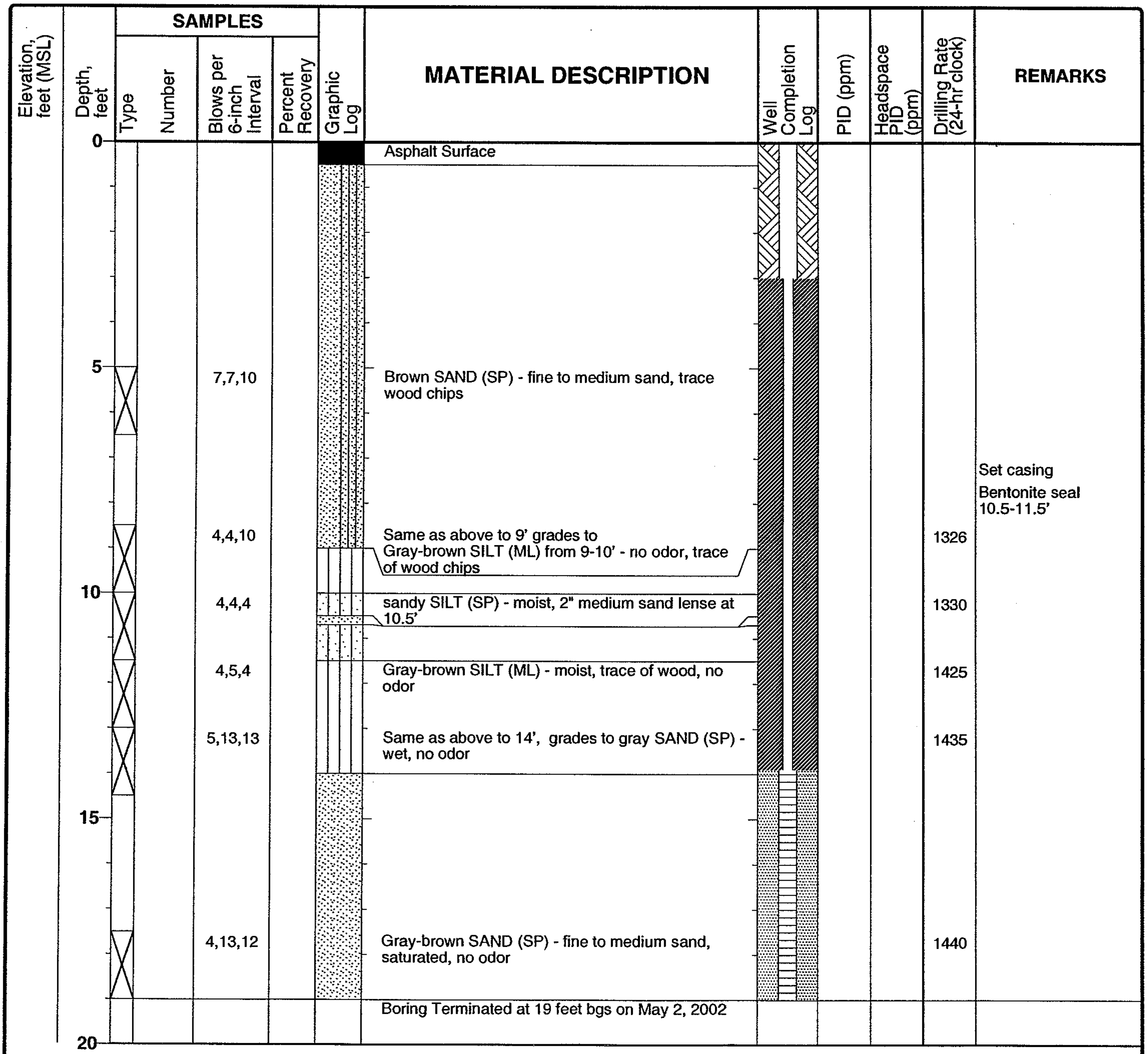
Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0							GP/SP	Asphalt surface	1115 Start
						PID/FID			Gray sandy GRAVEL (dry) (no odor, no sheen) (fill)	
					80%	0/0				
									Grades increasing sand, no odor, no sheen	
						0/0				
	5					0.6/160				
								SM	Dark gray silty fine SAND (moist) (no odor, no sheen) 7 ft ▼	Hanby @ 5' no detections
			PB87-S-7' @ 1120		100%			SP	Gray fine SAND (wet) (moderate odor, moderate sheen)	
						87/1000			Grading staining, NAPL from 8' to 9' bgs	
						25/1000				Hanby @ 8.5' ~1000 PPM Diesel
	10		PB87-S-10.5' @ 1130		100%			SM	Gray silty fine SAND (moist) (moderate odor, no sheen)	
								ML	Gray SILT, trace fine sand (moist) (moderate odor, no sheen)	
									Boring completed to 11' bgs Groundwater encountered at 7' bgs Boring backfilled with bentonite, concrete surface seal	1130 Finish
	15									
	20									
	25									
	30									

Project: International Paper
Project Location: Longview, WA
Project Number: 33749389

Log of Boring AV-9

Sheet 1 of 1

Date(s) Drilled	5/2/2002	Logged By	T. Middleton	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling Inc	Total Depth Drilled (FT BGS)	19.0
Drill Rig Type	CME 75	Sampler Type	18" Split Spoon	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	10.25" auger	Top of PVC Elevation	
Diameter of Hole (inches)	Diameter of Well (inches) 2"	Type of Well Casing	PVC	Screen Perforation	010 Slot
Type of Sand Pack	Colorado Silica 10/20	Type and Depth of Seal(s)	13'11"-19' Sand; 3-13'11" Bentonite; 2-3' Cement		
Comments	10.25" augers used to case off upper sand.				



Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0						Asphalt Surface					
	5	☒		7,7,10			Brown SAND (SP) - fine to medium sand, trace wood chips					
												Set casing Bentonite seal 10.5-11.5'
		☒		4,4,10			Same as above to 9' grades to Gray-brown SILT (ML) from 9-10' - no odor, trace of wood chips				1326	
	10	☒		4,4,4			sandy SILT (SP) - moist, 2" medium sand lense at 10.5'				1330	
		☒		4,5,4			Gray-brown SILT (ML) - moist, trace of wood, no odor				1425	
		☒		5,13,13			Same as above to 14', grades to gray SAND (SP) - wet, no odor				1435	
	15											
		☒		4,13,12			Gray-brown SAND (SP) - fine to medium sand, saturated, no odor				1440	
							Boring Terminated at 19 feet bgs on May 2, 2002					
	20											

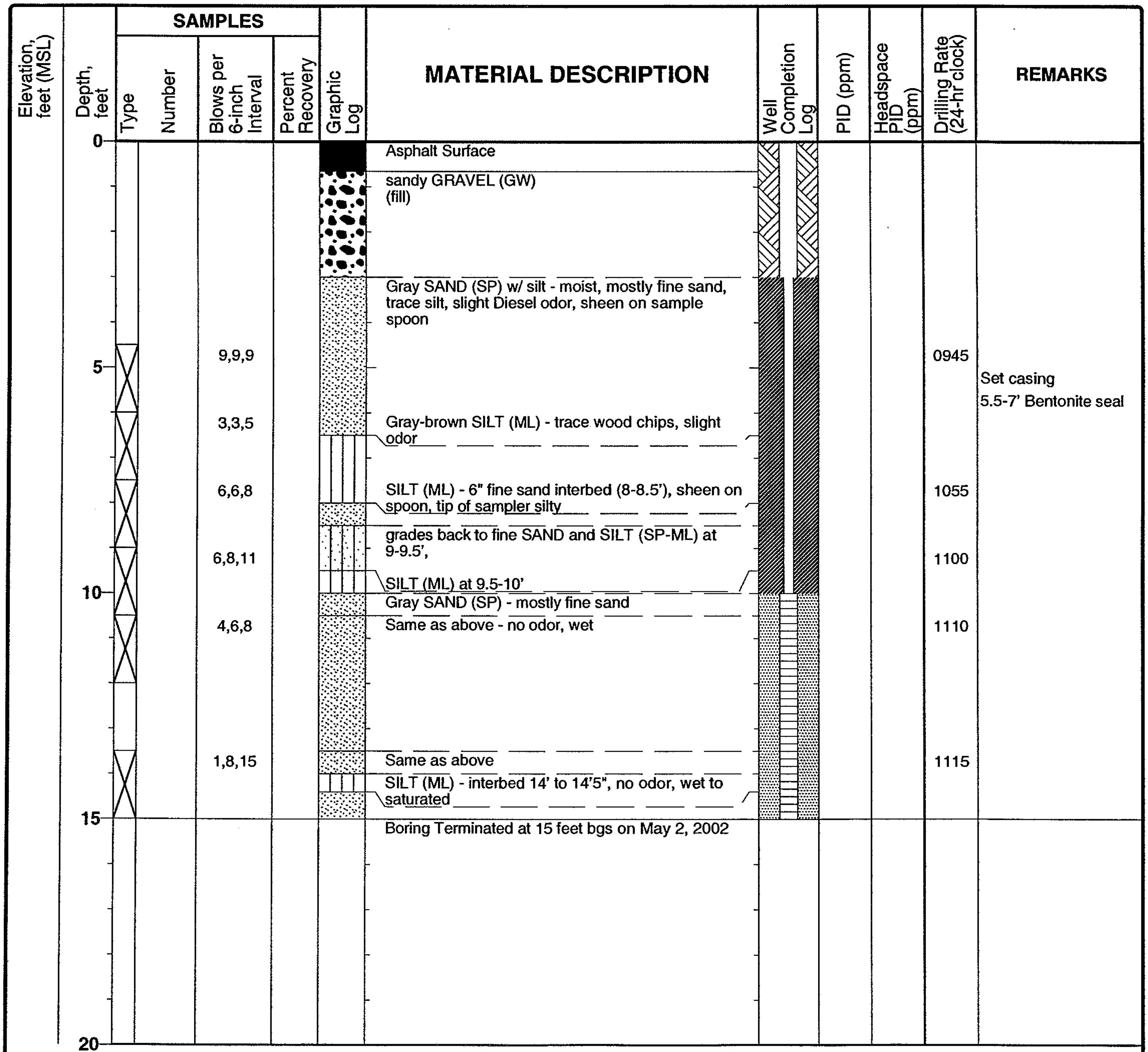
URS

Project: International Paper
Project Location: Longview, WA
Project Number: 33749389

Log of Boring AV-10

Sheet 1 of 1

Date(s) Drilled	**5/2/2003**	Logged By	**T. Middleton**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling Inc**	Total Depth Drilled (FT BGS)	**15.0**
Drill Rig Type	**CME 75**	Sampler Type	**18" Split Spoon**	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	**10.25" auger**	Top of PVC Elevation	
Diameter of Hole (inches) / Diameter of Well (inches)	**2"**	Type of Well Casing	**PVC**	Screen Perforation	**010 Slot**
Type of Sand Pack	**Colorado Silica 10/20**	Type and Depth of Seal(s)	**10-15' Sand; 3-10' Bentonite; 2'-3' Cement**		
Comments	**10.25" augers used to case off upper sand.**				



Elevation, feet (MSL)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	MATERIAL DESCRIPTION	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0					Asphalt Surface				
						sandy GRAVEL (GW) (fill)				
						Gray SAND (SP) w/ silt - moist, mostly fine sand, trace silt, slight Diesel odor, sheen on sample spoon				
	5			9,9,9					0945	Set casing 5.5-7' Bentonite seal
				3,3,5		Gray-brown SILT (ML) - trace wood chips, slight odor				
				6,6,8		SILT (ML) - 6" fine sand interbed (8-8.5'), sheen on spoon, tip of sampler silty			1055	
				6,8,11		grades back to fine SAND and SILT (SP-ML) at 9-9.5',			1100	
						SILT (ML) at 9.5-10'				
	10					Gray SAND (SP) - mostly fine sand				
				4,6,8		Same as above - no odor, wet			1110	
				1,8,15		Same as above			1115	
						SILT (ML) - interbed 14' to 14'5", no odor, wet to saturated				
	15					Boring Terminated at 15 feet bgs on May 2, 2002				
	20									

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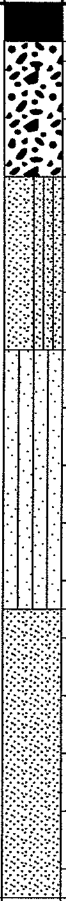
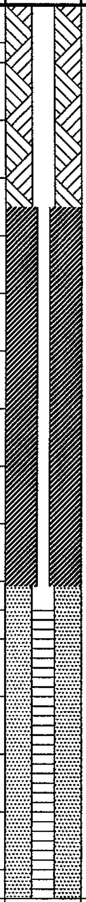
Project: International Paper
Project Location: Longview, WA
Project Number: 33749389

Log of Boring AV-11

Sheet 1 of 1

Date(s) Drilled	5/1/2002-5/2/2002	Logged By	T. Middleton	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling Inc	Total Depth Drilled (FT BGS)	15.5
Drill Rig Type	CME 75	Sampler Type	18" Split Spoon	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	10.25" auger	Top of PVC Elevation	
Diameter of Hole (inches) / Diameter of Well (inches)	2"	Type of Well Casing	PVC	Screen Perforation	010 Slot
Type of Sand Pack	Colorado Silica 10/20	Type and Depth of Seal(s)	10-15.5' Sand; 3-10' Bentonite; 20"-3' Cement		
Comments	10.25" augers used to case off upper sand.				





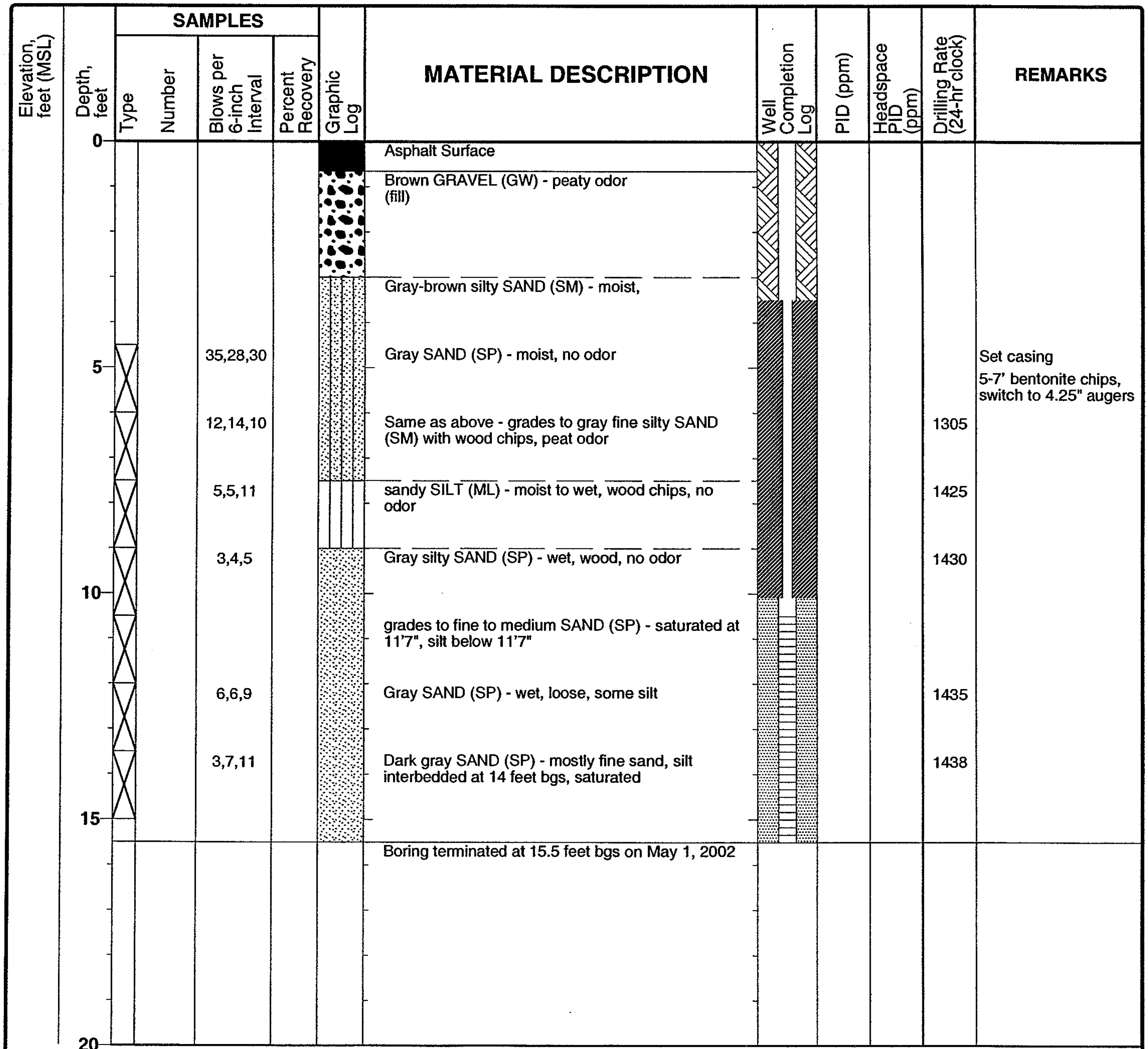
Elevation, feet (MSL)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	MATERIAL DESCRIPTION	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0					Asphalt Surface				
						Gravel and Cobbles, cuttings are dark brown fine sand and silt, moist (fill)				
	5	☒		3,5,7		Gray SAND (SP) - moist, medium to fine sand, silt lense at 5.5' (2" thick)			1625	Set casing 5-6' Bentonite seal, switch to 4.25" auger
		☒		2,2,3		Gray SILT (ML) - moist to wet, fine sand, wood chips at 7', wet to saturated sampler tip at 7'			1630	
		☒		1,1,1		Gray Brown sandy SILT (ML-SM) - moist, mottled, trace wood chips			0725	
	10	☒		4,4,4		Same as above - moist, trace clay			0730	
		☒		7,5,5		Gray SAND (SP) - saturated, mostly fine sand			0740	
	15	☒							0745	
						Boring Terminated at 15.5 feet bgs on May 2, 2002				
	20									

Project: International Paper
Project Location: Longview, WA
Project Number: 33749389

Log of Boring AV-12

Sheet 1 of 1

Date(s) Drilled	5/1/2002	Logged By	T. Middleton	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling Inc	Total Depth Drilled (FT BGS)	15.5
Drill Rig Type	CME 75	Sampler Type	18" Split Spoon	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	10.25" auger	Top of PVC Elevation	
Diameter of Hole (inches)	Diameter of Well (inches) 2"	Type of Well Casing	PVC	Screen Perforation	010 Slot
Type of Sand Pack	Colorado Silica 10/20	Type and Depth of Seal(s)	10'1"-15.5' Sand; 3.5-10'1" Bentonite; 2-3.5' Cement		
Comments	10.25" augers used to case off upper sand.				



Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0						Asphalt Surface					
							Brown GRAVEL (GW) - peaty odor (fill)					
							Gray-brown silty SAND (SM) - moist,					
	5			35,28,30			Gray SAND (SP) - moist, no odor					Set casing 5-7' bentonite chips, switch to 4.25" augers
				12,14,10			Same as above - grades to gray fine silty SAND (SM) with wood chips, peat odor				1305	
				5,5,11			sandy SILT (ML) - moist to wet, wood chips, no odor				1425	
				3,4,5			Gray silty SAND (SP) - wet, wood, no odor				1430	
	10						grades to fine to medium SAND (SP) - saturated at 11'7", silt below 11'7"					
				6,6,9			Gray SAND (SP) - wet, loose, some silt				1435	
				3,7,11			Dark gray SAND (SP) - mostly fine sand, silt interbedded at 14 feet bgs, saturated				1438	
	15						Boring terminated at 15.5 feet bgs on May 1, 2002					
	20											

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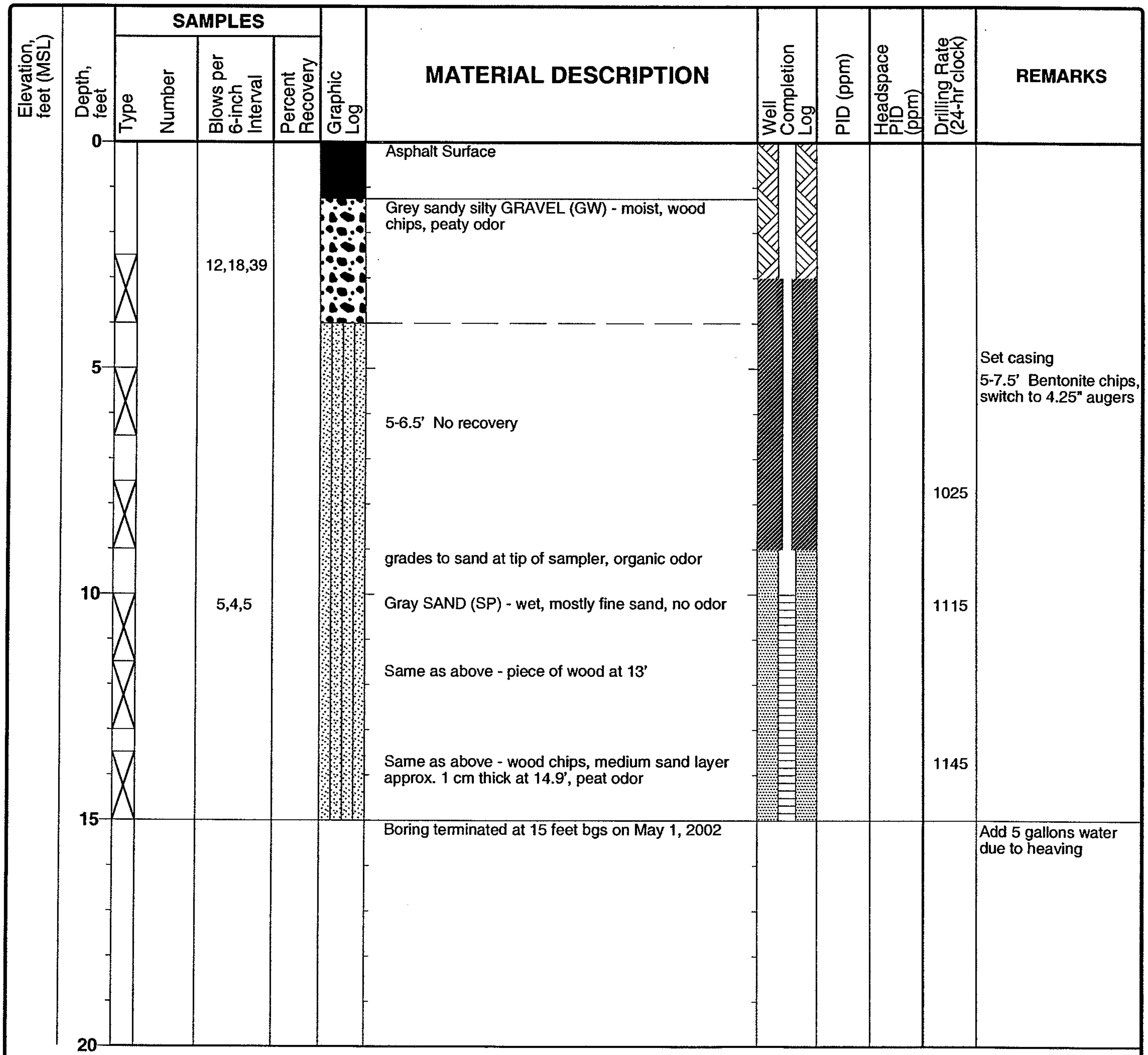
Project: International Paper
Project Location: Longview, WA
Project Number: 33749389

Log of Boring AV-13

Sheet 1 of 1

Date(s) Drilled	5/1/2002	Logged By	T. Middleton	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling Inc	Total Depth Drilled (FT BGS)	15.0
Drill Rig Type	CME 75	Sampler Type	18" Split Spoon	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	10.25" auger	Top of PVC Elevation	
Diameter of Hole (inches) / Diameter of Well (inches)	2"	Type of Well Casing	PVC	Screen Perforation	010 Slot
Type of Sand Pack	Colorado Silica 10/20	Type and Depth of Seal(s)	9-15' Sand; 3-9' Bentonite; 2-3' Cement		
Comments	10.25" augers used to case off upper sand.				



Elevation, feet (MSL)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0						Asphalt Surface					
							Grey sandy silty GRAVEL (GW) - moist, wood chips, peaty odor					
				12,18,39								
	5											Set casing 5-7.5' Bentonite chips, switch to 4.25" augers
							5-6.5' No recovery					
											1025	
							grades to sand at tip of sampler, organic odor					
	10			5,4,5			Gray SAND (SP) - wet, mostly fine sand, no odor				1115	
							Same as above - piece of wood at 13'					
							Same as above - wood chips, medium sand layer approx. 1 cm thick at 14.9', peat odor				1145	
	15						Boring terminated at 15 feet bgs on May 1, 2002					Add 5 gallons water due to heaving
	20											

Project: International Paper **Project Location:** Longview, WA **Project Number:** 33749389	**Log of Boring BV-12** Sheet 1 of 1

Date(s) Drilled	**5/3/2002-**	Logged By	**T. Middleton**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling Inc**	Total Depth Drilled (FT BGS)	**8.0**
Drill Rig Type	**CME 75**	Sampler Type	**18" Split Spoon**	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	**18" split spoon, 6.25" auger**	Top of PVC Elevation	
Diameter of Hole (inches) / Diameter of Well (inches)	**4"**	Type of Well Casing	**PVC**	Screen Perforation	**010 Slot**
Type of Sand Pack	**Colorado Silica 10/20**	Type and Depth of Seal(s)	**15-19' Sand; 3-9' Bentonite; 0-3' Cement**		
Comments					

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0											
	5	☒		10,12,20			Dark brown SAND (SP) - wet, fine sand, chunk of basalt				1645	
		☒		6,8,2			Same as above to 7.5'				1650	
							Gray SILT (ML) - moist, trace of sand, product at 7'					
							Boring Terminated at 8 feet bgs on May 2, 2002					
	10											
	15											
	20											

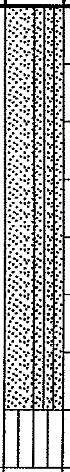
URS

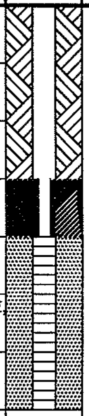
Project:	**International Paper**
Project Location:	**Longview, WA**
Project Number:	**33749389**

Log of Boring BV-13

Sheet 1 of 1

Date(s) Drilled	**5/3/2002-**	Logged By	**T. Middleton**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling Inc**	Total Depth Drilled (FT BGS)	**8.0**
Drill Rig Type	**CME 75**	Sampler Type	**18" Split Spoon**	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	**18" split spoon, 6.25" auger**	Top of PVC Elevation	
Diameter of Hole (inches)	Diameter of Well (inches) **4"**	Type of Well Casing	**PVC**	Screen Perforation	**010 Slot**
Type of Sand Pack	**Colorado Silica 10/20**	Type and Depth of Seal(s)	**4-8' Sand; 3-4' Bentonite**		
Comments					





Elevation, feet (MSL)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0											
	5			10,12,20			Gray SAND (SP) - wet, fine to medium sand, product sheen, gravel and cobbles at 5'				1645	
				6,8,2			Same as above				1650	
							Gray SILT (ML) - moist, trace of sand, product at 7'					
							Boring Terminated at 8 feet bgs on May 2, 2002					
	10											
	15											
	20											

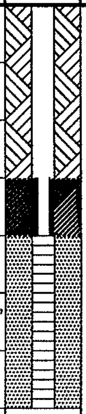
URS

Project: International Paper
Project Location: Longview, WA
Project Number: 33749389

Log of Boring BV-14

Sheet 1 of 1

Date(s) Drilled	5/2/2002-	Logged By	T. Middleton	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling Inc	Total Depth Drilled (FT BGS)	8.0
Drill Rig Type	CME 75	Sampler Type	18" Split Spoon	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	18" split spoon, 6.25" auger	Top of PVC Elevation	
Diameter of Hole (inches) / Diameter of Well (inches)	4"	Type of Well Casing	PVC	Screen Perforation	010 Slot
Type of Sand Pack	Colorado Silica 10/20	Type and Depth of Seal(s)	4-7' Sand; 3-4' Bentonite		
Comments					



Elevation, feet (MSL)	Depth, feet	SAMPLES Type	 Number	 Blows per 6-inch Interval	 Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0					▨						
	5	☒		10,12,20		▨	Gray SAND (SP) - moist to wet, fine to medium sand, diesel odor, sheen at 6'				1645	
		☒		6,8,2		▨	Same as above - sheen				1650	
						▥	Gray-brown SILT (ML) - moist, no sheen					
							Boring Terminated at 8 feet bgs on May 2, 2002					
	10											
	15											
	20											

URS

Project: International Paper
Project Location: Longview, WA
Project Number: 33749389

Log of Boring BV-15

Sheet 1 of 1

Date(s) Drilled	5/3/2002-	Logged By	T. Middleton	Checked By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling Inc	Total Depth Drilled (FT BGS)	9.5
Drill Rig Type	CME 75	Sampler Type	18" Split Spoon	Surface Elevation	
Groundwater Level		Drill Bit Size/Type	18" split spoon, 6.25" auger	Top of PVC Elevation	
Diameter of Hole (inches) / Diameter of Well (inches)	4"	Type of Well Casing	PVC	Screen Perforation	010 Slot
Type of Sand Pack	Colorado Silica 10/20	Type and Depth of Seal(s)	4-8' Sand; 3-4' Bentonite		
Comments					

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS
	0						0-5' Drill to 5'					
	5	☒		10,12,20			Gray SAND (SP) - wet, fine to medium sand, product sheen, gravel and cobbles at 5'				1645	
		☒		6,8,2			Same as above				1650	
		☒					Gray-brown SILT (ML) - moist, trace of sand, slight odor					
							SAND (SP) - sand lense 8.5-9'					
							SILT (ML) - slight odor					
							Boring Terminated at 9.5 feet bgs on May 3, 2002					
	10											
	15											
	20											

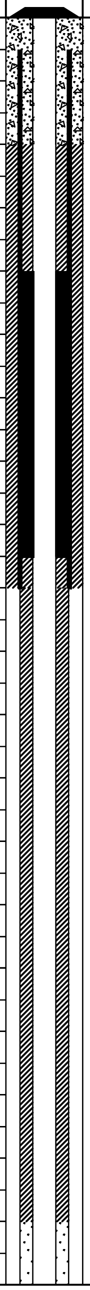
Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-01

Sheet 1 of 2

Date(s) Drilled	**9/10/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**30.5 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**18.70 feet MSL**
Groundwater Level	**~8 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 18.34**	**Rim Elevation 18.68**	

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
							GP	GRAVEL (dry) (loose) (base rock/fill)	
						0/0			
	2								Concrete, schedule 40 PVC riser
					80	0/0			
							SM	Gray silty fine SAND (medium dense) (dry to moist) (no odor)	Steel casing
15						0/0			Bentonite chips
	4								
						0/0			
								3" organic matter at 5' bgs	Bentonite grout inside steel casing
						0/0	SP	Gray fine SAND (loose to medium dense) (wet to moist) (no odor)	
	6				83				
						250			
							SM	Grades to gray silty SAND (wet) (slight hydrocarbon odor)	
			S-7 10:05		100	150	SP	Grades back to fine SAND (loose) (wet to saturated) (slight odor) 8 ft ▼	
	8								
10					100	150/600	ML	Grades to gray SILT with sand for 3" then to SILT with trace clay (no odor)	
					100	0/0		Gray SILT with fine sand and trace clay (slightly plastic) (stiff) (moist to wet) (no odor, no sheen)	
	10								
						0/0			
						0/0			
	12								
					90	0/0		Grades to brown/gray mottled SILT with trace clay (moist) (no odor, no sheen)	
5			S-13.5 10:25			10/400			
	14								
							SM/ML	Gray SILT with fine sand, trace clay (no odor)	
						0/0	ML	Brown/gray SILT with trace clay (slightly plastic) (wet)	
	16								
						0/0			
					80		SP	Grades to brown fine SAND (loose) (wet) (no odor, no stain)	
	18								
0									20/40 silica sand
						0/0		Grades to gray	
	20								



Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-01

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	20								No recovery 20'-25'	ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
	21.5					0/0				
	22.5				0					
-5	24					0/0				
	25							SP	Gray fine SAND (loose) (wet) (no odor)	
	27.5				33	0/25				
	28								Grades to medium SAND, fining upward sequence, clean sand (no odor, no sheen)	
-10										
	30								Grades to fine SAND with some silt	
	30.5								Boring was completed to 30.5' bgs. Boring was completed as monitoring well.	
	32									
-15	34									
	36									
	38									
-20										
	40									
	42									

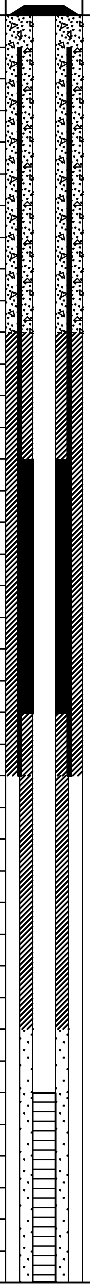
Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-02

Sheet 1 of 2

Date(s) Drilled	**9/10-11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**27 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.25 feet MSL**
Groundwater Level		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 15.96**	**Rim Elevation 16.36**	

Elevation, feet	Downhole Depth, feet	Samples: Number	Samples: Recovery (%)	Samples: OVM (ppm)	USCS	MATERIAL DESCRIPTION
	0			PID/FID		Top of concrete under pit, ~34" bgs. Ground surface measured at level floor of shop.
15						
	2					
						Concrete
					GP	GRAVEL (fill material/base rock)
	4					
				0/0	SP	Brown fine SAND with silt (moist) (no odor)
					SM	Grades to black silty fine SAND with trace organics (moist) (no odor)
10	6			0/0		
					SP	Gray fine SAND (moist to wet)
			50	360/650	SM	Grades to gray silty SAND (moist) (medium dense)
	8	S-8 14:45				
				60/170		
	10					
5		S-11 15:00		44/1050	ML	Grades to gray SILT with trace clay (slightly plastic, stiff) (slight odor, no stain)
	12			0/0		
			87	0/0		
	14			0/0		
					SM	Grades to gray silty SAND (moist) (no odor, no stain)
				0/0	SP	Brown fine SAND (loose) (wet) (no odor, no sheen)
0	16					16:00 stop for day Begin 09:00 9/11/08 Grades to gray fine SAND (loose) (wet) (no odor)
			70	85/42		
	18			10/15		
					SM	Gray silty fine SAND (soft/loose) (wet)
	20				SP	Gray fine SAND (loose) (wet) (no odor)



REMARKS AND WELL DETAILS

Aircraft rated, very high strength "atomic" wellbox

Concrete, schedule 40 PVC riser

Steel casing

Bentonite chips

Bentonite grout inside steel casing

20/40 silica sand

ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-02

Sheet 2 of 2

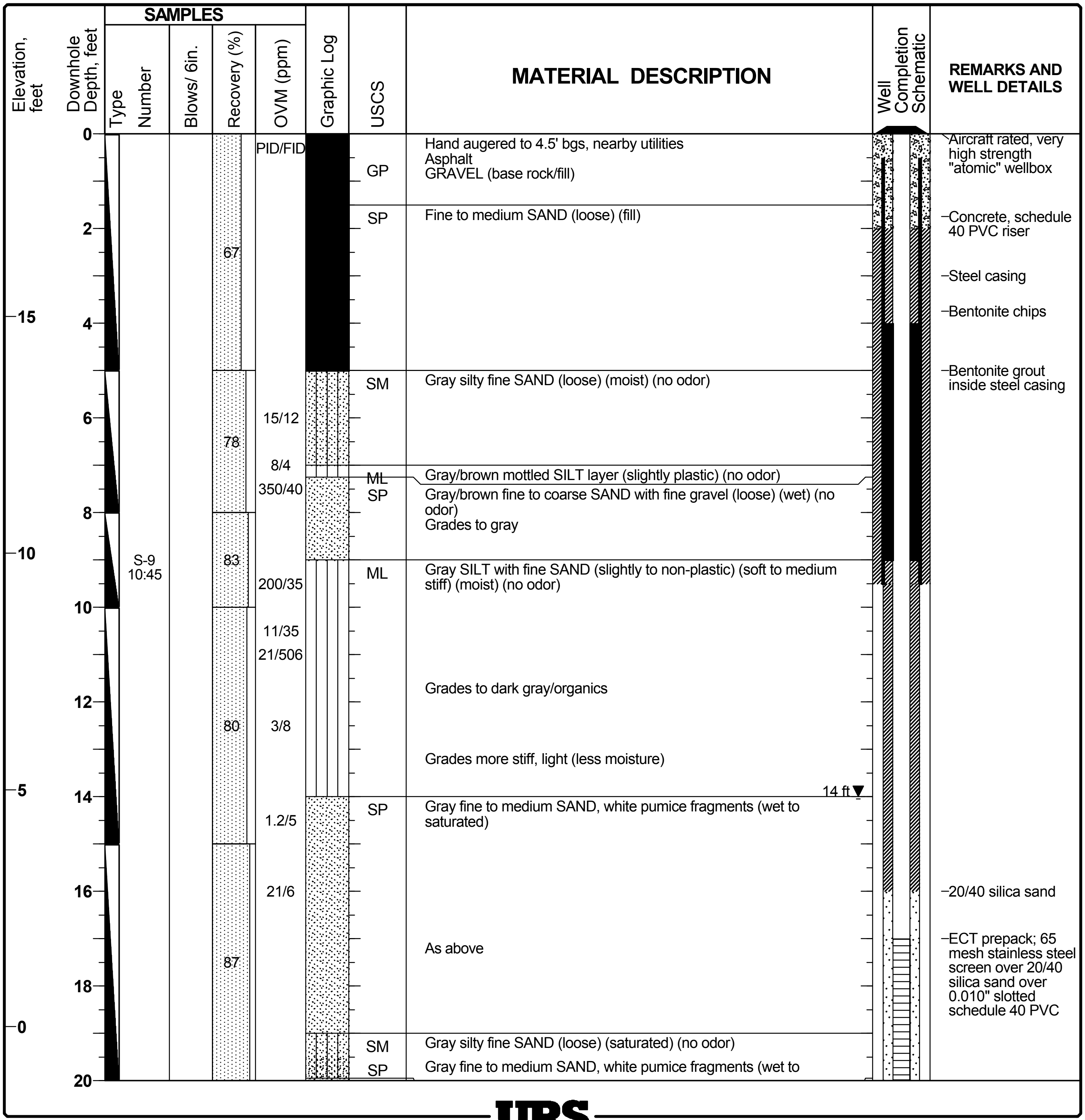
Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	20								Gray fine SAND, white pumice (loose to medium dense) (wet) (no odor)	
						0/0				
-5									Gray fine to medium SAND with pumice fragments (very loose) (wet to saturated) (no odor)	
	22									
					63	0/0				
									Gray fine SAND (loose) (wet) (no pumice)	
	24					0/0				
									As above (no odor)	
									Gray fine SAND (wet)	
	26				83	0/0				
-10										
									More pumice at bottom	
									Boring was completed to 27' bgs. Boring was completed as monitoring well.	
	28									
	30									
-15										
	32									
	34									
	36									
-20										
	38									
	40									
-25										
	42									

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-03

Sheet 1 of 2

Date(s) Drilled	**9/11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**27 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**18.86 feet MSL**
Groundwater Level	**14 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 18.55**		**Rim Elevation 18.85**



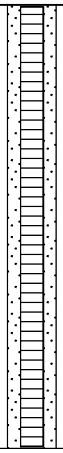
Elevation, feet	Downhole Depth, feet	SAMPLES					Graphic Log	USCS	MATERIAL DESCRIPTION	Well Completion Schematic	REMARKS AND WELL DETAILS
		Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)					
	0					PID/FID		GP	Hand augered to 4.5' bgs, nearby utilities Asphalt GRAVEL (base rock/fill)		Aircraft rated, very high strength "atomic" wellbox
	2							SP	Fine to medium SAND (loose) (fill)		Concrete, schedule 40 PVC riser
					67						
											Steel casing
15	4										Bentonite chips
								SM	Gray silty fine SAND (loose) (moist) (no odor)		Bentonite grout inside steel casing
	6					15/12					
					78						
						8/4					
								ML	Gray/brown mottled SILT layer (slightly plastic) (no odor)		
						350/40		SP	Gray/brown fine to coarse SAND with fine gravel (loose) (wet) (no odor) Grades to gray		
	8										
10			S-9 10:45		83			ML	Gray SILT with fine SAND (slightly to non-plastic) (soft to medium stiff) (moist) (no odor)		
						200/35					
	10										
						11/35					
						21/506					
									Grades to dark gray/organics		
	12										
					80	3/8					
									Grades more stiff, light (less moisture)		
									14 ft ▼		
5	14							SP	Gray fine to medium SAND, white pumice fragments (wet to saturated)		
						1.2/5					
	16					21/6					20/40 silica sand
									As above		ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
					87						
	18										
0											
								SM	Gray silty fine SAND (loose) (saturated) (no odor)		
								SP	Gray fine to medium SAND, white pumice fragments (wet to		
	20										

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-03

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	20								saturated) Dark gray fine to medium SAND, white pumice fragments (saturated) (no odor)	
						0/0				
	22				80				As above, fine to medium SAND (no odor)	
						0/3				
-5	24								Grades (loose) (saturated) (no odor, no sheen)	
						4/8				
	26				75				As above, more pumice fragments (no odor)	
						9/6				
									Boring was completed to 27' bgs. Boring was completed as monitoring well.	
	28									
-10										
	30									
	32									
-15	34									
	36									
	38									
-20										
	40									
	42									



Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

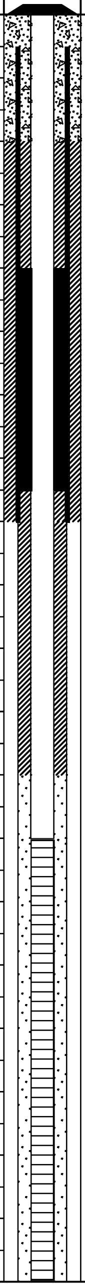
Log of Boring TMW-04

Sheet 1 of 2

Date(s) Drilled	**9/12/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**23 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.27 feet MSL**
Groundwater Level	**10.9 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 16.09**		**Rim Elevation 16.29**

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
15							GP	GRAVEL (fill) [1st 5' run, hit rock, no recovery on 1st run]	
	2								Concrete, schedule 40 PVC riser
					67		SP	Dark gray fine SAND (loose) (moist) (no odor, no sheen)	
									Steel casing
						0/0		Grades to gray	Bentonite chips
	4								
						0/0			
									Bentonite grout inside steel casing
						0/0	SM	Grades to gray silty fine SAND, trace medium gravel (stiff to medium stiff) (moist) (no odor, no sheen)	
10	6								
					67	0/0			
			S-7.5 09:00			0/0			
							ML	Grades to gray SILT with trace clay (slightly plastic) (soft to medium stiff) (moist) (no odor, no sheen)	
	8					0/0			
					92			Grades to brown/gray mottled (stiff) (dry to moist) (no odor, no stain)	
						0/0			
	10						SM	Grades to gray/brown silty fine SAND (wet) (no odor)	
						0/0		10.9 ft ▼	
5							SP	Gray fine to medium SAND (very loose) (saturated)	
						0/0	SM	Brown/gray silty fine SAND (loose) (saturated) (no odor, no sheen)	
	12								20/40 silica sand
					77	0/0	SP	Gray fine to medium SAND (very loose) (saturated) (no odor)	
									ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
						0/0			
	14							Grades to fine to medium SAND (saturated)	
						0/0			
						0/0		Grades to fine to medium SAND, white pumice fragments (very loose) (saturated) (no odor, no sheen)	
0	16								
						0/0			
					77	0/0			
	18								
						0/0		2" gray silt lense at 18' Same as above	
	20								

Well Completion Schematic



Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-04

Sheet 2 of 2

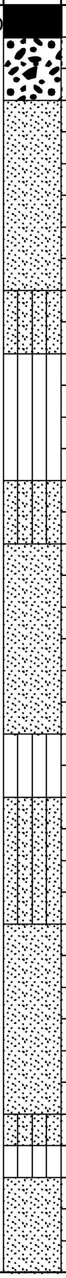
Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
	20					0/0			Gray fine to medium SAND (saturated) (no odor) As above		
-5					78	0/0					
	22										
									Boring was completed to 23' bgs. Boring was completed as monitoring well.		
	24										
-10	26										
	28										
	30										
-15	32										
	34										
-20	36										
	38										
	40										
-25	42										

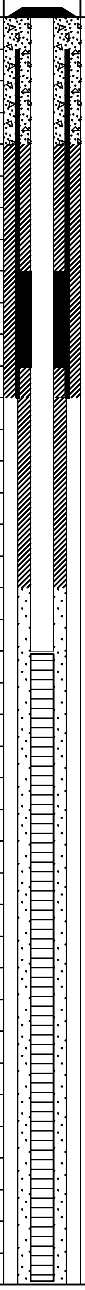
Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-05

Sheet 1 of 2

Date(s) Drilled	**9/12/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**20 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.81 feet MSL**
Groundwater Level		Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 16.53**	**Rim Elevation 16.78**	





Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
							GP	GRAVEL (fill)	
15	2						SP	Black fine SAND (loose) (moist) (no odor) Grades to brown (no odor)	Concrete, schedule 40 PVC riser
					53				Steel casing
						0/0			Bentonite chips
	4					0/0	SM	Gray silty fine SAND (moist) (no odor, no sheen)	Bentonite grout inside steel casing
						0/0	ML	Grades to gray SILT with trace clay (slightly plastic) (moist) (no odor, no sheen)	
	6		S-6 09:15		83				
10						0/0		Grades to brown/gray mottled	
						0/0	SM	Grades to brown/gray mottled silty fine SAND (moist) (no odor, no sheen)	
	8				100	0/0	SP	Brown fine SAND (loose) (moist) (no odor, no sheen)	20/40 silica sand
						0/0			
	10					0/0		As above, fining upward (saturated)	ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
5	12					0/0	ML	Gray SILT with fine SAND (very soft) (saturated) (no odor)	
					87	0/0	SM	Brown/gray silty fine SAND (very loose) (saturated) (no odor, no sheen)	
	14					0/0			
						0/0	SP	Gray fine to medium SAND, some white pumice fragments (very loose) (saturated) (no odor, no sheen)	
	16					0/0		Increasing fines	
0						0/0			
					77	0/0	SM	Gray SILTY SAND, some white pumice fragments (very loose) (saturated) (no odor, no sheen)	
	18						ML	Grades to gray SILT (very soft) (saturated) (no odor)	
						0/0	SP	Gray fine to medium SAND (loose) (saturated) (no odor, no sheen)	
						0/0			
	20								

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-05

Sheet 2 of 2

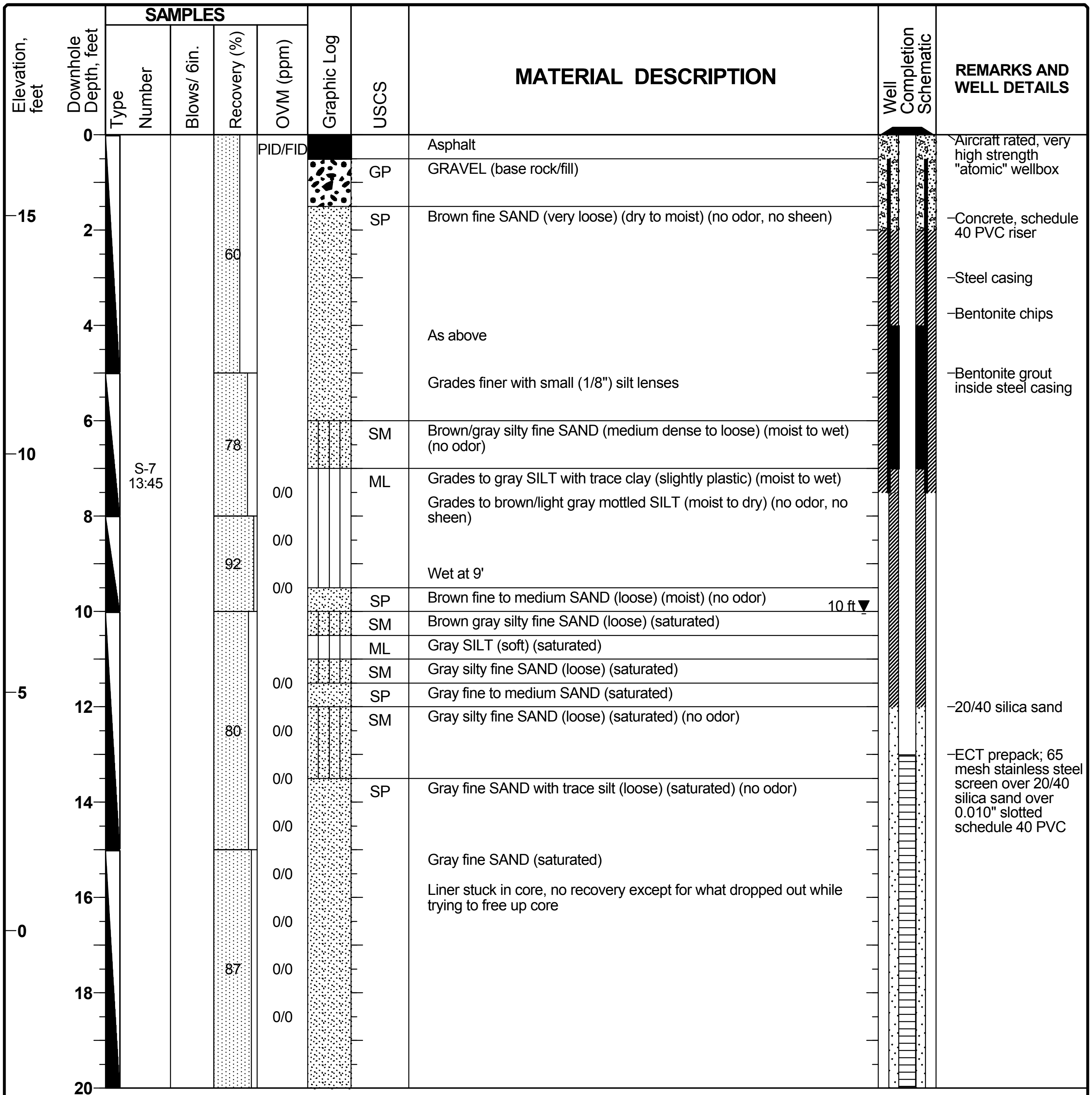
Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
	20								Boring was completed to 20' bgs. Boring was completed as monitoring well.		
-5											
	22										
	24										
	26										
-10											
	28										
	30										
-15											
	32										
	34										
	36										
-20											
	38										
	40										
-25											
	42										

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-06

Sheet 1 of 2

Date(s) Drilled	**9/12/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**23 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**16.70 feet MSL**
Groundwater Level	**10 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 16.37**		**Rim Elevation 16.73**



Elevation, feet	Downhole Depth, feet	Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
							GP	GRAVEL (base rock/fill)	
15	2				60		SP	Brown fine SAND (very loose) (dry to moist) (no odor, no sheen)	Concrete, schedule 40 PVC riser
									Steel casing
	4							As above	Bentonite chips
								Grades finer with small (1/8") silt lenses	Bentonite grout inside steel casing
10	6		S-7 13:45		78		SM	Brown/gray silty fine SAND (medium dense to loose) (moist to wet) (no odor)	
						0/0	ML	Grades to gray SILT with trace clay (slightly plastic) (moist to wet)	
	8							Grades to brown/light gray mottled SILT (moist to dry) (no odor, no sheen)	
					92	0/0		Wet at 9'	
						0/0	SP	Brown fine to medium SAND (loose) (moist) (no odor)	10 ft ▼
	10						SM	Brown gray silty fine SAND (loose) (saturated)	
							ML	Gray SILT (soft) (saturated)	
						0/0	SM	Gray silty fine SAND (loose) (saturated)	
5							SP	Gray fine to medium SAND (saturated)	
	12				80	0/0	SM	Gray silty fine SAND (loose) (saturated) (no odor)	20/40 silica sand
						0/0			ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
	14					0/0	SP	Gray fine SAND with trace silt (loose) (saturated) (no odor)	
						0/0		Gray fine SAND (saturated)	
	16							Liner stuck in core, no recovery except for what dropped out while trying to free up core	
0						0/0			
					87	0/0			
	18					0/0			
	20								

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-06

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
	20					0/0			Gray fine SAND (very loose) (saturated) (no odor, no stain)		
-5					67	0/0					
	22					0/0			As above		
									Boring was completed to 23' bgs. Boring was completed as monitoring well.		
	24										
	26										
-10											
	28										
	30										
-15											
	32										
	34										
	36										
-20											
	38										
	40										
-25											
	42										

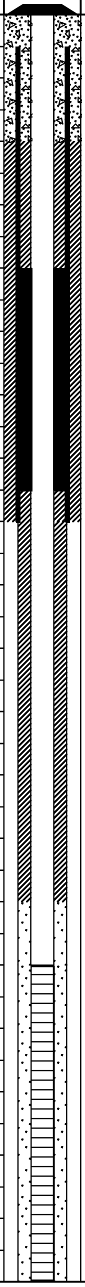
Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-07

Sheet 1 of 2

Date(s) Drilled	**9/9-11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**25 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**19.00 feet MSL**
Groundwater Level	**11.5 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 18.78**		**Rim Elevation 18.97**

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID			Multiple asphalt layers are seen, makes for slow drilling	Aircraft rated, very high strength "atomic" wellbox
						0/0		GP	GRAVEL and COBBLE (base rock/fill)	
	2					0/0			As above (loose) (dry) (fill)	Concrete, schedule 40 PVC riser
					57					
						0/0		SM	Gray/brown mottled silty fine SAND (loose) (dry)	Steel casing
15	4					0/0			Some gravel at 4' bgs Grades to gray (no odor, no sheen)	Bentonite chips
						0/0				Bentonite grout inside steel casing
	6					0/0		SP	Light brown fine SAND (loose) (dry to moist) (no odor)	
					89	0/0				
	8					0/0		SM	Grades to brown fine silty SAND	
10						0/0			Grades to gray (no odor)	
	10				78	0/0				
						0/0			11.5 ft ▼	
	12		S-11.5 13:50		56	0/0		SP	Grades to brown fine SAND, very little to no silt (loose) (wet) (no odor)	
					60	16/11		SM	Grades to gray silty SAND (loose to wet)	
5	14									20/40 silica sand
						19/31		SP	Grades to gray fine to medium SAND, white pumice fragments (loose to very loose) (no odor, no sheen)	ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
	16									
					67				As above	
	18					11/11				
0										
						21/58		SM	Black silty fine SAND, organics (loose) (saturated) (no odor, no	
	20									



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URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-07

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	20					21/58		SP	sheen) Dark gray fine SAND (very loose) (saturated) (no odor, no sheen)	
	22				70					
								ML	Dark gray SILT with fine sand (loose to soft) (saturated) (no odor)	
						10/45		SP	Dark gray fine SAND (very loose) (saturated) (no odor, no sheen)	
-5	24					4/161				
									Boring was completed to 25' bgs. Boring was completed as monitoring well.	
	26									
	28									
-10										
	30									
	32									
-15	34									
	36									
	38									
-20										
	40									
	42									

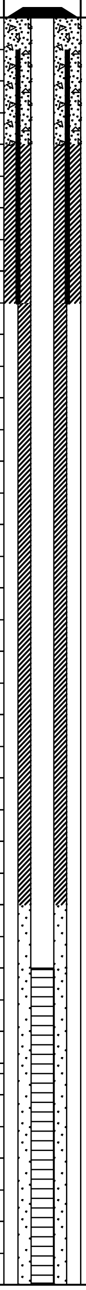
Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-08

Sheet 1 of 2

Date(s) Drilled	**9/9-11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**25 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.23 feet MSL**
Groundwater Level	**13.5 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 16.96**		**Rim Elevation 17.23**

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
						0/0	GP	GRAVEL (base rock) (dry, wet at top from coring)	Concrete, schedule 40 PVC riser
15	2				60	0/0			
						0/0			Steel casing
									Bentonite chips
	4					0/0	SM	Brown silty fine SAND (soft to medium dense) (moist to dry) (no odor, no sheen)	
						0/0			
	6				93	0/0		Brown/gray slightly mottled fine silty SAND (no odor, no sheen)	
10						0/0			
	8					0/0			
					83	0/0			
	10		S-10 15:00			0/0		Small amount of organics and gravel at 10' bgs Brown/gray silty SAND (moist) (no odor, no sheen)	
						0/0			
5	12				67	0/0	SP	Brown fine SAND (loose) (moist to wet) (no odor, no sheen)	
						0/0	ML	13.5 ft ▼ Gray SILT with fine sand (soft) (wet) (no odor)	
	14					0/0	SP	Brown fine SAND (very loose) (no odor) (saturated)	20/40 silica sand
						0/0		Grades to gray, pumice fragments	ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
	16					0/0	ML SP	2" SILT with fine sand lense (saturated) (no odor) Brown fine SAND (very loose) (no odor, no sheen) (saturated)	
0					80	0/0			
	18					0/0			
						0/0			
	20								



Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-08

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
	20								Gray fine SAND (very loose) (saturated) (no odor, no sheen)		
						0/0					
						0/0					
-5	22				83	0/0					
						0/0			As above (no odor)		
	24					0/0		SM	GRAY silty SAND		
									Boring was completed to 25' bgs. Boring was completed as monitoring well.		
	26										
-10	28										
	30										
-15	32										
	34										
	36										
-20	38										
	40										
-25	42										

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

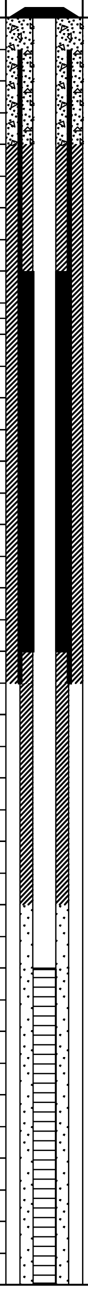
Log of Boring TMW-09

Sheet 1 of 2

Date(s) Drilled	**9/9-11/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**25 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.94 feet MSL**
Groundwater Level	**13 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 17.73**		**Rim Elevation 17.96**

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
							GP	GRAVEL (fill/base rock)	Concrete, schedule 40 PVC riser
	2								
					50	0/0			
15									Steel casing
							ML	Brown/gray mottled SILT with fine sand (medium stiff)	
						0/0			
							SM	Brown silty SAND (medium dense) (dry to moist) (no odor, no sheen)	Bentonite chips
	4								
						0/0			
							SP	Brown fine SAND (loose) (dry to moist) (no odor)	Bentonite grout inside steel casing
						0/0			
	6								
						0/0			
							SM	Grades to gray silty fine SAND (moist) (no odor, no sheen)	
							ML	Gray SILT with trace clay (slightly plastic) (stiff)	
					80	0/0			
							SM	Brown/gray mottled silty SAND (loose to medium dense) (dry to moist) (no odor, no sheen)	
10	8								
						0/0			
			S-9.5 15:55			0/0			
	10								
							ML	Grades to brown/gray mottled SILT with fine sand (medium stiff) (moist to wet) (no odor, no sheen)	
						0/0			
							SP	Brown fine SAND (loose) (wet) (no odor, no sheen)	
					94	0/0			
	12								
						0/0			
5								13 ft ▼	
							ML	Gray/brown mottled SILT with fine sand (wet)	
						0/0			
	14				100				20/40 silica sand
						0/0	SP	Brown fine to medium SAND (very looose) (saturated) (no odor, no sheen)	
									ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
						0/0			
	16								
						0/0		As above	
					73	0/0			
0	18								
						0/0			
							SM	Gray silty fine SAND (soft) (wet to saturated) (no odor) Grades to brown	
						0/0			
							SP	Brown fine SAND (saturated) (no odor)	
	20								

Well Completion Schematic



Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-09

Sheet 2 of 2

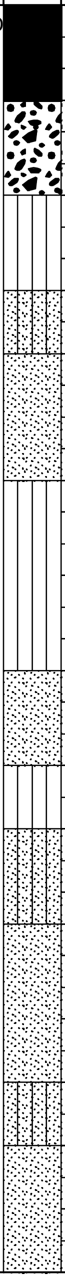
Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
	20					0/0			Gray fine to medium SAND (very loose) (saturated) (no odor, no sheen)		
						0/0					
	22				87	0/0					
-5						0/0		SM	Grades to gray silty fine SAND (very loose) (saturated)		
	24					0/0					
									Boring was completed to 25' bgs. Boring was completed as monitoring well.		
	26										
-10	28										
	30										
	32										
-15											
	34										
	36										
-20	38										
	40										
	42										
-25											

Project: IP Longview Additional Investigation **Project Location: Longview, Washington** **Project Number: 33759250**	# Log of Boring TMW-10 Sheet 1 of 2

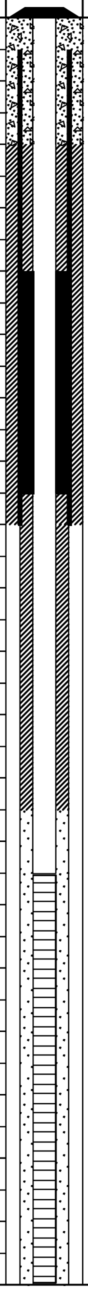
Date(s) Drilled	**9/9-12/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**24 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**18.44 feet MSL**
Groundwater Level	**13 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 18.21**		**Rim Elevation 18.47**

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
						0/0	GP	GRAVEL (base rock/fill)	Concrete, schedule 40 PVC riser
	2				57	0/0			
							ML	Gray SILT with fine sand (slightly to non-plastic) (medium stiff to stiff) (moist) (no odor, no sheen)	Steel casing
15						0/0			Bentonite chips
	4					0/0	SM	Gray silty fine SAND (slightly to non-plastic) (medium stiff to stiff) (moist) (no odor, no sheen) Organic sandy layer at 5' bgs	Bentonite grout inside steel casing
						0/0	SP	Brown fine SAND (loose) (moist)	
	6				83	0/0			
			S-7 16:30			0/0	ML	SILT with fine sand (slightly to non-plastic) (medium stiff) (moist) (slight hydrocarbon odor, no sheen)	
10	8					0/0			
					92			Same as above (wet)	
						2/300			
	10		S-10 16:35			3/10	SP	Brown fine SAND (loose) (wet to moist) (no odor)	
	12				70	0/0	ML	Gray SILT with fine sand (soft) (saturated) (slight odor, no sheen) 13 ft ▼	20/40 silica sand
5						0/0	SM	Gray silty fine SAND (loose) (saturated) (slight hydrocarbon odor, no sheen)	ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
	14					0/0	SP	Gray fine SAND (loose) (saturated) (no odor, no sheen)	
						0/0			
	16					0/0		Grades coarser with medium sand and white pumice fragments	
					77	0/0	SM	Gray silty fine SAND (very loose) (saturated) (no odor, no sheen)	
0	18					0/0	SP	Gray fine to medium SAND (very loose) (saturated) (no odor, no sheen)	
						0/0			
	20								

Graphic Log



Well Completion Schematic



URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-10

Sheet 2 of 2

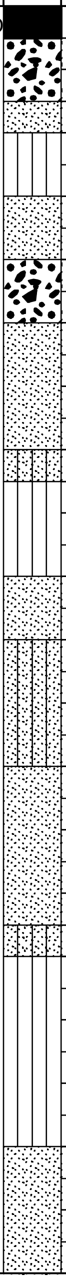
Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
	20					0/0			Gray fine to medium SAND (very loose) (saturated) (no odor, no sheen)		
						0/0			Fining upwards		
	22				94	0/0			White pumice at 22.5' bgs		
-5									2" thick gray silt layer at 23' bgs		
	24								Boring was completed to 24' bgs. Boring was completed as monitoring well.		
	26										
	28										
-10											
	30										
	32										
-15											
	34										
	36										
	38										
-20											
	40										
	42										

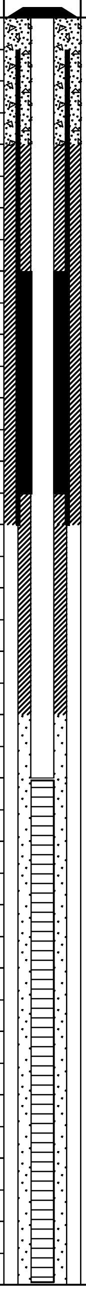
Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-11

Sheet 1 of 2

Date(s) Drilled	**9/12/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**22 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**17.20 feet MSL**
Groundwater Level	**10 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 16.86**		**Rim Elevation 17.19**





Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
							GP	GRAVEL (fill/base rock)	
							SP	Brown fine to medium SAND (loose) (dry) (fill)	Concrete, schedule 40 PVC riser
15	2				50	0/0	ML	Dark brown SILT with fine sand, some organics (dry to moist) (organic odor)	
						0/0	SP	Brown fine to medium SAND with organics at 4' bgs (loose) (moist) (no odor)	Steel casing Bentonite chips
	4					0/0	GP	GRAVEL or COBBLES	
						0/0	SP	Dark brown fine to medium SAND with organics (loose) (moist) (no odor, no sheen)	Bentonite grout inside steel casing
	6				83	0/0		Grades to brown	
10			S-7.5 11:10			3/2	SM	Grades to gray silty fine SAND (dense) (moist) (no odor)	
	8					11/3	ML	Gray SILT with clay (slightly to non-plastic) (stiff) (dry to moist) (no odor, no sheen)	
					83	14/1	SP	Reddish brown fine SAND (very loose) (moist to dry) (no odor, no stain) 10 ft ▼	
	10					0/0	SM	Gray silty fine SAND (very loose) (saturated) (no odor)	
						0/0		2" dark brown sand lense	20/40 silica sand
5	12				80	3/9	SP	Gray fine to medium SAND (very loose) (saturated) (no odor, no sheen)	ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
						0/0			
	14					0/0		Grading finer at 14.5' bgs	
							SM	As above with more fines	
						0/0	ML	Light gray silt with fine sand (wet to saturated) (no odor)	
	16					0/0			
0					70	0/0			
	18					0/0	SP	Gray fine to medium SAND, white pumice fragments (very loose) (saturated) (no odor, no sheen) Gray fine to medium SAND, white pumice fragments (very loose) (saturated) (no odor, no sheen)	
						0/0			
	20								

URS

Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-11

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
	20				83	0/0 0/0			Gray fine to medium SAND (loose) (saturated) (no odor, no sheen)		
								SM	Gray silty fine SAND (saturated) (no odor)		
-5	22								Boring was completed to 23' bgs. Boring was completed as monitoring well.		
	24										
	26										
-10											
	28										
	30										
-15	32										
	34										
	36										
-20											
	38										
	40										
-25	42										

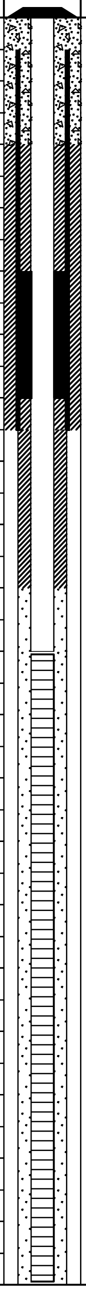
Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-12

Sheet 1 of 2

Date(s) Drilled	**9/12/08**	Logged By	**IPV**	Checked By	
Drilling Method	**Direct Push**	Drilling Contractor	**CDI**	Total Depth of Borehole	**20 feet bgs**
Drill Rig Type	**GeoProbe**	Drill Bit Size/Type		Ground Surface Elevation	**15.98 feet MSL**
Groundwater Level	**9.5 ft bgs**	Sampling Method	**Continuous**	Hammer Data	
Borehole Backfill		Location	**Top of Casing Elevation 15.69**		**Rim Elevation 15.99**

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	0					PID/FID		Asphalt	Aircraft rated, very high strength "atomic" wellbox
15							GP	GRAVEL	
	2						SP	Gray fine to medium SAND (loose to very loose) (moist) (no odor, no sheen)	Concrete, schedule 40 PVC riser
									Steel casing
						0/0		Same as above	Bentonite chips
	4					0/0			
						0/0	SM	Brown/gray mottled silty fine SAND	Bentonite grout inside steel casing
10	6		S-6.5 09:35			0/0	ML	Brown/gray mottled SILT with trace clay (slightly plastic) (moist) (no odor)	
						0/0	SM	Brown/gray mottled silty fine SAND (loose) (moist) (no odor, no sheen)	
	8					3/9	SP	Brown fine SAND (loose) (moist) (no odor, no sheen)	
						6/6		2" thick silt lense 9.5 ft ▼ Gray fine SAND (very loose) (wet to saturated) (no odor, no sheen)	20/40 silica sand
	10					2/5	SM	Grades to gray silty fine SAND (loose) (saturated)	ECT prepack; 65 mesh stainless steel screen over 20/40 silica sand over 0.010" slotted schedule 40 PVC
5						3/9			
	12					0/0			
						0/0	SP	Gray fine to medium SAND (very loose) (saturated) (no odor, no sheen)	
	14					0/0	ML	Gray SILT with fine sand (saturated)	
						0/0	SP	Gray fine to medium SAND, white pumice fragments (very loose) (saturated) (no odor, no sheen)	
0	16					0/0			
						0/0			
	18					0/0		As above	
						0/0	SM	Gray silty fine SAND (loose) (saturated)	
	20								



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Project: IP Longview Additional Investigation
Project Location: Longview, Washington
Project Number: 33759250

Log of Boring TMW-12

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES					Graphic Log	USCS	MATERIAL DESCRIPTION		REMARKS AND WELL DETAILS
		Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)					
	20								Boring was completed to 20' bgs. Boring was completed as monitoring well.		
-5											
	22										
	24										
-10	26										
	28										
	30										
-15											
	32										
	34										
-20	36										
	38										
	40										
-25											
	42										

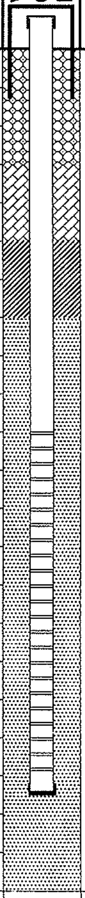
Project: International Paper / Longview - PCMP
Project Location: Longview, Washington
Project Number: 91C0796B

Log of Boring 97-1.A

Sheet 1 of 1

Date(s) Drilled	11/7/97	Logged By	JR	Checked By	
Drilling Method	Hollow-Stem Auger	Drill Bit Size/Type	6-1/4-inch-ID CME-type auger	Surface Elevation	± 10 feet MSL
Drill Rig Type	CME 75	Drilling Contractor	Cascade Drilling (Daryl)	Total Depth of Borehole (feet)	22
Groundwater Level and Date Measured	approx. 8 ft bgs on 11/7	Sampler Type(s)	2-inch-OD unlined split spoon	Hammer Data	140 lbs / 30-inch drop
Diameter of Hole (inches)	10-1/4 Diameter of Well (inches) 4	Type of Casing	Stainless steel	Screen Perforation	0.010-inch slot
Type of Sand Pack	Colorado 10-20	Type of Seal(s)	Bentonite chips 7-5 ft, bentonite-cement grout 5-3 ft, cement 3-0 ft		
Comments	See site plan for boring/well location.				

Depth, feet	Elevation, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance Blows/6 in.	MATERIAL DESCRIPTION	Drilling Progress (24-hour clock)	REMARKS
0	10				CLAY (CL); some organics [Fill].		
					SAND (SP); some wood fragments, medium dense [Fill].		
		▧	1	-- 5 8 13		1000	
5	5	▧	2	-- 3 4 5	SILT (ML); stiff.	1015	Sample 97-1.A-5 submitted for analysis.
		▧	3	-- 2 4 6	Becomes olive green, very wet; some wood, odor of decaying wood. ▽ Increasing sand.		
10	0	▧	4	-- 3 4 5	SAND (SP); some interbedded silt, loose.	1030	Sample 97-1.A-9 submitted for analysis.
		▧	5	-- 4 8 13	SAND to SILTY SAND (SP/SM); some grass and slough, medium dense.		
15	-5	▧	6	-- 8 13 22	SAND (SP); coarse pumice grains, dense [Lower Sand].		
20	-10	▧	7	-- 18 50/6"	Becomes very dense.	1045	
					Bottom of boring at 22 feet.		
25	-15						
30	-20						

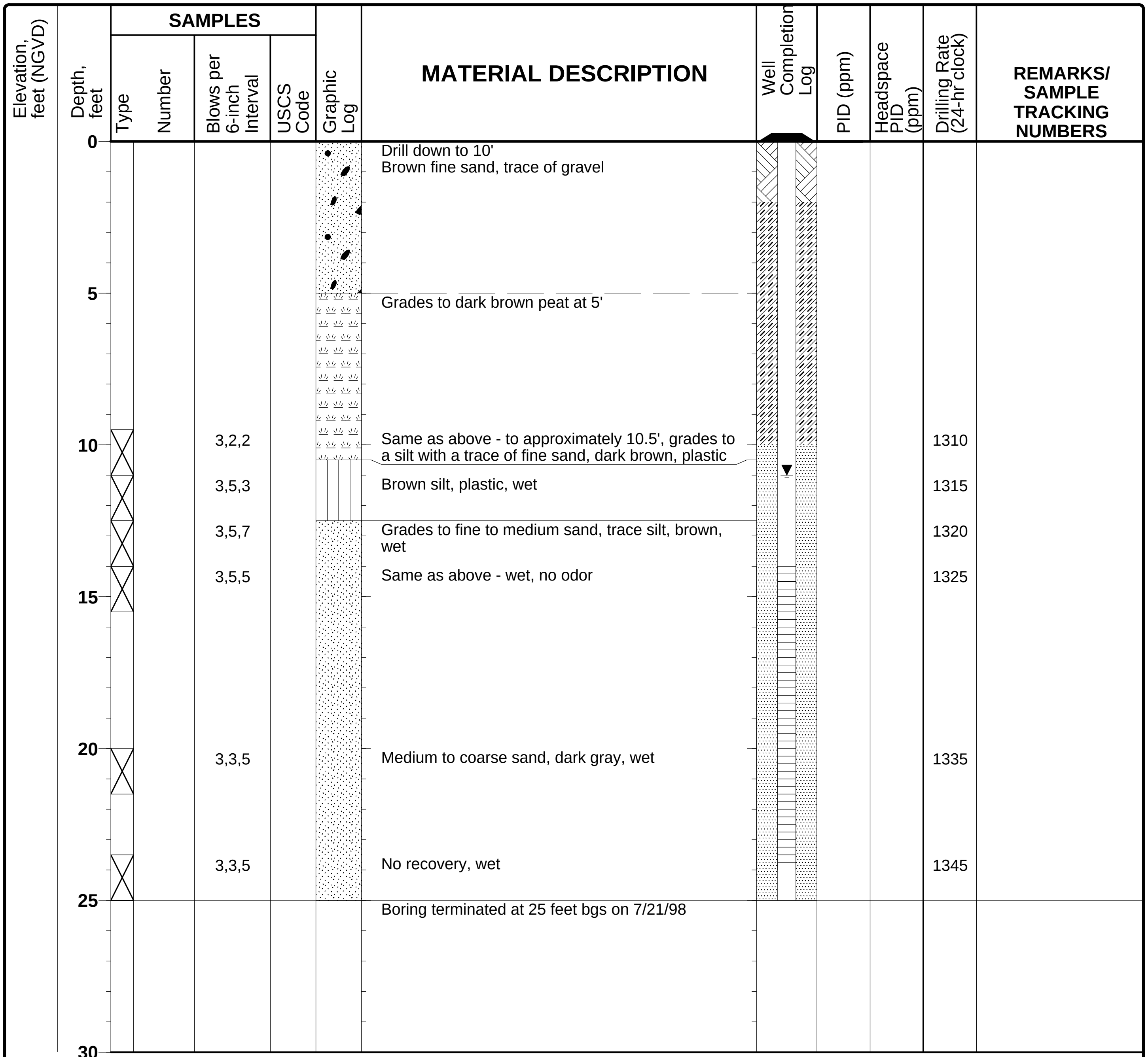


Project: International Paper - PCMP
Project Location: Longview, Washington
Project Number: 33755932

Log of Boring 97-5A

Sheet 1 of 1

Date(s) Drilled	**7/21/1998**	Logged By	**T. Middleton**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth Drilled (FT BGS)	**25.0**
Drill Rig Type	**CME 75**	Sampler Type	**2-inch-OD unlined split spoon**	Surface Elevation	
Groundwater Level (feet bgs)	**11 7/21/1998**	Drill Bit Size/Type	**6.25-inch-ID CME auger**	Top of PVC Elevation	**15.93**
Diameter of Hole (inches)	**10.25** ¦ Diameter of Well (inches) **4**	Type of Well Casing	**Stainless steel**	Screen Perforation	**0.010"**
Type of Sand Pack	**Colorado 10/20**	Type and Depth of Seal(s)	**Sump (24-25'); Screen (14-24'); Filter sand (12.5-24'); Bentonite (2-10')**		
Comments	**Stainless steel riser, screen and sump with flush mount completion**				



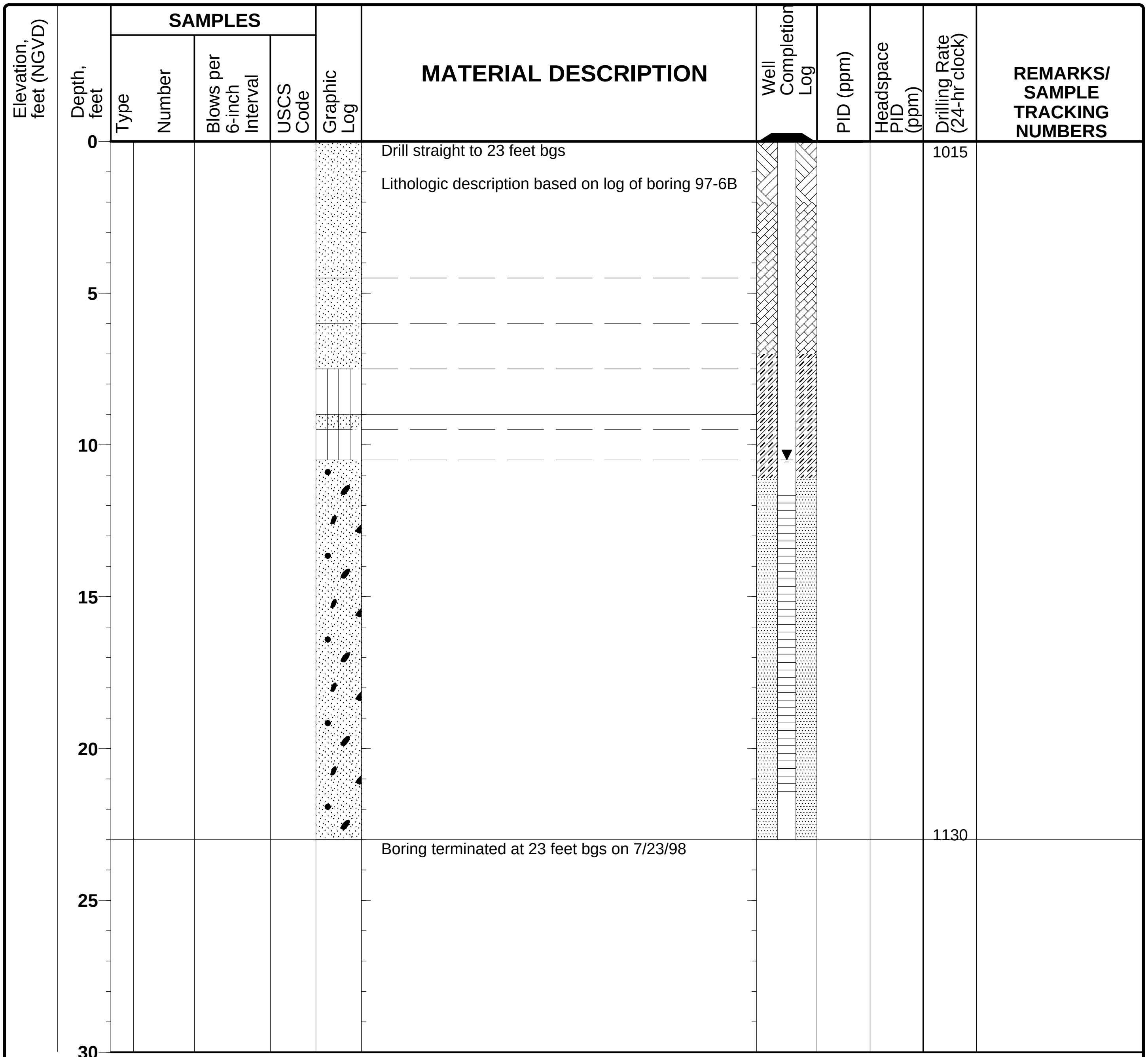
Elevation, feet (NGVD)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES USCS Code	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS/ SAMPLE TRACKING NUMBERS
	0						Drill down to 10' Brown fine sand, trace of gravel					
	5						Grades to dark brown peat at 5'					
	10			3,2,2			Same as above - to approximately 10.5', grades to a silt with a trace of fine sand, dark brown, plastic				1310	
				3,5,3			Brown silt, plastic, wet				1315	
				3,5,7			Grades to fine to medium sand, trace silt, brown, wet				1320	
				3,5,5			Same as above - wet, no odor				1325	
	15											
	20			3,3,5			Medium to coarse sand, dark gray, wet				1335	
				3,3,5			No recovery, wet				1345	
	25						Boring terminated at 25 feet bgs on 7/21/98					
	30											

Project: International Paper - PCMP
Project Location: Longview, Washington
Project Number: 33755932

Log of Boring 97-6A

Sheet 1 of 1

Date(s) Drilled	**7/23/1998**	Logged By	**T. Middleton**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth Drilled (FT BGS)	**23.0**
Drill Rig Type	**CME 75**	Sampler Type	**2-inch-OD unlined split spoon**	Surface Elevation	
Groundwater Level (feet bgs)	**10.5 7/23/1998**	Drill Bit Size/Type	**6.25-inch-ID CME auger**	Top of PVC Elevation	**13.06**
Diameter of Hole (inches)	**10.25** ¦ Diameter of Well (inches) **4**	Type of Well Casing	**Stainless steel**	Screen Perforation	**0.010"**
Type of Sand Pack	**Colorado 10/20**	Type and Depth of Seal(s)	**Sump (21'8"-22'8"); Screen (11'8"-21'8"); Filter sand (11'1"-11'8"); Bentonite (7'-11'8")**		
Comments	**Stainless steel riser, screen and sump with flush mount completion**				



Drill straight to 23 feet bgs

Lithologic description based on log of boring 97-6B

Boring terminated at 23 feet bgs on 7/23/98

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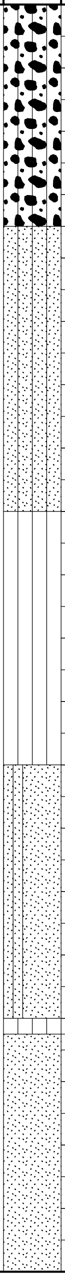
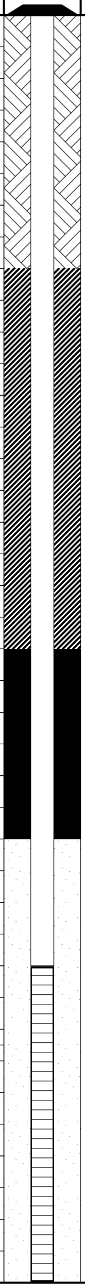
Project: IP Longview
Project Location: Port of Longview
Project Number: 33756800

Log of Boring MW04-6A

Sheet 1 of 2

Date(s) Drilled	**5/11/04**	Logged By	**ALZ**	Checked By	**TG**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade (Portland)**	Total Depth of Borehole	**36.5 feet**
Drill Rig Type	**CME-75**	Drill Bit Size/Type	**10.25" OD**	Ground Surface Elevation	
Groundwater Level	**10'**	Sampling Method	**Split Spoon**	Hammer Data	**140 lb.**
Borehole Backfill		Location			





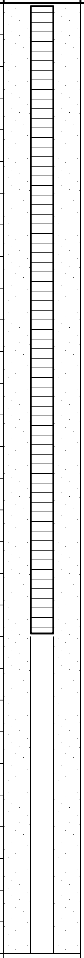
Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery (%)	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	Well Completion Schematic	REMARKS AND WELL DETAILS
	0							GM	Surface: topsoil with vegetation and gravel		Flush mount monument
									Dark gray GRAVEL, crushed and coarse rock, with black silt (moist) (no apparent odor or sheen)		Concrete surface seal
	2										
								SM	Dark gray, fine to medium SAND, some silt, trace gravel (moist) (no apparent odor or sheen)		
	4										Bentonite/grout
	6		1	21 17 15					Dark gray, fine to medium SAND, some silt, trace gravel (wet) (strong petroleum sheen and free product at 5.5')		
									As above with wood debris (strong petroleum odor and product)		
	8		2	3 5 6				ML	Gray SILT, wood fibers to 2" in length, oxidized orange areas (medium plasticity) (moist at contact, grading drier with depth) (no apparent odor or sheen)		
	10								10 ft ▼		Water level after installation
			3	3 5 2					As above		Bentonite seal
	12							SM/ SP	Interbedded gray to dark gray SAND and SAND/SILT, granitic fine to coarse sand, (slight petroleum odor, no sheen) (wet)		
	14		4	12 21 38							
											4" wire wrapped stainless steel 0.010 slot screen
	16		5	10 15 22				ML	Olive brown SILT lense, wood debris (wet) (no apparent odor or sheen)		
								SP	Gray fine to medium SAND, trace wood debris (wet) (no apparent odor or sheen)		10/20 silica sand
	18										
	20										

Project: IP Longview
Project Location: Port of Longview
Project Number: 33756800

Log of Boring MW04-6A

Sheet 2 of 2

Elevation, feet	Downhole Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery (%)	OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND WELL DETAILS
	20	◣	6	17 50-6"					As above	
	22									
	24									
	26	◣	7	15 17 25					As above, increased wood debris (trace free product)	Driller notes heave during soil sampling
	28	◣	8	3 14 17					Gray, fine to medium SAND with 30% wood debris (trace free product blebs, petroleum odor apparent, no sheen)	
	30	◣	9	5 15 25					As above	4" stainless steel sump
	32									
	34	◣	10	10 23 36					As above	11:30
									As above	
	36	◣	11	23 50-6"						Boring diameter = 10 1/4"
	38								Auger advanced to 35' bgs. Boring sampled to 36.5' bgs. Groundwater was encountered at 10' No analytical samples collected. Boring was completed as well MW04-6A	
	40									
	42									



Project: International Paper - PCMP
Project Location: Longview, Washington
Project Number: 33755932

Log of Boring 97-6B

Sheet 1 of 2

Date(s) Drilled	**7/23/1998**	Logged By	**T. Middleton**	Checked By	
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc.**	Total Depth Drilled (FT BGS)	**57.5**
Drill Rig Type	**CME 75**	Sampler Type	**2-inch-OD unlined split spoon**	Surface Elevation	
Groundwater Level (feet bgs)	**10.5 7/23/1998**	Drill Bit Size/Type	**6.25-inch-ID CME auger**	Top of PVC Elevation	**12.97**
Diameter of Hole (inches)	**10.25** ¦ Diameter of Well (inches) **4**	Type of Well Casing	**Stainless steel**	Screen Perforation	**0.010"**
Type of Sand Pack	**Colorado 10/20**	Type and Depth of Seal(s)	**Sump (56.5-57.5'); Screen (46.5-56.5'); Filter sand (42'10"-57.5'); Bentonite (39'4"-42'10")**		
Comments	**Stainless steel riser, screen and sump with flush mount completion**				

Elevation, feet (NGVD)	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES USCS Code	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS/ SAMPLE TRACKING NUMBERS
	0						Drill to 4.5 feet bgs					
	5			13,12,9			Dark brown to gray sand - moist, slight petroleum odor				1745	
				1,2,1			wet, fine sand, trace silt, slight sheen, slight petroleum odor				1750	
							Grades to silt with trace of fine sand and wood, slight petroleum odor, medium plasticity				1755	
	10						Fine sand lense from 9-9.5'				1800	
							Gray-brown sand w/ gravel - wet, medium to coarse sand, slight sheen, slight petroleum odor	▼			1805	
							Intermixed with pumice, coarse sand, wet, slight petroleum odor, slight sheen on water				1806	
							Dark gray, strong petroleum odor				1808	
	15											
	20						Saturated, dark gray, coarse sand				1815	
	25											
	30											

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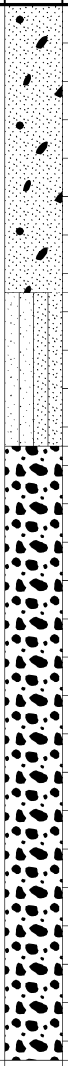
URS

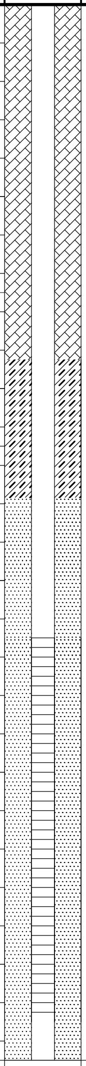
Project: International Paper - PCMP
Project Location: Longview, Washington
Project Number: 33755932

Log of Boring 97-6B

Sheet 2 of 2

Elevation, feet (NGVD)	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	USCS Code	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	PID (ppm)	Headspace PID (ppm)	Drilling Rate (24-hr clock)	REMARKS/ SAMPLE TRACKING NUMBERS
	30	☒					Dark gray, saturated, medium to coarse sand, trace of fine sand, slight petroleum odor, slight sheen				1840	
	35	☒					As above				1850	
		☒		3,4,2							1855	
		☒		5,3,1			Grades to a fine sand with trace of silt, moist to wet, dense, no odor Dark gray fine sand and silt, no odor, wet				1910	
	40	☒					Moderately plastic				1925	
		☒		3,9,21			silt ends at 41.5' grades to coarse sand and cobbles, rounded pumice, saturated (dark gray)					
	45											
	50											
											1956	
	55											
							Boring terminated at 57.5 feet bgs on 7/23/98					
	60											
	65											
	70											





Project:	**International Paper**
Project Location:	**Longview WA**
Project Number:	**54-09900003.01**

Log of Boring 99EA-SB3

Sheet 1 of 1

Date(s) Drilled	**1/5/99**	Logged By	**T. Middleton**	Checked By	**R. Siegel**
Drilling Method	**Hollow Stem Auger**	Drilling Contractor	**Cascade Drilling, Inc**	Total Depth Drilled (feet)	**11.5**
Drill Rig Type	**CME 75 Truck Mounted**	Type of Sampler	**Modified California (2.5" ID)**	Surface Elevation	**15.7 MSL**
Groundwater Level	**7.75' bgs**	Hammer Weight and Drop	**140lb/30"**	Top of PVC Elevation	**NA**
Diameter of Hole (inches)	**8** ; Diameter of Probe (inches) **NA**	Type of Well Casing	**NA**	Screen Perforation	**NA**
Type of Sand Pack	**NA**	Type and Depth of Seal(s)	**NA**		
Comments	**cement bentonite grout to surface/concrete top**				

Elevation, feet	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS AND FIELD/LAB TESTS
	0					■	6" of Asphalt				1526	start drilling
15						░	SAND (SP); fine sand; trace of silt; dark brown; grades to a fine gray sand; pebbles; moist					
		☒		23/20/13	90	░			NR		1530	
		☒		22/35/25	90	░			NR		1535	
						▥	Silty SAND (SM); fine; wood chips and sand to 5.5'; moist to wet					
10	5	☒		10/13/18	90	▥	wood chips; brown; moist		NR		1545	sample to lab
		☒		23/25/28	90	░	SAND (SP); uniform; gray; moist		3		1548	
						░	∇					
		☒		13/13/15	100	░	saturated		NR		1555	sample to lab
5	10	☒		5/5/7	100	░			NR			sample to lab
						▥	Sandy SILT (ML); brown; iron stained					
							BORING TERMINATED AT 11.5 FEET BGS				1610	end drilling
0	15											
	20											

Report: ENV_23A; Project File: H:\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 6/24/99

URS Greiner Woodward-Clyde

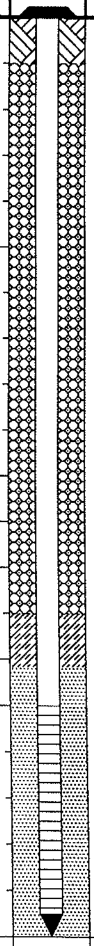
Project: International Paper
Project Location: Longview WA
Project Number: 54-09900003.01

Log of Well 99EA-3A

Sheet 1 of 1

Date(s) Drilled	1/8/99	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet)	20.0
Drill Rig Type	CME 75 Truck Mounted	Type of Sampler	Modified California (2.5" ID)	Surface Elevation	15.1 MSL
Groundwater Level	5.88 MSL	Hammer Weight and Drop	140lb/30"	Top of PVC Elevation	14.79 MSL
Diameter of Hole (inches)	8 ; Diameter of Probe (inches) 2	Type of Well Casing	Schedule 40 PVC	Screen Perforation	0.010"
Type of Sand Pack	10/20	Type and Depth of Seal(s)	Cement (0-1'); grout/cement (1-13')		
Comments	Heavy duty flush mount protective casing				

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6-inch Interval	SAMPLES Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS AND FIELD/LAB TESTS
15	0						6" of Asphalt 0.5'-8'; (See 99-EA-SB3 for geology)				1135	begin drilling
10	5											
				3/3/3	90		Sandy SILT (ML); fine; saturated; dark gray				1158	
5	10			3/5/8	90						1200	
				2/3/4	90		grades to fine sand				1205	
							grades to wet sandy silt					
				5/7/1	90						1206	
				7/8/11	90		SAND (SP); fine and medium; dark gray sand; silty interbed				1212	
0	15											
				NR	90		saturated					
-5	20						BORING TERMINATED AT 20 FEET BGS				1220	end drilling
	25											



Project: IP Longview Treatability Study
Project Location: Longview, Washington
Project Number: 33763156

Log of Test Pit TP-01

Sheet 1 of 1

Date(s) Excavated	**8/22/11**	Logged By	**IPV**	Checked By	
Excavation Equipment	**CAT KCS1770**	Excavation Contractor	**CCS**	Total Depth of Test Pit	**8 feet**
Excavation Dimensions	**ft x ft**	Pit Alignment		Ground Surface Elevation	
Groundwater Level		Sampling Method(s)			
Location					

Elevation feet	Depth, feet	Type	Number	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
	0					Asphalt surface				
					GP	Gray coarse GRAVEL (dry) (fill)				
	2					Geotextile fabric at 2'				
					ML	Gray SILT with trace fine sand (dry) (no odor)				
					SM	Dark brown silty fine SAND (moist) (no odor)				
	4				SP	Light gray fine SAND (moist) (no odor)				
			TP01-S-2.0-7.5-082211			Grading light brown				
	6				SM	Gray silty fine SAND (moist) (no odor)				
					ML	Gray SILT with trace fine sand (moist) (no odor)				
	8		TP01-S-7.5-082211			Test pit was completed to 8' bgs.				
	10									

Project: IP Longview Treatability Study
Project Location: Longview, Washington
Project Number: 33763156

Log of Test Pit TP-02

Sheet 1 of 1

Date(s) Excavated	**8/22/11**	Logged By	**IPV**	Checked By	
Excavation Equipment	**CAT KCS1770**	Excavation Contractor	**CCS**	Total Depth of Test Pit	**6.5 feet**
Excavation Dimensions	**ft x ft**	Pit Alignment		Ground Surface Elevation	
Groundwater Level		Sampling Method(s)			
Location					

Elevation feet	Depth, feet	Type	Number	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
	0			■		Asphalt surface				
				▨	GP	Gray coarse GRAVEL (moist) (fill/bare rock)				
	2	■		░	SP	Dark brown fine to medium SAND				
		■		░		Grading dark gray (moist)				
	4	■	TP02-S-2.0-6.5-082211	░						
		■		░		Grading (wet) (strong creosote odor)				
	6	■		░		Grading (staining and free product)				
			TP02-S-6.5-082211			Test pit was completed to 6.5' bgs.				
	8									
	10									

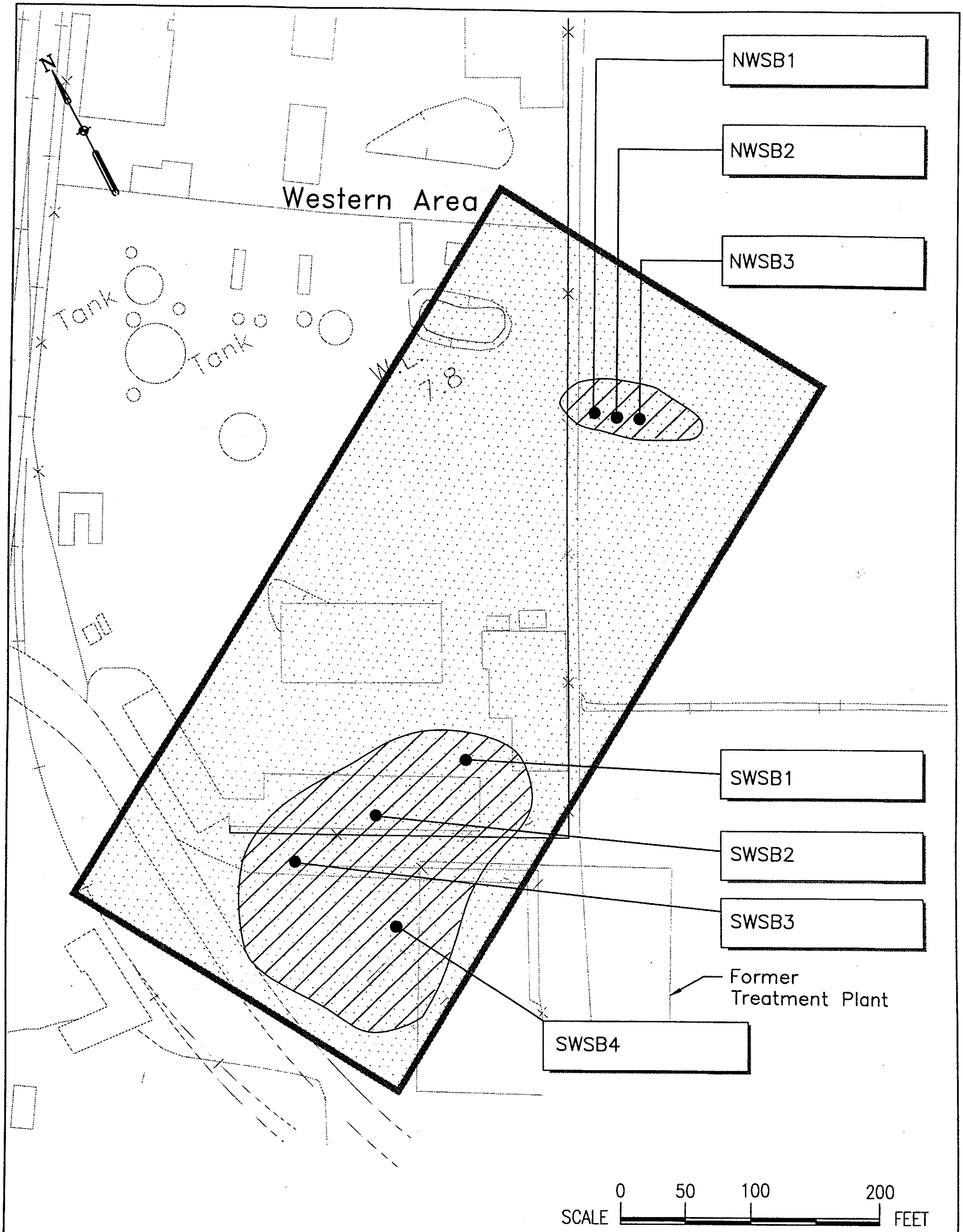
Appendix C

Previous Investigation Figures

Appendix C

Previous Investigation Figures

(Western Area Report)



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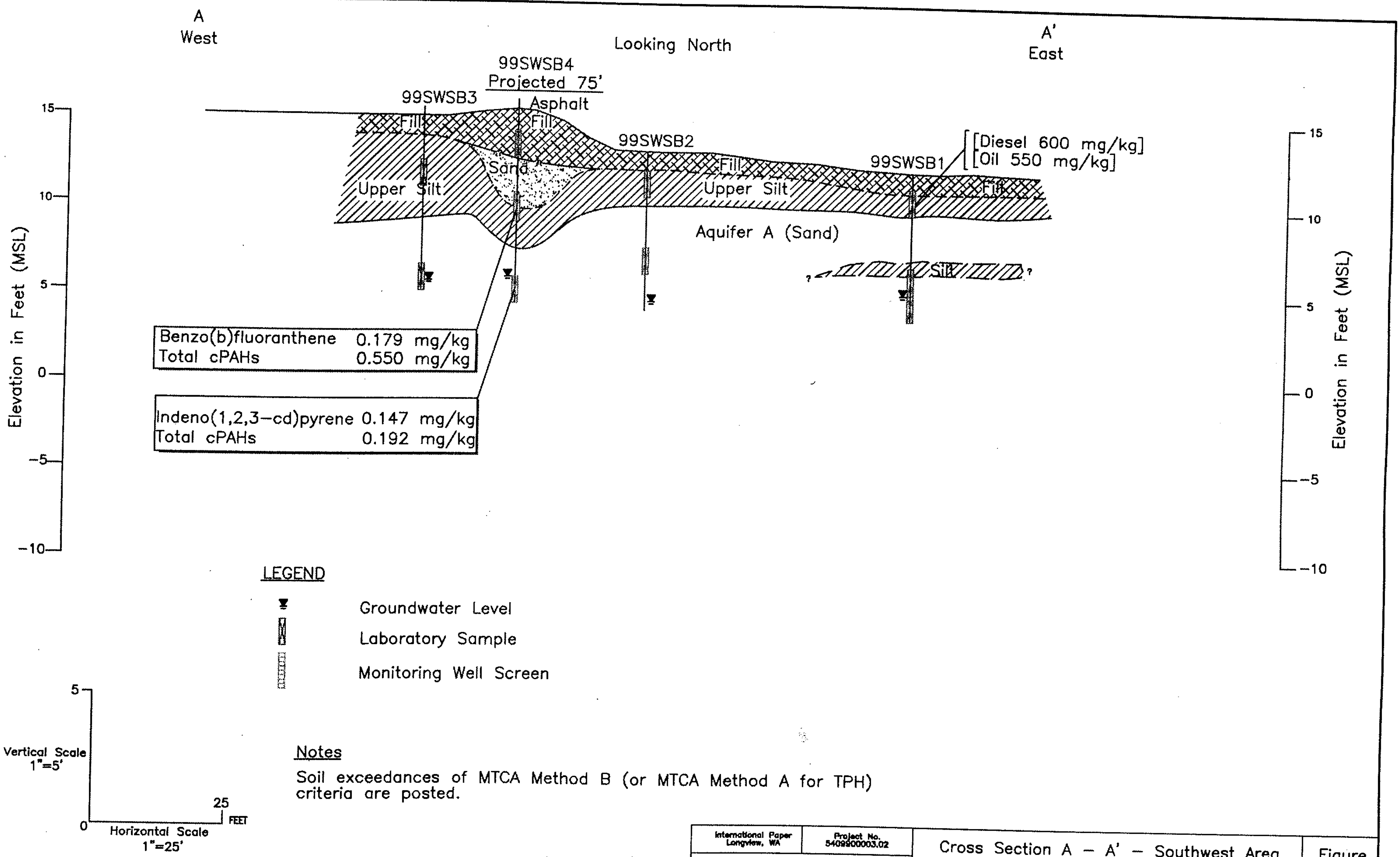
International Paper
Longview, Washington

Project No.
5409900003.01

URS Greiner Woodward Clyde

Sampling Locations
Western Area

Figure
2-1



Notes

Soil exceedances of MTCA Method B (or MTCA Method A for TPH) criteria are posted.

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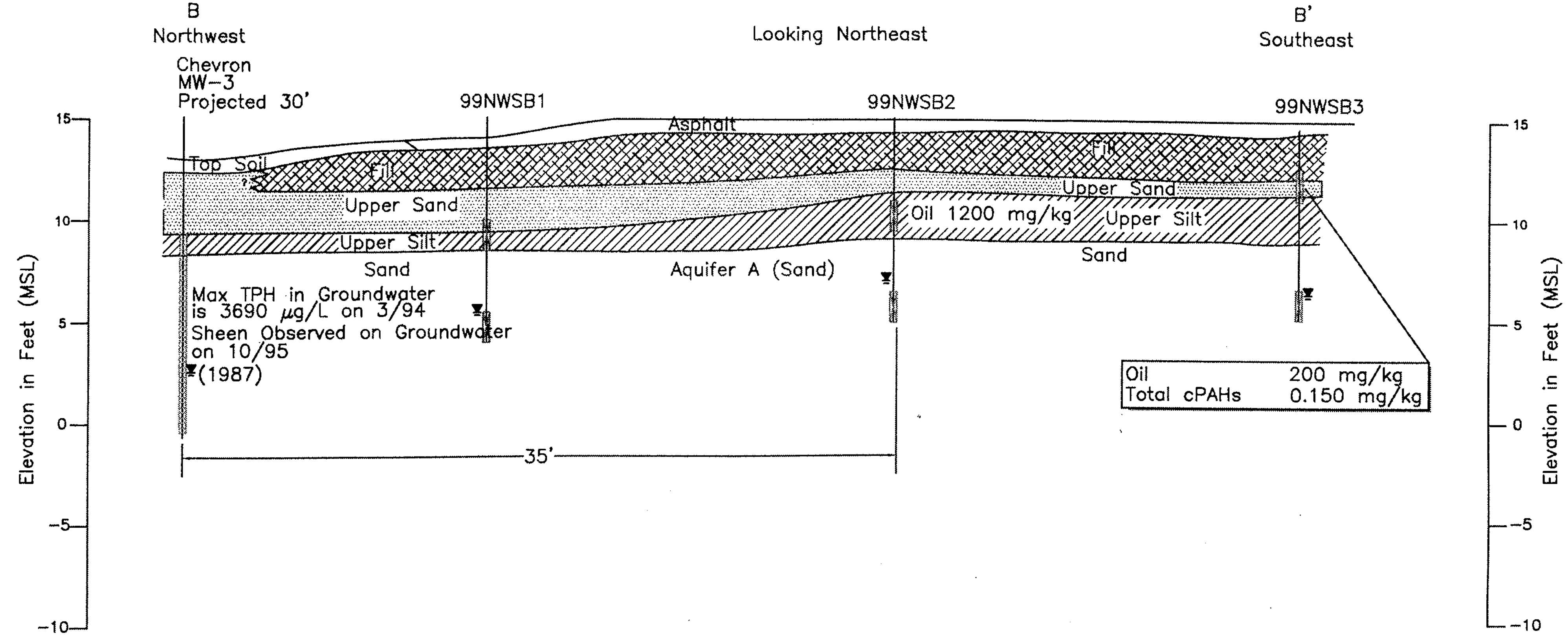
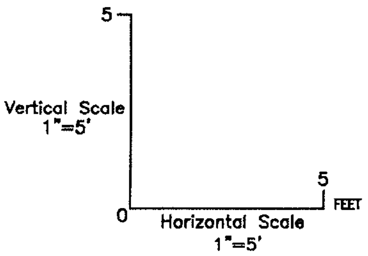
International Paper Longview, WA	Project No. 5409900003.02	Cross Section A – A' – Southwest Area Soil and Groundwater Data	Figure 3–1
URS Greiner Woodward Clyde			



<u>LEGEND</u>

- ▼ Groundwater Level
- ▥ Laboratory Sample
- ▤ Monitoring Well Screen



Notes

MW–3 Petroleum sheen and odor noted at all depths during monitoring well construction.

Soil exceedances of MTCA Method B (or MTCA Method A for TPH) criteria are posted.

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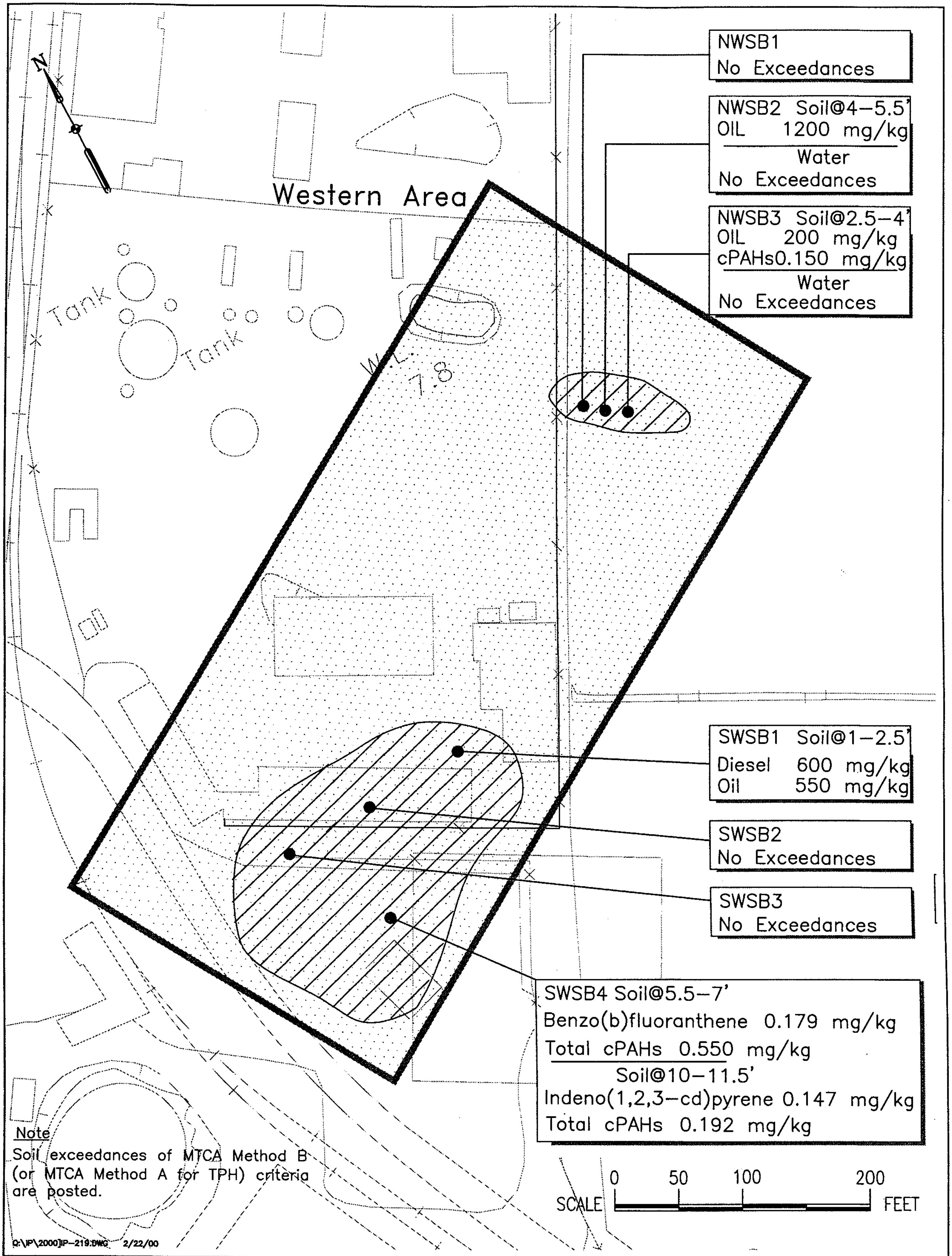
International Paper Longview, WA	Project No. 5409900003.01	Cross Section B – B' – Northwest Area Soil and Groundwater Data	Figure 3–2
URS Greiner Woodward Clyde			



Note

Soil exceedances of MTCA Method B (or MTCA Method A for TPH) criteria are posted.

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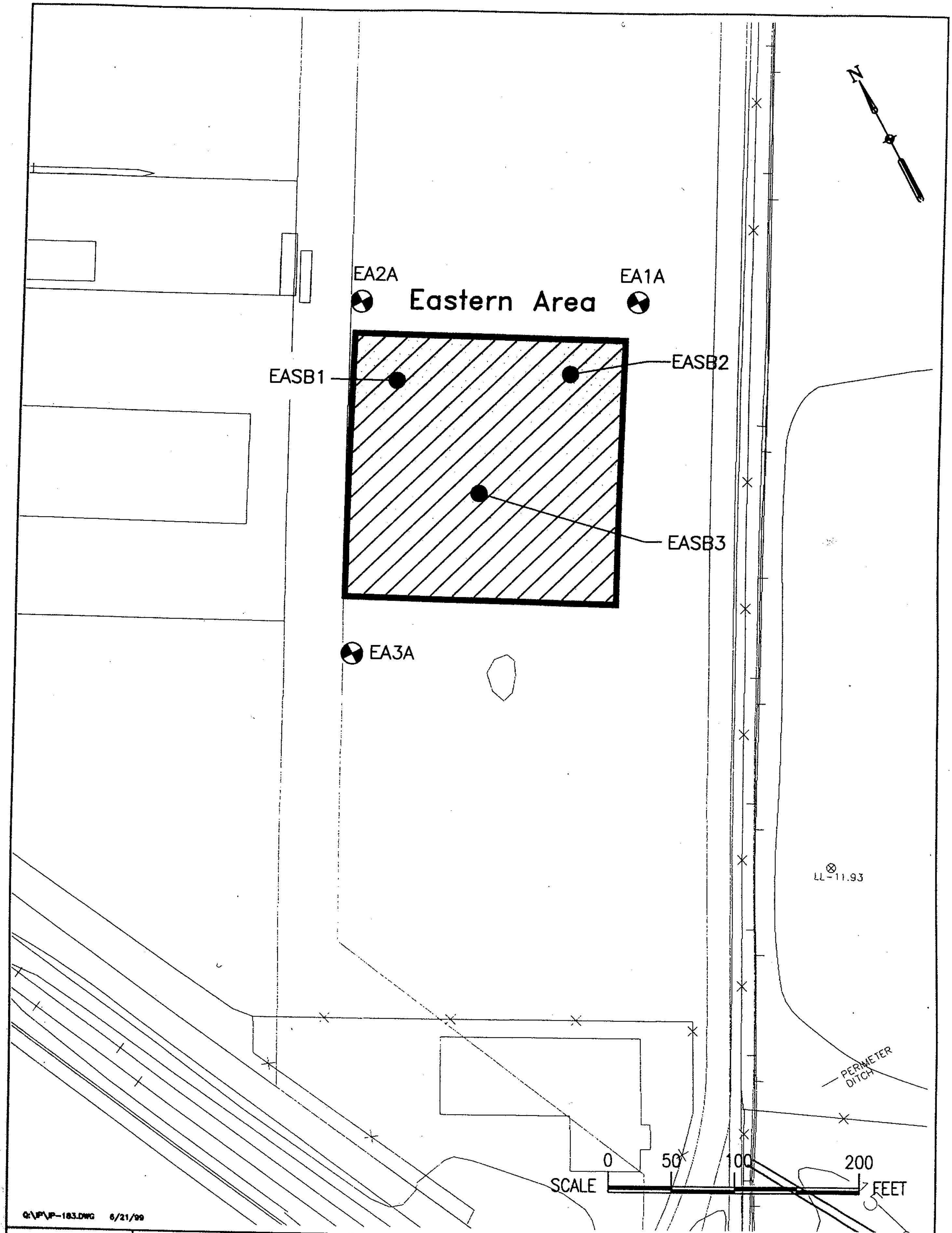
International Paper Longview, Washington	Project No. 5409900003.01	Soil and Groundwater Exceedances Western Area	Figure 4–1
URS Greiner Woodward Clyde			

Appendix C

Previous Investigation Figures

(Eastern Area Report)



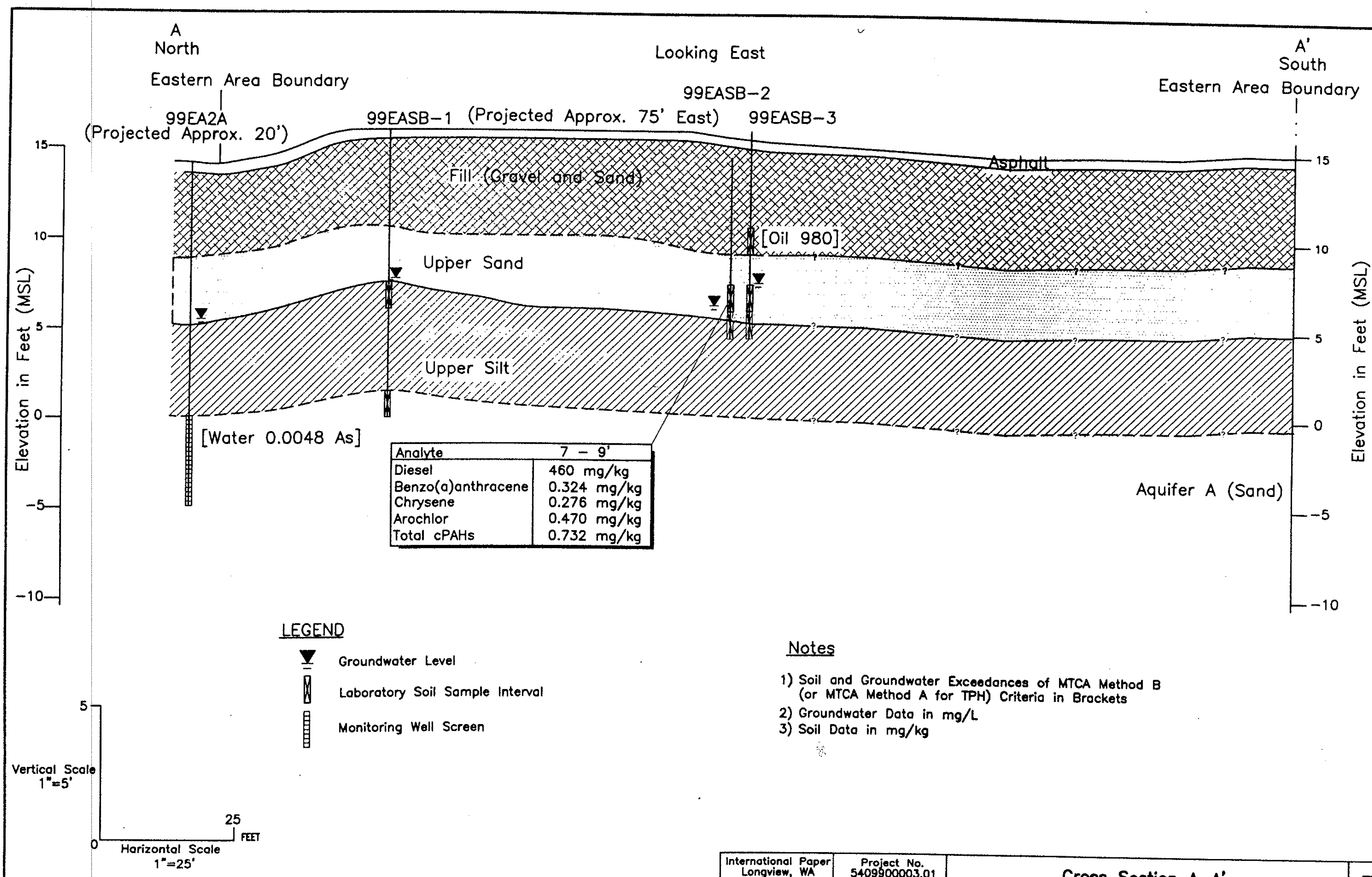
International Paper
Longview, Washington

Project No.
5409900003.01

URS Greiner Woodward Clyde

Sampling Locations
Eastern Area

Figure
2–1



Analyte	7 - 9'
Diesel	460 mg/kg
Benzo(a)anthracene	0.324 mg/kg
Chrysene	0.276 mg/kg
Arochlor	0.470 mg/kg
Total cPAHs	0.732 mg/kg

LEGEND

▼	Groundwater Level
☒	Laboratory Soil Sample Interval
▤	Monitoring Well Screen

Notes

1) Soil and Groundwater Exceedances of MTCA Method B (or MTCA Method A for TPH) Criteria in Brackets
2) Groundwater Data in mg/L
3) Soil Data in mg/kg

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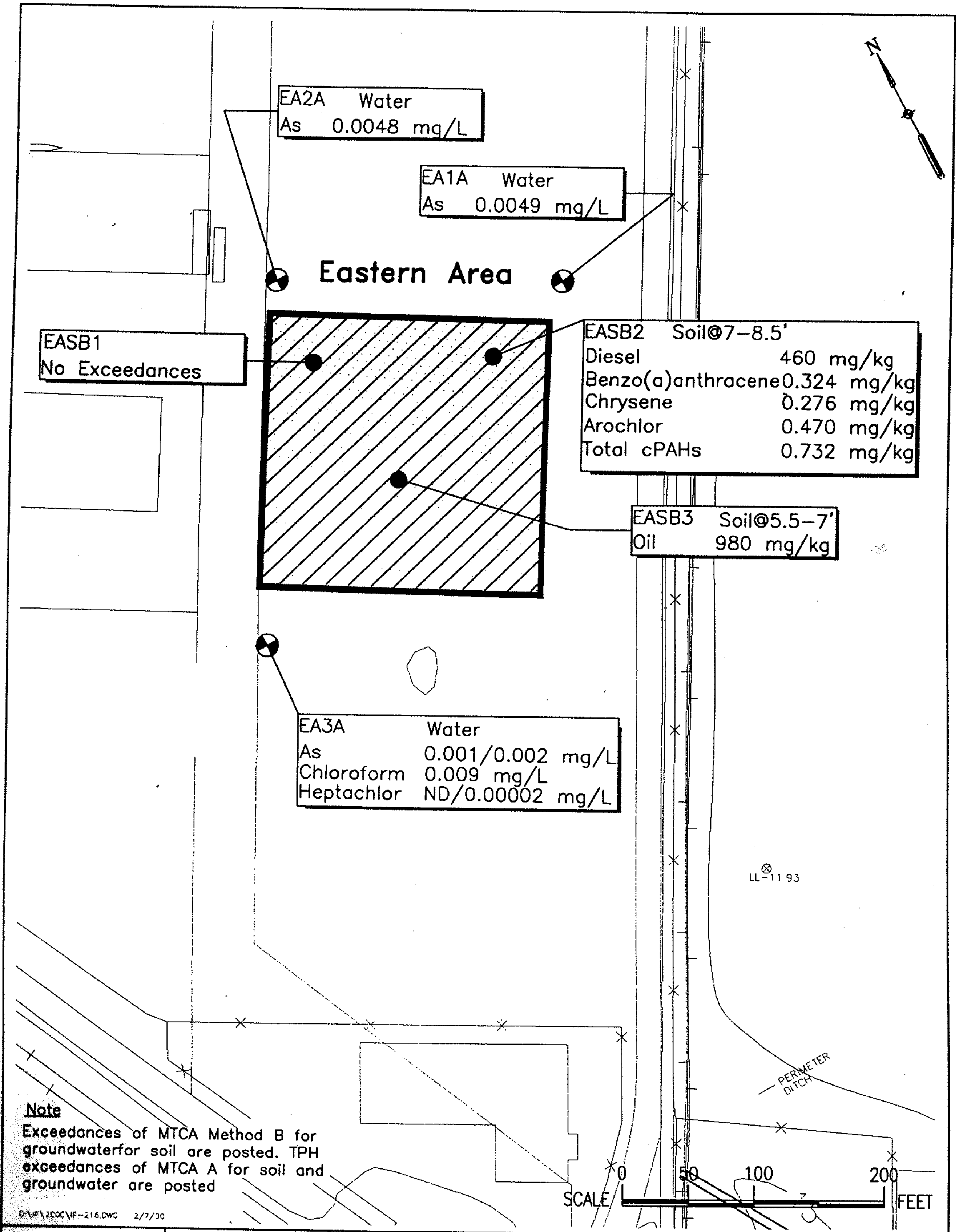
International Paper
Longview, WA

Project No.
5409900003.01

URS Greiner Woodward Clyde

Cross Section A-A'
Eastern Area

Figure
3-1



Note

Exceedances of MTCA Method B for groundwaterfor soil are posted. TPH exceedances of MTCA A for soil and groundwater are posted

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International Paper
Longview, Washington

Project No.
91C0796B

URS Greiner Woodward Clyde

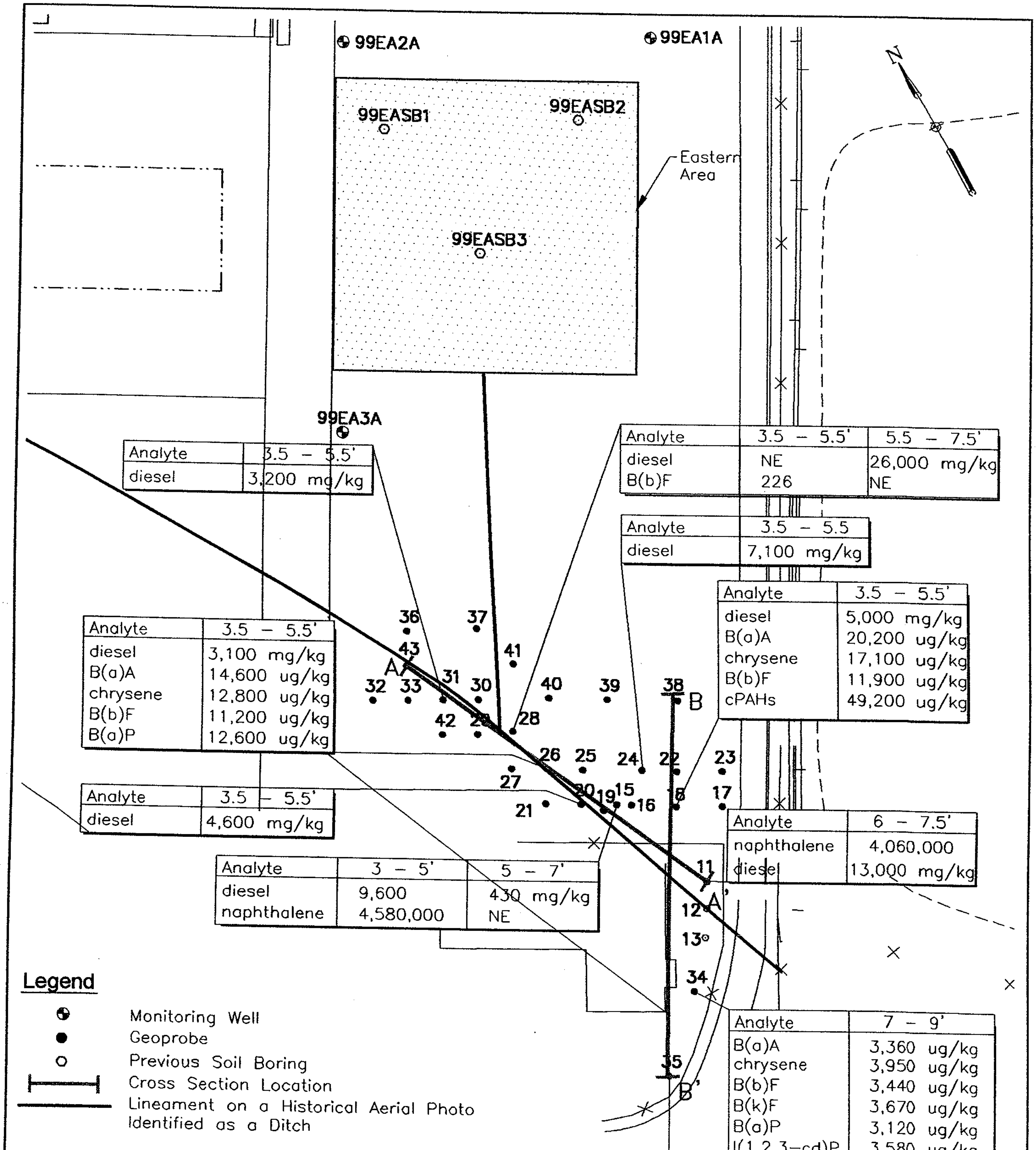
Soil and Groundwater Exceedances
Eastern Area

Figure
4–1

Appendix C

Previous Investigation Figures

(Additional Perimeter Boring Investigation)



Analyte	3.5 – 5.5'
diesel	3,200 mg/kg

Analyte	3.5 – 5.5'	5.5 – 7.5'
diesel	NE	26,000 mg/kg
B(b)F	226	NE

Analyte	3.5 – 5.5
diesel	7,100 mg/kg

Analyte	3.5 – 5.5'
diesel	5,000 mg/kg
B(a)A	20,200 ug/kg
chrysene	17,100 ug/kg
B(b)F	11,900 ug/kg
cPAHs	49,200 ug/kg

Analyte	3.5 – 5.5'
diesel	3,100 mg/kg
B(a)A	14,600 ug/kg
chrysene	12,800 ug/kg
B(b)F	11,200 ug/kg
B(a)P	12,600 ug/kg

Analyte	3.5 – 5.5'
diesel	4,600 mg/kg

Analyte	3 – 5'	5 – 7'
diesel	9,600	430 mg/kg
naphthalene	4,580,000	NE

Analyte	6 – 7.5'
naphthalene	4,060,000
diesel	13,000 mg/kg

Analyte	7 – 9'
B(a)A	3,360 ug/kg
chrysene	3,950 ug/kg
B(b)F	3,440 ug/kg
B(k)F	3,670 ug/kg
B(a)P	3,120 ug/kg
I(1,2,3-cd)P	3,580 ug/kg
D(a,h)A	3,660 ug/kg
PCP	17,300 ug/kg
cPAHs	24,300 ug/kg

Legend

⊕	Monitoring Well
●	Geoprobe
○	Previous Soil Boring
├─┤	Cross Section Location
──	Lineament on a Historical Aerial Photo Identified as a Ditch

ABBREVIATIONS

NE	No Exceedence	B(k)F	benzo(k)fluorathene
B(a)P	benzo(a)pyrene	I(1,2,3-cd)P	indeno(1,2,3-cd)pyrene
B(a)A	benzo(a)anthracene	D(a,h)A	dibenz(a,h)anthracene
B(b)F	benzo(b)fluorathene	PCP	pentachlorophenol

MTCA Level B (or MTCA Level A for TPH) Exceedances for Offsite Soil Samples are Shown.

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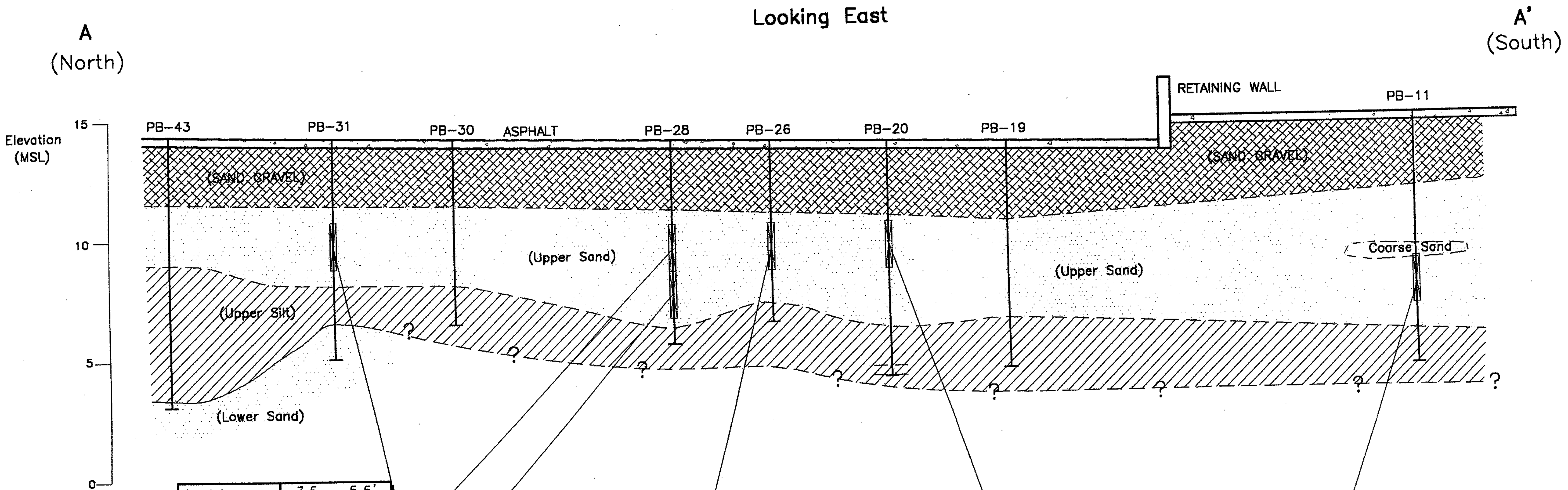
URS Greiner Woodward Clyde

Facility Maintenance Area Soil Results

Figure
1–2



Analyte	3.5 – 5.5'
Diesel	3,200 mg/kg

Analyte	3.5 – 5.5'
B(b)F	226 ug/kg

Analyte	5.5 – 7.5'
Diesel	26,000 mg/kg
B(b)F	No Exceedance

Analyte	3.5 – 5.5'
Diesel	3,100 mg/kg
B(a)A	14,600 ug/kg
chrysene	12,800 ug/kg
B(b)F	11,200 ug/kg
B(a)P	12,600 ug/kg
cPAHs	51,200 ug/kg

Analyte	3.5 – 5.5'
Diesel	4,600 mg/kg

Analyte	6–7.5'
Diesel	13,000 mg/kg
Naphthalene	4,060,000 ug/kg

Legend

▯ Soil Sample Interval

Exceedances of MTCA B criteria (or MTCA A for TPH) for offsite soils are shown

SCALE 0 5 FEET
Vertical Scale

SCALE 0 25 FEET
Horizontal Scale

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11x17-STD.pcp

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Longview, WA

Project No.
5409900003.10

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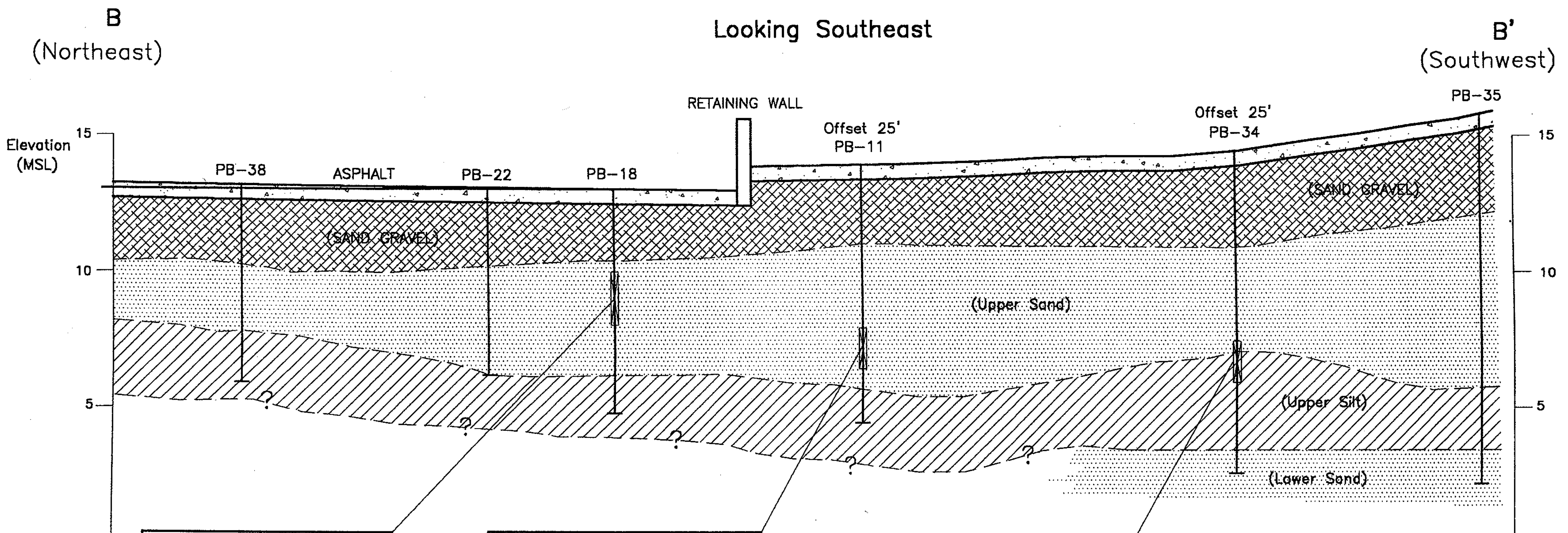
Additional Perimeter Boring Investigation
Cross Section A–A'

Figure
1–3



Analyte	3.5 - 5.5'
diesel	5,000 mg/kg
B(a)A	20,200 ug/kg
chrysene	17,100 ug/kg
B(b)F	11,900 ug/kg
CPAHs	49,200 ug/kg

Analyte	6 - 7.5'
Diesel	13,000 mg/kg
Naphthalene	4,060,000 mg/kg

Analyte	7 - 9'
B(a)A	3,360 ug/kg
chrysene	3,950 ug/kg
B(b)F	4,440 ug/kg
B(k)F	3,670 ug/kg
B(a)F	3,120 ug/kg
I(1,2,3-cd)P	3,580 ug/kg
D(a,h)A	3,660 ug/kg
PCP	17,300 ug/kg
CPAHs	24,780 ug/kg

Legend

▯ Sample Interval

Abbreviations

Exceedances of MTCA B criteria
(or MTCA A for TPH) for offsite soils are shown

NE	No Exceedances

SCALE 0 — 5 FEET
Vertical Scale

SCALE 0 — 25 FEET
Horizontal Scale

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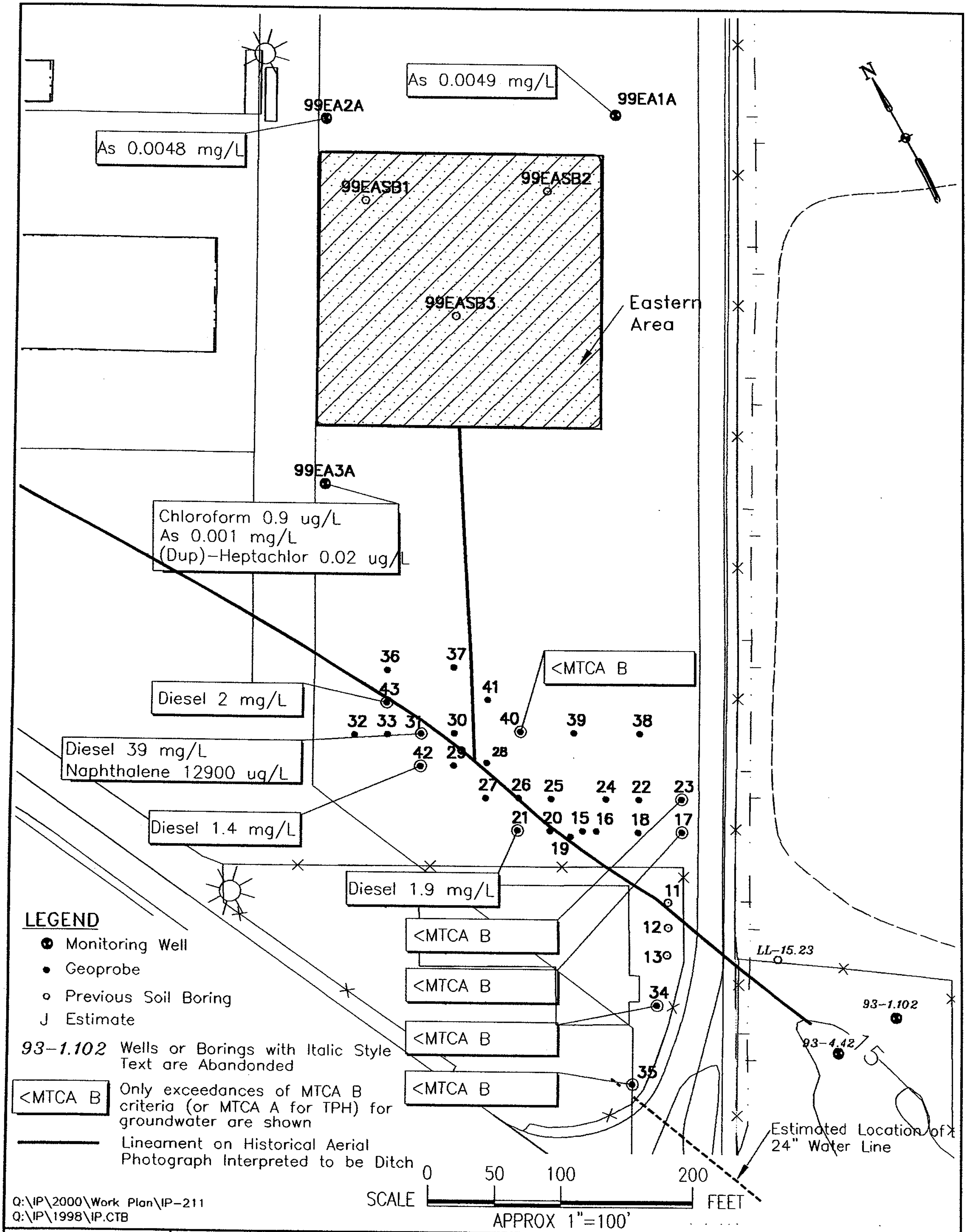
11x17-STD.pcp

International Paper Longview, WA	Project No. 5409900003.10
URS Greiner Woodward Clyde	

Additional Perimeter Boring Investigation
Cross Section B-B'
Showing Soil Sample Results

Figure
1-4



International Paper
Longview, Washington

Project No.
91C0796B

URS Greiner Woodward Clyde

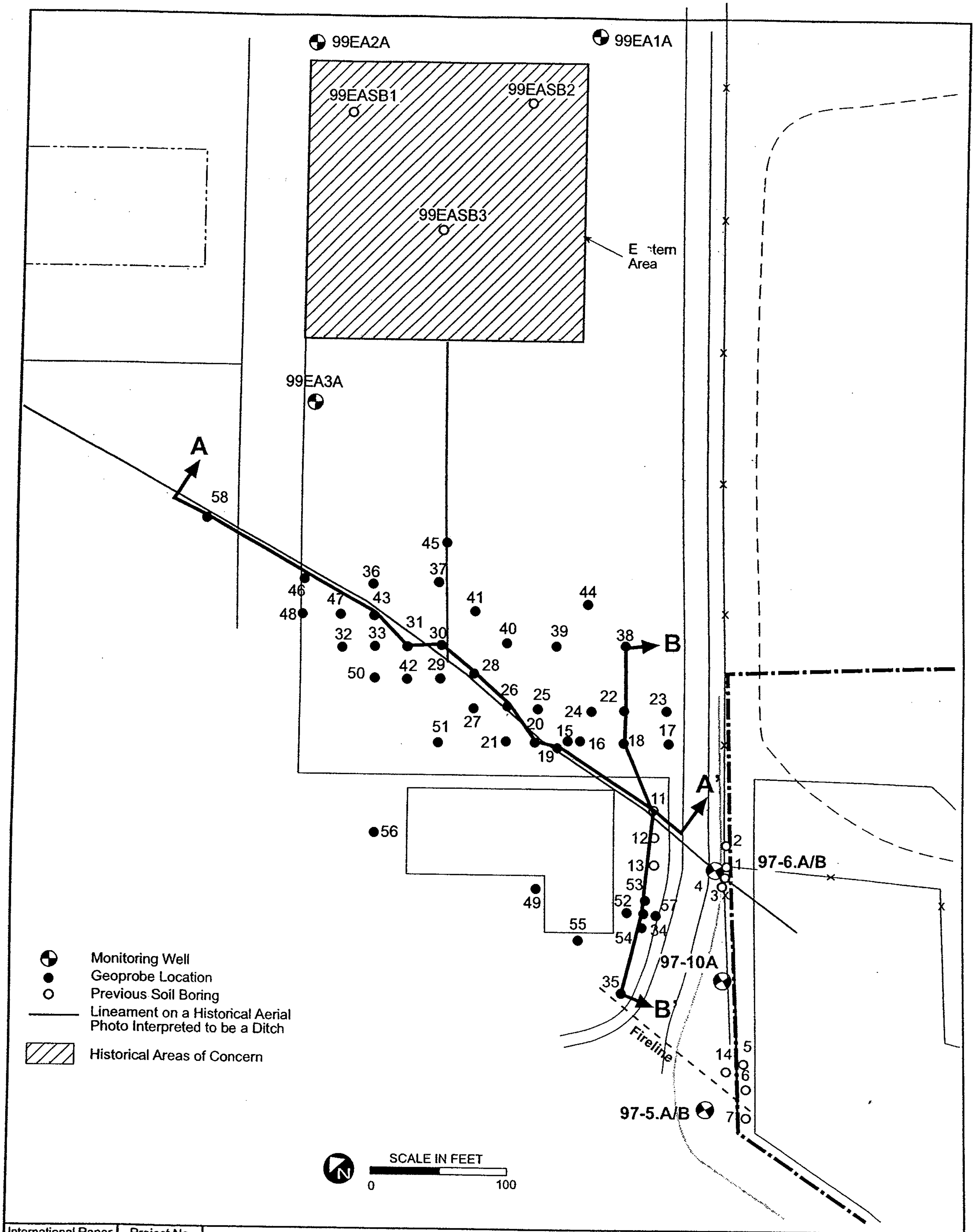
Facility Maintenance Area Groundwater Analytical Results

Figure
1–5

Appendix C

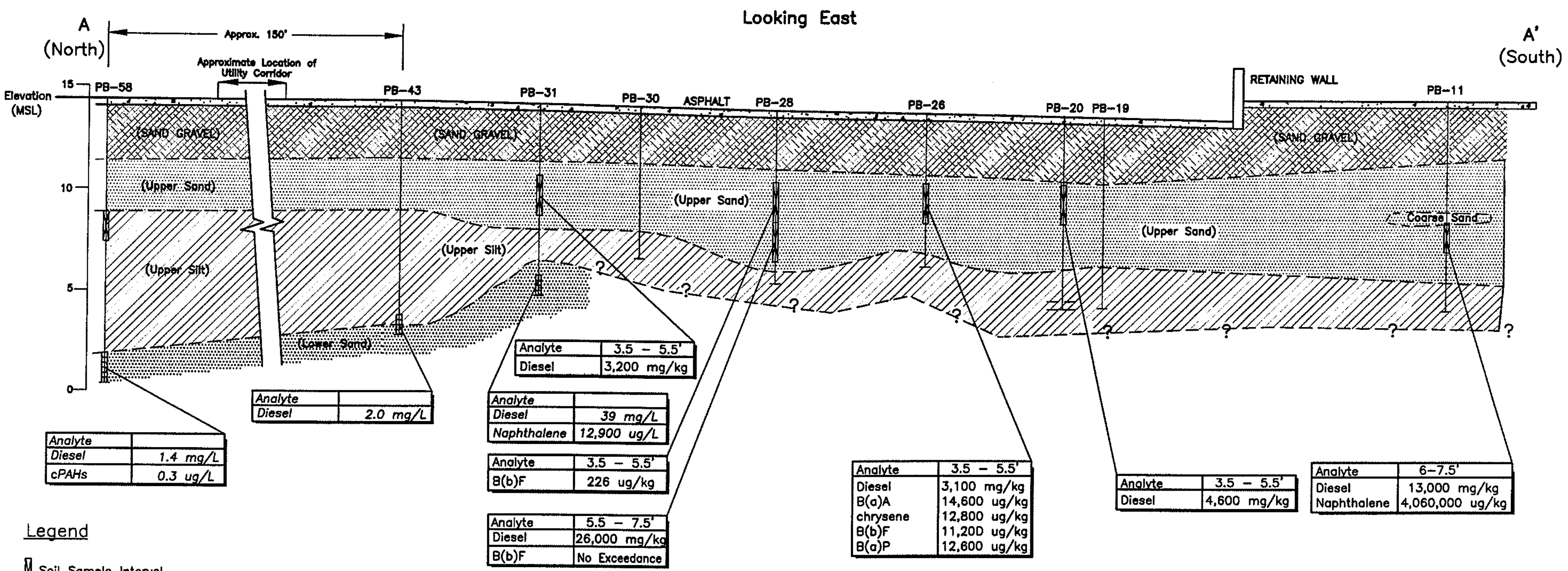
Previous Investigation Figures

(Offsite Investigation Report and Additional Action Feasibility Study)



International Paper Longview, WA	Project No. 54944006NA	Cross Sections in the Maintenance Facility Area	Figure 5 -1
URS			

99/IP Long 6/00



Analyte	
Diesel	1.4 mg/L
cPAHs	0.3 ug/L

Analyte	
Diesel	2.0 mg/L

Analyte	3.5 – 5.5'
Diesel	3,200 mg/kg

Analyte	
Diesel	39 mg/L
Naphthalene	12,900 ug/L

Analyte	3.5 – 5.5'
B(b)F	226 ug/kg

Analyte	5.5 – 7.5'
Diesel	26,000 mg/kg
B(b)F	No Exceedance

Analyte	3.5 – 5.5'
Diesel	3,100 mg/kg
B(a)A	14,600 ug/kg
chrysene	12,800 ug/kg
B(b)F	11,200 ug/kg
B(a)P	12,600 ug/kg

Analyte	3.5 – 5.5'
Diesel	4,600 mg/kg

Analyte	6–7.5'
Diesel	13,000 mg/kg
Naphthalene	4,060,000 ug/kg

Legend

▯ Soil Sample Interval

▯ *Groundwater sample*

Abbreviations

B(a)P	benzo(a)pyrene
B(a)A	benzo(a)anthracene
B(b)F	benzo(b)fluoranthene
B(k)F	benzo(k)fluoranthene
I(1,2,3-cd)P	indeno(1,2,3-cd)pyrene
D(a,h)A	dibenz(a,h)anthracene
PCP	pentachlorophenol

Units are µg/kg unless otherwise stated.

Exceedances of MTCA B criteria (or MTCA A for TPH) for offsite soils are shown

SCALE 0 5 FEET
Vertical Scale

SCALE 0 25 FEET
Horizontal Scale

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Longview, WA

Project No.
5409900003.10

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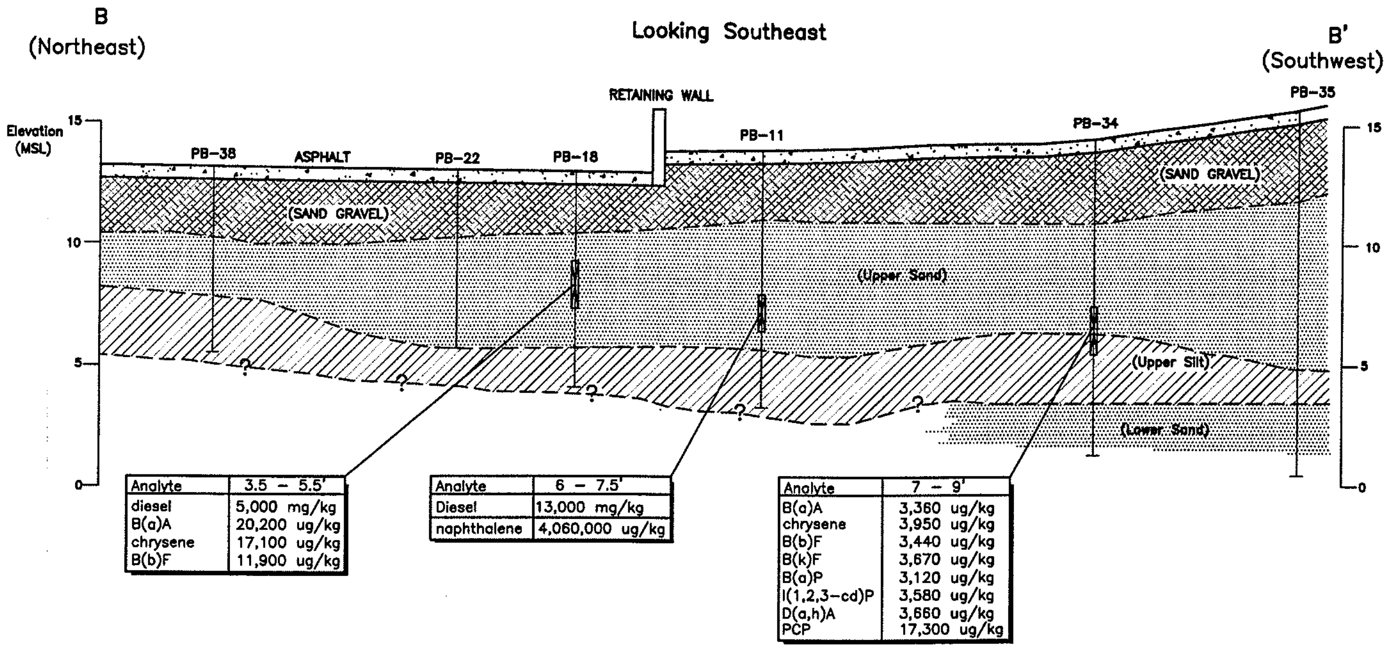
Additional Perimeter Boring Investigation
Cross Section A-A'

Figure
5-2



Analyte	3.5 – 5.5'
diesel	5,000 mg/kg
B(a)A	20,200 ug/kg
chrysene	17,100 ug/kg
B(b)F	11,900 ug/kg

Analyte	6 – 7.5'
Diesel	13,000 mg/kg
naphthalene	4,060,000 ug/kg

Analyte	7 – 9'
B(a)A	3,360 ug/kg
chrysene	3,950 ug/kg
B(b)F	3,440 ug/kg
B(k)F	3,670 ug/kg
B(a)P	3,120 ug/kg
I(1,2,3-cd)P	3,580 ug/kg
D(a,h)A	3,660 ug/kg
PCP	17,300 ug/kg

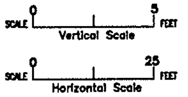
Legend

▯ Soil Sample Interval

Abbreviations

B(a)P	benzo(a)pyrene
B(a)A	benzo(a)anthracene
B(b)F	benzo(b)fluoranthene
B(k)F	benzo(k)fluoranthene
I(1,2,3-cd)P	indeno(1,2,3-cd)pyrene
D(a,h)A	dibenz(a,h)anthracene
PCP	pentachlorophenol

Exceedances of MTCA B criteria (or MTCA A for TPH) for offsite soils are shown



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Longview, WA

Project No.
5409900003.10

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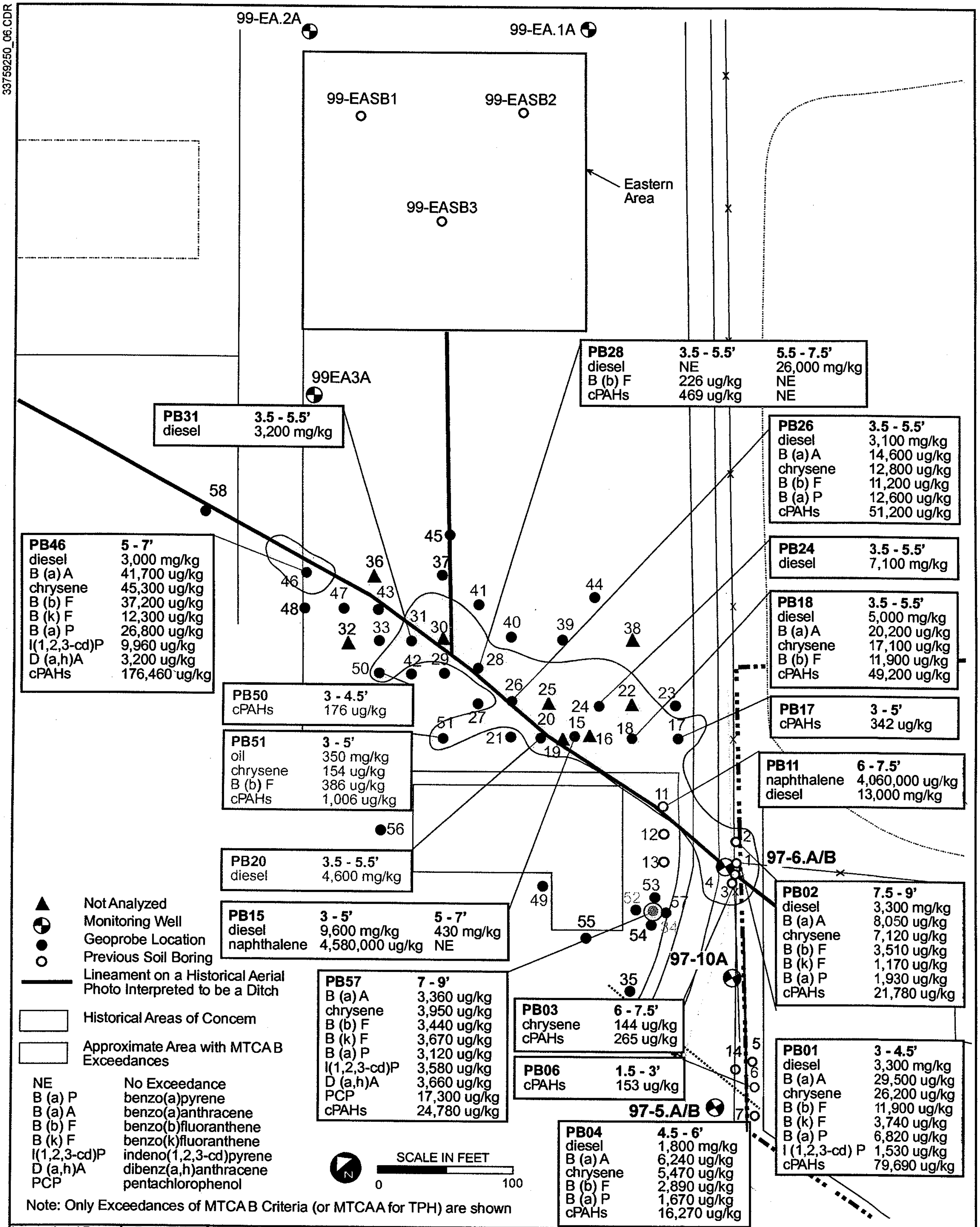
Additional Perimeter Boring Investigation
Cross Section B-B'
Showing Soil Sample Results

Figure
5-3

33759250_06.CDR



PB28	3.5 - 5.5'	5.5 - 7.5'
diesel	NE	26,000 mg/kg
B (b) F	226 ug/kg	NE
cPAHs	469 ug/kg	NE

PB31	3.5 - 5.5'
diesel	3,200 mg/kg

PB26	3.5 - 5.5'
diesel	3,100 mg/kg
B (a) A	14,600 ug/kg
chrysene	12,800 ug/kg
B (b) F	11,200 ug/kg
B (a) P	12,600 ug/kg
cPAHs	51,200 ug/kg

PB46	5 - 7'
diesel	3,000 mg/kg
B (a) A	41,700 ug/kg
chrysene	45,300 ug/kg
B (b) F	37,200 ug/kg
B (k) F	12,300 ug/kg
B (a) P	26,800 ug/kg
I(1,2,3-cd)P	9,960 ug/kg
D (a,h)A	3,200 ug/kg
cPAHs	176,460 ug/kg

PB24	3.5 - 5.5'
diesel	7,100 mg/kg

PB18	3.5 - 5.5'
diesel	5,000 mg/kg
B (a) A	20,200 ug/kg
chrysene	17,100 ug/kg
B (b) F	11,900 ug/kg
cPAHs	49,200 ug/kg

PB50	3 - 4.5'
cPAHs	176 ug/kg

PB17	3 - 5'
cPAHs	342 ug/kg

PB51	3 - 5'
oil	350 mg/kg
chrysene	154 ug/kg
B (b) F	386 ug/kg
cPAHs	1,006 ug/kg

PB11	6 - 7.5'
naphthalene	4,060,000 ug/kg
diesel	13,000 mg/kg

PB20	3.5 - 5.5'
diesel	4,600 mg/kg

PB02	7.5 - 9'
diesel	3,300 mg/kg
B (a) A	8,050 ug/kg
chrysene	7,120 ug/kg
B (b) F	3,510 ug/kg
B (k) F	1,170 ug/kg
B (a) P	1,930 ug/kg
cPAHs	21,780 ug/kg

PB15	3 - 5'	5 - 7'
diesel	9,600 mg/kg	430 mg/kg
naphthalene	4,580,000 ug/kg	NE

PB57	7 - 9'
B (a) A	3,360 ug/kg
chrysene	3,950 ug/kg
B (b) F	3,440 ug/kg
B (k) F	3,670 ug/kg
B (a) P	3,120 ug/kg
I(1,2,3-cd)P	3,580 ug/kg
D (a,h)A	3,660 ug/kg
PCP	17,300 ug/kg
cPAHs	24,780 ug/kg

PB03	6 - 7.5'
chrysene	144 ug/kg
cPAHs	265 ug/kg

PB06	1.5 - 3'
cPAHs	153 ug/kg

PB01	3 - 4.5'
diesel	3,300 mg/kg
B (a) A	29,500 ug/kg
chrysene	26,200 ug/kg
B (b) F	11,900 ug/kg
B (k) F	3,740 ug/kg
B (a) P	6,820 ug/kg
I (1,2,3-cd) P	1,530 ug/kg
cPAHs	79,690 ug/kg

PB04	4.5 - 6'
diesel	1,800 mg/kg
B (a) A	6,240 ug/kg
chrysene	5,470 ug/kg
B (b) F	2,890 ug/kg
B (a) P	1,670 ug/kg
cPAHs	16,270 ug/kg

▲ Not Analyzed
⊕ Monitoring Well
● Geoprobe Location
○ Previous Soil Boring
━ Lineament on a Historical Aerial Photo Interpreted to be a Ditch
☐ Historical Areas of Concern
☐ Approximate Area with MTCA B Exceedances

NE	No Exceedance
B (a) P	benzo(a)pyrene
B (a) A	benzo(a)anthracene
B (b) F	benzo(b)fluoranthene
B (k) F	benzo(k)fluoranthene
I(1,2,3-cd)P	indeno(1,2,3-cd)pyrene
D (a,h)A	dibenz(a,h)anthracene
PCP	pentachlorophenol

Note: Only Exceedances of MTCA B Criteria (or MTCA A for TPH) are shown

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Longview, WA

Project No.
54944006NA

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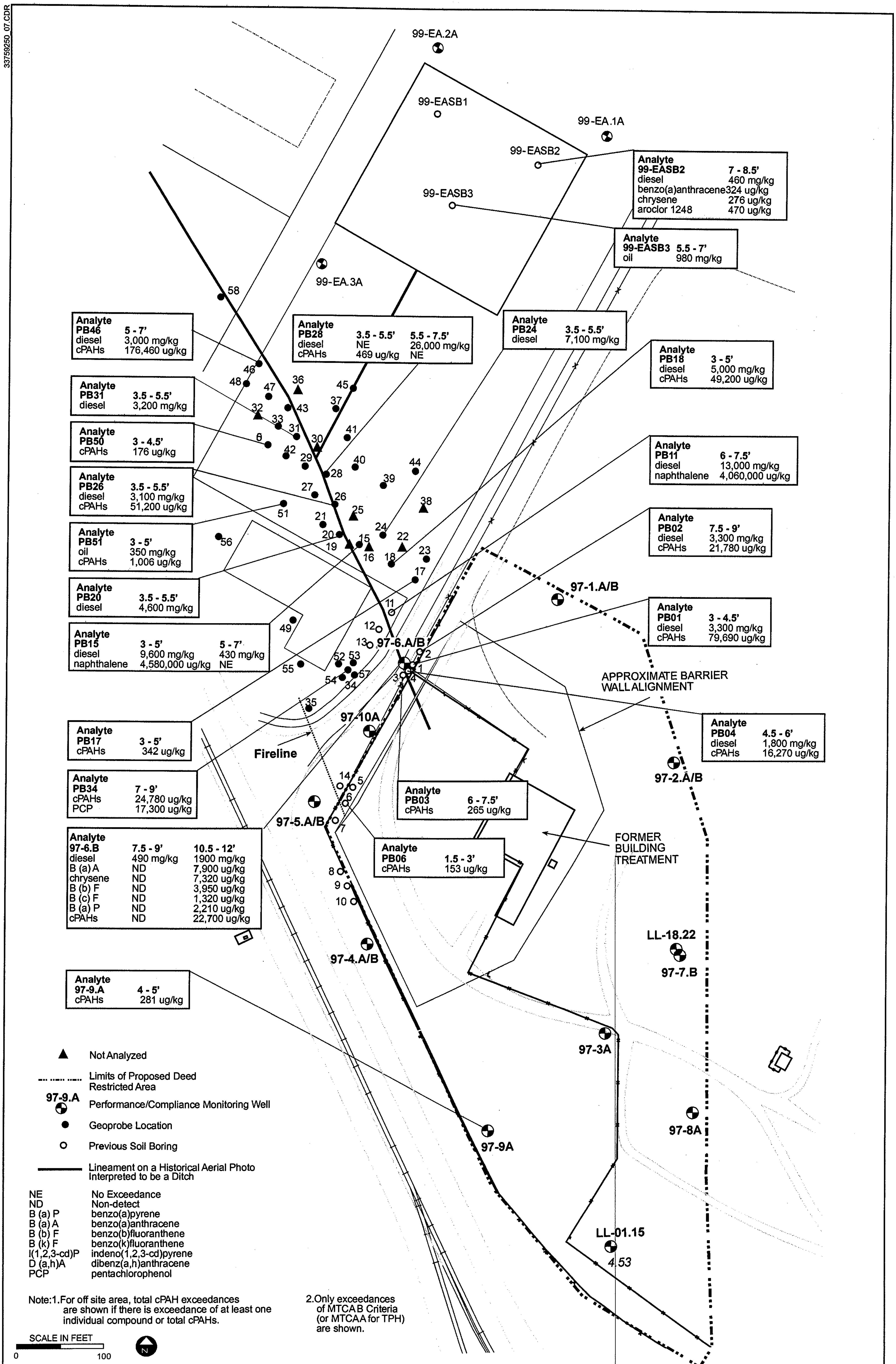
Maintenance Facility Area
Soil Analytical Results

Figure
6-1



▲ Not Analyzed

-.. .... Limits of Proposed Deed Restricted Area

97-9.A Performance/Compliance Monitoring Well

● Geoprobe Location

○ Previous Soil Boring

—— Lineament on a Historical Aerial Photo Interpreted to be a Ditch

NE	No Exceedance
ND	Non-detect
B (a) P	benzo(a)pyrene
B (a) A	benzo(a)anthracene
B (b) F	benzo(b)fluoranthene
B (k) F	benzo(k)fluoranthene
I(1,2,3-cd)P	indeno(1,2,3-cd)pyrene
D (a,h)A	dibenz(a,h)anthracene
PCP	pentachlorophenol

Note:1.For off site area, total cPAH exceedances are shown if there is exceedance of at least one individual compound or total cPAHs.

2.Only exceedances of MTCA B Criteria (or MTCA A for TPH) are shown.

International Paper
Longview, WA

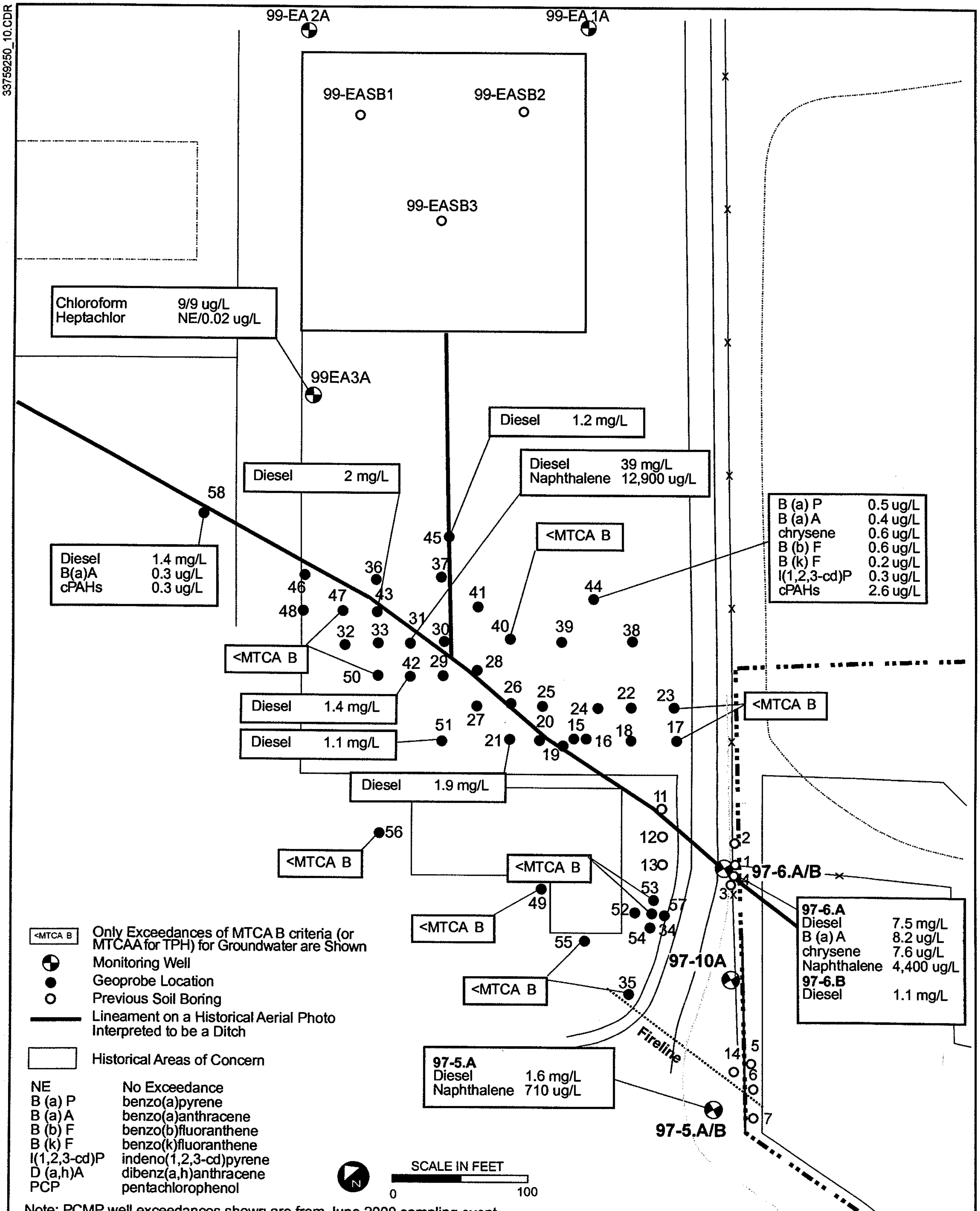
Project No.
54944006NA

URS

Study Area
Soil Analytical Results

Figure
6-2

33759250_10.CDR



Note: PCMP well exceedances shown are from June 2000 sampling event.

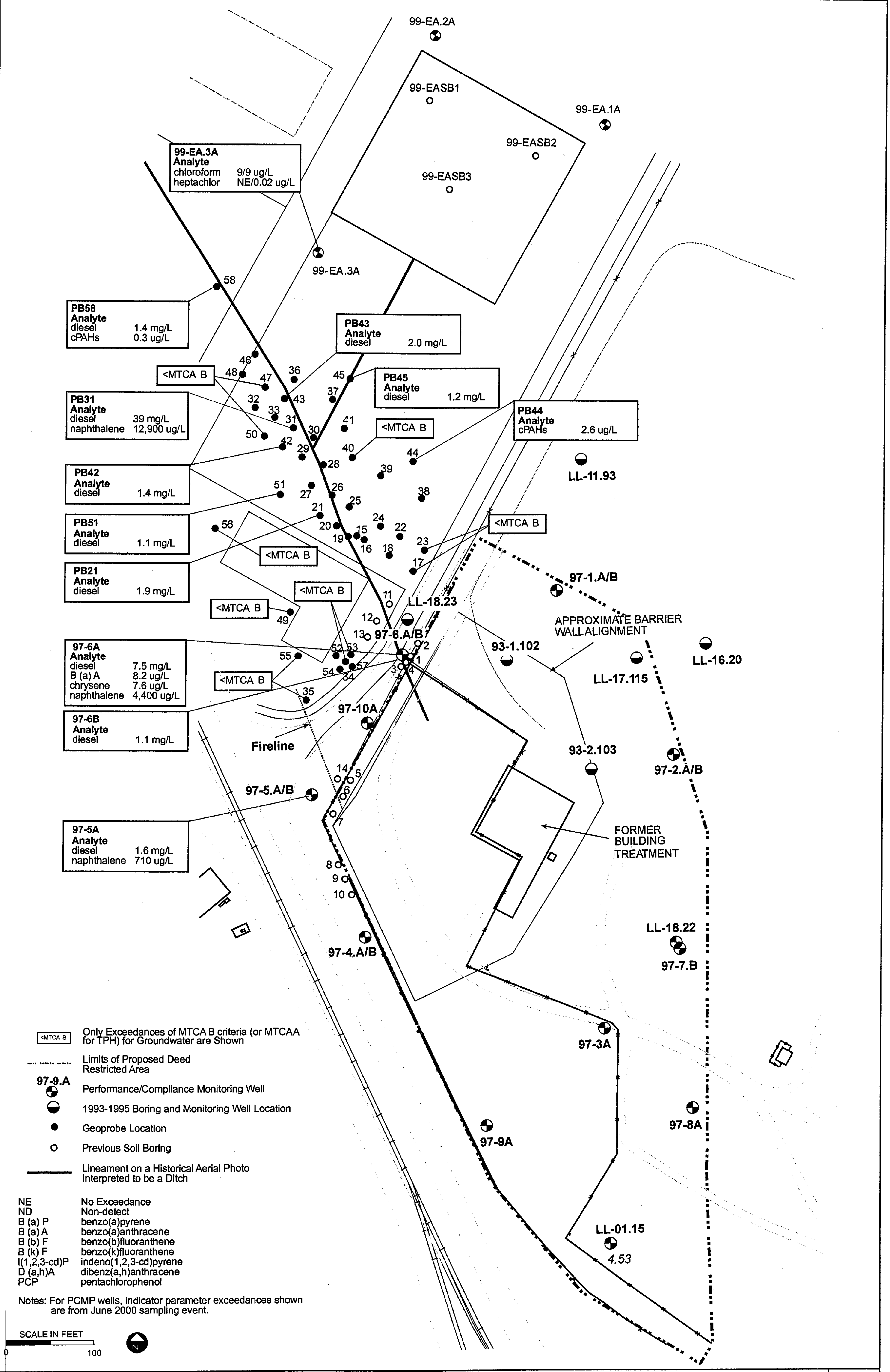
International Paper
Longview, WA

Project No.
54944006NA

URS

Maintenance Facility Area
Groundwater Analytical Results

Figure
6-3



33759250_08.CDR

International Paper
Longview, WA

Project No.
54944006NA

URS

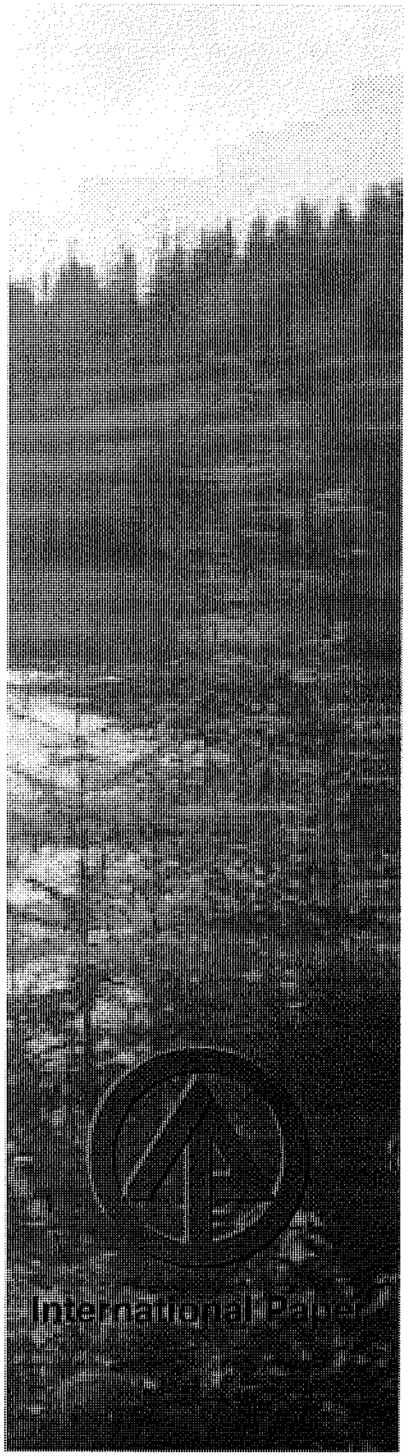
Study Area
Groundwater Analytical Results

Figure 6-4

Appendix C

Previous Investigation Figures

(ORC Injection Results)



GROUNDWATER RESULTS FROM ORC SYSTEM

Location ID:	MTCA	MW-ORC-IA								
Date Sampled:	**A or B[a]**	**28-Feb-00**	**13-Mar-00**	**27-Mar-00**	**10-Apr-00**	**24-Apr-00**	**8-May-00**	**22-May-00**	**6/5/2000[b]**	**19-Jun-00**
Field Measurements										
dissolved oxygen	--	9.49	NM	9.98	11.59	2.62*	3.54*	11.79	13.07	10.94
TPH (mg/L)										
diesel range	1	2	**7.3**	**6.9**	**7.7**	**7.0**	**2.9**	**7.4**	**6.3**	**2**
oil range	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatiles (µg/L)										
naphthalene	320	**1,440**	**1,750**	**1,220**	**2,180**	262	**1,350**	**1,480**	**1,400**	**1,780**
acenaphthylene	--	1.2	1.1	1.2	1.2	1.3	1.4	0.9	0.6	1.7
acenaphthene	960	135	156	160	155	166	163	120	150	150
fluorene	640	54.1	58.2	64.9	63.6	65.0	57.7	44.8	58	58.5
phenanthrene	--	39.7	31.3	31.9	26.6	30.0	27.0	29.6	29	35.5
anthracene	4,800	4.9	3.5	3.3	2.9	3.4	2.9	2.9	3.1	3.2
fluoranthene	640	3.8	2.6	3.0	2.7	1.4	2.0	3.2	2.5	2.4
pyrene	480	2.9	1.4	2.2	1.5	0.9	1.3	1.8	1.4	1.5
benz(a)anthracene	0.012	**0.7**	**0.2**	**0.6**	**0.3**	**0.1**	**0.3**	**1**	**0.3**	**0.2**
chrysene	0.012	**0.6**	**0.1**	**0.6**	**0.3**	0.1 U	**0.3**	**0.9**	**0.3**	**0.2**
benzo(b)fluoranthene	0.012	**0.7**	0.1 U	**0.6**	**0.2**	0.1 U	**0.3**	**1.3**	**0.4**	**0.3**
benzo(k)fluoranthene	0.012	**0.2**	0.1 U	**0.2**	0.1 U	0.1 U	0.1 U	**0.6**	--	0.1 U
benzo(a)pyrene	0.012	**0.6**	0.1 U	**0.5**	**0.2**	0.1 U	**0.3**	**1.3**	**0.3**	**0.2**
indeno(1,2,3-cd)pyrene	0.012	**0.4**	0.1 U	**0.3**	0.1 U	0.1 U	**0.1**	**0.7**	**0.1**	**0.1**
dibenz(a,h)anthracene	0.012	**0.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.2**	0.1 U	0.1 U
benzo(g,h,i)perylene	--	0.4	0.1 U	0.3	0.1 U	0.1 U	**0.2**	0.8	0.2	0.2
pentachlorophenol	0.729	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total PAHs	--	1,685.30	2,004.40	1,489.60	2,435.30	530.10	1,606.80	1,690.00	1,646.20	2,034.00
Total carcinogenic PAHs	0.012	3.30	0.30	2.80	1.00	0.10	1.50	6.00	1.40	1.00

Notes:

bold and **underlined** results are greater than MTCA B.

U = below the stated laboratory reporting limit

Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.

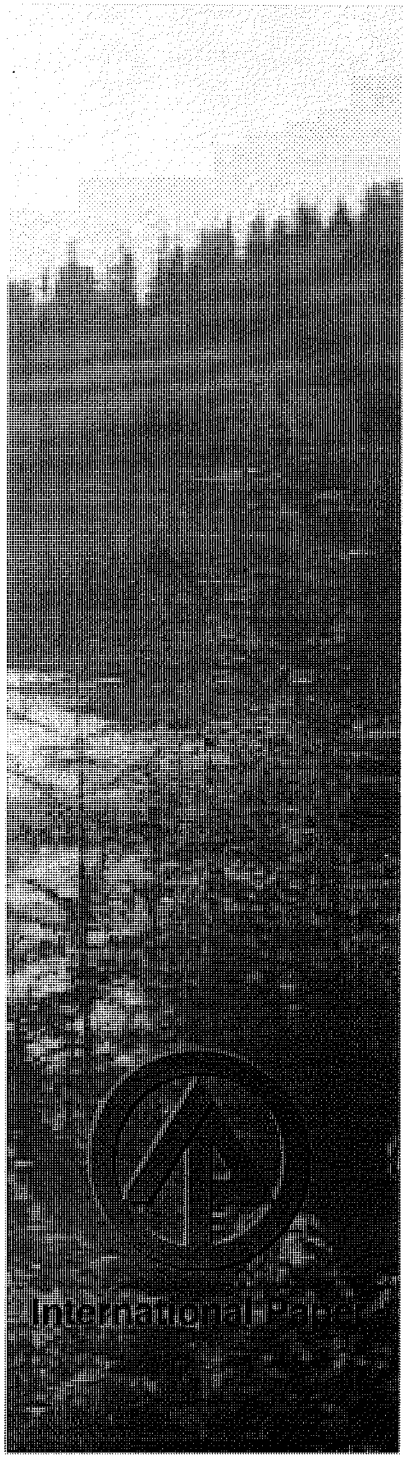
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method B value of 0.012.

a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

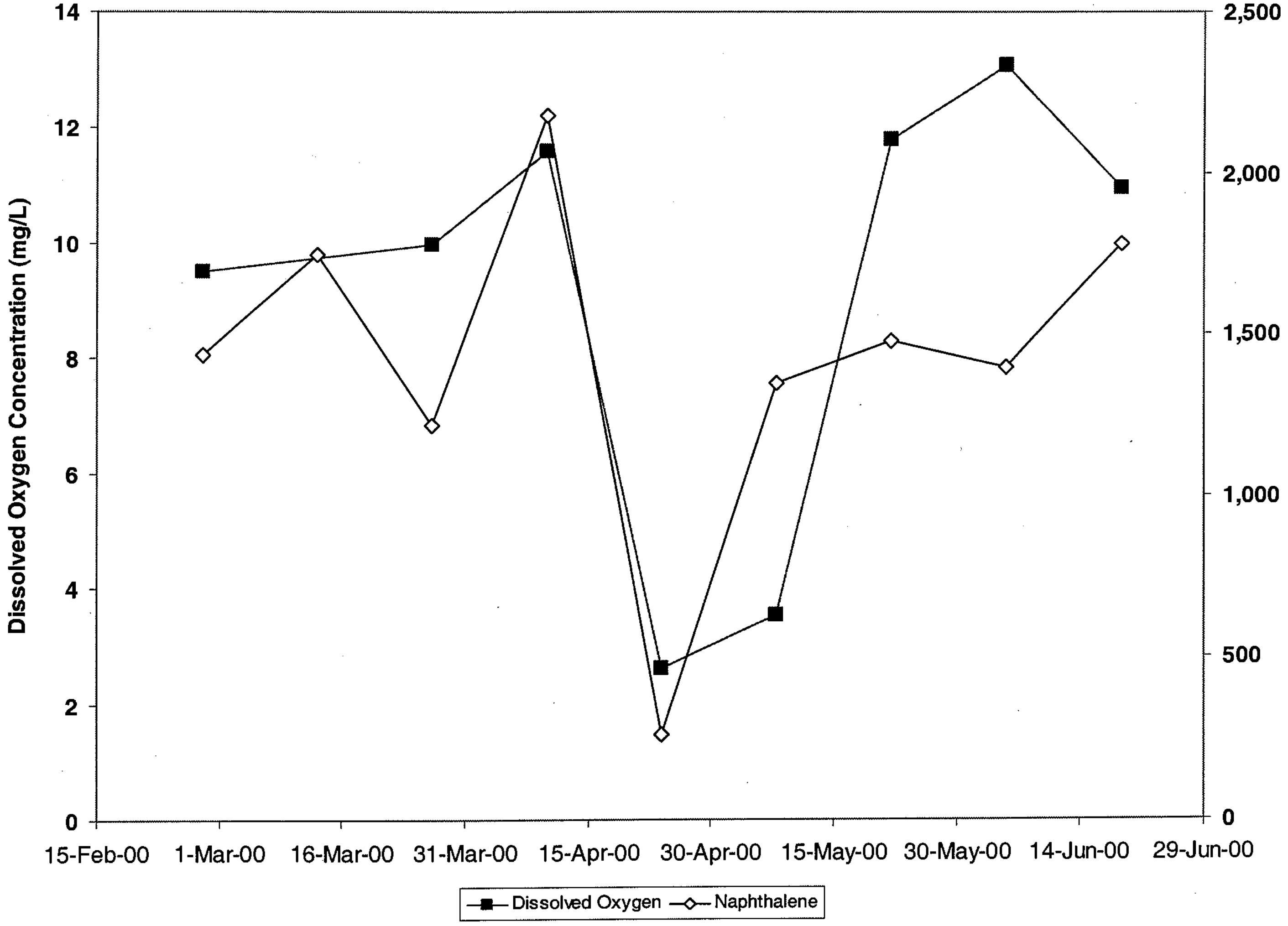
b: Benzo(b)fluoranthene value is for benzofluoranthenes (total of benzo(b) and benzo(a) fluoranthene).

* - different DO meter YSI Meter

NM - Not measured



PLOT OF ORC RESULTS



Appendix D

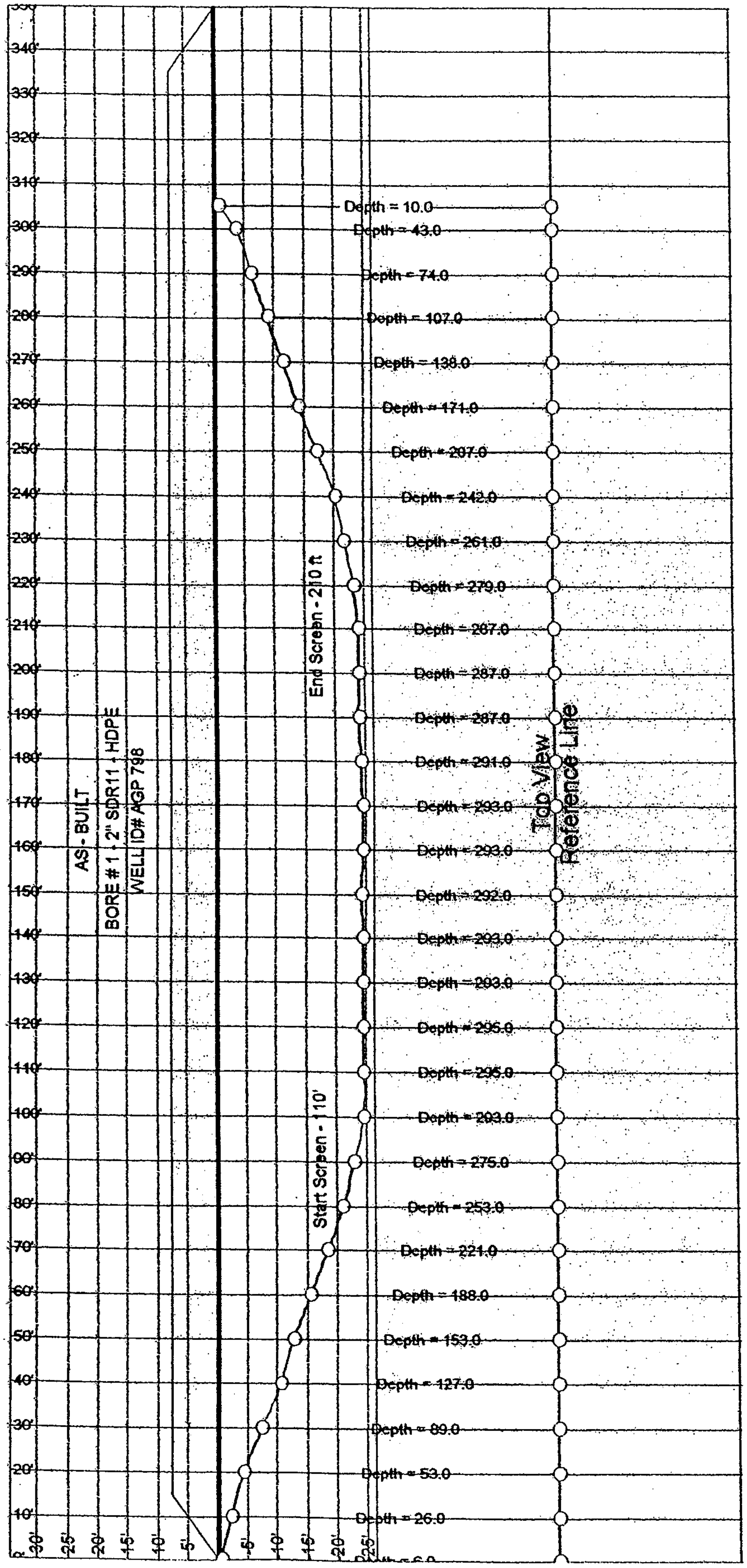
Biosparging/Bioventing System Design

AS-11

ATLAS BORE PLANNER™ V2.1

Do not use or rely upon this ATLAS Bore Planner for avoidance of underground utilities.

Vermeer



Do not use or rely upon this ATLAS Bore Planner for avoidance of underground utilities.

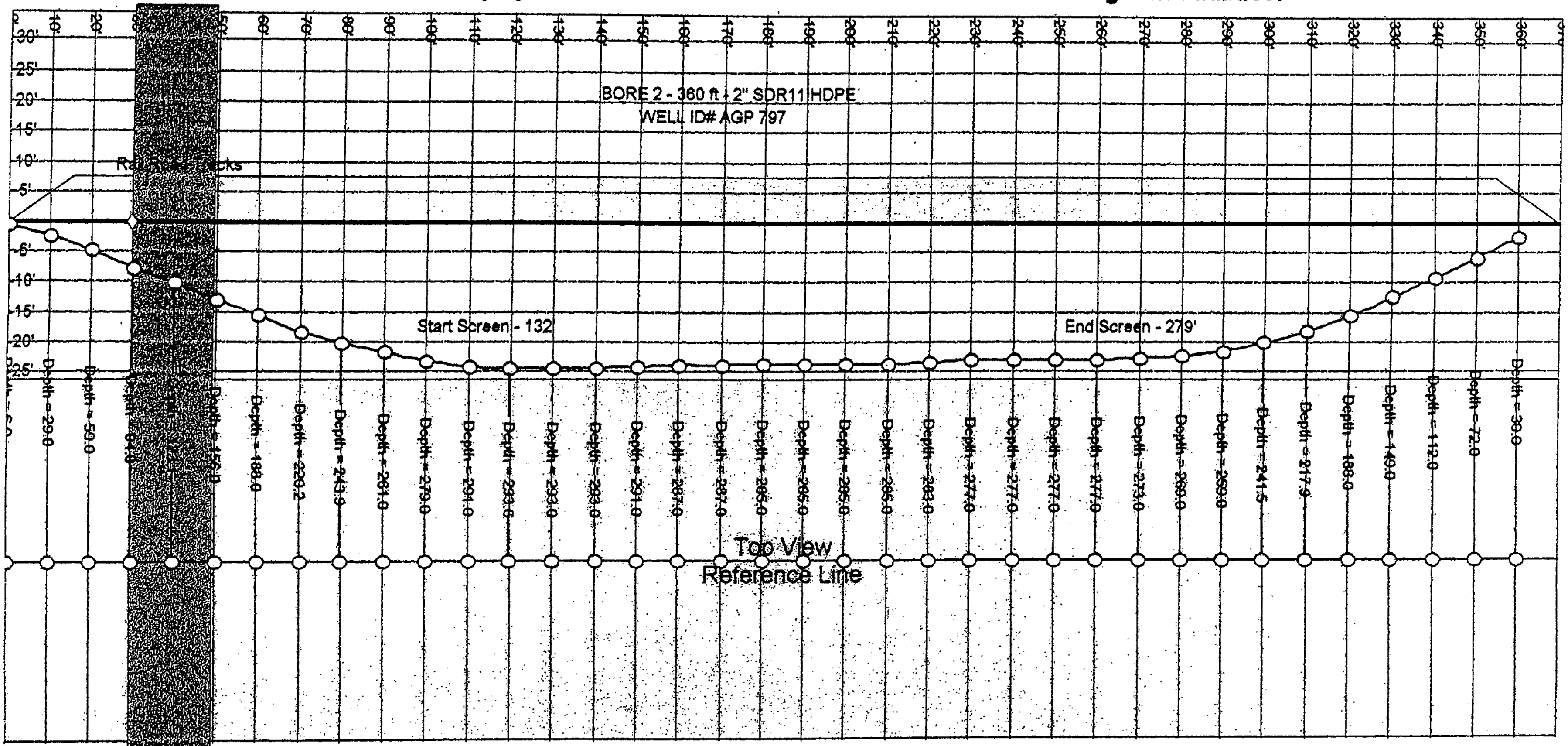
Targets

Distance '	Depth "	Left/Right '	Pitch % Slope	Azimuth % Slope
0.00	6.0	0.00	[-16.7]	[0.0]
10.00	26.0	0.00	[-19.6]	[0.0] [107.84]
20.00	53.0	0.00	[-26.2]	[0.0] [107.84]
30.00	89.0	0.00	[-30.8]	[0.0] [107.84]
40.00	127.0	0.00	[-26.5]	[0.0] [107.84]
50.00	153.0	0.00	[-25.3]	[0.0] [107.84]
60.00	188.0	0.00	[-28.3]	[0.0] [107.84]
70.00	221.0	0.00	[-27.1]	[0.0] [107.84]
80.00	253.0	0.00	[-22.4]	[0.0] [107.84]
90.00	275.0	0.00	[-16.7]	[0.0] [107.84]
100.00	293.0	0.00	[-8.3]	[0.0] [107.84]
110.00	295.0	0.00	[-0.8]	[0.0] [107.84]
120.00	295.0	0.00	[0.8]	[0.0] [107.84]
130.00	293.0	0.00	[0.8]	[0.0] [107.84]
140.00	293.0	0.00	[0.4]	[0.0] [107.84]
150.00	292.0	0.00	[0.0]	[0.0] [107.84]
160.00	293.0	0.00	[-0.4]	[0.0] [107.84]
170.00	293.0	0.00	[0.8]	[0.0] [107.84]
180.00	291.0	0.00	[2.5]	[0.0] [107.84]
190.00	287.0	0.00	[1.7]	[0.0] [107.84]
200.00	287.0	0.00	[0.0]	[0.0] [107.84]
210.00	287.0	0.00	[3.3]	[0.0] [107.84]
220.00	279.0	0.00	[10.8]	[0.0] [107.84]
230.00	261.0	0.00	[15.4]	[0.0] [107.84]
240.00	242.0	0.00	[22.3]	[0.0] [107.84]
250.00	207.0	0.00	[29.6]	[0.0] [107.84]
260.00	171.0	0.00	[28.7]	[0.0] [107.84]
270.00	138.0	0.00	[26.7]	[0.0] [107.84]
280.00	107.0	0.00	[26.7]	[0.0] [107.84]
290.00	74.0	0.00	[26.7]	[0.0] [107.84]
300.00	43.0	0.00	[43.9]	[0.0] [107.84]
305.00	10.0	0.00	[67.2]	[0.0] [107.84]

Vermeer

ATLAS BORE PLANNER™ V2.1

Do not use or rely upon this ATLAS Bore Planner for avoidance of underground utilities.


[redacted]

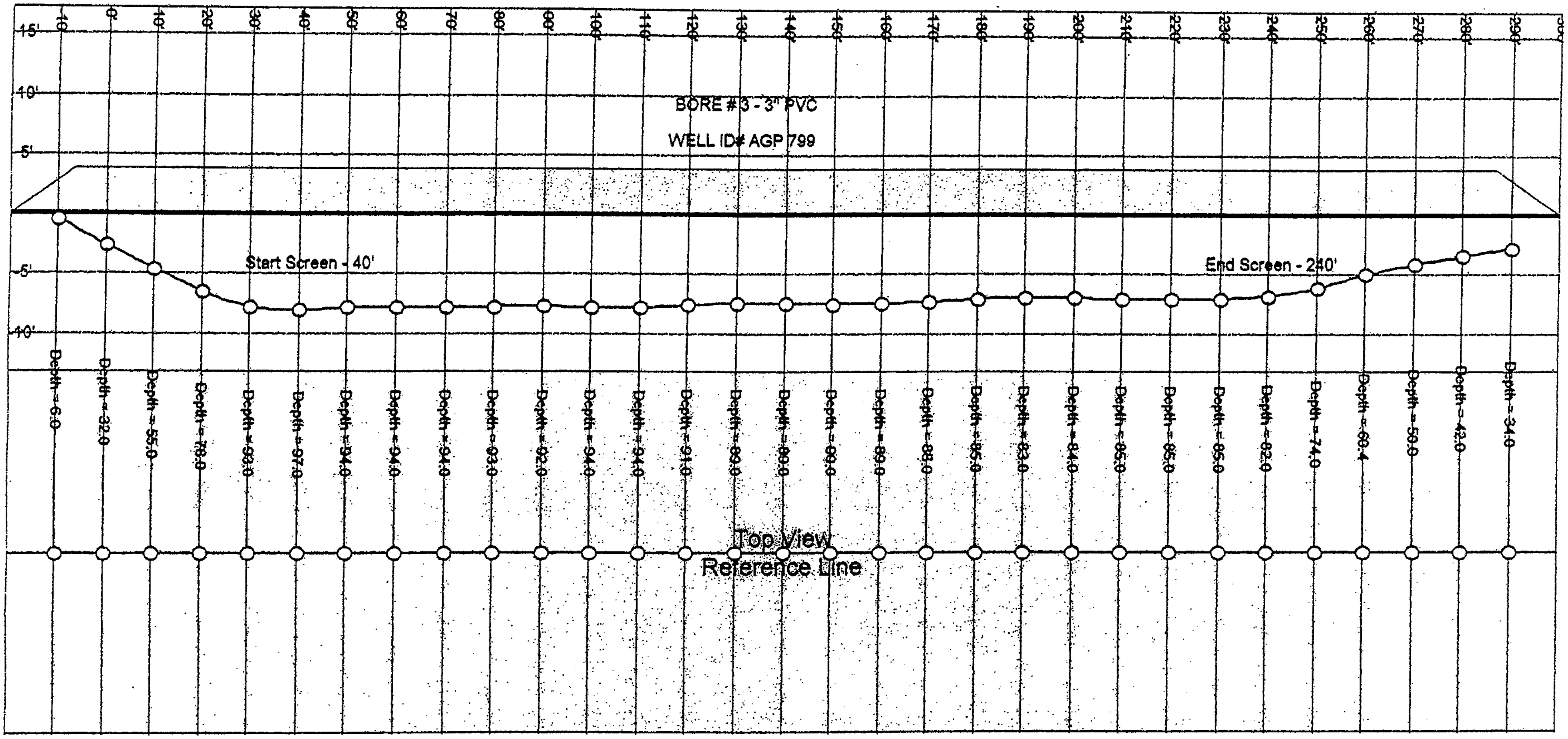
Targets

Distance '	Depth "	Left/Right '	Pitch % Slope	Azimuth % Slope	
0.00	6.0	0.00	[-19.2]	[0.0]	
10.00	29.0	0.00	[-22.0]	[0.0]	[107.84]
20.00	59.0	0.00	[-27.1]	[0.0]	[107.84]
30.00	94.0	0.00	[-27.2]	[0.0]	[107.84]
39.56	123.1	0.00	[-25.8]	[0.0]	[107.84]
50.00	156.0	0.00	[-26.5]	[0.0]	[107.84]
60.00	188.0	0.00	[-26.8]	[0.0]	[107.84]
69.97	220.2	0.00	[-23.4]	[0.0]	[107.84]
79.86	243.9	0.00	[-17.0]	[0.0]	[107.84]
90.00	261.0	0.00	[-14.5]	[0.0]	[107.84]
100.00	279.0	0.00	[-12.5]	[0.0]	[107.84]
110.00	291.0	0.00	[-6.1]	[0.0]	[107.84]
119.79	293.6	0.00	[-0.9]	[0.0]	[107.84]
130.00	293.0	0.00	[0.3]	[0.0]	[107.84]
140.00	293.0	0.00	[0.8]	[0.0]	[107.84]
150.00	291.0	0.00	[2.5]	[0.0]	[107.84]
160.00	287.0	0.00	[1.7]	[0.0]	[107.84]
170.00	287.0	0.00	[0.8]	[0.0]	[107.84]
180.00	285.0	0.00	[0.8]	[0.0]	[107.84]
190.00	285.0	0.00	[0.0]	[0.0]	[107.84]
200.00	285.0	0.00	[0.0]	[0.0]	[107.84]
210.00	285.0	0.00	[0.8]	[0.0]	[107.84]
220.00	283.0	0.00	[3.3]	[0.0]	[107.84]
230.00	277.0	0.00	[2.5]	[0.0]	[107.84]
240.00	277.0	0.00	[0.0]	[0.0]	[107.84]
250.00	277.0	0.00	[0.0]	[0.0]	[107.84]
260.00	277.0	0.00	[1.7]	[0.0]	[107.84]
270.00	273.0	0.00	[3.3]	[0.0]	[107.84]
280.00	269.0	0.00	[5.8]	[0.0]	[107.84]
290.00	259.0	0.00	[11.7]	[0.0]	[107.84]
299.66	241.5	0.00	[17.1]	[0.0]	[107.84]
309.92	217.9	0.00	[22.0]	[0.0]	[107.84]
320.00	188.0	0.00	[28.5]	[0.0]	[107.8
330.00	149.0	0.00	[31.7]	[0.0]	[1
340.00	112.0	0.00	[32.1]	[0.0]	
350.00	72.0	0.00	[34.2]	[0.0]	
360.00	30.0	0.00	[35.0]	[0.0]	

Vermeer

ATLAS BORE PLANNER™ V2.1

Do not use or rely upon this ATLAS Bore Planner for avoidance of underground utilities.



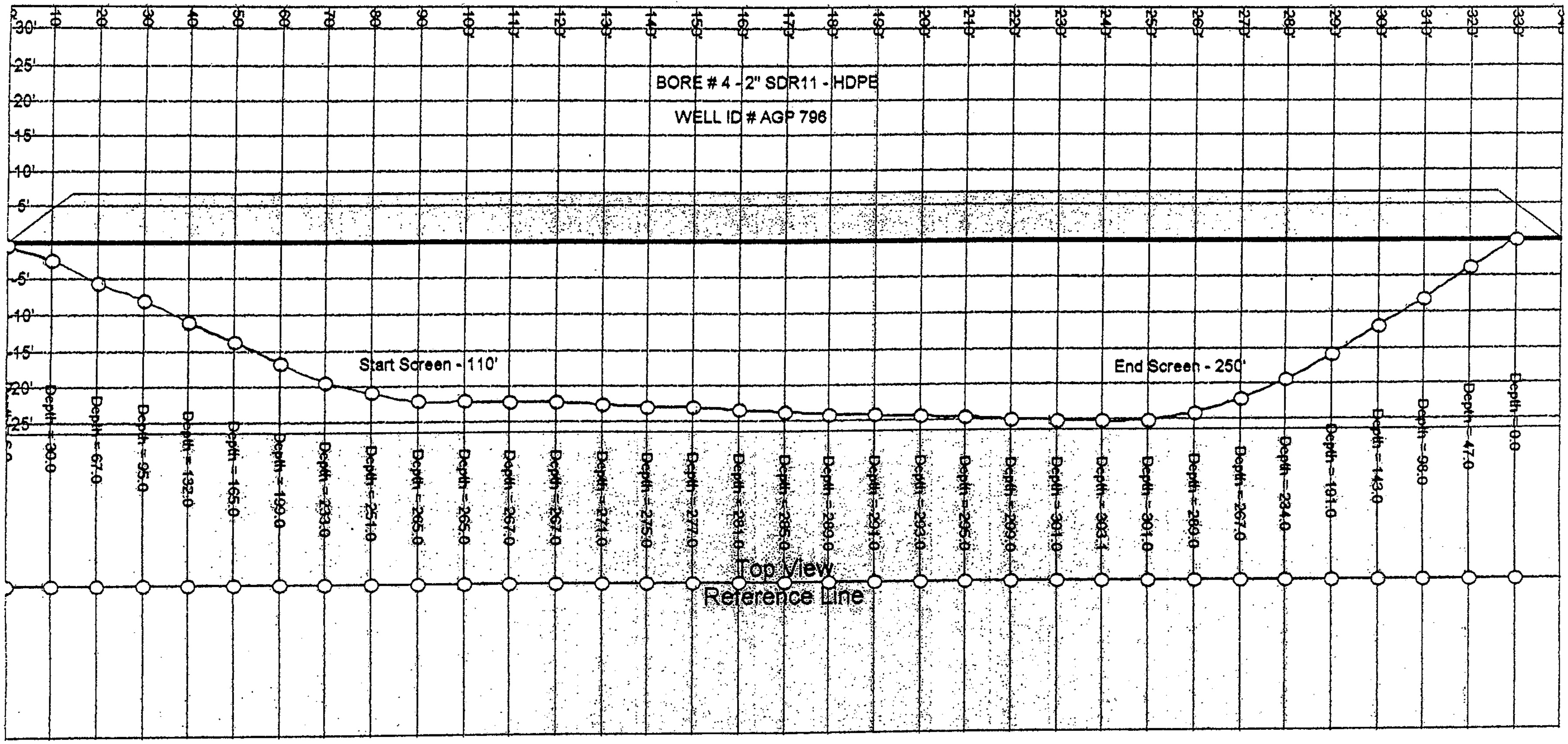
Targets

Distance '	Depth "	Left/Right '	Pitch % Slope	Azimuth % Slope	
0.00	6.0	0.00	[-21.7]	[0.0]	
9.96	32.0	0.00	[-20.4]	[0.0]	[107.84]
20.00	55.0	0.00	[-19.1]	[0.0]	[107.84]
30.00	78.0	0.00	[-15.8]	[0.0]	[107.84]
40.00	93.0	0.00	[-7.9]	[0.0]	[107.84]
50.00	97.0	0.00	[-0.4]	[0.0]	[107.84]
60.00	94.0	0.00	[1.2]	[0.0]	[107.84]
70.00	94.0	0.00	[0.0]	[0.0]	[107.84]
80.00	94.0	0.00	[0.4]	[0.0]	[107.84]
90.00	93.0	0.00	[0.8]	[0.0]	[107.84]
100.00	92.0	0.00	[-0.4]	[0.0]	[107.84]
110.00	94.0	0.00	[-0.8]	[0.0]	[107.84]
120.00	94.0	0.00	[1.2]	[0.0]	[107.84]
130.00	91.0	0.00	[2.1]	[0.0]	[107.84]
140.00	89.0	0.00	[0.8]	[0.0]	[107.84]
150.00	89.0	0.00	[-0.4]	[0.0]	[107.84]
160.00	90.0	0.00	[0.0]	[0.0]	[107.84]
170.00	89.0	0.00	[0.8]	[0.0]	[107.84]
180.00	88.0	0.00	[1.7]	[0.0]	[107.84]
190.00	85.0	0.00	[2.1]	[0.0]	[107.84]
200.00	83.0	0.00	[0.4]	[0.0]	[107.84]
210.00	84.0	0.00	[-0.8]	[0.0]	[107.84]
220.00	85.0	0.00	[-0.4]	[0.0]	[107.84]
230.00	85.0	0.00	[0.0]	[0.0]	[107.84]
240.00	85.0	0.00	[1.2]	[0.0]	[107.84]
250.00	82.0	0.00	[4.6]	[0.0]	[107.84]
260.00	74.0	0.00	[9.2]	[0.0]	[107.84]
269.76	60.4	0.00	[10.1]	[0.0]	[107.84]
280.00	50.0	0.00	[7.5]	[0.0]	[107.84]
290.00	42.0	0.00	[6.7]	[0.0]	[107.84]
300.00	34.0	0.00	[6.7]	[0.0]	[107.84]

Vermeer

ATLAS BORE PLANNER™ V2.1

Do not use or rely upon this ATLAS Bore Planner for avoidance of underground utilities.



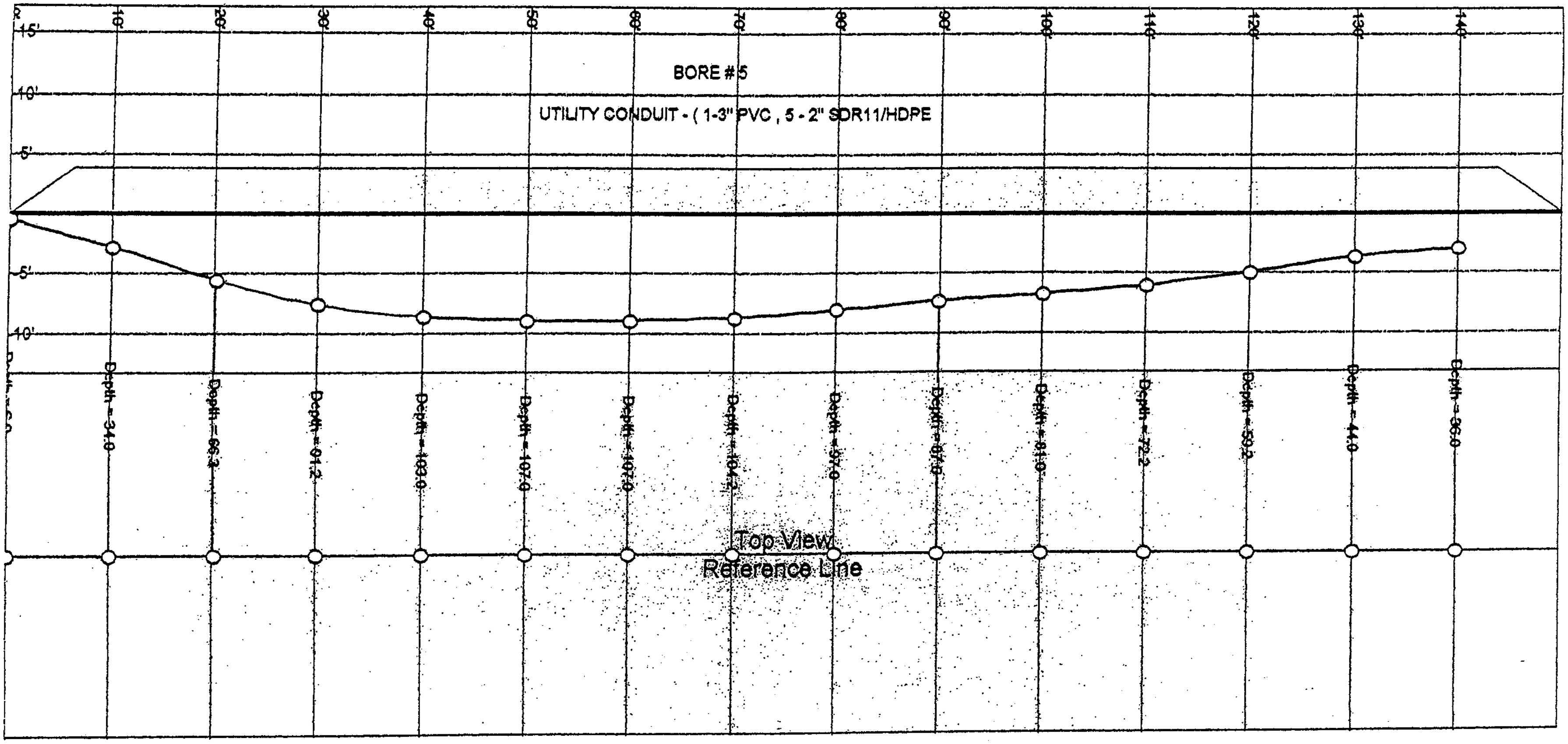
Targets

Distance '	Depth "	Left/Right '	Pitch % Slope	Azimuth % Slope
0.00	6.0	0.00	[-20.0]	[0.0]
10.00	30.0	0.00	[-25.3]	[0.0] [107.84]
20.00	67.0	0.00	[-27.0]	[0.0] [107.84]
30.00	95.0	0.00	[-27.0]	[0.0] [107.84]
40.00	132.0	0.00	[-29.2]	[0.0] [107.84]
50.00	165.0	0.00	[-27.9]	[0.0] [107.84]
60.00	199.0	0.00	[-28.3]	[0.0] [107.84]
70.00	233.0	0.00	[-21.5]	[0.0] [107.84]
80.00	251.0	0.00	[-13.3]	[0.0] [107.84]
90.00	265.0	0.00	[-5.8]	[0.0] [107.84]
100.00	265.0	0.00	[-0.8]	[0.0] [107.84]
110.00	267.0	0.00	[-0.8]	[0.0] [107.84]
120.00	267.0	0.00	[-1.7]	[0.0] [107.84]
130.00	271.0	0.00	[-3.3]	[0.0] [107.84]
140.00	275.0	0.00	[-2.5]	[0.0] [107.84]
150.00	277.0	0.00	[-2.5]	[0.0] [107.84]
160.00	281.0	0.00	[-3.3]	[0.0] [107.84]
170.00	285.0	0.00	[-3.3]	[0.0] [107.84]
180.00	289.0	0.00	[-2.5]	[0.0] [107.84]
190.00	291.0	0.00	[-1.7]	[0.0] [107.84]
200.00	293.0	0.00	[-1.7]	[0.0] [107.84]
210.00	295.0	0.00	[-2.5]	[0.0] [107.84]
220.00	299.0	0.00	[-2.5]	[0.0] [107.84]
230.00	301.0	0.00	[-1.7]	[0.0] [107.84]
240.00	303.1	0.00	[0.0]	[0.0] [107.84]
250.00	301.0	0.00	[5.9]	[0.0] [107.84]
260.00	289.0	0.00	[14.1]	[0.0] [107.84]
270.00	267.0	0.00	[22.8]	[0.0] [107.84]
280.00	234.0	0.00	[31.6]	[0.0] [107.84]
290.00	191.0	0.00	[37.9]	[0.0] [107.84]
300.00	143.0	0.00	[38.7]	[0.0] [107.84]
310.00	98.0	0.00	[40.0]	[0.0] [107.84]
320.00	47.0	0.00	[40.8]	[0.0] [107.8
330.00	0.0	0.00	[39.0]	[0.0] [1

Vermeer

ATLAS BORE PLANNER™ V2.1

Do not use or rely upon this ATLAS Bore Planner for avoidance of underground utilities.



Road Boring

Targets

Distance '	Depth "	Left/Right '	Pitch % Slope	Azimuth % Slope	
0.00	6.0	0.00	[-23.3]	[0.0]	
10.00	34.0	0.00	[-25.0]	[0.0]	[107.84]
20.05	66.3	0.00	[-23.8]	[0.0]	[107.84]
30.00	91.2	0.00	[-15.3]	[0.0]	[107.84]
40.00	103.0	0.00	[-6.6]	[0.0]	[107.84]
50.00	107.0	0.00	[-1.7]	[0.0]	[107.84]
60.00	107.0	0.00	[1.2]	[0.0]	[107.84]
70.00	104.2	0.00	[4.2]	[0.0]	[107.84]
80.00	97.0	0.00	[6.9]	[0.0]	[107.84]
90.00	87.6	0.00	[6.7]	[0.0]	[107.84]
100.00	81.0	0.00	[6.4]	[0.0]	[107.84]
110.00	72.2	0.00	[9.1]	[0.0]	[107.84]
120.00	59.2	0.00	[11.7]	[0.0]	[107.84]
130.00	44.0	0.00	[9.6]	[0.0]	[107.84]
140.00	36.0	0.00	[5.9]	[0.0]	[107.84]

Appendix E

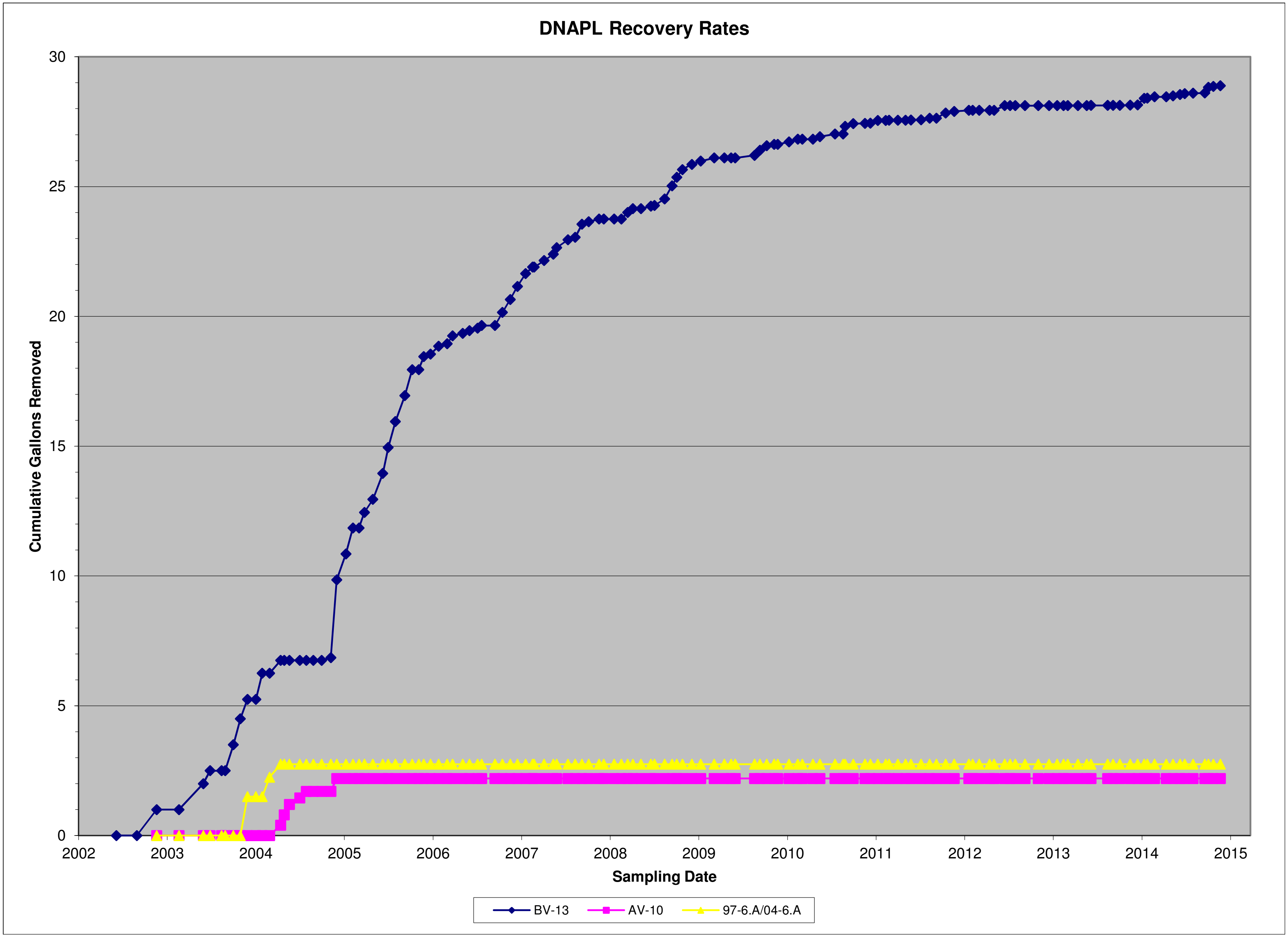
MFA Biosparging/Bioventing Performance Monitoring Data

APPENDIX E
TABLE OF CONTENTS

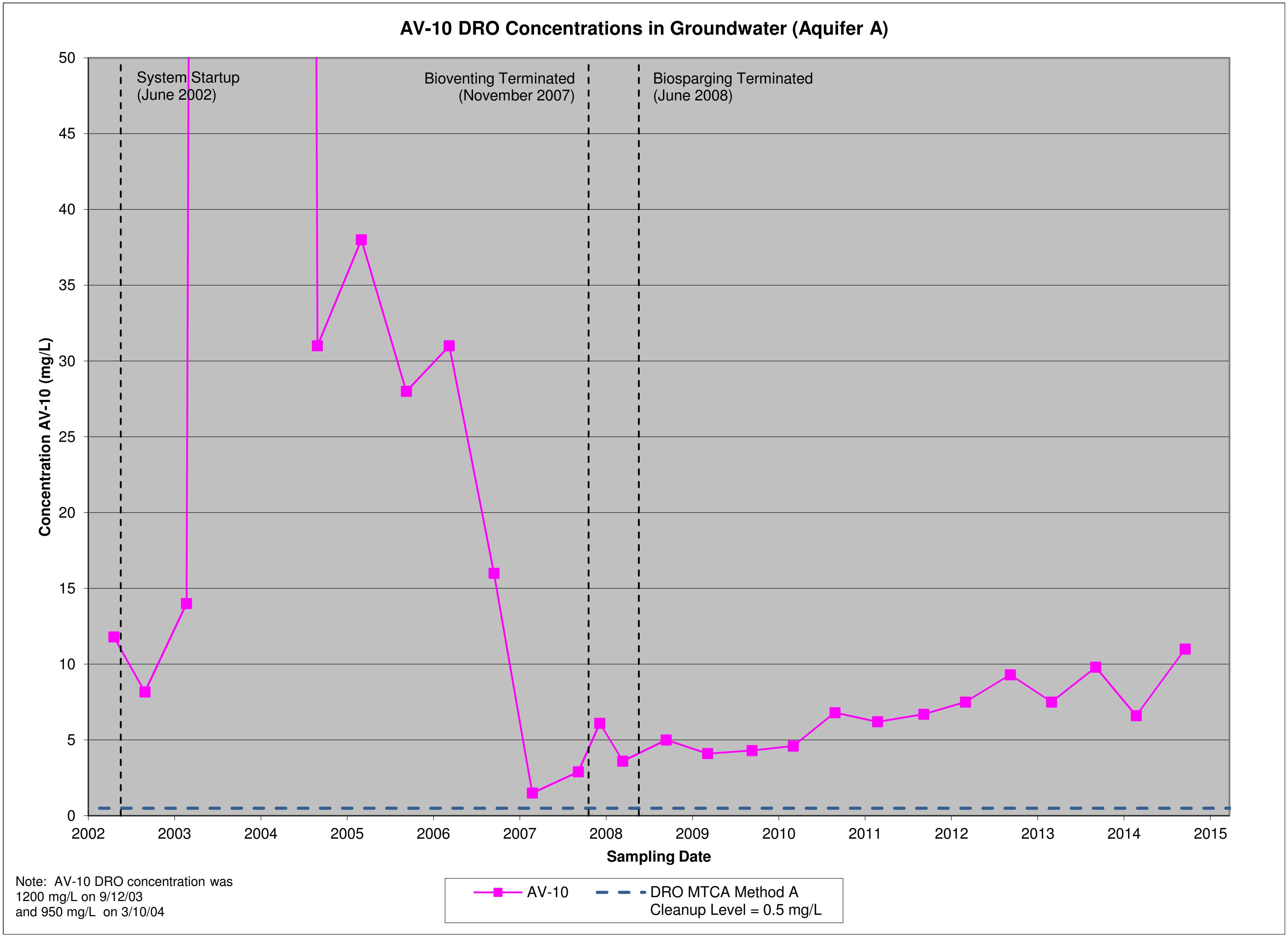
FIGURES

TABLES

Appendix E
Figure E-1

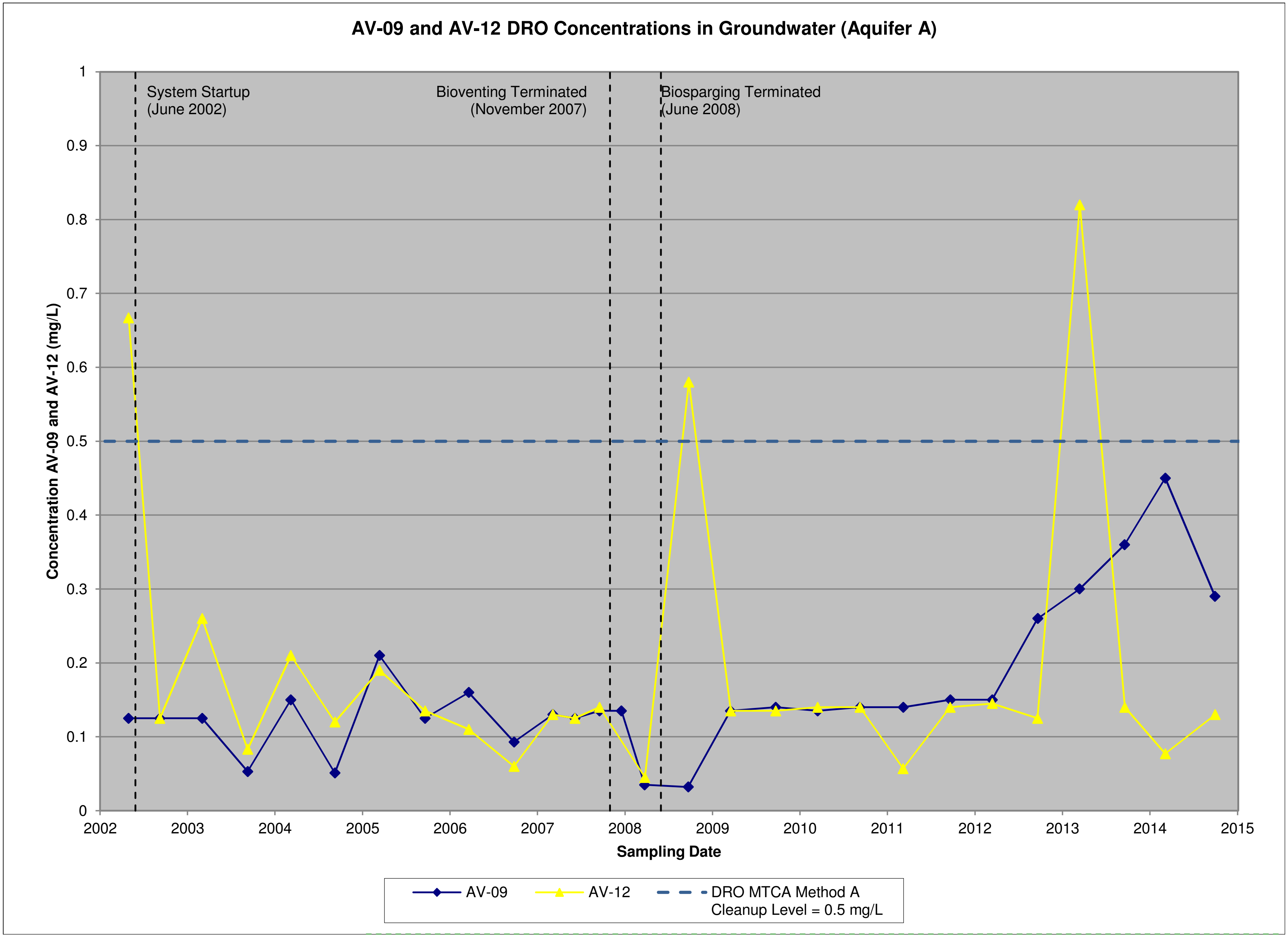


Appendix E
Figure E-2A

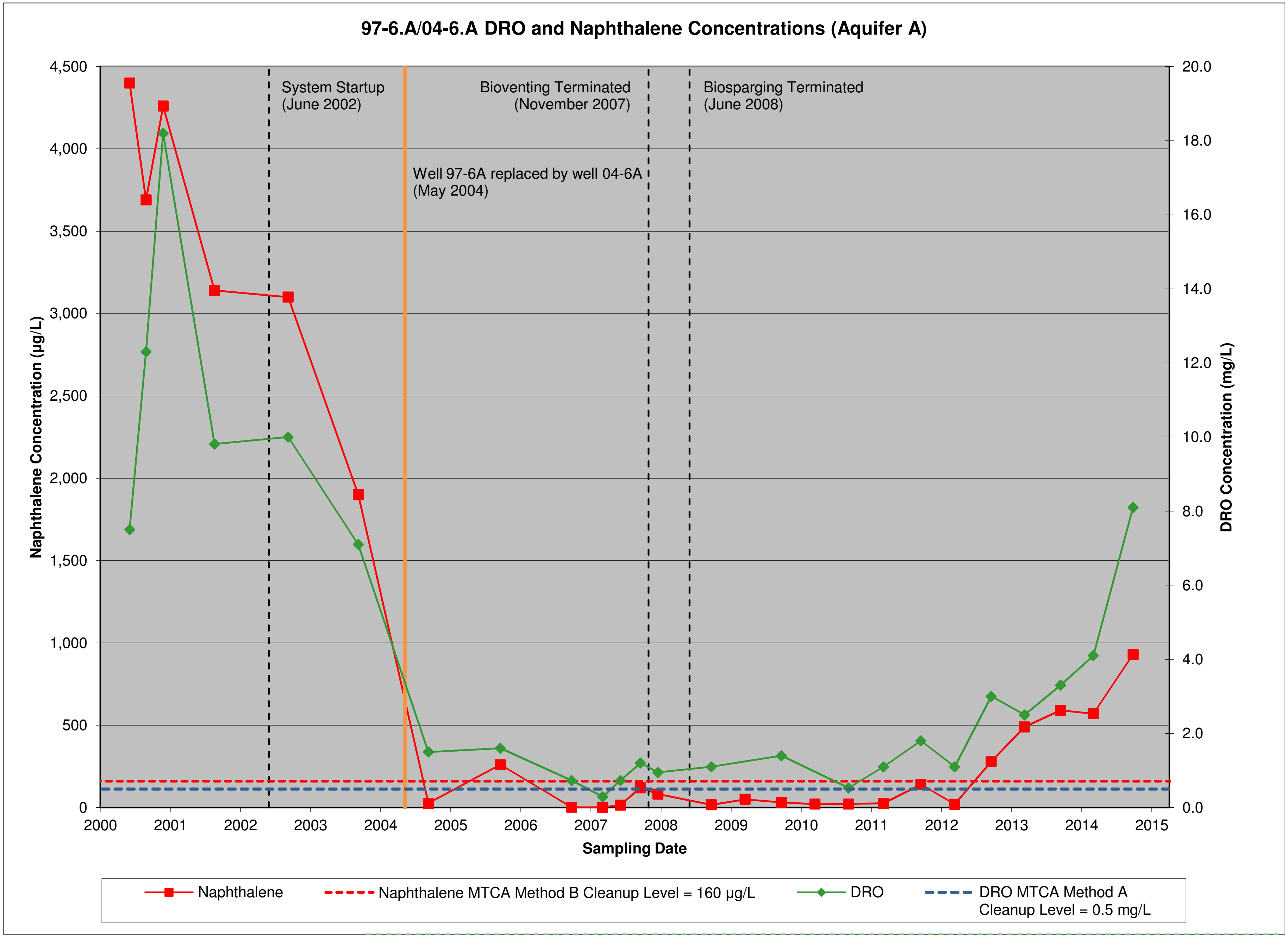


Note: AV-10 DRO concentration was
1200 mg/L on 9/12/03
and 950 mg/L on 3/10/04

Appendix E
Figure E-2B

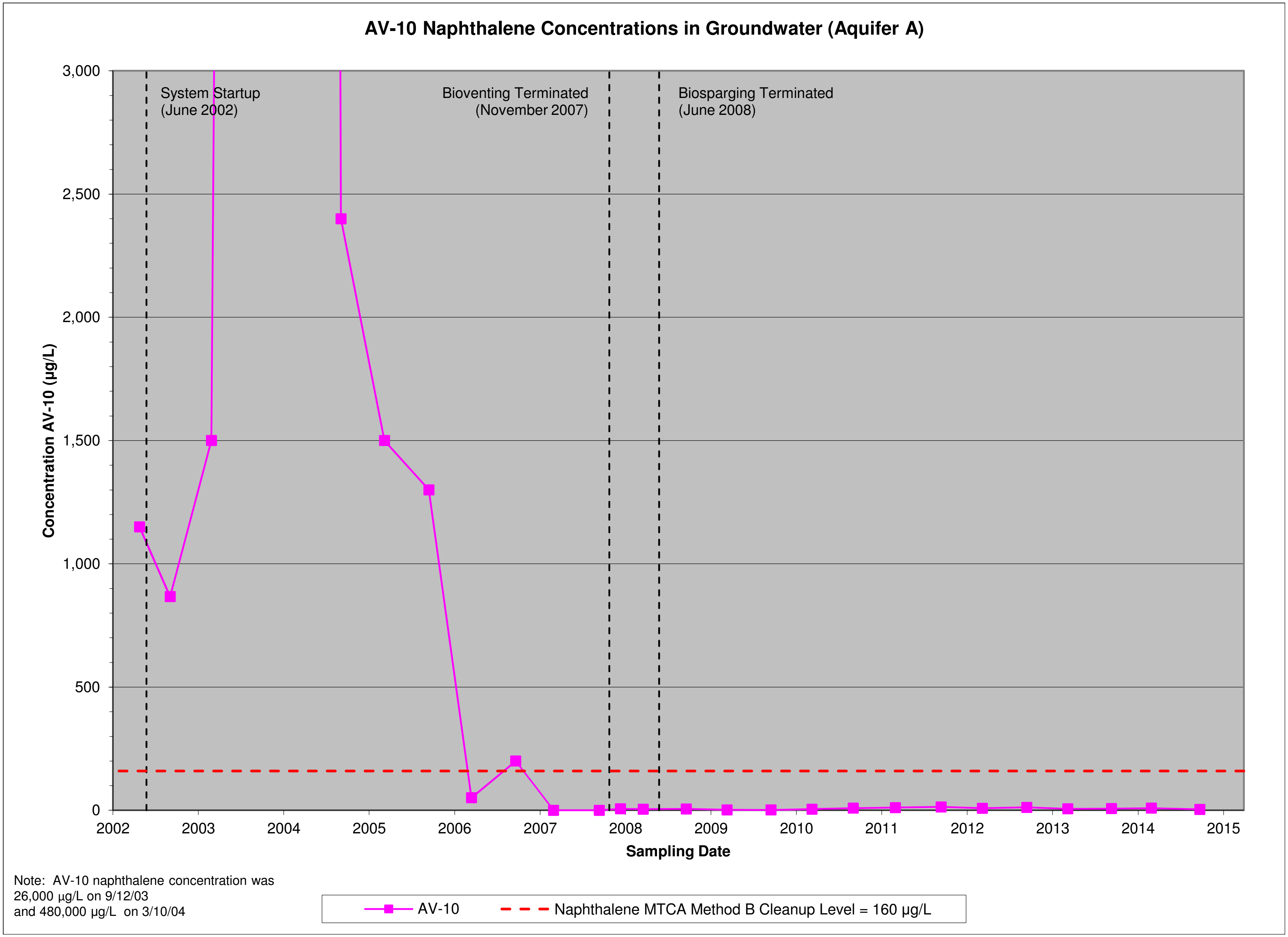


Appendix E
Figure E-3



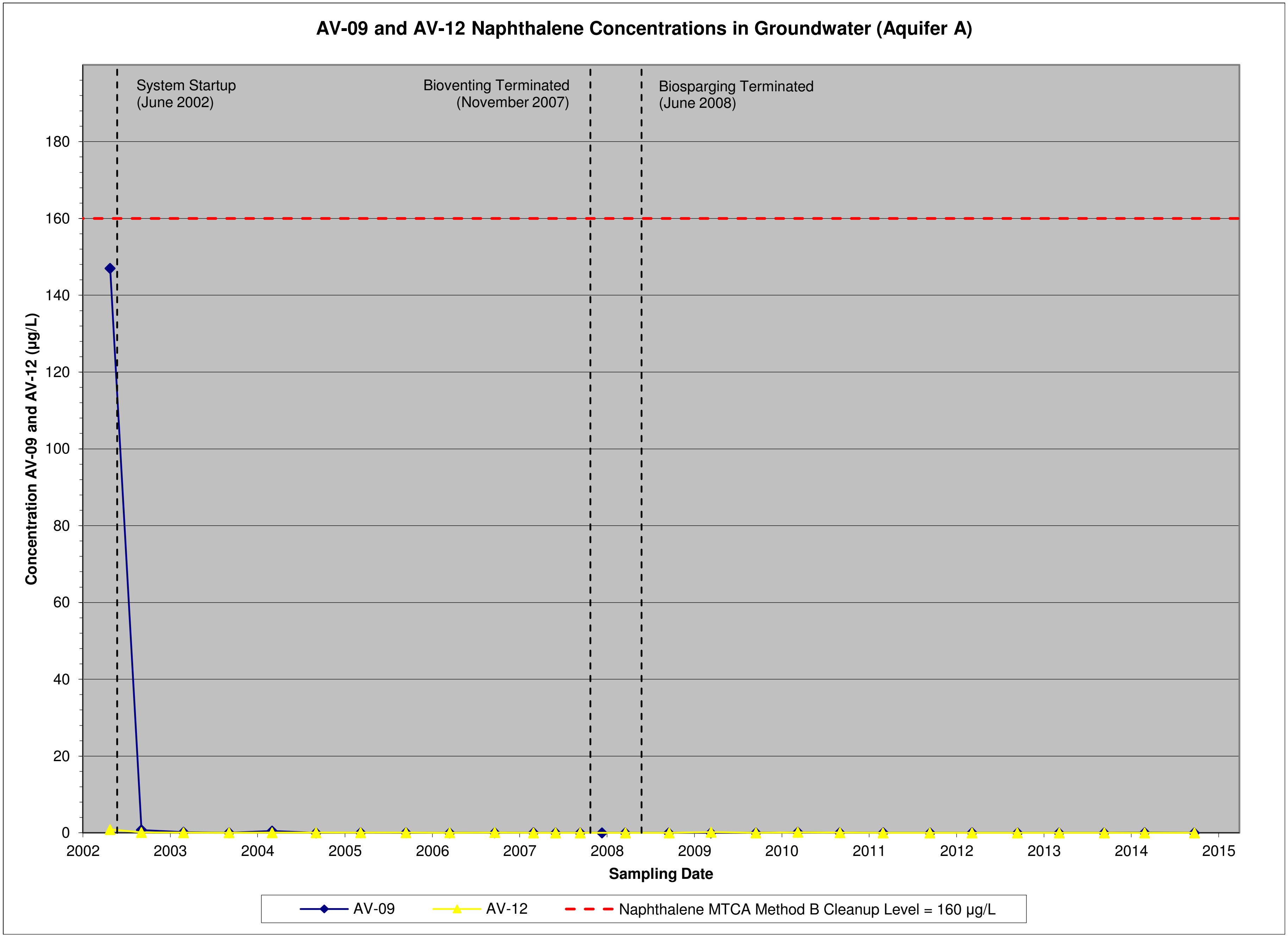
Note: Monitoring Well 97-6A was damaged, decommissioned and replaced by monitoring well 04-6A in 2004.

Appendix E
Figure E-4A

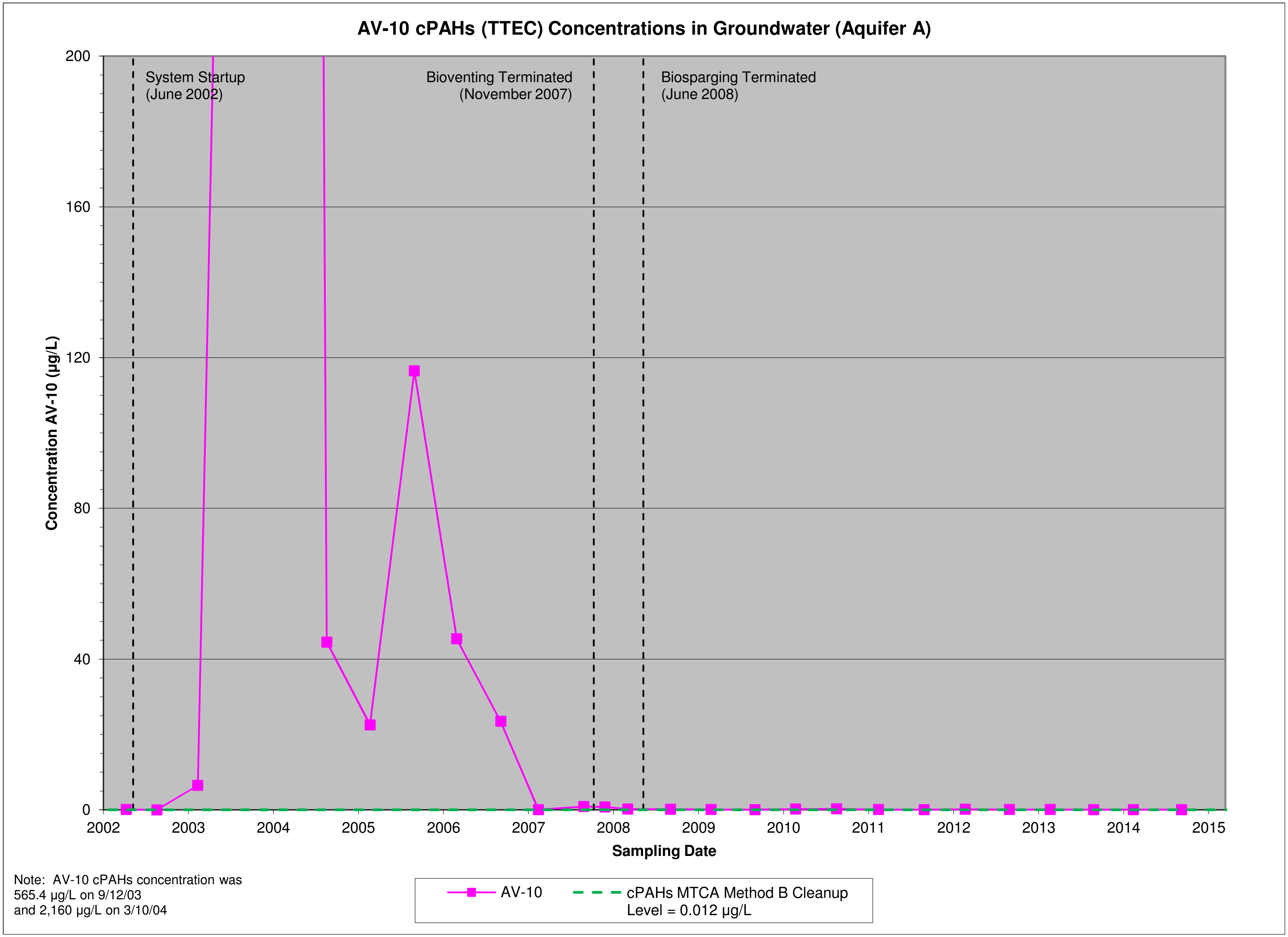


Note: AV-10 naphthalene concentration was
26,000 µg/L on 9/12/03
and 480,000 µg/L on 3/10/04

Appendix E
Figure E-4B

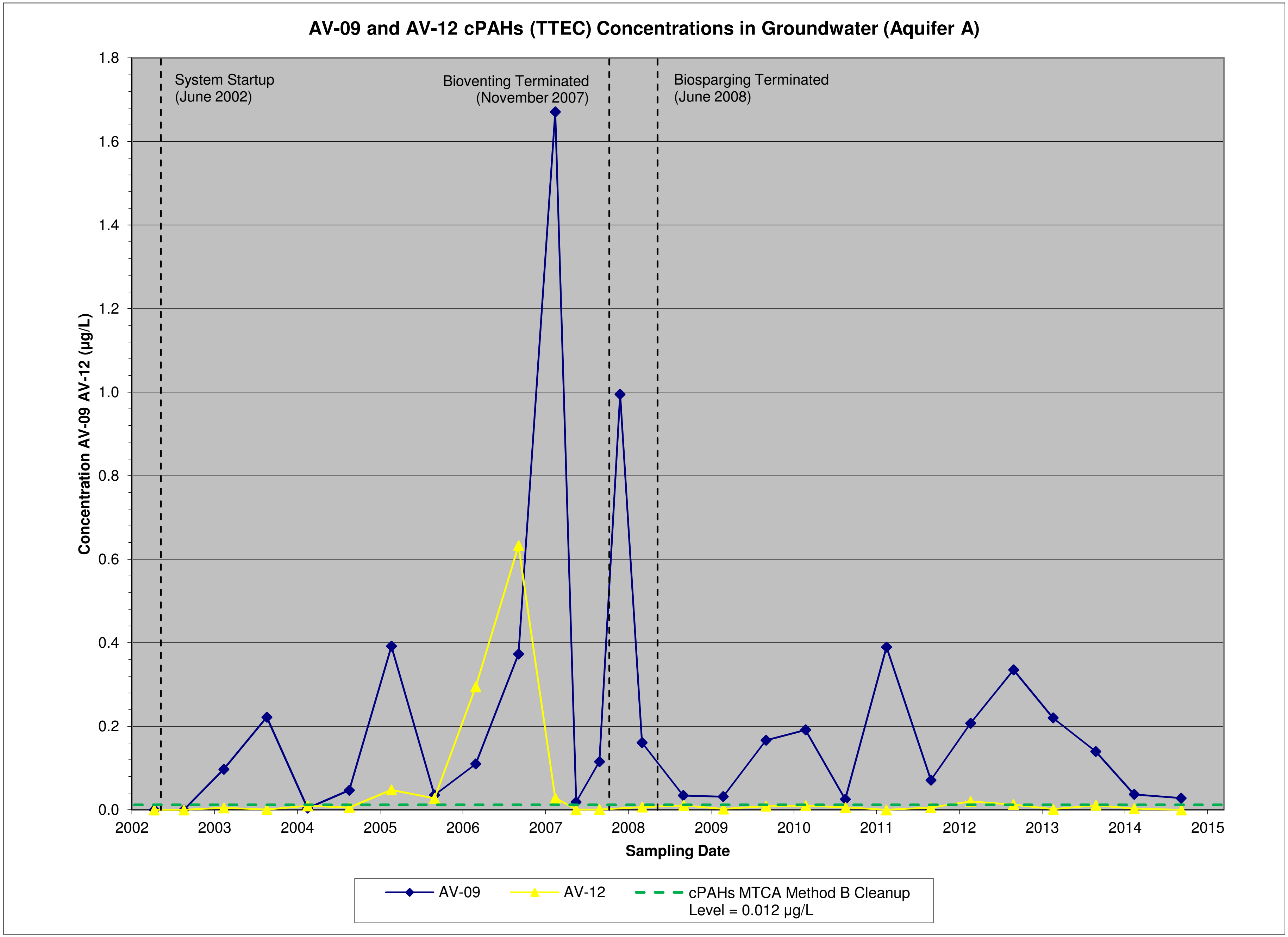


Appendix E
Figure E-5A

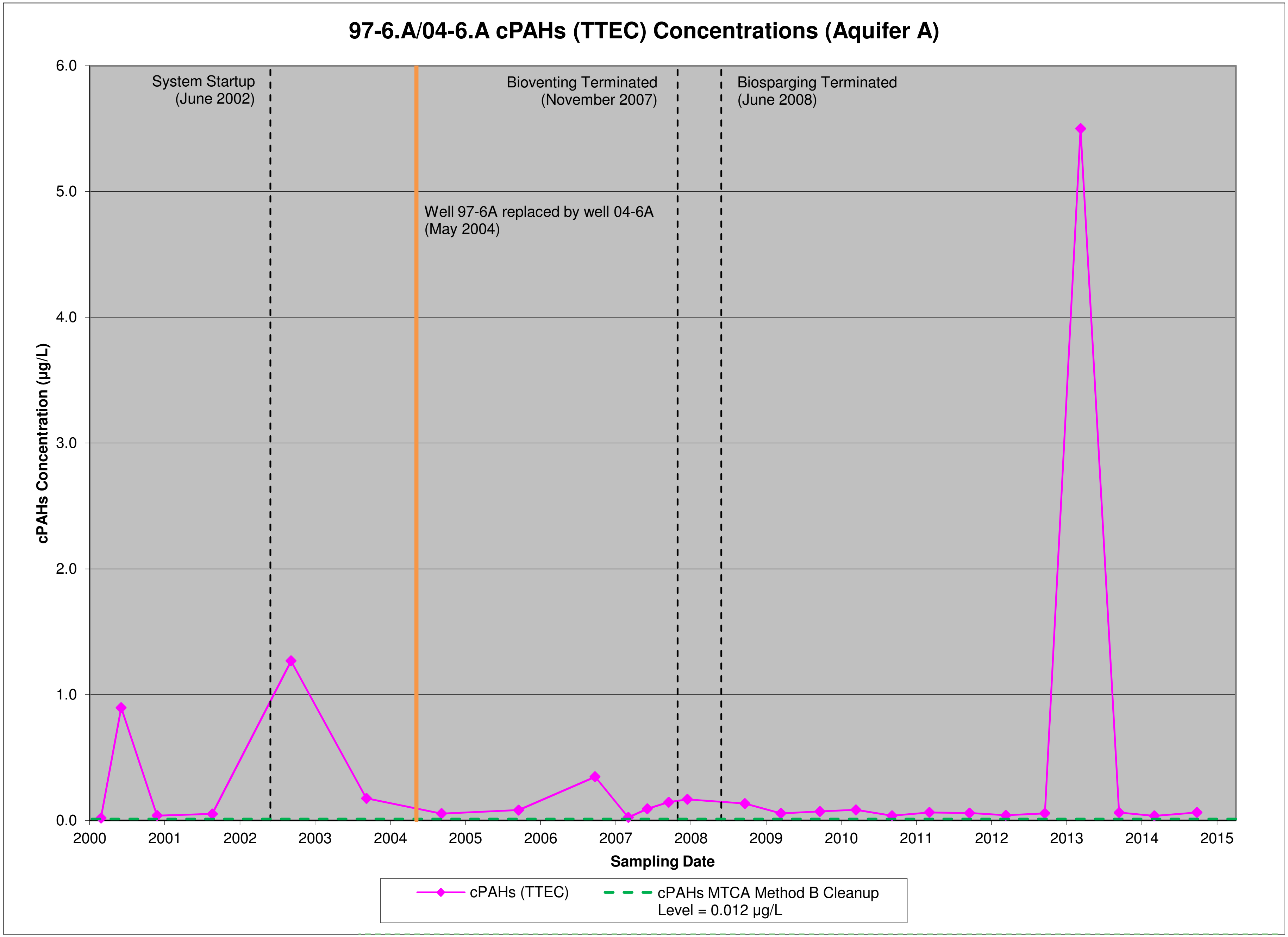


Note: AV-10 cPAHs concentration was
565.4 µg/L on 9/12/03
and 2,160 µg/L on 3/10/04

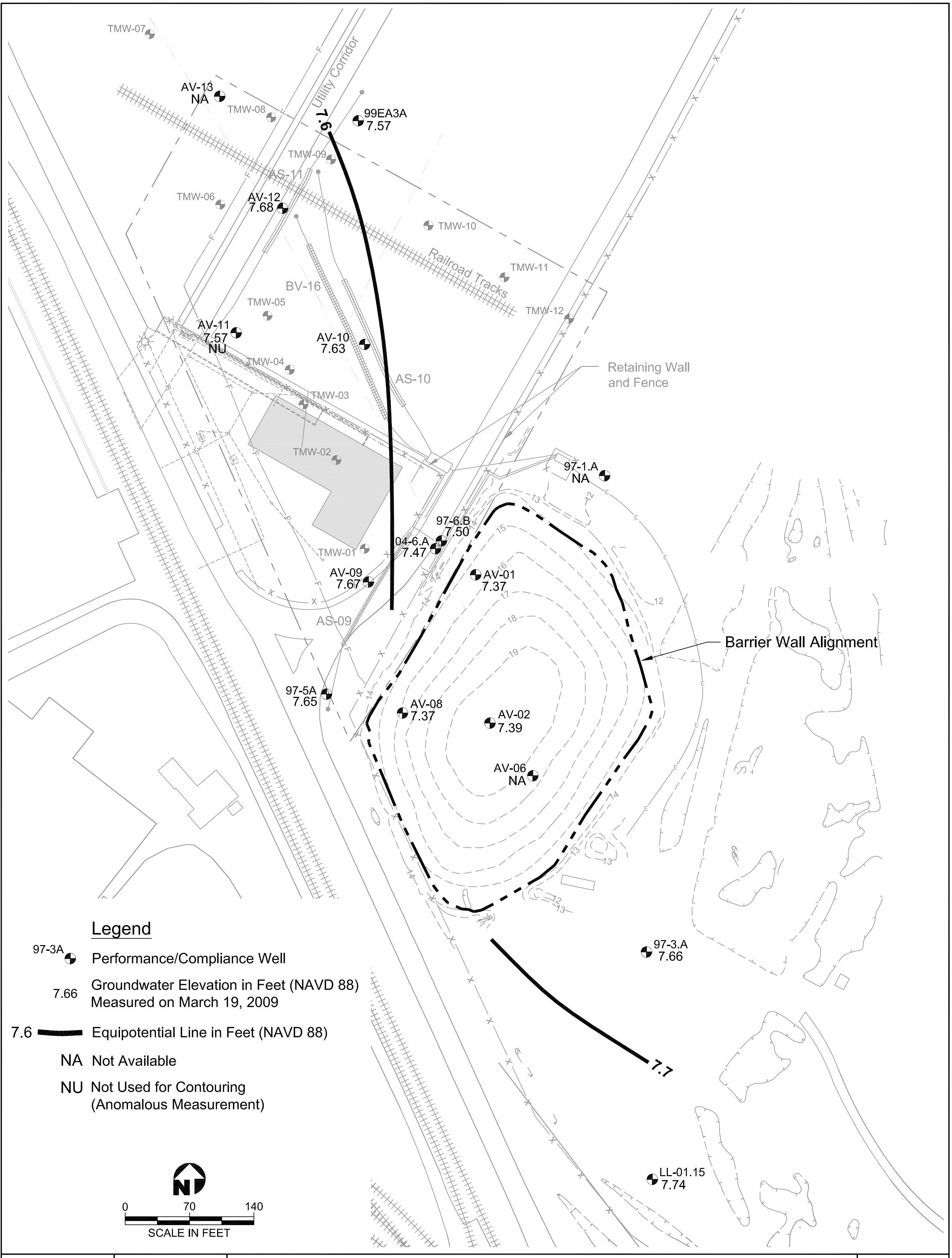
Appendix E
Figure E-5B



Appendix E
Figure E-6



Note: Monitoring Well 97-6A was damaged, decommissioned, and replaced by monitoring well 04-6A in 2004.



International Paper
Longview, WA

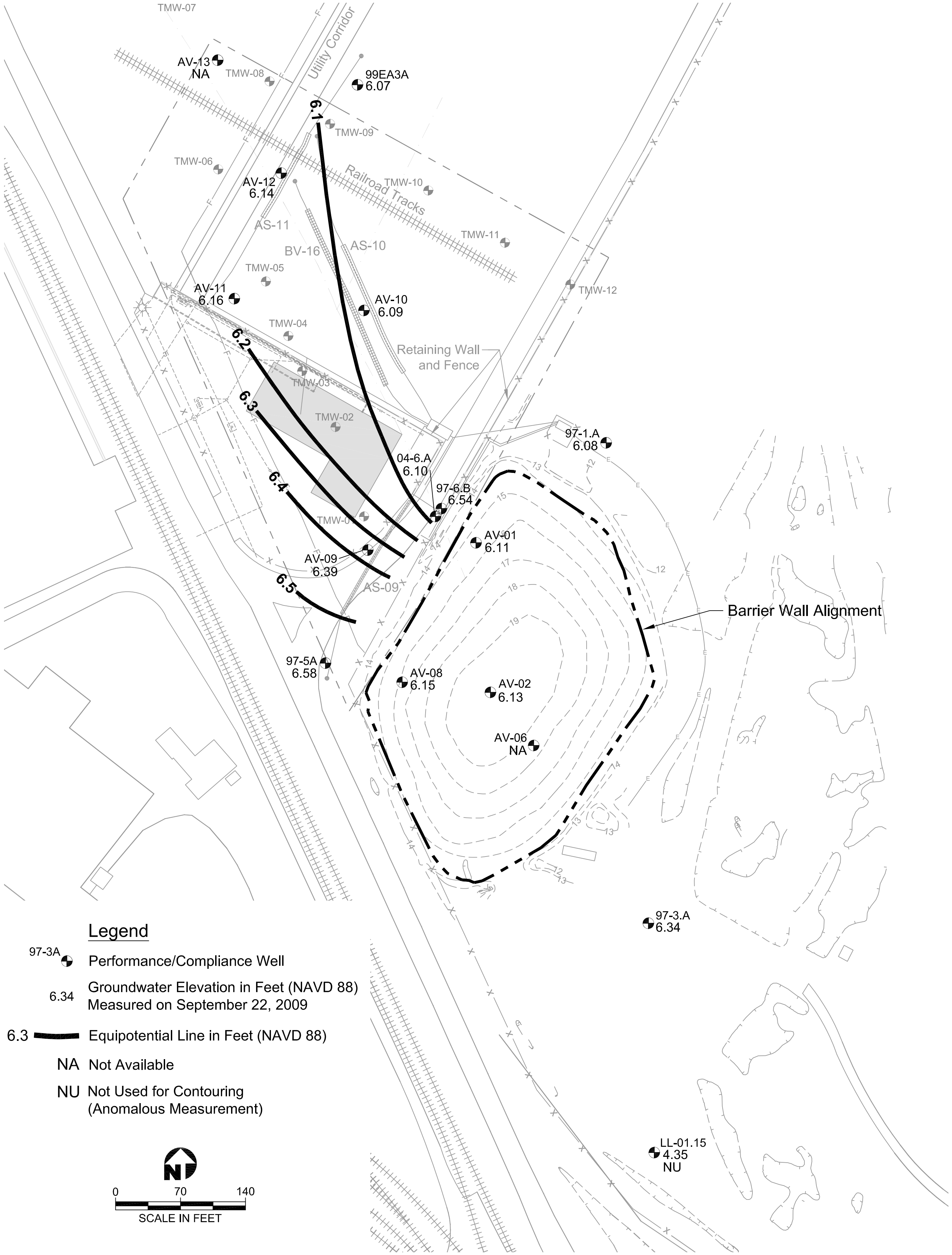
Project No.
33764232

URS

Potentiometric Contour Map - Aquifer A
March 19, 2009 - Systems Off

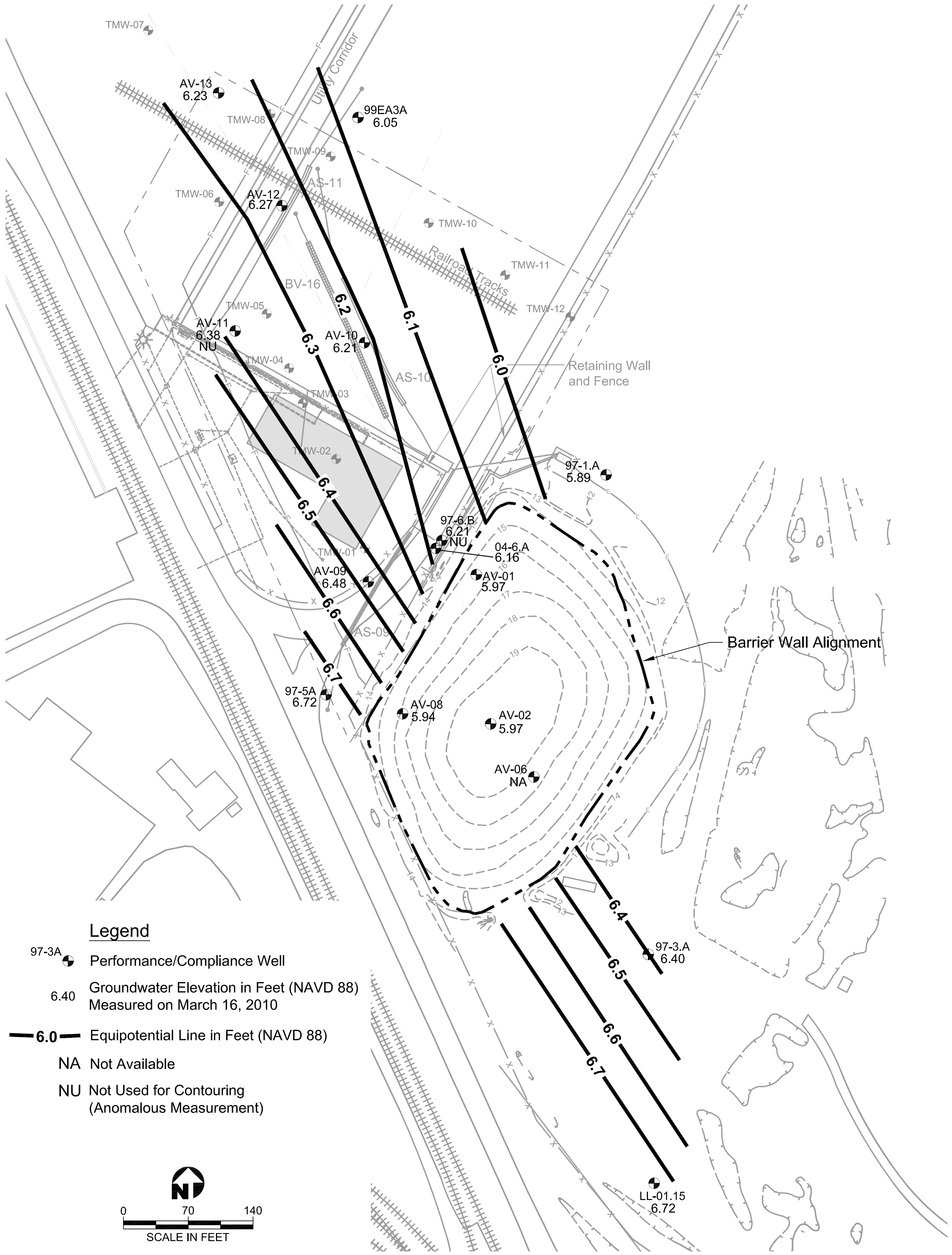
Figure
E-7

J:\Projects\CADGIS\International Paper\Longview\2013\MFA RIFS\Figure E-7 (March 2009 GW Contours).dwg
Mod: 08/19/2013, 09:31 | Plotted: 08/19/2013, 10:12 | chad_stickel



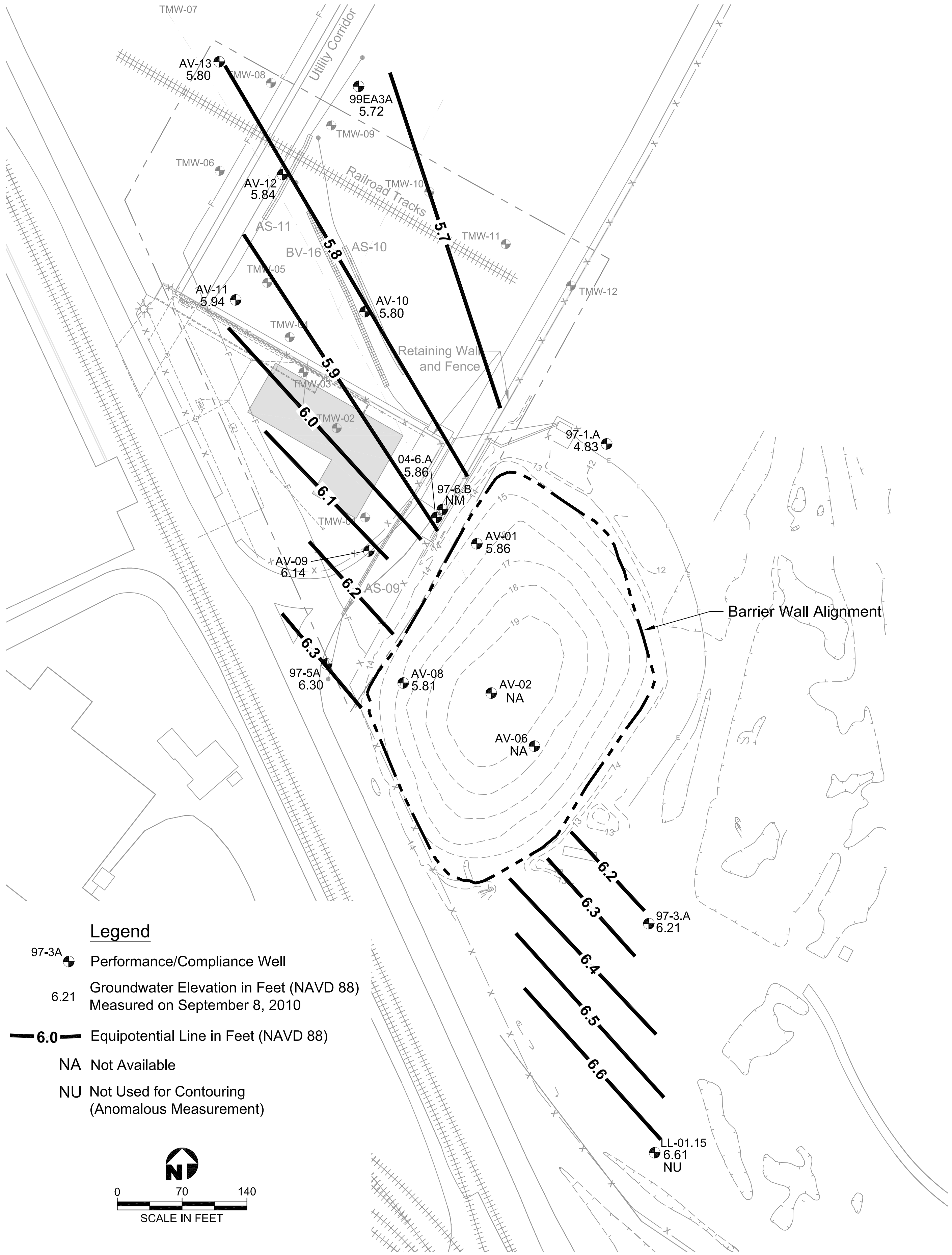
J:\Projects\CADGIS\International Paper\Longview\2013\MFA RIFS\Figure E-8 (Sept 2009 GW Contours).dwg
Mod: 08/19/2013, 10:18 | Plotted: 08/19/2013, 10:21 | chad_stickel

International Paper Longview, WA	Project No. 33764232	Potentiometric Contour Map - Aquifer A September 22, 2009 - Systems Off	Figure E-8
URS			



J:\Projects\CADGIS\International Paper\Longview\2013\MFA RIFS\Figure E-9 (March 2010 GW Contours).dwg
Mod: 08/19/2013, 10:45 | Plotted: 08/19/2013, 10:45 | chad_stickel

International Paper Longview, WA	Project No. 33764232	Designed by: P. Kalina Checked by: T. Griffith Drawn by: J. Knobbs	Potentiometric Contour Map - Aquifer A March 16, 2010 - Systems Off	Figure E-9
URS				



International Paper Longview, WA	Project No. 33764232	Designed by: P. Kalina
URS		Checked by: T. Griffith
		Drawn by: J. Knobbs

Potentiometric Contour Map - Aquifer A
September 8, 2010 - Systems Off

Figure
E-10

J:\Projects\CADGIS\International Paper\Longview\2013\MFA RIFS\Figure E-10 (Sept 2010 GW Contours).dwg
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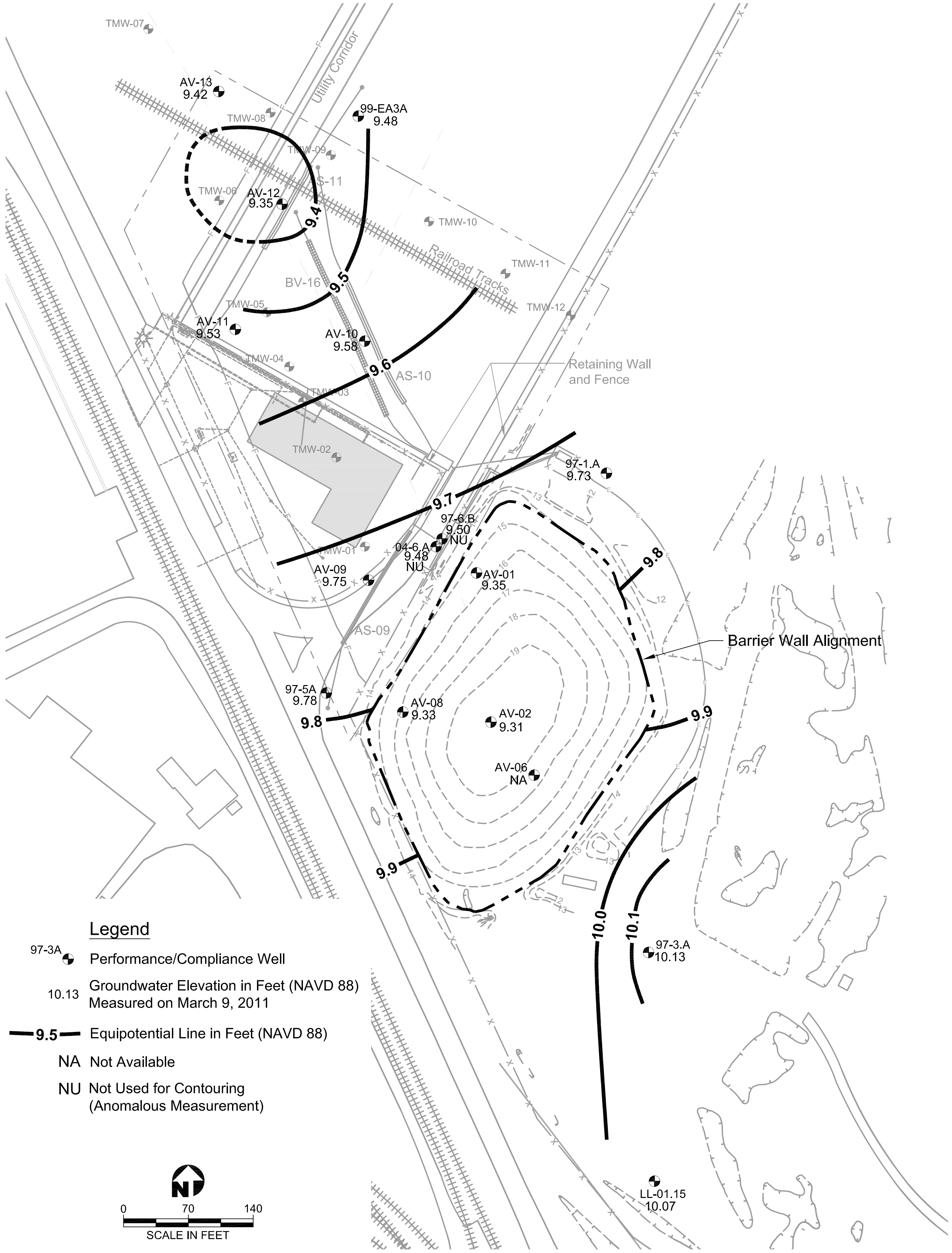


Legend

97-3A Performance/Compliance Well

10.13 Groundwater Elevation in Feet (NAVD 88) Measured on March 9, 2011

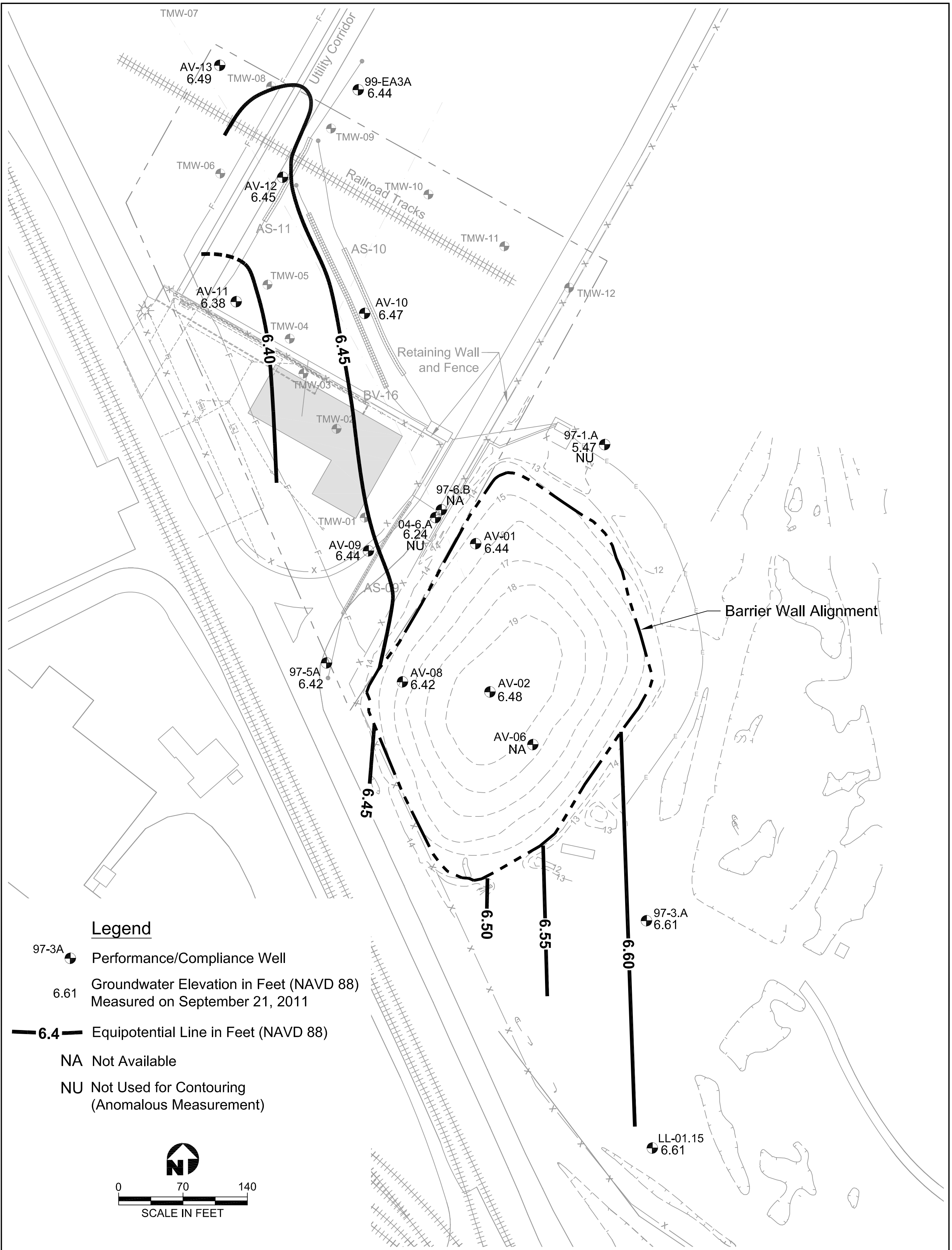
9.5 Equipotential Line in Feet (NAVD 88)

NA Not Available

NU Not Used for Contouring (Anomalous Measurement)

J:\Projects\CADGIS\International Paper\Longview\2013\MFA RIFS\Figure E-11 (March 2011 GW Contours).dwg
Mod: 08/19/2013, 11:04 | Plotted: 08/19/2013, 11:06 | chad_stickel

International Paper Longview, WA	Project No. 33764232	Designed by: P. Kalina	Potentiometric Contour Map - Aquifer A March 9, 2011 - Systems Off	Figure E-11
URS		Checked by: M. Meyer		
		Drawn by: C. Stickel		



J:\Projects\CADGIS\International Paper\Longview\2013\MFA RIFS\Figure E-12 (Sept 2011 GW Contours).dwg
Mod: 08/19/2013, 11:04 | Plotted: 08/19/2013, 11:09 | chad_stickel

International Paper
Longview, WA

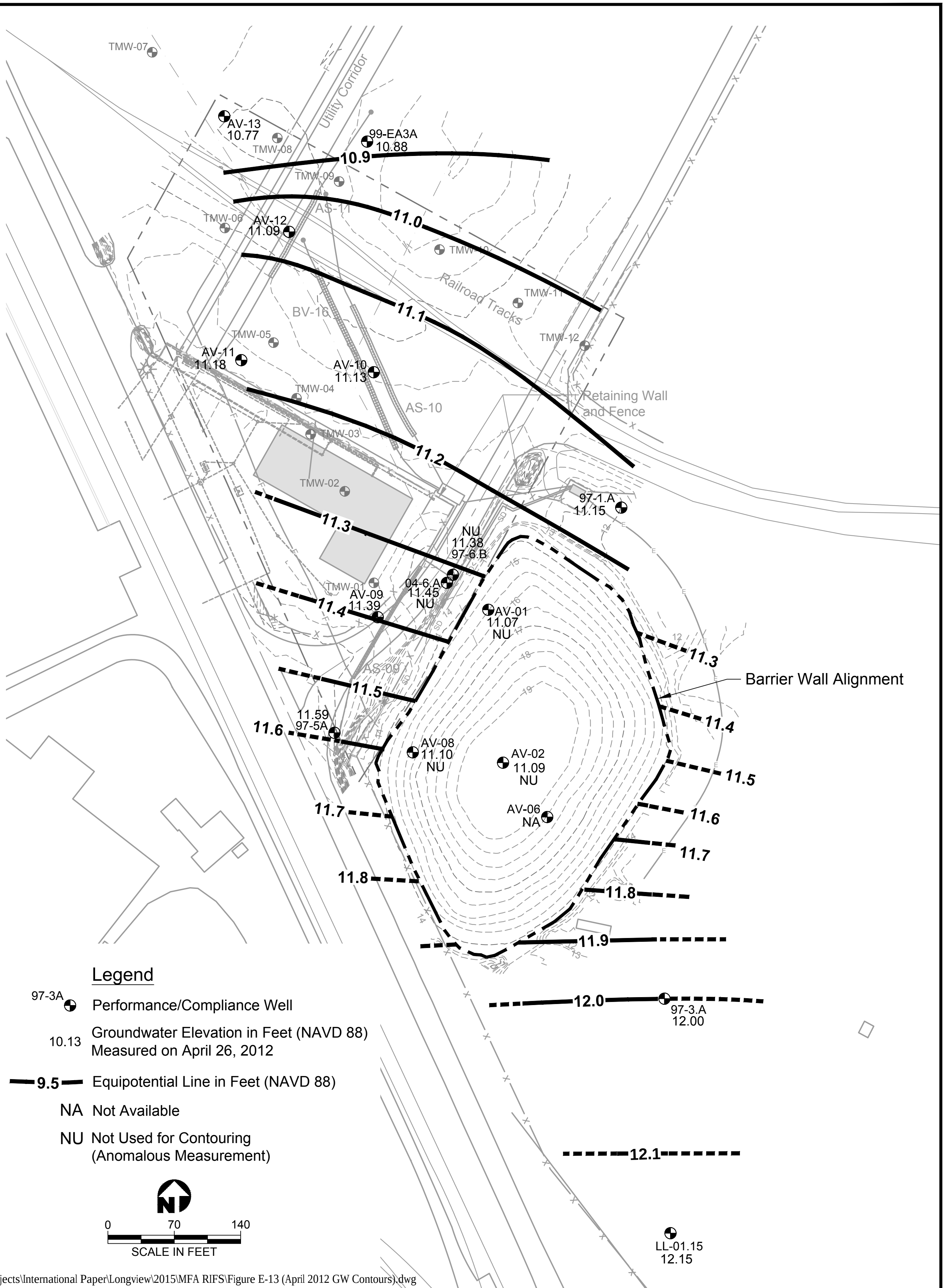
Project No.
33764232

URS

Designed by: P. Kalina
Checked by: M. Meyer
Drawn by: C. Stickel

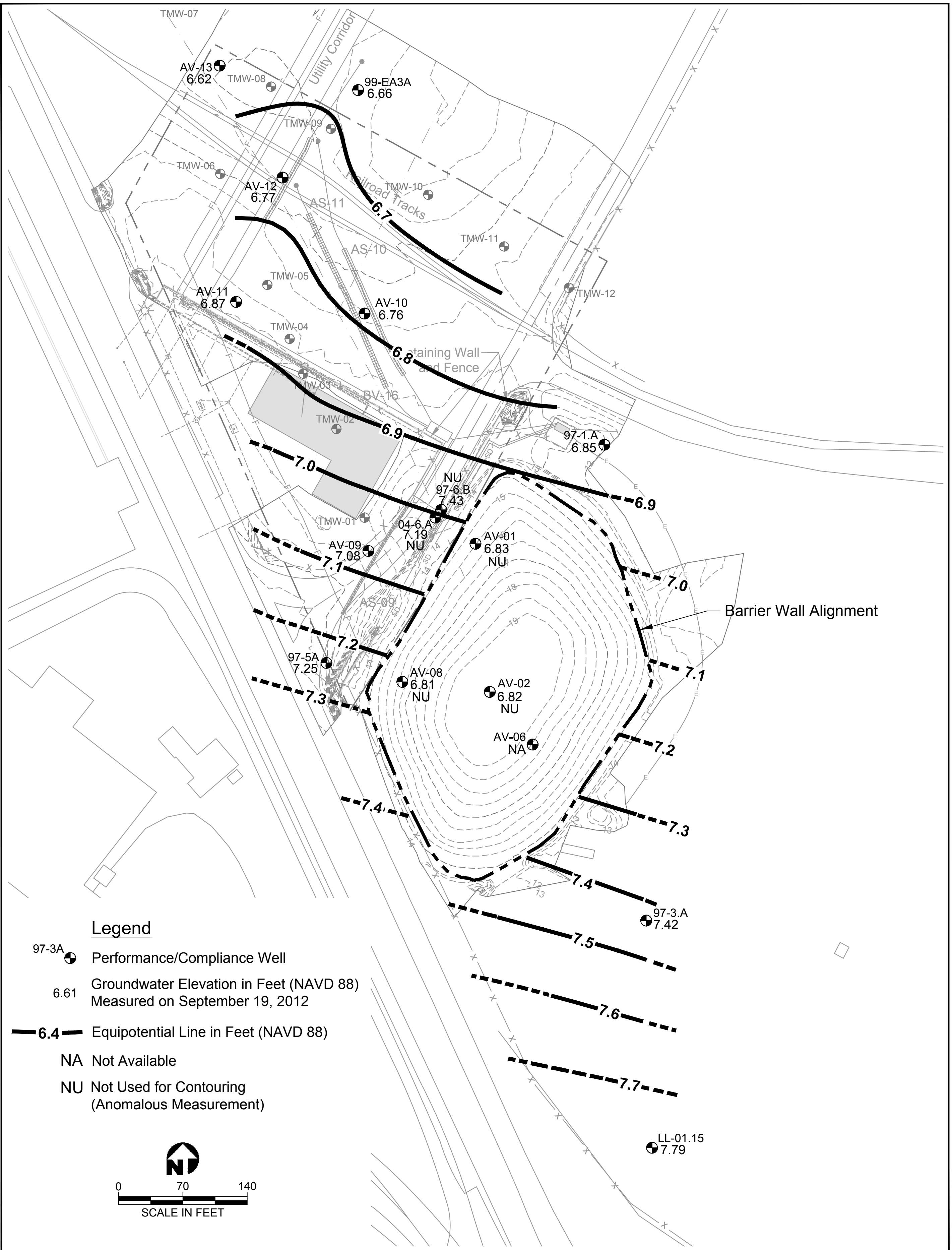
Potentiometric Contour Map - Aquifer A
September 21, 2011 - Systems Off

Figure
E-12



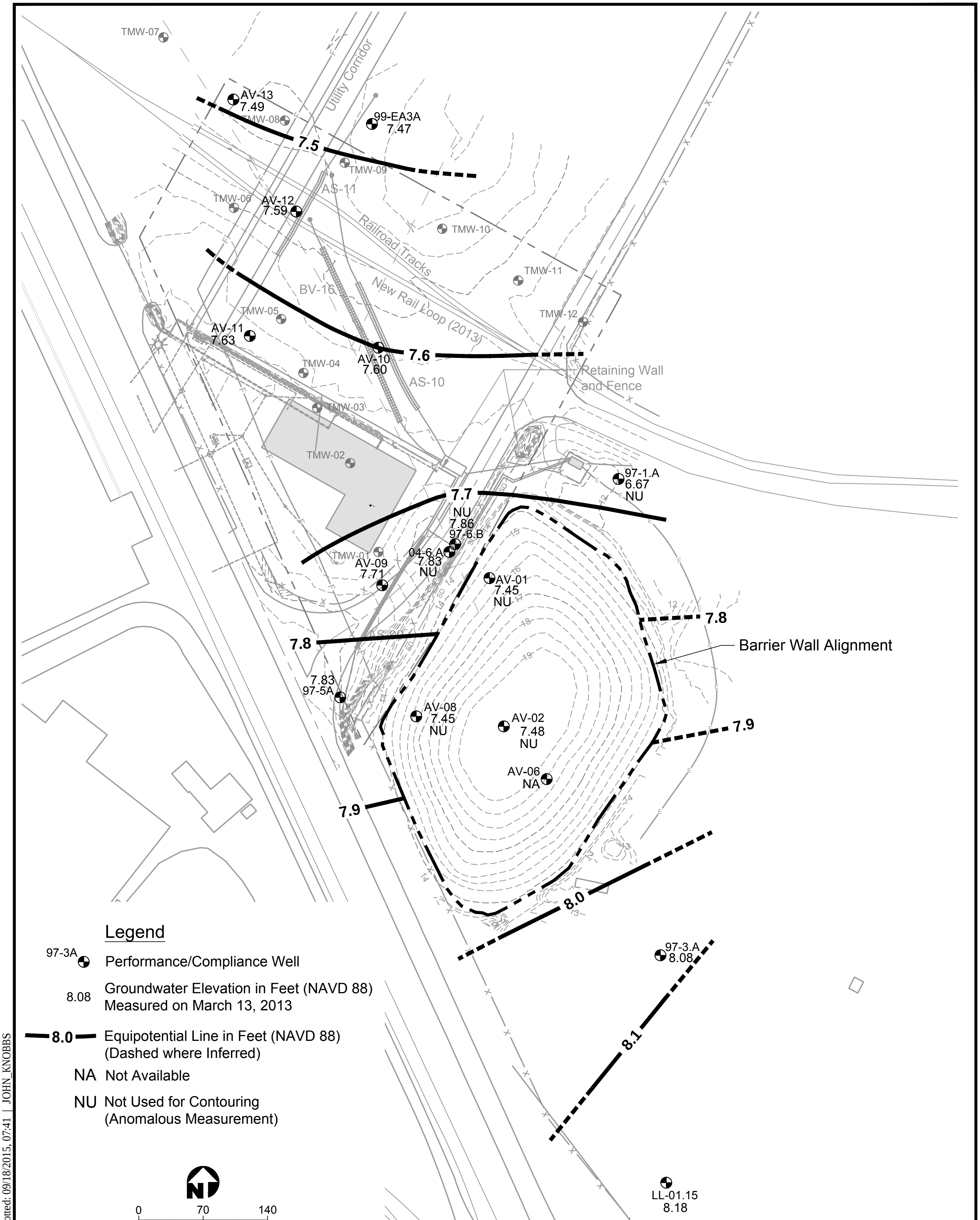
J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Figure E-13 (April 2012 GW Contours).dwg
Mod: 09/15/2015, 08:13 | Plotted: 09/18/2015, 07:37 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Potentiometric Contour Map - Aquifer A April 26, 2012 - Systems Off	Figure E-13
AECOM			



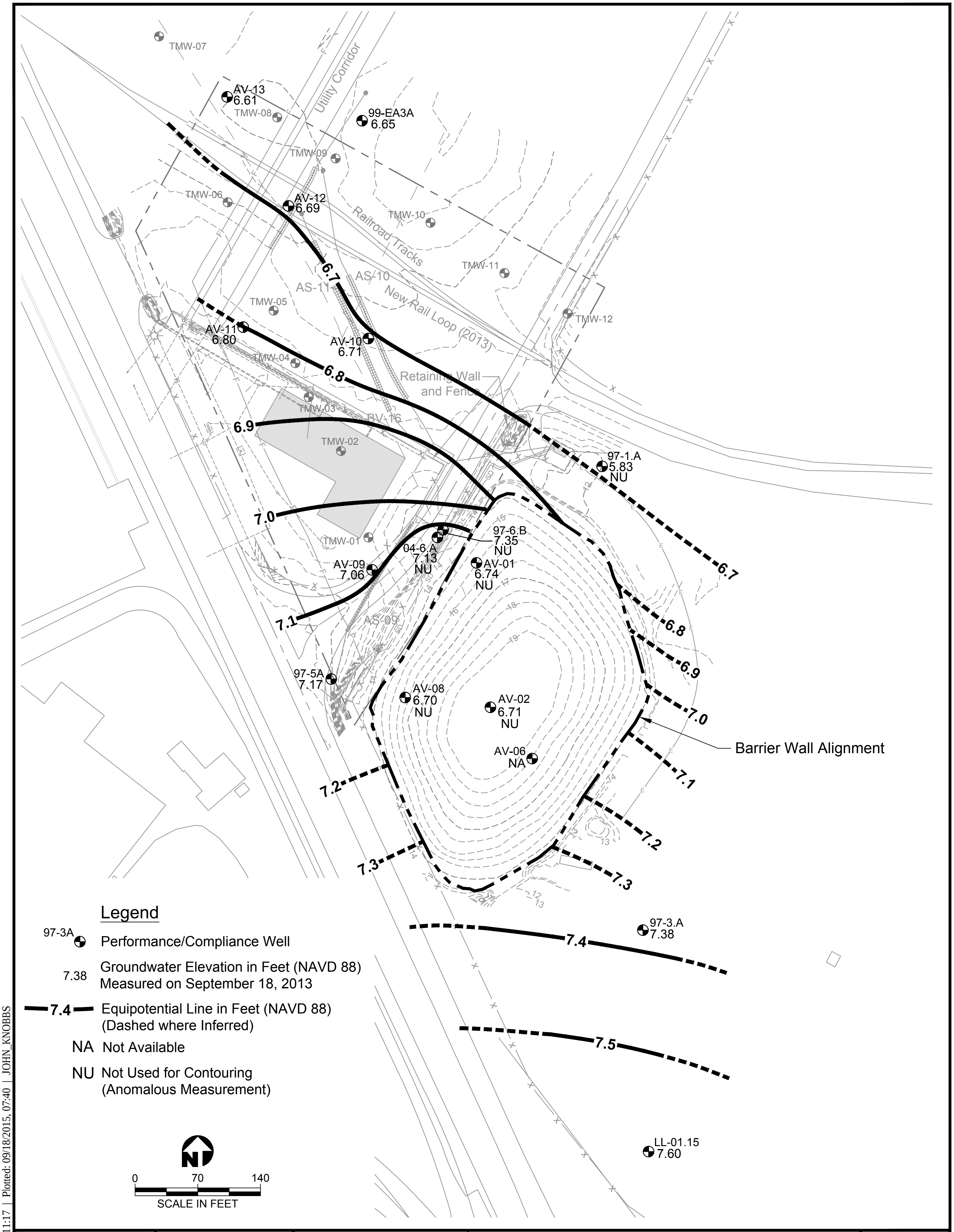
J:\GIS\Projects\International Paper\Longview\2013\MFA RIFS\Figure E-14 (Sept 2012 GW Contours).dwg
Mod: 09/14/2015, 10:08 | Plotted: 09/14/2015, 10:13 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 33764232	Designed by: P. Kalina	Potentiometric Contour Map - Aquifer A September 19, 2012 - Systems Off	Figure E-14
URS		Checked by: M. Meyer		
		Drawn by: C. Stickel		



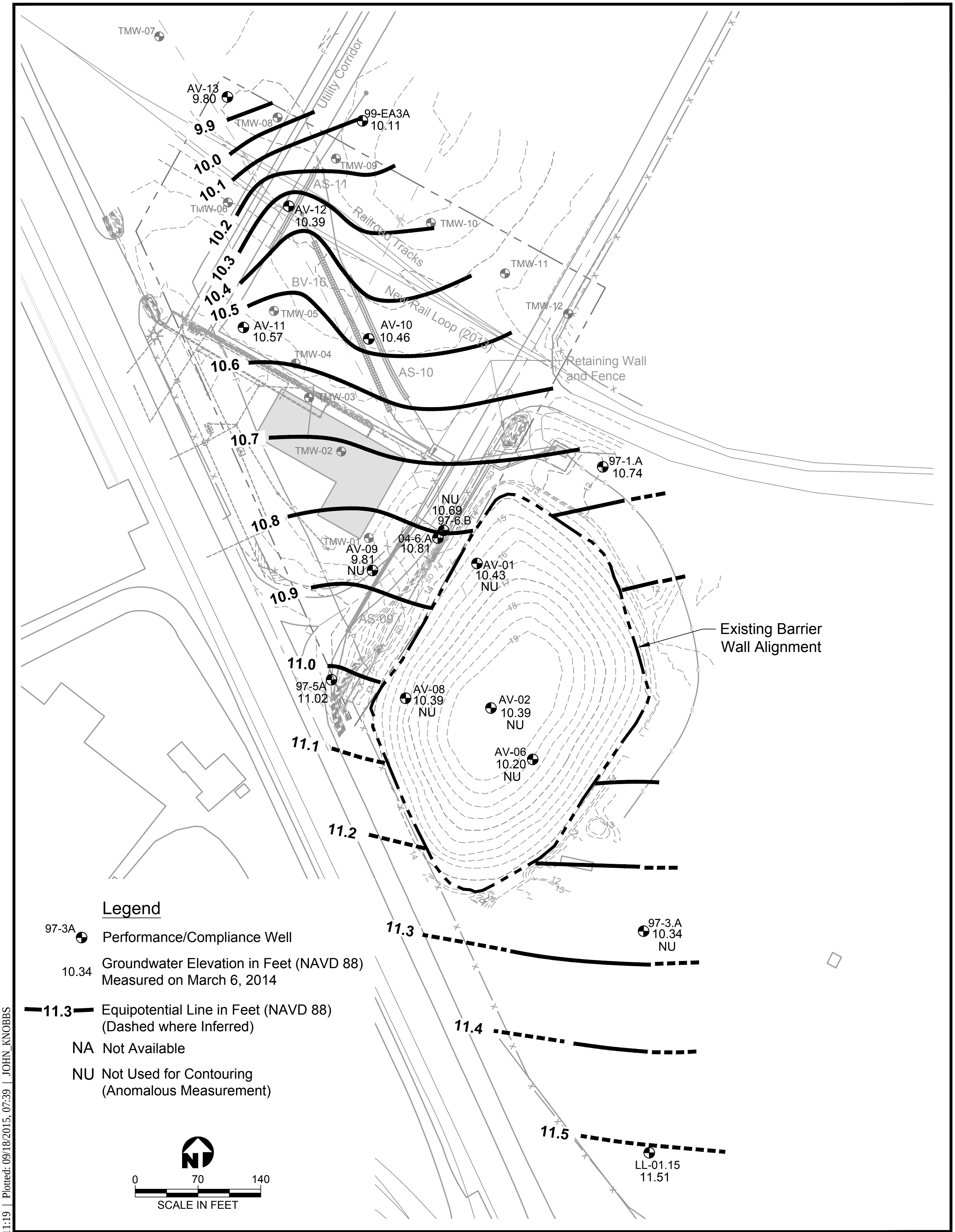
J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig E-15 Poten Contours March 2013.dwg
Mod: 08/19/2015, 11:16 | Plotted: 09/18/2015, 07:41 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Designed by: A. Palmieri Checked by: D. Raubvogel Drawn by: C. Stickel	Potentiometric Contour Map - Aquifer A March 13, 2013 - Systems Off
AECOM			Figure E-15



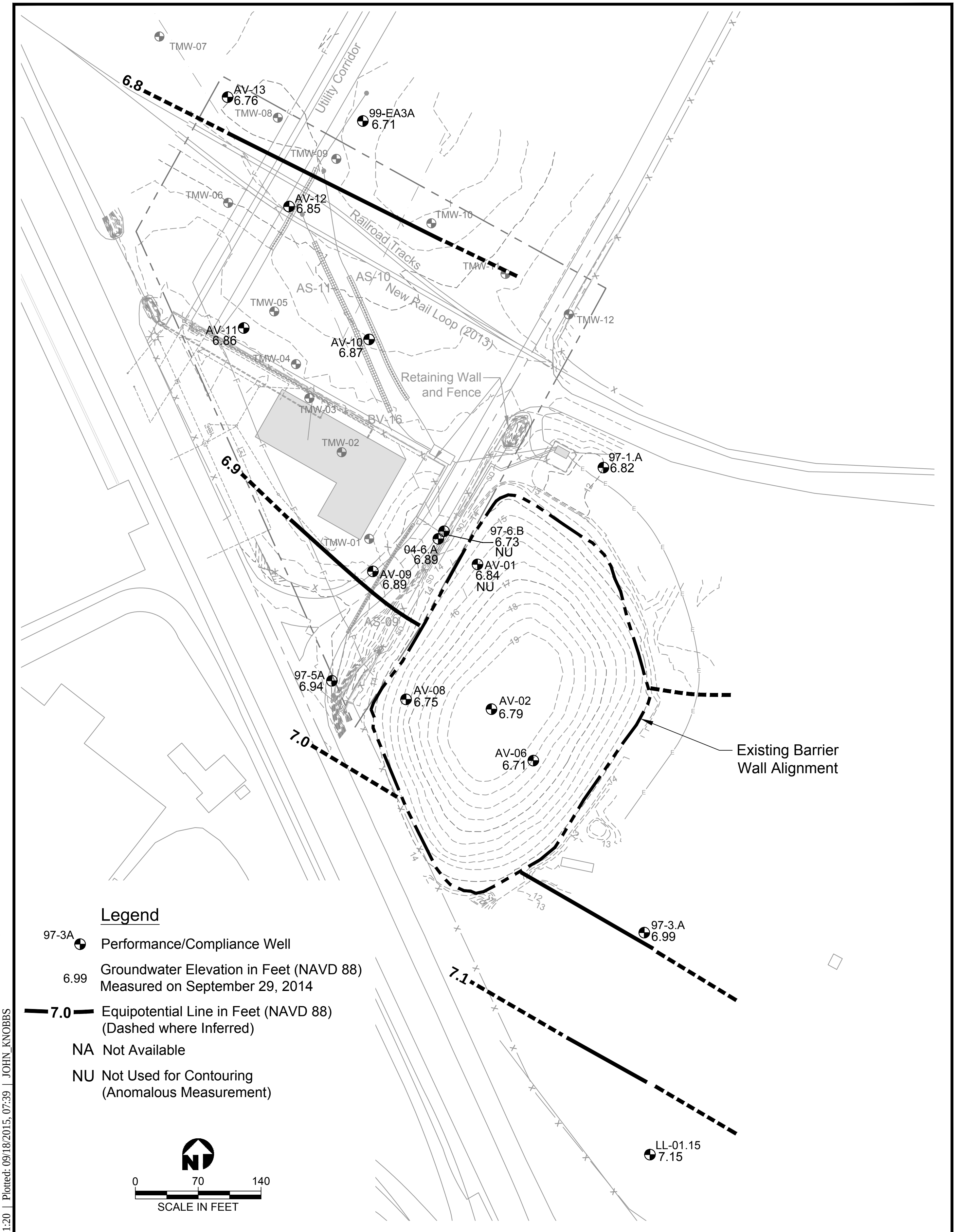
J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig E-16 Poten Contours Sept 2013.dwg
Mod: 08/19/2015, 11:17 | Plotted: 09/18/2015, 07:40 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Designed by:	A. Palmieri	Potentiometric Contour Map - Aquifer A September 18, 2013 - Systems Off	Figure E-16
AECOM		Checked by:	D. Raubvogel		
		Drawn by:	C. Stickel		



International Paper Longview, WA	Project No. 60395232	Designed by: A. Palmieri Checked by: D. Raubvogel Drawn by: C. Stickel	Potentiometric Contour Map - Aquifer A March 6, 2014 - Systems Off	Figure E-17
AECOM				

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig E-17 Poten Contours March 2014.dwg
Mod: 08/19/2015, 11:19 | Plotted: 09/18/2015, 07:39 | JOHN_KNOBBS



International Paper
Longview, WA

Project No.
60395232

AECOM

Designed by: A. Palmieri
Checked by: D. Raubvogel
Drawn by: C. Stickel

Potentiometric Contour Map - Aquifer A
September 29, 2014 - Systems Off

Figure
E-18

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig E-18 Poten Contours Sept 2014.dwg
Mod: 08/19/2015, 11:20 | Plotted: 09/18/2015, 07:39 | JOHN_KNOBBS

Table E-1
Biosparging Well Groundwater Monitoring Data Summary
RI\FS Port of Longview MFA - International Paper

Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)	Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)
AV-09					**AV-10**				
5/3/2002	14.6	NM	6.13	NA	5/3/2002	13.8	1	6.11	NA
6/19/02a	NM	NM	NM	NM	6/19/02a	NM	NM	NM	NM
6/19/02p	NM	NM	NM	NM	6/19/02p	NM	NM	NM	NM
6/20/2002	NM	NM	NM	NM	6/20/2002	NM	NM	NM	NM
9/11/2002	16.21	NM	6.66	5.42	9/11/2002	18.28	NM	6.15	1.3
12/2/2002	NM	NM	NM	NM	12/2/2002	20.22	-49	6.1	1.6
3/6/2003	16.24	132	5.84	4.28	3/6/2003	19.98	-45	6.07	0.77
6/12/2003	15.8	40	6.36	6-8	6/12/2003	19.3	-7	6.13	0.00
9/10/2003	16.25	201	5.11	9.36	9/10/2003	NM	NM	NM	NM
12/11/2003	16.22	210	5.22	NM	12/11/2003	23.02	-62	6.36	6.70
3/10/2004	16.26	341	4.84	10.69	3/10/2004	20.55	-11	5.81	0.34
9/8/2004	16.80	137	5.77	8.28	9/8/2004	20.9	-47	6.11	3.50
3/15/2005	15.37	235	5.81	10.20	3/15/2005	18.03	-59	6.28	3.53
9/21/2005	16.51	172	5.02	11.65	9/21/2005	19.65	-13	6.14	9.08
3/22/2006	15.96	435	4.68	10.20	3/22/2006	18.17	14.4	5.96	4.70
9/27/2006	17.49	208	4.23	7.35	9/27/2006	19.91	-61	7.65	8.11
3/8/2007	15.22	352	4.69	10.81	3/8/2007	15.43	138	6.29	10.02
6/8/2007	15.8	403	4.24	2.22	6/7/2007	NM	NM	NM	NM
9/19/2007	16.9	372	4.45	9.48	9/19/2007	20.4	44	5.99	5.36
12/19/2007	15.61	198	5.43	7.66	12/19/2007	17.59	-87	6.93	1.50
3/25/2008	15.47	378	4.24	6.91	3/25/2008	15.56	66	5.66	4.77
9/23/2008	17.23	315	4.63	0	9/25/2008	18.24	-125	6.63	0
3/18/2009	15.34	140	4.88	1.14	3/19/2009	14.44	-10	5.94	0.00
9/23/2009	18.17	179	4.50	0.02	9/23/2009	20.30	65	5.68	0.00
3/17/2010	14.8	216	5.22	0.00	3/17/2010	16.0	4	5.87	0.00
9/8/2010	16.1	200	4.46	4.75	9/9/2010	17.3	-28	4.83	3.56
3/9/2011	14.1	-15	6.30	2.14	3/8/2011	14.3	-108	7.14	1.78
9/21/2011	12.16	49	5.60	0.00	9/20/2011	13.95	-54	6.30	1.18
3/14/2012	11.99	167	5.53	1.70	3/14/2012	11.30	-22	5.63	0.07
9/20/2012	15.5	80	6.33	NA	9/20/2012	18.1	-38	6.78	17.75
3/13/2013	15.14	46	6.66	0.58	3/14/2013	13.48	-33	6.55	0.53
9/17/2013	17.61	76	5.37	4.14	9/17/2013	18.36	34	5.27	0.93
3/6/2014	14.32	14.7	6.13	0.72	3/7/2014	5.40	-87	6.16	0.00
9/29/2014	16.24	-36	6.25	0.00	9/30/2014	18.95	-35	6.08	0.00

Table E-1
Biosparging Well Groundwater Monitoring Data Summary
RI\FS Port of Longview MFA - International Paper

Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)	Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)
AV-11					**AV-12**				
5/3/2002	13.1	NM	6.27	NA	5/3/2002	13.1	-101.3	6.15	NA
6/19/02a	NM	NM	NM	NM	6/19/02a	NM	NM	NM	NM
6/19/02p	NM	NM	NM	NM	6/19/02p	NM	NM	NM	NM
6/20/2002	NM	NM	NM	NM	6/20/2002	NM	NM	NM	NM
9/11/2002	16.61	NM	6.36	2.08	9/11/2002	17.62	NM	6.17	3.01
12/2/2002	NA	NA	NA	NA	12/2/2002	17.54	119	5.34	8.76
3/6/2003	14.84	-38	6.14	0.32	3/6/2003	15.52	188	4.97	0.28
6/12/2003	14.9	-34	5.95	0.00	6/12/2003	15.4	159	4.98	8.43
9/10/2003	16.74	39	6.38	6.11	9/10/2003	17.81	231	5.37	10.01
12/11/2003	16.1	-14	6.25	2.08	12/11/2003	17.31	181	5.53	10.05
3/10/2004	14.83	62	6.13	4.90	3/10/2004	15.44	149	4.79	8.43
9/8/2004	17.70	12	6.05	1.23	9/8/2004	18.3	147	5.94	6.87
3/15/2005	14.57	15	6.14	10.15	3/15/2005	15.33	239	5.3	9.72
9/21/2005	16.35	31	5.82	10.32	9/21/2005	17.22	163	5.28	9.30
3/22/2006	15.1	142	5.8	7.50	3/22/2006	15.2	201	5.08	10.80
9/27/2006	17.52	5	7.01	7.39	9/27/2006	18.53	113	6.28	8.65
3/8/2007	14.77	18	6.18	3.10	3/8/2007	13.99	139	6.61	10.71
6/7/2007	NM	NM	NM	NM	6/8/2007	14.9	301	4.53	3.95
9/19/2007	17.5	36	5.89	1.66	9/19/2007	17.8	231	5.24	8.98
12/19/2007	16.57	125	6.23	1.50	12/18/2007	NM	NM	NM	NM
3/25/2008	14.48	159	5.37	1.63	3/26/2008	13.09	258	5.35	10.24
9/23/2008	16.85	34	6.02	0	9/25/2008	17.19	183	5.44	0
3/19/2009	13.97	49	0.00	0.00	3/19/2009	13.65	86	5.35	0.00
9/23/2009	19.13	162	5.30	0.00	9/23/2009	19.99	162	4.93	0.14
3/17/2010	14.9	30	6.33	0.00	3/17/2010	13.2	190	5.64	0.00
9/9/2010	15.1	-13	4.92	3.76	9/9/2010	17.2	118	4.82	1.80
3/9/2011	12.6	-74	7.19	4.74	3/8/2011	13.2	8	5.49	2.25
9/20/2011	11.51	-86	6.87	0.00	9/20/2011	13.68	17	6.49	0.00
3/14/2012	10.08	11	6.13	1.16	3/14/2012	11.25	112	5.76	0.64
9/20/2012	16.8	-73	6.85	0.00	9/19/2012	17.4	10	6.71	0.00
3/14/2013	13.55	-75	6.58	0.47	3/14/2013	13.71	43	6.46	0.80
9/17/2013	17.50	NM	5.18	-0.21	9/18/2013	16.6	NM	4.88	1.11
3/7/2014	4.60	-1	6.19	0.00	3/6/2014	5.61	-154	5.86	0.00
9/30/2014	17.90	-68	6.53	0.00	9/30/2014	18.33	38	6.12	0.00

Table E-1
Biosparging Well Groundwater Monitoring Data Summary
RI\FS Port of Longview MFA - International Paper

Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)	Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)
AV-13					**99-EA3A**				
5/3/2002	13.4	-1	6.21	NA	5/3/2002	14.40	-100.9	6.11	7.57
6/19/02a	NM	NM	NM	NM	9/11/2003	17.07	-56	6.66	4.28
6/19/02p	NM	NM	NM	NM	3/10/2004	17.52	106	6.33	3.29
6/20/2002	NM	NM	NM	NM	9/8/2004	18.7	-57	6.34	2.09
9/11/2002	18.36	NM	6.24	2.26	3/15/2005	17.07	-74	6.41	9.49
12/2/2002	15.71	-67	6.38	0.57	9/21/2005	17.08	-44	5.98	9.74
3/6/2003	15.6	-111	6.47	0.25	3/22/2006	17.05	-60.5	6.23	5.75
6/12/2003	15.6	-65	6.55	0.00	9/27/2006	18.38	-67	7.86	3.99
9/10/2003	16.53	-95	6.87	5.30	3/8/2007	16.16	80	6.32	5.82
12/11/2003	10.77	-91	8.8	3.14	6/8/2007	16.8	-64	6.12	0.00
3/10/2004	15.77	-77	6.32	2.80	9/18/2007	17.9	-112	6.36	0.11
9/8/2004	18.9	-64	5.77	1.84	12/19/2007	14.81	167	6.43	5.96
3/15/2005	15.79	-111	6.54	10.16	3/25/2008	16.38	-62	5.95	0.24
9/21/2005	16.81	-84	6.8	9.34	9/24/2008	17.12	-76	6.44	0
3/22/2006	15.2	-48	6.84	6.3	3/19/2009	14.31	107	6.59	NA
9/27/2006	18.71	-109	8.24	2.49	9/23/2009	20.75	-40	6.08	0.05
3/8/2007	15.11	-119	6.57	2.92	3/16/2010	15.3	-28	6.56	0.00
6/7/2007	NM	NM	NM	NM	9/9/2010	16.3	-82	5.07	1.74
9/18/2007	18.5	-91	6.24	0.11	3/8/2011	15.6	-174	7.89	2.30
12/18/2007	NM	NM	NM	NM	9/20/2011	13.50	-96	7.15	0.00
3/25/2008	14.11	-76	5.90	0.21	3/14/2012	8.69	101	6.38	12.77
9/24/2008	18.36	-72	6.25	0	9/19/2012	16.9	-131	7.11	0.00
3/19/2009	14.00	-113	6.54	NA	3/14/2013	14.27	-76	6.49	0.64
9/23/2009	20.31	-4	5.74	0.00	9/17/2013	19.8	60	5.65	0.39
3/16/2010	14.9	-88	6.37	0.00	3/7/2014	15.59	-38.4	5.92	0.60
9/9/2010	17.6	-89	5.06	2.96	9/30/2014	17.43	-8	6.19	0.00
3/8/2011	14.6	-194	8.21	1.86					
9/20/2011	14.26	-158	7.28	0.00					
3/14/2012	12.26	-121	6.31	0.58					
9/20/2012	17.8	-134	6.86	4.71					
3/14/2013	13.15	-140	6.49	0.42					
9/17/2013	18.10	NM	5.64	0.10					
3/6/2014	6.71	-90	6.42	0.00					
9/30/2014	17.54	-87	6.10	0.00					

Table E-1
Biosparging Well Groundwater Monitoring Data Summary
RI\FS Port of Longview MFA - International Paper

Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)	Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)
97-6B					**04-6A**				
9/11/2003	14.48	-61	7.10	7.46	9/8/2004	16.2	-60	6.24	0.75
9/8/2004	14.70	-62	6.31	1.37	9/21/2005	14.75	-95	6.74	0.00
9/20/2005	13.48	-110	6.9	0.00	9/26/2006	15.87	-142	8.67	0.00
9/26/2006	13.94	-154	8.75	0.00	3/7/2007	13.96	-147	6.92	6.25
3/7/2007	13.75	78	9.20	9.52	6/7/2007	15.0	-95	5.99	0.00
6/7/2007	14.4	-186	7.50	0.10	9/19/2007	15.7	-87	6.08	0.19
9/18/2007	15.1	-133	6.41	0.09	12/19/2007	14.54	-62	6.85	0.99
12/18/2007	13.18	-119	6.85	3.75	3/26/2008	NM	NM	NM	NM
3/26/2008	NM	NM	NM	NM	9/23/2008	14.51	-102	6.58	0
9/22/2008	14.47	-105	5.75	0	3/18/2009	13.44	-118	6.67	1.20
9/23/2009	15.32	9	7.33	0.03	9/23/2009	14.68	49	6.30	0.12
3/17/2010	12.5	229	7.51	2.70	3/17/2010	13.1	-54	6.32	0.00
9/8/2010	14.4	115	4.95	2.42	9/8/2010	15.3	-105	4.76	3.49
3/9/2011	12.6	-92	8.19	6.95	3/9/2011	11.2	-175	8.10	0.80
9/20/2011	11.88	-199	8.29	0.00	9/20/2011	11.52	-175	7.24	0.00
3/14/2012	8.21	-93	7.43	4.49	3/14/2012	9.77	-135	6.33	1.72
9/20/2012	13.9	-86	6.69	0.30	9/20/2012	14.1	-67	6.71	4.38
3/14/2013	12.09	-84	6.53	0.65	3/13/2013	13.47	-145	6.76	1.32
9/18/2013	19.23	-54	6.05	0.28	9/18/2013	15.1	7	5.56	0.53
3/7/2014	4.24	-58	7.04	0.00	3/6/2014	12.88	-99	6.01	0.50
9/30/2014	14.93	-130	7.06	0.00	9/29/2014	14.79	-89	6.29	0.00

Notes:
AV - air vent well
°C - degrees Celsius
MFA - Maintenance Facility Area
mg/L - milligrams per liter
mV - millivolts
NA - not available
NM - not measured
RI/FS - remedial investigation/feasibility study

Table E-2
Bioventing Well Groundwater Monitoring Data Summary
RI/FS Port of Longview MFA - International Paper

Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)	Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)
BV-12					**BV-13**				
6/19/2002	NM	NM	NM	NM	6/19/2002	NM	NM	NM	NM
6/20/2002	NM	NM	NM	NM	6/20/2002	NM	NM	NM	NM
9/11/2002	NM	NM	NM	NM	9/11/2002	NM	NM	NM	NM
12/2/2002	12.74	3.2	6.79	4.17	12/2/2002	14.61	-57.4	6.98	1.61
3/4/2003	NM	NM	NM	NM	3/4/2003	NM	NM	NM	NM
6/12/2003	15.7	99	6.29	1.22	6/12/2003	NM	NM	NM	NM
9/10/2003	NM	NM	NM	NM	9/10/2003	NM	NM	NM	NM
12/11/2003	8.71	196	6.45	12.17	12/11/2003	NM	NM	NM	NM
3/10/2004	NM	NM	NM	NM	3/10/2004	NM	NM	NM	NM
9/20/2005	18.09	162	5.99	4.57	9/20/2005	NM	NM	NM	NM
9/26/2006	NM	NM	NM	NM	9/26/2006	NM	NM	NM	NM
3/8/2007	10.01	226	5.7	11.79	3/8/2007	NM	NM	NM	NM
6/7/2007	NM	NM	NM	NM	6/7/2007	NM	NM	NM	NM
9/19/2007	18.7	2	6.25	7.83	9/20/2007	NM	NM	NM	NM
12/19/2007	NM	NM	NM	NM	12/19/2007	NM	NM	NM	NM
3/26/2008	NM	NM	NM	NM	3/26/2008	NM	NM	NM	NM
9/25/2008	NM	NM	NM	NM	9/25/2008	NM	NM	NM	NM
3/18/2009	NM	NM	NM	NM	3/18/2009	NM	NM	NM	NM
9/23/2009	NM	NM	NM	NM	9/23/2009	NM	NM	NM	NM
3/16/2010	NM	NM	NM	NM	3/16/2010	NM	NM	NM	NM
9/8/2010	NM	NM	NM	NM	9/8/2010	NM	NM	NM	NM
3/8/2011	NM	NM	NM	NM	3/8/2011	NM	NM	NM	NM
9/20/2011	NM	NM	NM	NM	9/20/2011	NM	NM	NM	NM
9/19/2012	NM	NM	NM	NM	9/19/2012	NM	NM	NM	NM
9/17/2013	NM	NM	NM	NM	9/17/2013	NM	NM	NM	NM
9/30/2014	NM	NM	NM	NM	9/30/2014	NM	NM	NM	NM

Table E-2
Bioventing Well Groundwater Monitoring Data Summary
RI/FS Port of Longview MFA - International Paper

Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)	Date	Temperature (°C)	Reduction Oxidation Potential (mV)	pH	Dissolved Oxygen Concentration (mg/L)
BV-14					**BV-15**				
6/19/2002	NM	NM	NM	NM	6/19/2002	NM	NM	NM	NM
6/20/2002	NM	NM	NM	NM	6/20/2002	NM	NM	NM	NM
9/11/2002	NM	NM	NM	NM	9/11/2002	NM	NM	NM	NM
12/2/2002	13.22	-16	7.75	2.51	12/2/2002	14.91	-36	6.67	0.88
3/4/2003	NM	NM	NM	NM	3/4/2003	NM	NM	NM	NM
6/12/2003	NM	NM	NM	NM	6/12/2003	NA	NA	NA	NA
9/10/2003	NM	NM	NM	NM	9/10/2003	NM	NM	NM	NM
12/11/2003	NM	NM	NM	NM	12/11/2003	14.58	150	6.79	3.03
3/10/2004	NM	NM	NM	NM	3/10/2004	NM	NM	NM	NM
9/20/2005	18.04	-10	7.21	4.09	9/20/2005	19.45	-4	6.16	5.15
9/26/2006	NM	NM	NM	NM	9/26/2006	NM	NM	NM	NM
3/8/2007	9.4	159	6.25	12.57	3/8/2007	10.63	242	5.57	7.04
6/7/2007	NM	NM	NM	NM	6/7/2007	NM	NM	NM	NM
9/19/2007	18.5	27	7.90	4.00	9/19/2007	18.9	-132	6.32	3.73
12/19/2007	NM	NM	NM	NM	12/19/2007	NM	NM	NM	NM
3/26/2008	NM	NM	NM	NM	3/26/2008	NM	NM	NM	NM
9/25/2008	NM	NM	NM	NM	9/25/2008	NM	NM	NM	NM
3/18/2009	NM	NM	NM	NM	3/18/2009	NM	NM	NM	NM
9/23/2009	NM	NM	NM	NM	9/23/2009	NM	NM	NM	NM
3/16/2010	NM	NM	NM	NM	3/16/2010	NM	NM	NM	NM
9/8/2010	NM	NM	NM	NM	9/8/2010	NM	NM	NM	NM
3/8/2011	NM	NM	NM	NM	3/8/2011	NM	NM	NM	NM
9/20/2011	NM	NM	NM	NM	9/20/2011	NM	NM	NM	NM
9/19/2012	NM	NM	NM	NM	9/19/2012	NM	NM	NM	NM
9/17/2013	NM	NM	NM	NM	9/17/2013	NM	NM	NM	NM
9/30/2014	NM	NM	NM	NM	9/30/2014	NM	NM	NM	NM

Notes:

Groundwater data for wells BV-1 through BV-11 not collected since 12/03/03 due to system shutdown status. Wells are still inspected biannually for water.

°C - degrees Celsius
MFA - Maintenance Facility Area
mg/L - milligrams per liter
mV - millivolts
NM - not measured
RI/FS - remedial investigation/feasibility study

Table E-3
Biosparging Well Vapor Monitoring Data Summary
RI/FS Port of Longview MFA - International Paper

			Concentration (%V)			Concentration (ppmv)	
Date	Flow[a] (sfm)	Pressure (in H_2O)[b]	Carbon Dioxide	Methane	Oxygen	PID	FID
AV-09							
9/11/2002	NA	NM	0.0	0.1	19.1	5	10
12/2/2002	NA	5.5	NM	NM	NM	NM	NM
3/4/2003	NA	60.0	0.5	0.0	20.7	5.8	NM
6/12/2003	NA	73.0	0.0	0.0	20.1	NA	NA
9/10/2003	NA	0.0	0.6	0.1	8.4	0	NM
12/11/2003	NA	70	0.2	0.0	21.2	0	NM
3/10/2004	NA	41	0.0	0.1	20.6	NA	NM
9/8/2004	NA	42	0.0	0.0	19.8	0	NM
3/15/2005	NA	49	NM	NM	NM	NM	NM
9/20/2005	NA	52.0	0.2	0.0	20.2	NM	NM
9/26/2006	NA	1.0	0.5	1.7	18.3	0	NM
9/19/2007	NA	NM	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/29/2014	NA	NM	NM	NM	NM	NM	NM
AV-10							
9/11/2002	NA	NM	3.5	0.1	12.1	140	460
12/2/2002	NA	22	NM	NM	NM	NM	NM
3/4/2003	NA	25	3.6	0.6	16.6	20	NM
6/12/2003	NA	46	0.8	0.1	18.6	16	NA
9/10/2003	NA	29	1.5	0.0	18.5	160	NM
12/11/2003	NA	35	1.4	1.1	18.1	70	NM
3/10/2004	NA	22	1.2	0.0	19.2	45	NM
9/8/2004	NA	26	1.4	0.0	18.3	110	NM
3/15/2005	NA	36	NM	NM	NM	NM	NM
9/20/2005	NA	8	6.9	0.0	16.1	NM	NM
9/26/2006	NA	0	4.9	0.0	11.2	0	NM
9/19/2007	NA	NM	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM

Table E-3
Biosparging Well Vapor Monitoring Data Summary
RI/FS Port of Longview MFA - International Paper

Date	Flow[a] (sfm)	Pressure (in H_2O)[b]	Concentration (%V) Carbon Dioxide	Concentration (%V) Methane	Concentration (%V) Oxygen	Concentration (ppmv) PID	Concentration (ppmv) FID
AV-11							
9/11/2002	NA	NM	0.1	0.1	18.8	0	27
12/2/2002	NA	NM[c]	NM	NM	NM	NM	NM
3/4/2003	NA	0.00	2.9	0.5	14.3	0.32	NM
6/12/2003	NA	0.00	0.1	0.1	19.4	0.6	NA
9/10/2003	NA	0.05	3.2	4.3	0.0	7.5	NM
12/11/2003	NA	17	3.4	3.3	14.2	0	NM
3/10/2004	NA	18	2.8	1.9	13.1	NA	NM
9/8/2004	NA	3	5.9	8.8	1.0	0	NM
3/15/2005	NA	-3	NM	NM	NM	NM	NM
9/20/2005	NA	1.20	3.0	0.6	11.5	NM	NM
9/26/2006	NA	0.00	1.8	1.4	16.2	0.00	NM
9/19/2007	NA	NM	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM
AV-12							
9/11/2002	NA	NM	0.0	0.1	8.8	0	11
12/2/2002	NA	16.00	NM	NM	NM	NM	NM
3/4/2003	NA	30	5.5	0.6	0.0	0.61	NM
6/12/2003	NA	40	0.0	0.0	19.4	0.09	NA
9/10/2003	NA	20	0.2	0.0	20.0	0	NM
12/11/2003	NA	4.6	0.6	0.2	20.4	0	NM
3/10/2004	NA	23	0.2	0.1	20.5	0.6	NM
9/8/2004	NA	25	0.1	0.0	19.7	0	NM
3/15/2005	NA	27	NM	NM	NM	NM	NM
9/20/2005	NA	28	0.0	0.0	20.8	NM	NM
9/26/2006	NA	0	0.5	0.1	19.6	0.00	NM
9/19/2007	NA	NM	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM

Table E-3
Biosparging Well Vapor Monitoring Data Summary
RI/FS Port of Longview MFA - International Paper

Date	Flow[a] (sfm)	Pressure (in H_2O)[b]	Concentration (%V) Carbon Dioxide	Methane	Oxygen	Concentration (ppmv) PID	FID
AV-13							
9/11/2002	NA	NM	28.6	20.1	0.1	134	FO
12/2/2002	NA	0.00	NM	NM	NM	NM	NM
3/4/2003	NA	0.00	6.0	37.4	0.0	0.2	NM
6/12/2003	NA	1.50	9.2	18.6	3.4	0	NA
9/10/2003	NA	0.00	13.5	4.2	0.0	37	NM
12/11/2003	NA	2.20	13.5	11.0	0.0	3.8	NM
3/10/2004	NA	-6.0	6.0	9.5	8.8	0.6	NM
9/8/2004	NA	0.0	15.1	10.6	0.0	0	NM
3/15/2005	NA	0.0	NM	NM	NM	NM	NM
9/20/2005	NA	0.04	16.4	13.7	3	NM	NM
9/26/2006	NA	0.00	14.3	9.8	3.3	10.50	NM
9/19/2007	NA	NM	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM

Notes:

[a] Minimum detection limit is 5 standard feet per minute
[b] Inches of water column
[c] Forklift parked on well box lid.

%V - percent by volume
FID - flame ionization detector
FO - flame ionization detector flamed out
in H_2O - inches of water column
MFA - Maintenance Facility Area
NA - not available
NM - not measured
PID - photoionization detector
ppmv - parts per million by volume
RI/FS - remedial investigation/feasibility study
sfm - standard feet per minute

Table E-4
Bioventing Well Vapor Monitoring Data Summary
RI/FS Port of Longview MFA - International Paper

Date	Flow[a] (sfm)	Pressure (in H_2O)[b]	Concentration (%V)			Concentration (ppmv)	
			Carbon Dioxide	Methane	Oxygen	PID	FID
BV-12							
9/11/2002	NA	NM	NM	NM	NM	NM	NM
12/2/2002	NA	NM	NM	NM	NM	NM	NM
3/4/2003	NA	NA	NM	NM	NM	NM	NM
6/12/2003	NA	0.1	0	0.0	20.3	NA	NA
9/10/2003	NA	0	NM	NM	NM	NM	NM
12/11/2003	3	8.6	NM	NM	NM	NM	NM
9/8/2004	4	0.44	NM	NM	NM	NM	NM
9/26/2006	NA	0	0.4	0.0	19.7	0	NM
9/19/2007	3.4	3.5	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM
BV-13							
9/11/2002	NA	NM	NM	NM	NM	NM	NM
12/2/2002	NA	NM	NM	NM	NM	NM	NM
3/4/2003	NA	30	NM	NM	NM	NM	NM
6/12/2003	NA	17.5	0	0.0	20.1	NA	NA
9/10/2003	NA	9	NM	NM	NM	NM	NM
12/11/2003	3.5	NM	NM	NM	NM	NM	NM
9/8/2004	5	13	NM	NM	NM	NM	NM
9/26/2006	NA	0	0.4	0.0	20.6	0	NM
9/19/2007	3.1	0	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM

Table E-4
Bioventing Well Vapor Monitoring Data Summary
RI/FS Port of Longview MFA - International Paper

Date	Flow[a] (sfm)	Pressure (in H_2O)[b]	Concentration (%V) Carbon Dioxide	Concentration (%V) Methane	Concentration (%V) Oxygen	Concentration (ppmv) PID	Concentration (ppmv) FID
BV-14							
9/11/2002	NA	NM	NM	NM	NM	NM	NM
12/2/2002	NA	NM	NM	NM	NM	NM	NM
3/4/2003	NA	27	NM	NM	NM	NM	NM
6/12/2003	NA	18	0	0.0	20.1	NA	NA
9/10/2003	NA	9	NM	NM	NM	NM	NM
12/11/2003	5	NM	NM	NM	NM	NM	NM
9/8/2004	6	11	NM	NM	NM	NM	NM
9/26/2006	NA	0	1.5	0.1	17.7	0	NM
9/19/2007	3.2	6.8	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM
BV-15							
9/11/2002	NA	NM	NM	NM	NM	NM	NM
12/2/2002	NA	NM	NM	NM	NM	NM	NM
3/4/2003	NA	27	NM	NM	NM	NM	NM
6/12/2003	NA	NM	NM	NM	NM	NM	NM
9/10/2003	NA	20	NM	NM	NM	NM	NM
12/11/2003	3.5	2.2	NM	NM	NM	NM	NM
9/8/2004	4	NM	NM	NM	NM	NM	NM
9/26/2006	NA	0	0.9	0.0	18.6	0	NM
9/19/2007	4.0	1	NM	NM	NM	NM	NM
9/25/2008	NA	NM	NM	NM	NM	NM	NM
9/23/2009	NA	NM	NM	NM	NM	NM	NM
9/8/2010	NA	NM	NM	NM	NM	NM	NM
9/20/2011	NA	NM	NM	NM	NM	NM	NM
9/19/2012	NA	NM	NM	NM	NM	NM	NM
9/17/2013	NA	NM	NM	NM	NM	NM	NM
9/30/2014	NA	NM	NM	NM	NM	NM	NM

Notes:

[a] Minimum detection limit is 5 standard feet per minute

[b] Inches of water column

%V - percent by volume
FID - flame ionization detector
in H_2O - inches of water column
MFA - Maintenance Facility Area
NA - not available
NM - not measured
PID - photoionization detector
ppmv - parts per million by volume
sfm - standard feet per minute
RI/FS - remedial investigation/feasibility study

Table E-5
Summary of Groundwater Elevations
RI/FS Port of Longview MFA - International Paper

		Depth to Water (ft)[3]												Water Table Elevation (ft)[2]											
Well ID	**MP Elev. (ft)[2]**	**3/19/2009**	**9/22/2009**	**3/16/2010**	**9/8/2010**	**3/9/2011**	**9/21/2011**	**4/26/2012**	**9/19/2012**	**3/13/2013**	**9/18/2013**	**3/6/2014**	**9/29/2014**	**3/19/2009**	**9/22/2009**	**3/16/2010**	**9/8/2010**	**3/9/2011**	**9/21/2011**	**4/26/2012**	**9/19/2012**	**3/13/2013**	**9/18/2013**	**3/6/2014**	**9/29/2014**
04-6.A	16.28	8.81	10.18	10.12	10.42	6.80	10.04	-	-	-	-	-	-	7.47	6.10	6.16	5.86	9.48	6.24	-	-				
04-6.A [5, 7]	16.62	-	-	-	-	-	-	5.17	9.43	8.79	9.49	5.81	9.73	-	-	-	-	-	-	11.45	7.19	7.83	7.13	10.81	6.89
97-1.A	17.02	-	10.94	11.13	12.19	7.29	11.55	5.87	10.17	10.35	11.19	-	-	-	6.08	5.89	4.83	9.73	5.47	11.15	6.85	6.67	5.83	-	-
97-1.A [7]	17.15	-	-	-	-	-	-	-	-	-	-	6.41	10.33	-	-	-	-	-	-	-	-	-	-	10.74	6.82
97-3.A	20.40	12.74	-	-	-	-	-	-	-	-	-	-	-	7.66	-	-	-	-	-	-	-	-	-	-	-
97-3.A [4]	22.68		16.34	16.28	16.47	12.55	16.07	10.68	15.26	14.60	15.30				6.34	6.40	6.21	10.13	6.61	12.00	7.42	8.08	7.38	22.68	22.68
97-3.A [7]	22.55	-	-	-	-	-	-	-	-	-	-	12.21	15.56	-	-	-	-	-	-	-	-	-	-	10.34	6.99
97-5.A	18.97	11.32	12.39	12.25	12.67	9.19	12.55	7.38	11.72	11.14	11.80	-	-	7.65	6.58	6.72	6.30	9.78	6.42	11.59	7.25	7.83	7.17	-	-
97-5.A [7]	19.09	-	-	-	-	-	-	-	-	-	-	8.07	12.15	-	-	-	-	-	-	-	-	-	-	11.02	6.94
97-6.B	16.01	8.51	9.47	9.80	NM	6.51	NM	-	-	-	-	-	-	7.50	6.54	6.21	NA	9.50	NA	-	-	-	-	-	-
97-6.B [5]	16.16	-	-	-	-	-	-	4.78	8.73	8.30	8.81	-	-	-	-	-	-	-	-	11.38	7.43	7.86	7.35	-	-
97-6.B [7]	16.15	-	-	-	-	-	-	-	-	-	-	5.46	9.42	-	-	-	-	-	-	-	-	-	-	10.69	6.73
99EA-3A [5]	17.83	10.26	11.76	11.78	12.11	8.35	11.39	6.95	11.17	10.36	11.18			7.57	6.07	6.05	5.72	9.48	6.44	10.88	6.66	7.47	6.65	-	-
99EA-3A [7]	17.93	-	-	-	-	-	-	-	-	-	-	7.82	11.22	-	-	-	-	-	-	-	-	-	-	10.11	6.71
AV-01	20.57	13.20	14.46	14.60	14.71	11.22	14.13	9.50	13.74	13.12	13.83	-	-	7.37	6.11	5.97	5.86	9.35	6.44	11.07	6.83	7.45	6.74	-	-
AV-01 [7]	20.68	-	-	-	-	-	-	-	-	-	-	10.25	13.84	-	-	-	-	-	-	-	-	-	-	10.43	6.84
AV-02	25.51	18.12	19.38	19.54	NM	16.20	19.03	14.42	18.69	18.03	18.80	-	-	7.39	6.13	5.97	NA	9.31	6.48	11.09	6.82	7.48	6.71	-	-
AV-02 [7]	25.58	-	-	-	-	-	-	-	-	-	-	15.19	18.79	-	-	-	-	-	-	-	-	-	-	10.39	6.79
AV-06	NA	18.07	19.30	19.57	NM	16.23	18.86	14.41	18.72	18.08	18.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AV-06 [7]	25.47	-	-	-	-	-	-	-	-	-	-	15.27	18.76	-	-	-	-	-	-	-	-	-	-	10.20	6.71
AV-08	21.35	13.98	15.20	15.41	15.54	12.02	14.93	10.25	14.54	13.90	14.65	-	-	7.37	6.15	5.94	5.81	9.33	6.42	11.10	6.81	7.45	6.70	-	-
AV-08 [7]	21.42	-	-	-	-	-	-	-	-	-	-	11.03	14.67	-	-	-	-	-	-	-	-	-	-	10.39	6.75
AV-09 [5]	18.65	10.98	12.26	12.17	12.51	8.90	12.21	7.26	11.57	10.94	11.59	-	-	7.67	6.39	6.48	6.14	9.75	6.44	11.39	7.08	7.71	7.06	-	-
AV-09 [7]	18.75	-	-	-	-	-	-	-	-	-	-	8.94	11.86	-	-	-	-	-	-	-	-	-	-	9.81	6.89
AV-10 [5]	16.58	8.95	10.49	10.37	10.78	7.00	10.11	5.45	9.82	8.98	9.87	-	-	7.63	6.09	6.21	5.80	9.58	6.47	11.13	6.76	7.60	6.71	-	-
AV-10 [7]	16.74	-	-	-	-	-	-	-	-	-	-	6.28	9.87	-	-	-	-	-	-	-	-	-	-	10.46	6.87
AV-11 [5]	15.68	8.11	9.52	9.30	9.74	6.15	9.30	4.50	8.81	8.05	8.88	-	-	7.57	6.16	6.38	5.94	9.53	6.38	11.18	6.87	7.63	6.80	-	-
AV-11 [7]	15.88	-	-	-	-	-	-	-	-	-	-	5.31	9.02	-	-	-	-	-	-	-	-	-	-	10.57	6.86
AV-12 [5]	16.64	8.96	10.50	10.37	10.80	7.29	10.19	5.55	9.87	9.05	-	-	-	7.68	6.14	6.27	5.84	9.35	6.45	11.09	6.77	7.59	-	-	-
AV-12 [6]	17.23	-	-	-	-	-	-	-	-	-	10.54	-	-	-	-	-	-	-	-	-	-	-	6.69	-	-
AV-12 [7]	17.45	-	-	-	-	-	-	-	-	-	-	7.06	10.60	-	-	-	-	-	-	-	-	-	-	10.39	6.85
AV-13 [5]	17.32	10.18	NM	11.09	11.52	7.90	10.83	6.55	10.70	9.83	10.71	-	-	-	NA	6.23	5.80	9.42	6.49	10.77	6.62	7.49	6.61	-	-
AV-13 [7]	17.42	-	-	-	-	-	-	-	-	-	-	7.62	10.66	-	-	-	-	-	-	-	-	-	-	9.80	6.76
LL 01.15	16.83	9.09	-	-	-	-	-	-	-	-	-	-	-	7.74	-	-	-	-	-	-	-	-	-	-	-
LL 01.15 [4]	24.87	-	20.52	18.15	18.26	14.80	18.26	12.72	17.08	16.69	17.27	-	-	-	4.35	6.72	6.61	10.07	6.61	12.15	7.79	8.18	7.60	-	-
LL 01.15 [7]	24.88	-	-	-	-	-	-	-	-	-	-	13.37	17.73	-	-	-	-	-	-	-	-	-	-	11.51	7.15

Notes:

[1] Relative to State Planar Coordinate System

[2] MP and water table elevations in feet (NAVD 1988).

[3] Depth to water expressed in feet below MP.

[4] Well completions reconfigured during site grading and resurveyed (Hagedorn) approximately September 8, 2009.

[5] Resurveyed February 2012

[6] Resurveyed September 2013

[7] Resurveyed October 2014

ft- feet
ID - identification
MFA - Maintenance Facility Area
MP - measuring point
NA - not available
NAVD - North American Vertical Datum
NM - not measured
RI/FS - remedial investigation/feasibility study

Appendix F

Groundwater Sampling Logs – 2008/2009

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	CLEAR/ CLOUDY
Date:	9/22/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	97-1A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	GOOD			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOMONUMENT	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.90	Elevation:		One Purge Volume:	
Depth to Bottom:	21.95	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAH-8270	AMBER	2	
NWTPH-Dx	↓	1	

Meter Information

Model & Calibration Date

pH:

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	97-1A
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	17'
Pump Intake Depth:	

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.01	26.4	263.0	1.41	13.53	127	1341	10.91	
	4.82	26.6	59.9	0.25	13.65	128	1344	10.92	
	4.79	26.6	23.5	0	13.65	127	1347	10.96	
	4.78	26.7	17.7	0	13.62	125	1350	10.96	
	4.77	26.7	18.1	0	13.57	125	1353	10.96	
	4.77	26.7	16.3	0	13.55	125	1356	10.97	
	4.75	26.6	17.3	0	13.47	124	1359	10.97	
	4.75	26.5	29.6	0	13.44	124	1403	10.98	

Comments

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	~~Sunny~~ RAINING ☹
Date:	9/22/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	97-3A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	GOOD			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOMONUMENT	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	14.39	Elevation:		One Purge Volume:	
Depth to Bottom:	24.35	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	AMBER	2 L	
NWTPH-Dx	↓	1 500ML	

Meter Information

Model & Calibration Date

pH:
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: 97-3A
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 19.35
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.39	44.8	65.1	1.95	13.69	-67	1425	14.46	
	5.37	44.6	6.8	0.37	13.44	-80	1428	14.48	
	5.33	44.6	3.5	0	13.41	-85	1432	14.39	
	5.30	44.5	4.0	0	13.29	-87	1435	14.39	
	5.30	44.2	2.9	0	13.12	-90	1439	14.39	
	5.31	44.4	4.7	0	12.94	-91	1442	14.38	
	5.35	44.3	3.2	0	12.90	-94	1445	14.38	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	SUNNY
Date:	9/22/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	LL-01.15			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	GOOD			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	11.09	Elevation:		One Purge Volume:	
Depth to Bottom:	16.75	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHS	AMBER	2 L	
NWTPH-DX	↓	500 ML	

Meter Information

Model & Calibration Date

pH:

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	LL-01.15
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	14'
Pump Intake Depth:	

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.51	27.0	62.2	1.40	12.83	-58	1521	11.10	
	5.36	27.1	38.5	0	12.39	-57	1524	11.13	
	5.19	26.8	30.5	0	12.25	-52	1527	11.14	
	5.10	26.4	15.5	0	12.19	-48	1530	11.14	
	5.03	26.4	14.1	0	12.16	-46	1533	11.15	
	4.99	26.3	13.2	0	12.16	-44	1536	11.15	
	4.96	26.5	12.6	0	12.12	-44	1539	11.15	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Sunny
Date:	9/22/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	97-5A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	13.15	Elevation:		One Purge Volume:	
Depth to Bottom:	24.80	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAH	AMBER	2 L	
DIESEL	↓	500 ML	

Meter Information

Model & Calibration Date

pH:

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	97-5A
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	20'
Pump Intake Depth:	

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.60	24.2	71.4	2.64	14.59	-27	1647	13.15	
	5.67	24.3	51.3	6.56	14.73	-44	1650	13.15	
	5.68	24.9	35.3	0.17	14.17	-54	1653	13.15	
	5.67	25.7	29.7	0	14.05	-58	1656	13.16	
	5.67	26.5	27.6	0	14.04	-65	1700	13.16	
	5.67	27.0	26.9	0	14.04	-71	1703	13.15	
	5.67	27.8	18.2	0	13.97	-77	1706	13.16	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	~~33761076~~	Weather:	CLEAR
Date:	9/22/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	97-6B			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	GOOD			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.35	Elevation:		One Purge Volume:	
Depth to Bottom:	59.72	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
NWTPH-Dx	AMBER	500 mL	
PAH	↓	2L	

Meter Information

Model & Calibration Date

pH:

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	97-6B
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	55
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.95	47.4	38.3	4.16	15.15	-78	1741	10.29	–
	5.84	47.3	12.1	0	14.69	-99	1744	10.28	
	5.83	47.2	14.0	0	14.58	-102	1747	10.27	
	5.81	47.2	16.5	0	14.56	-103	1750	10.26	
	5.79	47.3	22.9	0	14.52	-104	1753	10.25	
	5.77	46.8	11.0	0	14.48	-105	1756	10.24	
	5.75	46.7	12.0	0	14.47	-105	1759	10.23	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	CLEAR
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	04-6A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	GOOD			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.81	Elevation:		One Purge Volume:	
Depth to Bottom:	35.10	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	AMBER	2 L	

Meter Information

Model & Calibration Date

pH:	HORIBA U22 9/23/08
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	04-6A
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	25
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	97-6C
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.19	46.3	15.9	3.81	14.46	-55	0857	10.80	
	6.36	46.3	22.7	0.01	14.53	-82	0900	10.81	
	6.43	46.4	29.3	0	14.52	-89	0903	10.80	
	6.46	46.3	30.9	0	14.51	-93	0906	10.80	
	6.51	46.3	20.5	0	14.49	-96	0909	10.80	
	6.55	46.2	18.9	0	14.49	-99	0912	10.80	
	6.57	46.2	19.4	0	14.49	-101	0915	10.80	
	6.58	46.2	23.8	0	14.51	-102	0918	10.80	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Clouds
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-08			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	15.34	Elevation:		One Purge Volume:	
Depth to Bottom:	19.10	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHS	AMBER	2 L	
	↓	500 ML	
HTC		100 ML	
HDB		100 ML	
NO_2, NO_3, TOC			

Meter Information

	Model & Calibration Date
pH:	Horiba U22 9/23/08
Eh:	↓
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	AV-08
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.86	0.109	109.0	0.73	12.88	27	1015	15.34	
	5.87	0.109	87.4	0.72	12.91	27	1018	15.33	
	5.86	0.109	56.6	0.27	12.87	28	1021	15.33	
	5.90	0.109	55.6	0.41	12.90	28	1024	15.33	
	5.84	0.109	53.2	0.60	12.98	29	1027	15.33	
	5.83	0.109	49.5	0.82	12.93	30	1030	—	
	5.82	0.110	39.5	0.99	12.94	31	1035	15.37	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

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Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Sunny, 60°
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-02			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good (contained hornet nest)			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	19.44	Elevation:		One Purge Volume:	
Depth to Bottom:	23.36	Feet of Water:	3.82	Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs (8270C)	1 L Amber	1	—
NWTPH - Dx	500 ml Amber	1	—
HTC & HDB	100 ml	2	-
N, TPhos, SO4, TOC			

Meter Information

Model & Calibration Date

pH: Horiba U-22 9/23/08

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	AV-02
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	21'
Pump Intake Depth:	—

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.32	0.095	6.4	2.87	13.62	-69	1124	19.46	
	6.34	0.095	4.9	1.73	13.53	-76	1127	19.47	
	6.37	0.094	6.2	0.76	13.51	-83	1130	19.47	
	6.36	0.094	7.1	0.84	13.51	-83	1133	19.47	
	6.38	0.094	7.0	1.03	13.49	-85	1136	19.46	
	6.38	0.094	8.2	1.01	13.49	-86	1140	—	
	6.38	0.094	15.2	1.07	13.49	-87	1143	19.46	
	6.38	0.094	12.5	1.15	13.61	-88	1146	—	
	6.39	0.094	9.0	1.23	13.64	-89	1149	19.46	
	6.39	0.094	12.0	1.29	13.62	-89	1152	19.46	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

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Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Sunny 65°
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-02			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	9.71	Elevation:	–	One Purge Volume:	
Depth to Bottom:	23.90	Feet of Water:	14.19	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs 8270C	1L Amber	1	–
NWTPH-Dx	500 ml Amber	1	–
[illegible]	[illegible]	2	
[illegible]			

Meter Information

Model & Calibration Date

pH: Horiba V-22 9/22/08

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	TMW-2
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	20'
Pump Intake Depth:	–

Field Test Kit Results:

PID:

DO:

Alkalinity:

~~Ferrous Iron:~~

~~Other:~~

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

~~Blank:~~

~~Other:~~

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.45	49.1	7.5	2.65	19.62	-116	1313	9.71	–
	6.52	48.3	7.7	0.65	19.68	-119	1316	9.71	
	6.54	48.1	12.8	0.20	19.60	-122	1319	–	
	6.55	47.9	11.1	0.16	19.54	-124	1322	9.72	
	6.56	47.8	11.6	0	19.52	-125	1325	9.71	
	6.56	47.7	13.3	0	19.51	-126	1328	9.71	
	6.57	47.5	12.7	0	19.50	-127	1331	9.71	
	6.57	47.3	10.5	0	19.51	128	1334	9.71	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	CLEAR
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-09			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	GOOD			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	12.61	Elevation:	–	One Purge Volume:	
Depth to Bottom:	19.20	Feet of Water:	6.59	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs (8270C)			
NWTPH-Dx			
HOB HPC			
SO_4			
NO_3, NO_2, PHOS			
			—

Meter Information

	Model & Calibration Date
pH:	Horibc U-22 9/23/08
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	AV-09
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	16'
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.03	58.9	8.7	2.64	17.26	200	1308	12.65	–
	4.75	58.8	7.5	0.13	17.08	261	1311	–	
	4.67	58.9	5.9	0	17.11	287	1315	–	
	4.63	58.9	6.8	0	17.20	301	1319	12.67	
	4.56	59.0	2.0	0	17.21	309	1322	—	
	4.60	59.0	4.2	0	17.16	312	1325	12.67	
	4.63	59.2	2.2	0	17.23	315	1328	—	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

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Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Partly cloudy, 65°
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	99EA-3A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:				Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	—	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	11.81	Elevation:	—	One Purge Volume:	
Depth to Bottom:	20.45	Feet of Water:	8.64	Final Purge Volume:	
Depth to LNAPL:	—	Thickness:	—	Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs (8270c)	1L amber	2	—
NWTPH-Dx	500ml amber	1	—
Conventionals	—		

Meter Information

Model & Calibration Date

pH: Horiba U-22 9/23/08

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	99EA-3A
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	16'
Pump Intake Depth:	

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.96	28.9	175.0	4.76	18.73	-15	1528	11.84	
	6.29	31.4	79.6	0.16	17.88	-50	1531	11.85	
	6.34	32.3	45.5	0.01	17.90	-55	1534	11.84	
	6.36	32.4	26.0	0	18.08	-60	1537	—	
	6.38	32.7	13.6	0	18.35	-67	1541	11.83	
	6.39	32.6	14.1	0	18.91	-70	1545	11.83	← Realized pump/
	6.40	33.6	9.0	0	17.61	-76	1548	11.85	battery had stopped.
	6.41	34.5	3.4	0	17.66	-80	1551	11.85	
	6.43	34.7	7.1	0	17.76	-85	1554	11.85	

Comments

A portion of the well casing is broken (~ 1 inch from TOC and down) that allows surface water infiltration.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

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Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-11			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	—	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	9.80	Elevation:	-	One Purge Volume:	
Depth to Bottom:	15.15	Feet of Water:	5.35	Final Purge Volume:	
Depth to LNAPL:	—	Thickness:	-	Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs (8270c)	1L amber	2	—
NWTPH-Dx	500 ml amber	1	—
Conventionals			—

Meter Information

Model & Calibration Date

pH: Horiba U-22 9/23/08

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	AV-11
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	12'
Pump Intake Depth:	

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.25	27.1	5.7	3.52	17.67	20	1629	9.84	-
	6.02	23.4	1.5	0.07	16.96	31	1633	9.86	
	6.01	23.2	0.7	0	16.91	35	1636	9.86	
	6.00	23.2	3.2	0	16.90	38	1639	9.86	
	6.01	22.9	1.1	0	16.88	37	1642	—	
	6.02	23.0	4.9	0	16.90	35	1645	9.86	
	6.02	23.0	2.9	0	16.85	34	1648	9.86	

Comments

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	CLOUDS
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-05			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.41	Elevation:		One Purge Volume:	
Depth to Bottom:	19.59	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAH's	AMBER	2 L	
NWTPH-Dx	↓	500 ML	

Meter Information

Model & Calibration Date

pH: HORIBA U22 9/23/08
Eh:
Conductivity:
DO Meter:
Turbidity: ✓
Temperature:
Other:

Sampling Data

Sample Name: TMW-05
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 14'
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.36	16.7	31.9	0.71	19.18	164	1709	10.43	
	5.20	17.4	16.8	0.06	19.04	193	1712	10.43	
	5.19	17.2	13.4	0	19.00	204	1715	10.45	
	5.19	17.4	7.7	0	19.00	209	1718	10.45	
	5.20	17.8	8.1	0	18.98	212	1721	10.45	
	5.20	17.6	2.9	0	18.96	214	1724	10.45	
	5.21	17.9	2.8	0	18.93	215	1727		

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

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Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Clouds
Date:	9/23/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-04			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.02	Elevation:		One Purge Volume:	
Depth to Bottom:	22.75	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAH's	〃	2L	
NUTROX	Amber	500 ML	

Meter Information

	Model & Calibration Date
pH:	Horiba U22 9/23/08
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	TMW-04
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	16
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.06	40.1	43.5	0.21	16.42	-35	1740	10.04	
	6.18	40.1	55.1	0	16.32	-54	1743	–	
	6.22	40.0	43.2	0	16.25	-63	1746	–	
	6.36	40.0	33.6	0	16.16	-76	1749	10.04	
	6.39	39.9	29.0	0	16.15	-80	1752	–	
	6.41	40.1	28.4	0	16.14	-82	1755	–	
	6.42	40.1	27.2	0	16.13	-83	1758	10.04	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Partly cloudy 60°
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-02			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	9.99	Elevation:	–	One Purge Volume:	
Depth to Bottom:	23.90	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
Metals, Total		1	–
VOCs (8260B)	VOAs	3	
NWTPH-Dx		1	

Meter Information

Model & Calibration Date

pH: 9/23/08 / Horiba U-22

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	TMW-02
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	17'
Pump Intake Depth:	–

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.31	50.0	17.2	1.12	18.47	-71	0840	10.02	
	6.45	48.8	7.3	0.07	19.13	-98	0843	10.02	
	6.52	48.3	7.4	0	19.20	-109	0846	–	
	6.56	47.6	10.6	0	19.19	-114	0849	10.02	
	6.57	47.5	10.0	0	19.18	-117	0852	–	
	6.59	47.0	7.0	0	19.17	-119	0855	10.02	
	6.59	47.1	12.7	0	19.15	-121	0858	–	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

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Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	99EA 2A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	BADLY RUSTED BOLTS			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.89	Elevation:	–	One Purge Volume:	
Depth to Bottom:	18.99	Feet of Water:	8.10	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	
Dx	↓	2	
PCBs		1	
Pesticides		1	
Metals	500ml poly	1	
VOCs	VOAs	3	

Meter Information

	Model & Calibration Date
pH:	9/24/08 Horiba U-22
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	99EA2A
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	15'
Pump Intake Depth:	–

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.88	33.9	140.0	5.31	16.58	5	1040	11.07	
	6.30	33.3	47.3	0.19	15.98	-81	1043	11.04	
	6.37	33.9	130.0	0	15.76	-95	1046	11.04	
	6.41	33.0	48.6	0	15.66	-102	1049	–	
	6.42	32.9	26.5	0	15.67	-106	1052	11.02	
	6.43	32.8	24.0	0	15.66	-107	1055	–	
	6.44	32.7	13.9	0	15.65	-109	1058	11.00	

Comments

1 of 3 screws on monument lid won't come out, Used wood block to partially keep open while sampling.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Clouds
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	99EA 1A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.55	Elevation:	–	One Purge Volume:	
Depth to Bottom:	19.70	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty

Meter Information

Model & Calibration Date

pH: 9/24/08 Horiba U.22

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	99EA 1A
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	15
Pump Intake Depth:	–

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.52	21.0	19.9	2.35	15.31	-78	1129	10.58	
	6.57	22.5	34.0	0.15	14.84	-106	1132	10.57	
	6.57	25.7	25.4	0	14.68	-113	1135	–	
	6.57	26.8	45.3	0	14.62	-118	1138	10.57	
	6.56	26.9	27.6	0	14.59	-122	1141	10.57	
	6.52	27.0	12.5	0	14.55	-121	1144	10.57	
	6.48	27.0	17.8	0	14.54	-121	1147	–	
	6.49	26.9	13.5	0	14.55	-120	1150	10.57	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Clouds
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	99EA3A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	11.86	Elevation:		One Purge Volume:	
Depth to Bottom:	20.45	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
NWTPH-DX	Amber	500 ml	
PCB Pesticides	↓	2L	
METALS	500 ml		
VOC	VOA	150 ml	

Meter Information

	Model & Calibration Date
pH:	Horiba U22 9/24/08
Eh:	↓
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name: 99EA3A
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 15'
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.31	30.4	27.3	0.90	17.49	-30	1211	11.88	
	6.40	31.5	17.9	0	17.23	-56	1214	11.89	
	6.42	32	21.7	0	17.17	-64	1217	11.88	
	6.43	31.8	12.9	0	17.12	-72	1220	11.88	
	6.45	31.6	13.6	0	17.12	-73	1223	11.89	
	6.44	31.5	17.2	0	17.12	-75	1226	11.89	
	6.44	31.3	14.7	0	17.12	-76	1229	11.89	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-07			Screen Interval:	–
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	12.60	Elevation:	–	One Purge Volume:	
Depth to Bottom:	24.27	Feet of Water:	11.67	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1 L amber	2	–
Dx	500 ml amber	2	–

Meter Information

Model & Calibration Date

pH: 9/24/08 Horiba U-22

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	18'
Pump Intake Depth:	

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.27	25.5	23.8	10.05	15.60	9	1346	13.60	
	6.48	25.9	42.3	0.39	15.09	-56	1349	–	
	6.54	25.8	39.5	0.03	15.01	-69	1352	13.60	
	6.56	25.7	70.0	0	14.99	-78	1355	–	
	6.57	25.6	101.0	0	14.95	-83	1358	13.60	
	6.56	25.6	111.0	0	14.94	-85	1401	–	
	6.55	25.3	139.0	0	14.93	-86	1404	13.60	

Comments

Sampled at 1415.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy 60°
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-13			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	11.27	Elevation:	–	One Purge Volume:	
Depth to Bottom:	15.08	Feet of Water:	2.81	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	Dup ~~MS/MSD~~ Qty
PAHs	1L amber	2	2
Dx	500 ml amber	2	2
Conventionals	varies	3	3

Meter Information

	Model & Calibration Date
pH:	Horiba U-22 9/24/08
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	AV-13 & AV-14 (DUP)
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	13'
Pump Intake Depth:	—

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	✓
Replicate:	–
MS/MSD:	–
Blank:	–
Other:	–

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.34	79.3	15.0	8.57	18.69	-2	1421	11.38	
	6.22	84.7	22.1	1.19	18.39	-53	1424	11.37	
	6.24	84.1	16.4	0.20	18.39	-62	1427	–	
	6.24	84.6	7.2	0	18.39	-66	1430	11.37	
	6.25	84.9	9.6	0	18.38	-70	1433	11.37	
	6.25	84.7	7.2	0	18.36	-72	1436	–	
	6.25	84.6	5.7	0	18.36	-72	1439	11.37	

Comments

Sampled at 1445

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy 55°
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-08	Screen Interval:	
Station Type:	Monitoring Well	Well Diameter:	2" Annulus Dia.:
Well Condition:	NEW	Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC Elevation: -	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.75 Elevation: -	One Purge Volume:	
Depth to Bottom:	24.85 Feet of Water: 14.10	Final Purge Volume:	
Depth to LNAPL:	- Thickness: -	Purge Method:	
LNAPL Description:	-	Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHS	1 L amber	2	-
NWTPH-Dx	500 ml amber	2	-

Meter Information

Model & Calibration Date

pH: HORIBA U22 9/24/08
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-08
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 14.8
Pump Intake Depth: -

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.48	14.5	57.2	6.49	15.86	-13	1508	10.77	
	6.61	14.0	34.0	0.28	15.65	-48	1511	10.78	
	6.66	13.9	30.7	0	15.63	-64	1514	-	
	6.69	13.8	20.7	0	15.63	-72	1517	10.78	
	6.70	13.8	16.7	0	15.63	-78	1520	-	
	6.71	13.8	11.0	0	15.62	-83	1523	10.78	
	6.72	13.8	15.8	0	15.64	-85	1526	-	

Comments

Sampled at 1530

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy 60°
Date:	9/24/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-09			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	NEW			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	11.48	Elevation:	–	One Purge Volume:	
Depth to Bottom:	25.30	Feet of Water:	13.82	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	–
NWTPH-Dx	500 ml amber	2	–

Meter Information

Model & Calibration Date

pH: Horiba U-22 9/24/08

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name: TMW-09

Sample Method: Low Flow

Sampling Device: Geopump

Tubing Depth: 20

Pump Intake Depth: –

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.23	30.9	25.9	4.89	17.34	12	1538	11.50	–
	6.03	31.0	24.5	0.01	17.20	21	1541	11.51	
	6.01	31.1	32.3	0	17.21	22	1544	–	
	6.00	31.0	24.8	0	17.22	22	1547	11.51	
	5.99	31.0	25.8	0	17.18	22	1550	–	
	5.98	31.0	29.0	0	17.16	22	1553	11.51	
	5.98	30.9	28.7	0	17.17	22	1556	11.51	

Comments

Sampled at 1600.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name: IP Longview
Project/Task No.: 33761076
Date: 9/24/08
Location: Longview, WA
Weather: Partly cloudy, 60°
Samplers: JTM and IPV

Gauging and Purging Data

Station Number: TMW-10
Station Type: Monitoring Well
Well Condition: NEW
Reference Point: TOC
Elevation: –
Depth to Water: 12.01
Elevation: –
Depth to Bottom: 24.25
Feet of Water: 12.24
Depth to LNAPL: –
Thickness: –
LNAPL Description: –
Screen Interval:
Well Diameter: 2"
Annulus Dia.:
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
One Purge Volume:
Final Purge Volume:
Purge Method:
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	–
NWTPH-Dx	500ml amber	2	–

Meter Information

Model & Calibration Date
pH: Horiba U22 9/24/08
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-10
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 18'
Pump Intake Depth: –

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.27	32.5	83.7	4.63	16.99	-21	1610	12.00	
	6.45	31.5	172.0	0.17	16.42	-56	1613	12.00	
	6.54	29.5	56.2	0	16.34	-72	1616	—	
	6.52	29.0	61.4	0	16.31	-77	1619	12.00	
	6.60	28.2	61.1	0	16.26	-83	1622	–	
	6.61	28.4	61.6	0	16.25	-85	1625	12.00	
	6.61	28.2	52.3	0	16.26	-86	1628	12.00	

Comments

Sampled at 1630.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name: IP Longview
Project/Task No.: 33761076
Date: 9/24/08
Location: Longview, WA
Weather: Sun / Clouds
Samplers: JTM and IPV

Gauging and Purging Data

Station Number: TMW-11
Station Type: Monitoring Well
Well Condition: New
Reference Point: TOC
Elevation: –
Depth to Water: 10.63
Elevation: –
Depth to Bottom: 21.40
Feet of Water: 10.77
Depth to LNAPL: –
Thickness: –
LNAPL Description: –
Screen Interval:
Well Diameter: 2"
Annulus Dia.:
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
One Purge Volume:
Final Purge Volume:
Purge Method:
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	–
NWTPH-Dx	500 ml amber	2	–

Meter Information

Model & Calibration Date
pH: Horiba U22 9/24/08
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-11
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 16
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.45	21.3	10.1	2.18	15.66	-44	1644	10.65	-
	6.52	22.2	12.9	0	15.00	-75	1647	10.65	
	6.53	22.7	24.8	0	14.80	-82	1650	–	
	6.54	22.9	29.9	0	14.70	-86	1653	10.65	
	6.54	23.1	34.0	0	14.65	-89	1656	–	
	6.52	23.2	32.2	0	14.58	-92	1659	–	
	6.53	23.2	29.1	0	14.58	-93	1702	10.65	

Comments

Sampled at 1715.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Partly Cloudy 55°
Date:	9/25/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-01			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	4" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	-	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	14.50	Elevation:	-	One Purge Volume:	
Depth to Bottom:	19.90	Feet of Water:	5.40	Final Purge Volume:	
Depth to LNAPL:	-	Thickness:	-	Purge Method:	
LNAPL Description:	-			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	-
Dx	500ml amber	2	-
Conventionals	varies	4	-

Meter Information

Model & Calibration Date

pH: Horiba U-22 9/24/08

Eh:

Conductivity:

DO Meter:

Turbidity:

Temperature:

Other:

Sampling Data

Sample Name:	AV-01
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	18'
Pump Intake Depth:	-

Field Test Kit Results:

PID:

DO:

Alkalinity:

Ferrous Iron:

Other:

QA/QC Samples:

Duplicate:

Replicate:

MS/MSD:

Blank:

Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.22	87.6	83.0	3.36	13.64	-186	0820	14.95	-
	6.35	89.0	54.2	0	13.45	125	0823	15.00	
	6.40	91.8	51.7	0	13.50	74	0826	14.94	
	6.38	93.6	71.9	0	13.56	48	0829	14.93	
	6.37	94.8	47.8	0	13.52	33	0832	14.93	
	6.35	96.8	57.9	0	13.47	16	0835	-	
	6.33	98.4	44.6	0	13.47	4	0838	14.93	

Comments

Sampled at 0845.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of 1

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Partly cloudy, 55°
Date:	9/25/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-12			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.72	Elevation:	–	One Purge Volume:	
Depth to Bottom:	14.80	Feet of Water:	4.08	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	–
Dx	500 ml amber	2	–
Conventionals	varies	4	–

Meter Information

Model & Calibration Date

pH: 9/24/08 Horiba U-22
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name:	AV-12
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	13'
Pump Intake Depth:	–

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.45	9.0	8.5	4.05	17.14	81	0920	10.93	
	5.72	8.6	9.2	0.06	17.22	117	0923	10.95	
	5.56	8.4	5.2	0	17.21	136	0926	10.96	
	5.50	8.1	6.3	0	17.22	152	0929	10.96	
	5.46	8.0	20.3	0	17.21	169	0932	10.96	
	5.43	7.9	5.0	0	17.20	181	0935	–	
	5.44	7.9	6.1	0	17.19	183	0938	10.96	

Comments

Sampled at 0950.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Partly Cloudy, 55°
Date:	9/25/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	AV-10			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	-	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.60	Elevation:	-	One Purge Volume:	
Depth to Bottom:	15.10	Feet of Water:	4.50	Final Purge Volume:	
Depth to LNAPL:	-	Thickness:	-	Purge Method:	
LNAPL Description:	-			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	-
Dx	500 ml amber	2	-
Conventionals	varies	4	-

Meter Information

	Model & Calibration Date
pH:	Horiba U-22 9/24/08
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	AV-10
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	13
Pump Intake Depth:	-

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.11	59.8	81.2	6.66	18.18	-4	1001	11.44	
	6.53	60.5	81.6	0.08	18.28	-105	1004	11.45	
	6.61	59.4	86.1	0	18.21	-121	1007	11.53	
	6.64	58.3	73.8	0	18.21	-125	1010	11.51	
	6.64	57.4	82.8	0	18.25	-125	1013	11.50	
	6.63	56.8	68.9	0	18.22	-124	1016	11.50	
	6.63	56.6	55.9	0	18.21	-125	1019	11.50	

Comments

Sampled at 1031.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy. 55°
Date:	9/25/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-06			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.35	Elevation:	–	One Purge Volume:	
Depth to Bottom:	22.85	Feet of Water:	12.50	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAHs	1L amber	2	–
Dx	500 ml amber	2	–

Meter Information

Model & Calibration Date

pH: 9/24/08 Horiba U-22
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name:	TMW-06
Sample Method:	Low Flow
Sampling Device:	Geopump
Tubing Depth:	16.5
Pump Intake Depth:	–

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.34	19.9	53.3	4.48	17.39	34	1100	10.34	
	6.20	19.6	51.0	0.15	16.61	31	1103	10.34	
	6.18	19.7	56.2	0	16.42	31	1106	10.33	
	6.17	19.8	44.8	0	16.26	30	1109	10.33	
	6.15	20.0	37.3	0	16.18	27	1112	10.33	
	6.17	20.1	38.7	0	16.15	23	1115	10.33	
	6.17	20.1	36.4	0	16.11	22	1118	10.33	

Comments

Sampled at 1120.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy 55°
Date:	9/25/08	Samplers:	JTM and IPV

Gauging and Purging Data

Station Number:	TMW-03			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	–	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	12.30	Elevation:	–	One Purge Volume:	
Depth to Bottom:	26.60	Feet of Water:	14.30	Final Purge Volume:	
Depth to LNAPL:	–	Thickness:	–	Purge Method:	
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	Dup ~~MS/MSD~~ Qty
PAHs	1L amber	2	2
Dx	500 ml amber	2	2

Meter Information

Model & Calibration Date

pH: 9/24/08 Horiba U-22
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-03 and TMW-13 (dup)
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 21'
Pump Intake Depth: –

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate: ✓
Replicate: –
MS/MSD: –
Blank: –
Other: –

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.26	46.6	31.8	1.69	19.37	-9	1237	12.29	–
	6.40	48.8	27.7	0.38	19.00	-73	1240	12.28	
	6.43	50.1	29.7	0.10	18.87	-87	1243	12.27	
	6.46	50.9	27.6	0.01	18.77	-96	1246	12.26	
	6.48	50.9	24.1	0	18.70	-101	1249	12.25	
	6.49	51.5	26.9	0	18.69	-105	1252	12.24	
	6.50	51.5	45.8	0	18.63	-108	1255	12.23	

Comments

Sampled at 1300 and 1230 (for duplicate)

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name: IP Longview
Location: Longview, WA
Project/Task No.: 33761076
Weather: Cloudy
Date: 9/25/08
Samplers: JTM and IPV

Gauging and Purging Data

Station Number: TMW-01
Screen Interval:
Station Type: Monitoring Well
Well Diameter: 2"
Annulus Dia.:
Well Condition: NEW
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Reference Point: TOC
Elevation: -
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
Depth to Water: 11.95
Elevation: -
One Purge Volume:
Depth to Bottom: 29.55
Feet of Water: 17.60
Final Purge Volume:
Depth to LNAPL: -
Thickness: -
Purge Method:
LNAPL Description: -
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
PAH	1L amber	2	-
Dx	500 ml amber	2	-

Meter Information

Model & Calibration Date

pH: 9/24/08 Horiba U-22
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-01
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 24
Pump Intake Depth: -

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.34	43.6	77.5	4.10	18.89	-38	1326	11.94	-
	6.43	43.6	53.6	0.13	18.26	-87	1329	11.93	
	6.47	43.4	42.6	0	18.00	-103	1332	11.94	
	6.50	42.2	47.4	0	17.85	-109	1335	11.94	
	6.52	40.8	45.8	0	17.76	-112	1338	11.93	
	6.53	39.3	36.6	0	17.71	-115	1341	11.93	
	6.55	39.1	39.4	0	17.70	-116	1344	11.93	

Comments

Sampled at 1400.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name: IP Longview
Project/Task No.: 33761076
Date: 9/25/08
Location: Longview, WA
Weather: Clear
Samplers: JTM and IPV

Gauging and Purging Data

Station Number: TMW-12
Station Type: Monitoring Well
Well Condition: NEW
Reference Point: TOC
Elevation: –
Depth to Water: 9.44
Elevation: –
Depth to Bottom: 19.66
Feet of Water: 9.22
Depth to LNAPL: –
Thickness: -
LNAPL Description:
Screen Interval:
Well Diameter: 2"
Annulus Dia.:
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
One Purge Volume:
Final Purge Volume:
Purge Method:
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
NWTPH-Dx	500 ml amber	2	–
PAHs	1L amber	2	–

Meter Information

	Model & Calibration Date	
pH:	HORIBA U22	9/25/08
Eh:		
Conductivity:		
DO Meter:		
Turbidity:		
Temperature:		
Other:		

Sampling Data

Sample Name: TMW-12
Sample Method: Low Flow
Sampling Device: Geopump
Tubing Depth: 15'
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.17	24.7	22.9	6.06	15.17	26	1412	9.44	
	6.09	25.1	24.2	0.03	14.45	30	1415	9.45	
	6.11	25.8	22.7	0	14.21	21	1418	9.45	
	6.11	26.0	22.8	0	14.13	16	1421	9.44	
	6.16	26.1	20.6	0	14.66	11	1424	9.44	
	6.09	26.2	18.6	0	14.06	10	1427	9.44	
	6.08	26.1	20.1	0	14.03	9	1430	9.44	
	6.06	26.3	19.2	0	14.01	9	1433	9.44	

Comments

Sampled at 1440.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Clouds
Date:	3/18/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-03			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.73	Elevation:		One Purge Volume:	
Depth to Bottom:	26.60	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM ULL	1L AMB	2	—
8151 PCP	40 mL AMB	2	—

Meter Information

	Model & Calibration Date
pH:	Horiba U22 3/18/09
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	TMW-03
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	~20'
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.18	0.323	86.7	4.68	15.99	64	1351	10.73	175 mL/min
	6.37	0.419	17.5	0.98	16.09	-58	1354	10.73	
	6.40	0.423	43.7	0.88	16.07	-88	1357	10.73	
	6.44	0.424	34.9	0.88	16.06	-99	1400	10.73	
	6.48	0.424	55.1	0.94	16.13	-108	1403	10.73	
	6.49	0.424	38.0	0.96	16.12	-111	1406	10.73	
	6.51	0.423	44.5	0.95	16.09	-114	1409	10.73	
	6.52	0.423	45.0	0.97	16.13	-116	1412	10.73	

Comments

Sample @ 1415

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name: IP Longview
Location: Longview, WA
Project/Task No.: 33761076
Weather: Clouds
Date: 3/18/09
Samplers: IPV, JTM

Gauging and Purging Data

Station Number: 04-6A
Screen Interval:
Station Type: Monitoring Well
Well Diameter: ~~2~~ 4"
Annulus Dia.:
Well Condition: Good
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Reference Point: TOC
Elevation:
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
Depth to Water: 9.06 ~~9.03~~
Elevation:
One Purge Volume:
Depth to Bottom: 35.10
Feet of Water:
Final Purge Volume:
Depth to LNAPL: 9.05
Thickness: 0.01
Purge Method: Low-Flow
LNAPL Description: HAS CREOSOTE SMELL
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	DUP ~~MS/MSD~~ Qty
8270 C SIM ull	1L AMBER	2	2

Meter Information

Model & Calibration Date
pH: HORIBA U22 3/18/09
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: 04-6A
Sample Method: LF
Sampling Device: PP
Tubing Depth: 25
Pump Intake Depth:

Field Test Kit Results:

PID: —
DO: 0-1
Alkalinity: —
Ferrous Iron: —
Other: —

QA/QC Samples:

Duplicate: 97-6C
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0							1529		
	6.70	0.323	18.4	1.23	13.65	-77	1530	9.06	
	6.64	0.323	99.8	1.58	13.53	-99	1533	9.06	
	6.63	0.320	52.8	1.43	13.52	-105	1536	9.06	
	6.65	0.318	69.8	1.30	13.48	-111	1539	9.06	
	6.65	0.317	23.3	1.26	13.53	-112	1542	9.07	
	6.66	0.318	35.0	1.21	13.45	-116	1545	9.07	
	6.66	0.319	22.8	1.20	13.47	-117	1548	9.07	
	6.67	0.319	32.6	1.20	13.44	-118	1551	9.07	

Comments

Lots of trouble getting tubing down 4" well (tubing curls and sticks) used WLM as weight.

SAMPLE @ 1555 DUPLICATE @ 97-6C @ 1615

Attempted DO test three times. First two had seal problems and showed high DO as a result. Third one may have had minor leak when flipped (small "explosion") of purple noted. Fourth time, it showed 0-1 mg/L.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	SUN
Date:	3/18/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	AV-09			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	11.41	Elevation:		One Purge Volume:	
Depth to Bottom:	19.20	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:	1/100'	Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty

Meter Information

	Model & Calibration Date
pH:	Horiba U22 3/18/09
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name: AV-09
Sample Method: LF
Sampling Device: PP
Tubing Depth:
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.91	0.220	13.9	3.11	15.23	75	1649	11.42	150 mL/min
	5.42	0.353	38.0	2.27	15.20	93	1652	11.42	
	5.21	0.381	38.5	1.82	15.29	106	1655	11.43	
	5.11	0.397	53.1	1.52	15.27	115	1658	11.43	
	4.98	0.417	77.0	1.21	15.29	126	1701	11.43	
	4.94	0.424	80.7	1.18	15.33	131	1704	11.43	
MISSED →							1707		
	4.89	0.602	129.0	1.10	15.34	138	1710	11.45	
	4.88	0.567	133.0	1.19	15.34	140	1713	11.45	

Comments

SAMPLE @ 1715

POSSIBLE LNAPL – LIKELY EQUIP ERROR

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	CLOUDS
Date:	3/18/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	97-5A			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	4" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	9.03	Elevation:		One Purge Volume:	
Depth to Bottom:	24.80	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270 C SIM VOC	1L AMB	2	
" " FILTERED	"	2	

Meter Information

	Model & Calibration Date
pH:	HORIBA U22 3/18/09
Eh:	↓
Conductivity:	↓
DO Meter:	↓
Turbidity:	↓
Temperature:	↓
Other:	

Sampling Data

Sample Name:	97-5A
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	~19
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.24	0.427	108.0	1.77	12.56	11.88	1749	11.98	200 mL/L
	6.34	0.423	116.8	1.93	12.53	-43	1752	11.99	
	6.36	0.423	114.0	1.43	12.53	-65	1755	11.99	
	6.39	0.428	95.8	1.27	12.53	-78	1758	11.99	
	6.41	0.427	95.6	1.23	12.52	-83	1801	11.99	
	6.43	0.424	118.8	1.22	12.54	-89	1804	11.99	
	6.43	0.420	138.0	1.20	12.53	-91	1807	12.00	
	6.44	0.416	153.0	1.22	12.50	-94	1810	12.00	

Comments

SAMPLE @ 1815

~~POSSIBLE LNAPL~~ → EQUIP ERROR?

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page 1 of 1

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Sunny, 45-50°
Date:	3/18/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-02			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	8.06	Elevation:		One Purge Volume:	
Depth to Bottom:	23.90	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	–	Thickness:		Purge Method:	Low-Flow
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM VOC	1L amber	4	—
		(2 filtered) and	
		2 non-filtered)	
8151	40 ml voa	2	

Meter Information

Horiba U-22 3/18/09
Model & Calibration Date

pH:
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name:	TMW-02
Sample Method:	Low Flow
Sampling Device:	Peristaltic Pump
Tubing Depth:	≈16
Pump Intake Depth:	

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0							1156		
	6.33	0.396	18.6	1.32	18.44	-84	1157	8.07	200 ml/min
	6.42	0.502	25.5	0.76	18.54	-115	1203	8.07	
	6.49	0.586	35.6	0.83	18.65	-124	1208	8.08	
	6.52	0.551	43.6	0.89	18.71	-127	1212	8.08	
	6.54	0.466	50.6	0.92	18.69	-131	1216	8.09	
	6.57	0.411	58.6	0.99	18.59	-135	1226	8.59	

Comments

Well top and pit are covered in oily/grease. Gas odor present in sump. Light sheen on purge water.
Sampled at 1230.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page 1 of 1

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy
Date:	3/18/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-01			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.72	Elevation:		One Purge Volume:	
Depth to Bottom:	23.90	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	Low-Flow
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM LL	1L AMBER	2	—

Meter Information

	Model & Calibration Date
pH:	HORIBA U52 3/18/09
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	TMW-01
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	16
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0							1433		
	6.55	0.216	20.7	3.03	17.35	-15	1435	10.77	175ml/min
	6.34	0.216	13.3	1.56	17.53	3	1438	10.77	
	6.29	0.215	8.8	1.79	17.61	17	1441	10.77	
	6.28	0.214	13.4	1.83	17.62	25	1444	10.77	
	6.27	0.223	97.6	1.63	17.60	16	1447	10.77	
	6.42	0.277	71.8	1.21	17.61	-94	1450	10.77	
	6.50	0.285	83.1	1.08	17.53	-114	1453	10.78	
	6.52	0.294	81.0	1.03	17.46	-119	1456	10.78	

Comments

Sampled 1500

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	RAIN
Date:	3/17/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-10			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:				Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	10.50	Elevation:		One Purge Volume:	
Depth to Bottom:	24.25	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C-SIM VLL	1L amber	2	—
8151	40 ml amber	2	—

Meter Information

3/17/09 Horiba U-22

Model & Calibration Date

pH:
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name:	TMW-10
Sample Method:	Low Flow
Sampling Device:	Peristaltic Pump
Tubing Depth:	≈ 16'
Pump Intake Depth:	

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.62	0.178	46.2	0.00	14.39	-71	1638	10.51	200 ml/MIN
	6.62	0.181	47.1	0.00	14.18	-83	1642	10.53	
	6.57	0.181	49.2	0.00	14.36	-87	1647	10.53	
	6.56	0.179	77.6	0.00	14.51	-90	1652	10.54	
	6.56	0.179	93.3	0.00	14.49	-93	1657	10.54	
	6.56	0.179	71.2	0.00	14.59	-95	1702	10.55	
	6.57	0.179	81.0	0.00	14.61	-98	1707	10.56	
	6.58	0.179	79.2	0.00	14.64	-99	1712	10.56	

Comments

Sampled at 1715.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cold
Date:	3/17/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-09			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	Annulus Dia.:
Well Condition:	NEW			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	9.88	Elevation:		One Purge Volume:	
Depth to Bottom:	25.30	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	Low Flow
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM ULL	1L Amber	2	—

Meter Information

Model & Calibration Date

pH:	Horiba U22	3/17/09
Eh:	↓	↓
Conductivity:	↓	↓
DO Meter:	↓	↓
Turbidity:	↓	↓
Temperature:		
Other:		

Sampling Data

Sample Name:	TMW-09
Sample Method:	Low Flow
Sampling Device:	P. Pump
Tubing Depth:	≈16 ft
Pump Intake Depth:	—

Field Test Kit Results:

PID:	—
DO:	0-1.5 mg/L
Alkalinity:	—
Ferrous Iron:	—
Other:	—

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.08	0.295	35.9	0.44	14.44	31	1343		200 mL/min
	5.90	0.296	40.6	0.30	14.57	29	1347	9.90	
	5.81	0.297	47.3	0.12	14.53	27	1351	9.91	
	5.77	0.296	47.4	0.00	14.60	27	1355	9.91	
	5.77	0.296	48.0	0.00	14.77	24	1359	9.92	
	5.78	0.297	50.2	0.00	14.88	21	1403	9.93	
	5.78	0.297	64.4	0.00	14.88	20	1407	9.93	
	5.80	0.300	74.2	0.00	14.35	18	1411	9.94	
	5.80	0.300	76.7	0.00	14.21	17	1415	9.95	
	5.81	0.299	81.4	0.00	14.15	16	1419	9.95	

Comments

Sampled at 1425.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloud
Date:	3/17/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-08			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	9.11	Elevation:		One Purge Volume:	
Depth to Bottom:	24.85	Feet of Water:		Final Purge Volume:	2 gal
Depth to LNAPL:	—	Thickness:		Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270 CSIM ULL	1L amber	2	—

Meter Information

Model & Calibration Date

pH: HORIBA U22 3/17/09
Eh: ↓
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-08
Sample Method: Low Flow
Sampling Device: P-Pump
Tubing Depth: ~18'
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.42	0.188	147	0.30	13.40	-50	1234	9.11	200 mL/min
	6.31	0.188	177	1.54	13.40	-55	1238	9.11	175 mL/min
	6.29	0.187	206	1.05	13.40	-65	1242	9.12	|
	6.29	0.188	146.0	0	13.49	-66	1246	9.13	|
	6.26	0.190	132.0	0	13.61	-68	1250	9.12	|
	6.29	0.190	105.0	0.00	13.59	-73	1254	9.12	
	6.28	0.190	101.0	0.00	13.58	-73	1258	9.13	
	6.28	0.187	102.0	0.0	13.69	-74	1302	9.13	
	6.29	0.187	87.3	0.0	13.71	-75	1306	9.14	
	6.30	0.183	76.6	0.0	13.75	-77	1310	9.15	

Comments

WATER HAS REDDISH TINT

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name: IP Longview
Project/Task No.: 33761076
Date: 03/17/09
Location: Longview, WA
Weather: RAIN
Samplers: IPV, JTM

Gauging and Purging Data

Station Number: TMW-07
Station Type: Monitoring Well
Well Condition: NEW
Reference Point: TOC
Elevation:
Depth to Water: 10.87
Elevation:
Depth to Bottom: 24.27
Feet of Water:
Depth to LNAPL: —
Thickness:
LNAPL Description: —
Screen Interval:
Well Diameter: 2" Annulus Dia.:
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
One Purge Volume:
Final Purge Volume: 1.5 gal
Purge Method:
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C	1L AMBER	2	—

Meter Information

Model & Calibration Date
pH: Horiba U22 3/17/09
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-07
Sample Method: LOW FLOW
Sampling Device: PARYSTALTIC
Tubing Depth:
Pump Intake Depth:

Field Test Kit Results:

PID: —
DO: 0-1.5 mg/L
Alkalinity: —
Ferrous Iron: —
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.53	0.230	43.4	0.28	13.04	-77	1112	10.89	~150 mL/min
	6.30	0.226	56.1	0.07	13.15	-6	1115	10.89	
	6.23	0.225	48.1	0.00	13.22	-86	1118	10.89	
	6.19	0.226	47.1	0.00	13.24	-90	1121	10.89	
	6.18	0.226	39.0	0.00	13.13	-91	1124	10.89	~150 mL/min
	6.14	0.225	44.0	0.00	13.37	-92	1126	10.89	
	6.14	0.226	51.8	0.00	13.31	-93	1129	10.89	
	6.13	0.227	49.8	0.00	13.23	-95	1134	10.89	
	6.12	0.227	61.7	0.06	13.16	-97	1139	10.90	
	6.12	0.225	69.3	0.00	13.20	-98	1144	10.90	
	6.12	0.224	71.4	0.00	13.29	-99	1150	10.90	

Comments

SAMPLE @ 1200

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name: IP Longview
Project/Task No.: 33761076
Date: 3/18/09
Location: Longview, WA
Weather: Clouds
Samplers: IPV, JTM

Gauging and Purging Data

Station Number: LL 01-15
Station Type: Monitoring Well
Well Condition: Good
Reference Point: TOC
Elevation:
Depth to Water: 9.94
Elevation:
Depth to Bottom: 16.75
Feet of Water:
Depth to LNAPL: —
Thickness:
LNAPL Description:
Screen Interval:
Well Diameter:
Annulus Dia.:
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
One Purge Volume:
Final Purge Volume:
Purge Method:
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty

Meter Information

Model & Calibration Date
pH: HORIBA U22 3/18/09
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name:
Sample Method:
Sampling Device:
Tubing Depth:
Pump Intake Depth:

Field Test Kit Results:

PID:
DO: 0-1 mg/L
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0									

Comments

Horiba DO sensor contaminated during this time.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	cloudy
Date:	3/18/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-04			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	8.14	Elevation:		One Purge Volume:	
Depth to Bottom:	22.75	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	/	Thickness:		Purge Method:	
LNAPL Description:	/			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM all	1L Amb	2	
8151 PCP	40ml Amb	2	

Meter Information

	Model & Calibration Date
pH:	Horiba U22 3/18/09
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	TMW-04
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	16
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	/
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.76	0.348	6.3	1.45	12.81	-19	1022	8.14	200 mL/min
	6.03	0.358	19.7	1.27	13.87	-61	1026	8.14	
	6.15	0.369	19.9	1.31	13.58	-73	1030	8.14	
	6.17	0.374	25.4	1.29	13.60	-76	1034	8.14	
	6.21	0.377	36.0	1.26	13.66	-81	1038	8.15	
	6.25	0.365	52.3	1.26	13.73	-84	1042	8.15	
	6.27	0.359	69.7	1.24	13.60	-87	1046	8.15	
	6.30	0.348	79.5	1.22	13.98	-88	1050	8.15	
	6.32	0.343	79.4	1.19	14.02	-94	1054	8.15	

Comments

Sample @ 1100

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name: IP Longview
Project/Task No.: 33761076
Date: 3/18/09
Location: Longview, WA
Weather: Cold
Samplers: IPV, JTM

Gauging and Purging Data

Station Number: TMW-05
Station Type: Monitoring Well
Well Condition: Good
Reference Point: TOC
Elevation:
Depth to Water: 8.60
Elevation:
Depth to Bottom: 19.59
Feet of Water:
Depth to LNAPL: —
Thickness:
LNAPL Description: —
Screen Interval:
Well Diameter: 2"
Annulus Dia.:
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
One Purge Volume:
Final Purge Volume:
Purge Method:
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM VLL	1 L Amber	2	

Meter Information

Model & Calibration Date
pH: Horiba U22 3/18/09
Eh: ↓ ↓
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: TMW-05
Sample Method: LF
Sampling Device: PP
Tubing Depth: ~14
Pump Intake Depth:

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.28	0.124	1.1	1.08	12.28	123	0930	8.63	
	5.09	0.122	5.5	1.23	12.48	137	0934	8.63	200 mL/min
	5.06	0.127	11.4	1.22	12.56	145	0938	8.64	
	5.07	0.134	22.9	1.26	12.79	151	0942	8.63	
	5.08	0.137	58.9	1.19	12.83	157	0946	8.63	
	5.09	0.141	70.2	1.19	12.77	160	0950	8.63	
	5.10	0.137	82.1	1.24	12.85	163	0954	8.63	
	5.11	0.134	91.4	1.24	12.89	165	0958	8.63	
	5.11	0.130	82.1	1.24	12.82	166	1002	8.63	

Comments

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cold Clear
Date:	3/18/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-06			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	New			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	8.48	Elevation:		One Purge Volume:	
Depth to Bottom:	22.85	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:		Thickness:		Purge Method:	Low Flow
LNAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM LL	1L Amber	2	

Meter Information

	Model & Calibration Date
pH:	Horiba U22 3/18/09
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	TMW-07
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	~16'
Pump Intake Depth:	–

Field Test Kit Results:

PID:	–
DO:	
Alkalinity:	–
Ferrous Iron:	–
Other:	–

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0							0837		~250 ml/min
	6.80	0.340	55.3	1.87	12.37	44	0840	8.50	
	6.00	1.28	45.9	0.83	12.66	36	0843	8.50	
	5.80	0.721	48.4	1.32	12.89	28	0846	8.50	
	5.79	0.347	64.4	1.27	12.68	20	0849	8.49	
	5.77	0.338	60.3	1.27	13.00	20	0852	8.49	
	5.77	0.312	66.8	1.25	13.02	16	0855	8.48	
	5.78	6.282	72.0	1.29	12.86	15	0858	8.48	
	5.79	0.261	78.1	1.25	12.84	12	0801	8.48	
	5.79	0.250	85.3	1.26	12.81	10	0904	8.48	
	9.80	0.240	85.2	1.24	13.01	9	0907	8.48	

Comments

Sample at 0910.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	RAIN
Date:	3/17/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-12			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	7.87	Elevation:		One Purge Volume:	
Depth to Bottom:	21.40	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	Low Flow
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM VLL	1L Amber	2	—
8151	40ml amber VOA	2	—

Meter Information

	Model & Calibration Date
pH:	Horiba U22 3/17/09
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	TMW-12
Sample Method:	LF
Sampling Device:	P. Pump
Tubing Depth:	15.00
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.53	0.285	127.0	3.39	7.69	34	1744	7.91	150 ml/min
	6.00	0.266	101.0	0.60	7.36	44	1749	7.91	
	5.96	0.274	61.5	0.32	7.36	43	1754	7.91	
	5.95	0.285	45.5	0.14	7.36	39	1759	7.91	
	5.98	0.289	44.5	0.08	7.35	37	1804	7.91	
	5.96	0.290	41.5	0.00	7.34	36	1809	7.91	
							1814		

Comments

Low temp may be due to the adjacent creek/ditch.

Sampled at 1815.

GROUNDWATER SAMPLING DATA SHEET

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mation

e:	IP Longview	Location:	Longview, WA
k No.:	33761076	Weather:	RAIN
	3/19/09	Samplers:	IPV, JTM

and Purging Data

Number:	AV-13			Screen Interval:	
Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
ondition:	FNED			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
rence Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
pth to Water:	9.82	Elevation:		One Purge Volume:	
pth to Bottom:	15.08	Feet of Water:		Final Purge Volume:	
pth to LNAPL:		Thickness:		Purge Method:	Low Flow
NAPL Description:				Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM VLL	1 L AMB	2	|
8151 PCP	40 mL AMB	2	|
NWTPH Dx	500 mL AMB	2	|
TOH	500 mL UNPRE	1	|
T-Phos, TOC, NO2NO3	500 mL H2SO4	1	|
HOB-HPC	100 mL Sterile	2	|

Meter Information

Model & Calibration Date

pH:	Horiba U22 3/19/09
Eh:	
Conductivity:	↓ ↓
DO Meter:	↓ ↓
Turbidity:	↓ ↓
Temperature:	↓ ↓
Other:	

Sampling Data

Sample Name:	AV-13
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	≈12 ft bTOC
Pump Intake Depth:	—

Field Test Kit Results:

PID:	—
DO:	0-1
Alkalinity:	—
Ferrous Iron:	—
Other:	—

QA/QC Samples:

Duplicate:	AV-14
Replicate:	/
MS/MSD:	/
Blank:	/
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)	
0	—	—	—	—	—	—	0858	—	—	
	7.09	2.05	27.9	Error ?	12.32	-69	0900	9.83	150 ml/min	160→
	6.77	8.00	16.9	Error	13.19	-92	0903	~~9.80~~	↓	1610
	6.59	19.8	7.5	|	13.62	-100	0906	~~9.80~~		1613
	6.55	20.8	8.5	|	13.82	-106	0909	9.80		1616
	6.54	23.8	14.1	|	13.95	-109	0912	9.81		1619
	6.54	21.3	15.9	|	13.96	-111	0915	9.81		1622
	6.54	23.6	12.6	|	14.00	-113	0918	9.81		1625
							0921			

Comments

DO is reading 0.00, but sensor needs rebuild. Light creosote odor and minimal sheen in purge water (sheen could be from previous wells)

Sample at 0940.

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page _____ of _____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	RAIN
Date:	3/19/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	TMW-11			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	NEW			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	8.94	Elevation:		One Purge Volume:	
Depth to Bottom:	21.40	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM LL	1L AMB	2	
" " FILTERED	1L AMB	2	
8151 PCP	40 mL AMBER	2	

Meter Information

	Model & Calibration Date
pH:	HORIBA U22 3/19/09
Eh:	↓ ↓
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	TMW-11
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	15'
Pump Intake Depth:	

Field Test Kit Results:

PID:	
DO:	
Alkalinity:	
Ferrous Iron:	
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	6.43	0.249	4.7	0.00	12.51	30	1321	8.95	
	6.37	0.610	11.5	2.46	12.46	-14	1324	8.96	
	6.35	1.96	6.7	1.26	12.41	-39	1327	8.96	
	6.33	2.92	8.7	0.00	12.40	-54	1330	8.95	
	6.32	3.16	8.5	0.00	12.40	-59	1233	8.95	
	6.28	6.45	7.8	0.91	12.39	-66	1336	8.95	
	6.32	4.14	7.9	0.70	12.39	-69	1339	8.95	
	6.32	3.13	9.3	0.07	12.41	-70	1342	8.96	

Comments

SAMPLE @ 1345

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page ____ of ____

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Cloudy
Date:	3/19/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	AV-12			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	8.96	Elevation:		One Purge Volume:	
Depth to Bottom:	14.80	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:		Purge Method:	
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270 C SIM LL		2	
8151 PCP		3	
SO4		1	
NWTPH-Dx		2	
T-Phos, NO2/NO3, TOC	500 mL	1	
HDB HPC	100 mL Sterile	2	

Meter Information

	Model & Calibration Date
pH:	Horiba U22 3/19/09
Eh:	↓ ↓
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	AV-12
Sample Method:	LF
Sampling Device:	PP
Tubing Depth:	1
Pump Intake Depth:	

Field Test Kit Results:

PID:	—
DO:	See Notes.
Alkalinity:	—
Ferrous Iron:	—
Other:	

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.81	0.085	2.8	0.03	13.21	37	1420	9.04	
	5.51	0.156	0.3	0.00	13.28	56	1423	9.07	
	5.42	0.264	6.0	2.29	13.41	66	1426	9.07	
	5.41	0.615	6.2	1.94	12.45	70	1429	9.08	
	5.36	0.600	9.0	1.92	13.53	77	1432	9.08	
	5.39	0.378	19.9	2.76	13.53	81	1435	9.09	
	5.35	0.438	25.9	2.51	13.53	85	1438	9.09	
	5.35	0.655	33.2	0.00	13.65	86	1441	9.09	

Comments

DO Test showed no purple color, shading was orangeish and had similar darkness/turbidity as DO of 1-2 on color wheel.

Sampled at 1445

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page 1 of 1

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Overcast 40°
Date:	3/19/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	AV-11			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Good			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:		Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	8.11	Elevation:		One Purge Volume:	
Depth to Bottom:	15.15	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	–	Thickness:		Purge Method:	Low Flow
LNAPL Description:	–			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270C SIM VCL	1L amber	2	
8151 (PCP)	500 ml amber	2	
SO4	500 ml poly	1	
TPH-DR	500 ml amber	2	
TPhos, NO3/NO2, TO	C500 ml poly	1	
HDB	100 ml poly cup	1	
HPC	100 ml poly cup	1	

Meter Information

Horiba U-22 3/19/09

Model & Calibration Date

pH:	
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	AV-11
Sample Method:	
Sampling Device:	
Tubing Depth:	~12'
Pump Intake Depth:	

Field Test Kit Results:

PID:	—
DO:	See Notes
Alkalinity:	—
Ferrous Iron:	—
Other:	—

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.88	1.48	191.6	0.02	14.00	115	1515	8.27	
	5.91	0.243	218.0	0.75	14.02	112	1518	8.27	
	5.93	0.246	581	0.45	14.00	100	1521	8.27	
	5.93	0.423	618.0	0.00	13.97	84	1524	8.27	
	5.97	0.913	569	0.98	13.96	74	1527	8.28	
	6.00	1.76	605	0.00	13.96	64	1520	8.28	
	6.00	1.80	531	0.00	13.98	55	1523	8.28	
	6.00	1.71	469	0.00	13.97	49	1526	8.29	

Comments

Sampled 1540

ORANGE COLORED "SEDIMENT" IN TUBING AT 1ST
SETTLED IN HORIBA, SO TURB READINGS HIGH

No purple seen in DO colorimetric test. Turbidity matched 4-5 mg/L DO - due to orange stuff in water.

J:\Field_Resources\Field Forms(GW Sampling Log)
3/16/2009

3/16/2009

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page 1 of 1

Project Name:	IP Longview	Location:	Longview, WA
Project/Task No.:	33761076	Weather:	Overcast, 40°
Date:	3/19/09	Samplers:	IPV, JTM

Gauging and Purging Data

Station Number:	AV-10			Screen Interval:	
Station Type:	Monitoring Well			Well Diameter:	2" Annulus Dia.:
Well Condition:	Average			Gallons per Casing Foot: (2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)	
Reference Point:	TOC	Elevation:	—	Gallons per Annulus Foot: (8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)	
Depth to Water:	8.84	Elevation:	—	One Purge Volume:	
Depth to Bottom:	15.10	Feet of Water:		Final Purge Volume:	
Depth to LNAPL:	—	Thickness:	—	Purge Method:	Low-Flow
LNAPL Description:	—			Water Disposal/Qty:	

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270-C SIM VOC	1L amber	2	—
8151 (PCP)	40 ml amber	2	—
TPH DR	500ml amber	2	—
SO_4	500 ml poly	1	—
NO_3/NO_2, TOC, TPhos	500 ml poly	1	—
HPC	100 ml poly	1	—
HDB	100 ml poly	1	—

Meter Information

Horiba U-22 3/19/09

	Model & Calibration Date
pH:	
Eh:	
Conductivity:	
DO Meter:	
Turbidity:	
Temperature:	
Other:	

Sampling Data

Sample Name:	AV-10
Sample Method:	Low-Flow
Sampling Device:	Peristaltic Pump
Tubing Depth:	≈12'
Pump Intake Depth:	—

Field Test Kit Results:

PID:	—
DO:	See Notes
Alkalinity:	—
Ferrous Iron:	—
Other:	—

QA/QC Samples:

Duplicate:	
Replicate:	
MS/MSD:	
Blank:	
Other:	

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0	5.88	0.543	40.0	0.00	14.37	46	1610	9.35	
	5.80	2.24	47.0	0.38	14.56	38	1613	9.45	
	5.81	2.39	46.8	0.24	14.54	25	1616	9.45	
	5.83	2.40	49.8	0.26	14.58	19	1619	9.55	
	5.85	2.81	53.1	0.14	14.53	11	1622	9.47	
	5.90	2.42	72.5	0.21	14.51	1	1625	9.47	
	5.91	1.51	77.4	0.00	14.47	-3	1628	9.42	
	5.94	1.37	88.4	0.00	14.44	-16	1631	9.41	

Comments

SAMPLE @ 1635 PAH ODOR

URS

GROUNDWATER SAMPLING DATA SHEET

Project Information

Page 1 of ___

Project Name: IP Longview
Project/Task No.: 33761076
Date: 3/19/09
Location: Longview, WA
Weather: Overcast, 40-45°
Samplers: IPV, JTM

Gauging and Purging Data

Station Number: 99 EA-3A
Station Type: Monitoring Well
Well Condition: Needs Repair (see note)
Reference Point: TOC
Elevation: –
Depth to Water: 10.22
Elevation: –
Depth to Bottom: 20.45
Feet of Water:
Depth to LNAPL: –
Thickness: –
LNAPL Description: –
Screen Interval:
Well Diameter: 2"
Annulus Dia.:
Gallons per Casing Foot:
(2" well: 0.16 gal/ft; 4" well: 0.65 gal/ft)
Gallons per Annulus Foot:
(8" annulus with 2" casing = 1.85 gal/ft; 6" annulus with 2" casing = 1.34 gal/ft)
One Purge Volume:
Final Purge Volume:
Purge Method: Low Flow
Water Disposal/Qty:

Containers

Analysis	Type	Primary Qty	MS/MSD Qty
8270-C SIM VCL	1L amber	2	
↳ Filtered	1L amber	2	
8151	40 ml amber	2	
TPH-DR	500 ml amber	2	
SO4	500 ml Poly	1	
NO3/NO2, TOC, Phos	500 ml Poly	1	
HPC/HDB	100 ml Poly	2	

Meter Information

Horiba U-22 — Model & Calibration Date: 3/19/09
pH:
Eh:
Conductivity:
DO Meter:
Turbidity:
Temperature:
Other:

Sampling Data

Sample Name: 99EA-3A
Sample Method: Low Flow
Sampling Device: Peristaltic Pump
Tubing Depth: ≈15'
Pump Intake Depth: –

Field Test Kit Results:

PID:
DO:
Alkalinity:
Ferrous Iron:
Other:

QA/QC Samples:

Duplicate:
Replicate:
MS/MSD:
Blank:
Other:

Field Parameters

Volume (gallons)	pH (SU)	Conductivity (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temperature (°C)	ORP (mV)	Time (24 hr)	Water Level (Ft below TOC)	Flow Rate (L/min)
0							1205		
	6.04	0	243.0	Error	12.42	62	1210	10.24	200 ml/min
	7.39	0.072	70.4		13.62	53	1213	10.24	
	7.05	0.072	46.8		14.05	76	1217	10.24	
	6.98	0.067	48.8		14.14	89	1220	10.24	
	6.81	0.064	47.3		14.23	97	1223	10.24	
	6.69	0.081	52.6		14.24	104	1226	10.24	
	6.59	0.076	50.1		14.31	107	1229	10.24	

Comments

Well casing chipped at top which appears to allow stormwater into well. Was able to cut ≈ [illegible]" off top so cap would seal. Measurements above reflect casing ↳ (3/10") height prior to cutting.
Sample at 1240.

Appendix G

Laboratory Analytical Reports

Appendix G

September 2008 Laboratory Analytical Reports

Memo

URS

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To:	Paul Kalina, Project Manager	**Info:**	**FINAL**
From:	Tressa Pearson-Franks, Chemist Jennifer Garner, Chemist	**Date:**	April 17, 2009

RE: **Quality Assurance Review**
IP Longview – GeoProbe – Soil Samples
CAS SDGs K0808627, K0808731, K0808785, K0808869, and K0808948

The summary data quality review of 44 soil samples collected between September 8 and September 15, 2008 has been completed. The samples were submitted to Columbia Analytical Services (CAS), a Washington State Department of Ecology (Ecology) accredited laboratory, located in Kelso, Washington. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) by Environmental Protection Agency (EPA) Method 8270C modified by select ion monitoring (8270C-SIM), total petroleum hydrocarbons (TPH- diesel range and oil range) by Ecology Method NWTPH-Dx, volatile organic compounds (VOCs) by EPA Method 8260B, and metals by EPA Methods 6010B (arsenic, barium, cadmium, chromium, lead, selenium, and silver) 7417A (mercury) as identified by the cross reference below. Select samples were also analyzed for pentachlorophenol (PCP) in conjunction with PAHs by EPA Method 8270C-SIM. The analyses were performed in general accordance with methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846) Update IIIB*, June 2005 and Ecology's *Analytical Methods for Petroleum Hydrocarbons*, June 1997. The following samples are associated with CAS sample delivery groups (SDGs) K0808627, K0808731, K0808785, K0808869, and K0808948:

Sample ID	CAS ID	Parameters
PB65-S-10.5-090808	K0808627-001	PAHs, TPH-Dx
PB65-S-11-090808	K0808627-002	PAHs, TPH-Dx
PB64-S-6-090808	K0808627-003	PAHs, TPH-Dx
PB64-S-11-090808	K0808627-004	PAHs, TPH-Dx
PB66-S-2-090808	K0808627-005	PAHs, TPH-Dx
PB66-S-7-090808	K0808627-006	PAHs, TPH-Dx
PB67-S-7-090808	K0808627-007	PAHs, TPH-Dx
PB67-S-9-090808	K0808627-008	PAHs, TPH-Dx
PB69-S-3-090808	K0808627-009	PAHs, TPH-Dx
PB69-S-7-090808	K0808627-010	PAHs, TPH-Dx
TMW07-S-11.5-090908	K0808731-001	PAHs, TPH-Dx
TMW08-S-10-090908	K0808731-002	PAHs, TPH-Dx
TMW09-S-9.5-090908	K0808731-003	PAHs, TPH-Dx
TMW10-S-07-090908	K0808731-004	PAHs+PCP, TPH-Dx
TMW10-S-10-090908	K0808731-005	Hold
TMW01-S-7-091008	K0808731-006	PAHs, TPH-Dx
TMW01-S-13.5-091008	K0808731-007	PAHs, TPH-Dx
TMW02-S-8-091008	K0808731-008	VOCs, PAHs+PCP, TPH-Dx, Metals
TMW02-S-11-091008	K0808731-009	VOCs, PAHs+PCP, TPH-Dx, Metals

Sample ID	CAS ID	Parameters
TMW03-S-9-091108	K0808785-001	PAHs+PCP, TPH-Dx
PB61-S-6.5-091108	K0808785-002	PAHs+PCP, TPH-Dx
PB61-S-8-091108	K0808785-003	PAHs+PCP, TPH-Dx
PB60-S-8-091108	K0808785-004	PAHs+PCP, TPH-Dx
PB60-S-11-091108	K0808785-005	PAHs+PCP, TPH-Dx
PB59-S-8-091108	K0808785-006	PAHs+PCP, TPH-Dx
PB59-S-10-091108	K0808785-007	PAHs+PCP, TPH-Dx
TMW04-S-7.5-091208	K0808869-001	PAHs+PCP, TPH-Dx
TMW05-S-6-091208	K0808869-002	PAHs, TPH-Dx
TMW12-S-6.5-091208	K0808869-003	PAHs+PCP, TPH-Dx
TMW11-S-7.5-091208	K0808869-004	PAHs+PCP, TPH-Dx
TMW06-S-7-091208	K0808869-005	PAHs, TPH-Dx
S-DUP-1-091208 (Duplicate of TMW06-S-7-091208)	K0808869-006	PAHs, TPH-Dx
S-Dup-2-091508 (Duplicate of PB73-S-5-091508)	K0808948-001	PAHs, TPH-Dx
S-Dup-3-091508 (Duplicate of PB70-S-6-091508)	K0808948-002	PAHs, TPH-Dx
PB68-S-6-091508	K0808948-003	PAHs, TPH-Dx
PB71-S-6.5-091508	K0808948-004	PAHs, TPH-Dx
PB72-S-8.5-091508	K0808948-005	PAHs+PCP, TPH-Dx
PB68-S-8.5-091508	K0808948-006	PAHs, TPH-Dx
PB63-S-8-091508	K0808948-007	PAHs, TPH-Dx
PB73-S-5-091508	K0808948-008	PAHs+PCP, TPH-Dx
PB63-S-6.5-091508	K0808948-009	PAHs, TPH-Dx
PB73-S-6.5-091508	K0808948-010	PAHs+PCP, TPH-Dx
PB62-S-5.5-091508	K0808948-011	PAHs, TPH-Dx
PB70-S-6-091508	K0808948-012	PAHs+ PCP, TPH-Dx

Upon receipt by CAS, the sample jar information was compared to the chain-of-custody (COC). No discrepancies relating to sample identification were noted by the laboratory. The temperature blank and cooler temperatures were recorded as part of the check-in procedure. Several cooler temperatures (1.9, 1.6°C) and a cooler blank temperature (1.2°C) were outside the EPA recommended limits of 4ºC±2ºC. Data were not qualified based on the cooler and cooler blank temperatures. The temperature of the cooler associated with SDG K0909948 was not recorded by the laboratory upon receipt. The samples associated with this SDG were received by CAS within 4 hours collection. The samples were stored overnight in a secure 4ºC refrigerator by the laboratory prior to log in. Data were not qualified based on the unrecorded cooler temperature.

Data validation is based on method performance criteria and QC criteria as documented in the *Agency Draft Quality Assurance Project Plan (QAPP), Appendix A of the Performance and Compliance Monitoring Plan, Former Treated Wood Products Area, International Paper Facility / Longview, Washington* (Woodward Clyde, 1997). The laboratory provided EPA Contract Laboratory Program-equivalent validatable data packages. The data review conducted on this SDG included a review of summarized results and QA/QC data, per the requirements set forth in Section A.10 of the QAPP. Hold times, initial and continuing calibrations, method blanks, surrogate recoveries, laboratory control sample (LCS) results, matrix duplicate results, matrix spike/matrix spike duplicate (MS/MSD) results, field duplicates, and reporting limits were reviewed to assess compliance with applicable methods. Calculation checks and review of the raw data were not included in the data review. If data qualification was required, data were qualified in accordance with *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, October 1999 and *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review*, October 2004, as appropriate.

Organic Analyses

Samples were analyzed for TPH, PAHs, PCP and/or VOCs by the methods identified in the introduction to this report.

1. Holding Times – Acceptable except as noted below:

   PAHs+PCP by Method 8270C-SIM – Sample PB60-S-11-091101 was re-extracted 20 days outside the method holding time of 14 days due to the 2,4,6-tribromophenol surrogate failure. All surrogates were acceptable in the re-extract of this sample. The results for PAHs+PCP in the re-extraction of sample PB60-S-11-091101 are qualified as Do Not Report and flagged 'DNR' based on holding time exceedance.

   TPH by NWTPH-Dx – Samples PB-60-S-11-091101 and PB-70-S-6-091508 were re-extracted outside the method holding time of 14 days due to surrogate failures. In both samples, the TPH results in the re-extractions were significantly higher than the TPH results in the initial extraction. The results for diesel-range and oil-range TPH in the initial analyses of samples PB-60-S-11-091101 and PB-70-S-6-091508 are flagged 'DNR' based on the surrogate recoveries and the results for diesel-range and oil-range TPH in the re-extractions of samples PB-60-S-11-091101 and PB-70-S-6-091508 are qualified as estimated and flagged with a 'J' based on holding time exceedances.

2. Instrument Performance (Tunes – applicable to PAHs only) – Acceptable

3. Initial Calibrations – Acceptable except as noted below:

   PAHs+PCP by Method 8270C-SIM – The relative standard differences (RSDs) for several analytes exceeded the method control limit of 15% in the initial calibration analyzed on October 1, 2008 as shown below:

Analyte	% RSD
Pentachlorophenol	28.9
Indeno(1,2,3-cd)pyrene	21.4
Dibenzo(a,h)anthracene	16.8
2,4,6-Tribromophenol (surrogate)	18.3

   In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard allowing analysis to proceed. The results for pentachlorophenol (PCP), indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene are qualified as estimated and flagged 'J' or 'UJ' in the associated samples based on the initial calibration results. Results for the surrogate 2,4,6-tribromophenol are not qualified based on the initial calibration result.

4. Continuing Calibrations – Acceptable

5. Blanks – Acceptable except as noted below:

   VOCs by Method 8260B – Several analytes were detected in the method blank analyzed on September 19, 2008 as shown below:

Analyte	Concentration (ug/kg)
Chloromethane	0.16
Acetone	7.3
Methylene chloride	4.1
Toluene	0.19
Chlorobenzene	0.090

Analyte (continued)	Concentration (ug/kg)
Styrene	0.090
1,3-Dichlorobenzene	0.13
1,4- Dichlorobenzene	0.20
1,2- Dichlorobenzene	0.13
1,2,4- Trichlorobenzene	0.39
1,2,3- Trichlorobenzene	0.40
Naphthalene	0.62

All of the above-noted analytes were detected in the method blank at concentrations between the method detection limits (MDLs) and the laboratory reporting limits and were flagged with a 'J' by the laboratory. Per CLP guidelines, analytes detected in samples that are also detected in blanks are qualified if the sample concentration is less than five times (5x) the blank concentration. Results reported as not detected or at concentrations greater than 5x the concentration found in the blank do not require qualification. Results reported as detected above the MDL but below the laboratory reporting limit are qualified as not detected and flagged 'U' at the reporting limit. Associated sample results were qualified as specified above and qualified results are noted in Table 1.

<u>PAHs by Method 8270C-SIM</u> – One or more analytes were detected at concentrations between the MDLs and laboratory reporting limits in several method blanks as shown below:

Extraction Date	Analyte	Concentration (ug/kg)
9/22/08	Naphthalene	0.52
9/23/08	Fluoranthene	0.91
	Pyrene	0.66
	Benzo(b)fluoranthene	0.33
	Benzo(k)fluoranthene	0.16
	Chrysene	0.33
	Indeno(1,2,3-cd)pyrene	0.56
	Dibenz(a,h)anthracene	0.42
	Benzo(g,h,i)perylene	0.90
9/24/08	Naphthalene	0.96
	2-Methylnaphthlalene	0.44
	Benz(a)anthracene	0.56
	Chrysene	0.30
	Indeno(1,2,3-cd)pyrene	0.36
	Dibenz(a,h)anthracene	0.36
9/29/08	Fluoranthene	0.70
	Pyrene	0.70
	Benz(a)anthracene	1.5
	Chrysene	1.8
	Benzo(b)fluoranthene	1.6
	Benzo(k)fluoranthene	2.0
	Benzo(a)pyrene	0.95
	Indeno(1,2,3-cd)pyrene	2.4
	Dibenz(a,h)anthracene	1.9
	Benzo(g,h,i)perylene	2.0

Associated sample results were qualified as specified above and qualified results are noted in Table 1.

TPH by NWTPH-Dx – Diesel-range hydrocarbons (1.9 mg/kg) and oil-range hydrocarbons (5.0 mg/kg) were detected at concentrations between the MDLs and the laboratory reporting limits in the method blank extracted on September 22, 2008. Diesel-range hydrocarbons (1.4 mg/kg) and oil-range hydrocarbons (3.1 mg/kg) were detected at concentrations between the MDLs and the laboratory reporting limits in the method blank extracted on September 23, 2008. Associated sample results were qualified as specified above and qualified results are noted in Table 1.

6. Surrogates – Acceptable except as noted below:

PAHs by Method 8270C-SIM – The percent recoveries for one or more surrogates did not meet the control limits in several samples as shown below:

Sample ID *Control Limits*	**Fluorene-d10** *10-128%*	**2,4,6-Tribromophenol** *12-152%*	**Fluromethane-d14** *29-121%*	**Terphenyl-d14** *24-141%*
PB60-S-11-091108	ok	7.0%	ok	ok
PB59-S-8-091108 (DL)	263%	77%	149%	155%
LCS (9/24/08)	ok	8.0%	ok	ok

ok – Result acceptable DL – Dilution

Sample PB60-S-8-091108 was re-extracted 20 days outside the method holding time of 14 days. The surrogate recovery in the re-extract was acceptable and sample results were comparable. Reanalyzed results were not reported by the laboratory; therefore all results are reported from the initial analysis. The result for pentachlorophenol in sample PB60-S-8-091108 was previously qualified as an estimate and flagged ‘UJ’ based on the initial calibration results. No additional qualification based on the surrogate recovery is required.

Sample PB59-S-8-091108 was analyzed at dilutions between 50x and 1,000x. As the surrogate recoveries in the full-strength analysis of this sample were acceptable, data were not qualified based on the surrogate recoveries in the dilutions.

Data were not qualified based on surrogate recoveries in quality control samples.

TPH by NWTPH-Dx – The percent recovery for one or more surrogates did not meet the laboratory control limits in several samples as shown below:

Sample *Control Limits*	**o-Terphenyl** *50-150%*	**n-Triacontane** *50-150%*
PB60-S-11-091108	ok	48%
PB59-S-8-091108	205%	ok
PB70-S-6-091508	49%	33%

ok – Result acceptable

Samples PB60-S-8-091108 and PB70-S-68-091508 were re-extracted outside the 14-day method holding time as described in Section 1. The surrogate recoveries in the reanalyses were acceptable. The results for diesel-range and oil-range TPH in the initial extractions of samples PB60-S-8-091108 and PB70-S-68-091508 are flagged ‘DNR’ based on the surrogate recoveries. The results for diesel-range and oil-range TPH in the re-extractions of samples PB60-S-8-091108 and PB70-S-68-091508 are qualified as estimated and flagged with a ‘J’ based on the surrogate recoveries.

As the percent recovery for n-triacontane in sample PB59-S-8-091108 was acceptable, data were not qualified in this sample based on the o-terphenyl surrogate recovery.

7. Internal Standards (applicable to GC/MS only) – Acceptable

8. Laboratory Control/ Laboratory Control Duplicate Samples (LCS/LCSD) – Acceptable except as noted below:

   PAHs by Method 8270C-SIM – The relative percent differences (RPDs) for PCP for the LCS/LCSDs extracted on September 23, 2008 (61%) and September 24, 2008 (75%) exceeded the control limit of 40%. As the percent recoveries for PCP in the LCS/LCSDs were acceptable, data were not qualified based on the elevated RPDs.

   The percent recovery for pentachlorophenol (9%) in the LCS extracted on September 29, 2008 and the RPD for the LCS/LCSD pair (84%) were outside the laboratory control limits of 10-150% and 40%, respectively. The results for pentachlorophenol were previously qualified as estimated and flagged 'J' or 'UJ' based on the associated initial calibration results and no further qualification is necessary.

9. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted below:

   VOCs by Method 8260B – A MS/MSD was not performed in association with this analysis. Accuracy was assessed using the LCS.

   PAHs by Method 8270C-SIM – MS/MSDs were performed on samples PB64-S-6-090808 and S-DUP2-081508. Results were acceptable. MS/MSDs were performed on samples PB61-S-6.5-091108, PB73-S-5-091508, and a sample from an unrelated project. Results were acceptable except as noted below:

Sample ID	Analyte	MS	MSD	Control Limits
Unrelated project	PCP	57%	49%	70-130%
PB61-S-6.5-091108	Naphthalene	435 %	146%	10-129%
	2-Methylnaphthlalene	532 %	281%	10-133%
	Acenaphthene	179 %	193%	28-111%
	Dibenzofuran	169 %	186%	37-103%
	Fluorene	124 %	136%	24-122%
	PCP	175 %	173%	70-130%
PB73-S-5-091508	PCP	40%	37%	70-130%

No data was qualified based on the MS/MSD percent recoveries in non-project samples.

The sample concentrations for naphthalene and 2-methylnaphthalene in sample PB61-S-6.5-091108 were more than five times (5x) the spike concentration; therefore, data were not qualified for these analytes based on the elevated MS/MSD results. The results for acenaphthene, dibenzofuran, and fluorene in sample PB61-S-6.5-091108 are qualified as estimated and flagged 'J' based on the MS/MSD results. The result for PCP in sample PB61-S-6.5-091108 was previously qualified based on the initial calibration and no further qualification is required.

The result for PCP in sample PB73-S-5-091508 was previously qualified based on the initial calibration and no further qualification is required.

<u>TPH by NWTPH-Dx</u> – A MS/MSD was not performed in association with the TPH analysis. Accuracy was assessed using the LCS. Precision was assessed using the laboratory duplicate and field duplicate results.

10. Laboratory Duplicate – Acceptable except as noted below:

<u>VOCs by Method 8260B</u> – A laboratory duplicate was not performed in association with this analysis. Precision was not assessed.
<u>PAHs by Method 8270C-SIM</u> – A laboratory duplicate was not performed in association with this analysis. Precision was assessed using the LCS/LCSD, MS/MSD, and field duplicate results.

<u>TPH by NWTPH-Dx</u> – Laboratory duplicates were performed on samples TMW07-S-11.5-090908, TMW06-S-7-091208, PB68-S-8.5-091508 and two soil samples from unrelated projects. Results are acceptable.

11. Field Duplicate (applicable to PAH and TPH analyses only) – Acceptable except as noted below:

<u>General</u> – Field duplicates were submitted for samples TMW06-S-7-091208, PB73-S-5-091508, and PB70-S-6-091508 and identified as S-DUP1-091208, S-DUP2-091508, and S-DUP3-091508. Results were comparable for all organic analyses except as noted below.

<u>PAHs by Method 8270C-SIM</u> – The RPD for naphthalene (59%) in the parent sample / field duplicate pair TMW06-S-7-091208/ S-Dup-1-091208 was greater than 50%. The results for naphthalene in these samples were qualified as estimated and flagged with a ‘J’ based on the field duplicate RPD.

12. Reporting Limits – Acceptable except as noted below:

<u>VOCs by Method 8260B</u> – The reporting limits for one or more VOCs were elevated in several samples due to the percent moisture content of the samples. The elevated reporting limits may affect the use of the data for project objectives.

Samples TMW02-S-8-091008 and TMW02-S-11-091008 were analyzed for naphthalene by Method 8260B and Method 8270C-SIM. As the results for naphthalene in these samples were significantly higher when reported by Method 8270C-SIM, the results for naphthalene by Method 8260B are qualified ‘DNR’ and will not be reported.

<u>PAHs by Method 8270C-SIM</u> – The reporting limits for one or more PAHs were elevated in several samples due to the percent moisture content of the samples. The elevated reporting limits may affect the use of the data for project objectives.

The results for one or more PAHs in all samples were assigned a ‘J’ qualifier by the laboratory to indicate that the reported concentration is above the MDL, but below the MRL. All J-flagged results are considered estimated.

<u>TPH by NWTPH-Dx</u> – The reporting limits for one or more TPHs were elevated in several samples due to the percent moisture content of the samples.

The results for one or more TPHs in several samples were assigned a ‘J’ qualifier by the laboratory to indicate that the reported concentration is above the MDL, but below the MRL. All J-flagged results are considered estimated unless previously qualified based on quality control issues as described within this report.

The results for diesel-range and/or diesel-range hydrocarbons in several samples were assigned an 'H,' 'L,' 'O,' 'Y,' or 'Z' qualifier by the laboratory to indicate that the chromatographic fingerprint does not match the laboratory standard chromatographic fingerprint. No additional qualifiers were necessary based on the qualifiers assigned by the laboratory.

Metals Analysis

Samples were analyzed for metals as identified in the introduction of this report.

1. Holding Times – Acceptable

2. Initial Calibrations – Acceptable

3. Continuing Calibrations – Acceptable

4. Method Blanks - Acceptable

5. Laboratory Control Samples – Acceptable

6. Matrix Spike Samples – Acceptable

   A matrix spike was performed on sample TMW02-S-8-091008. Results were acceptable.

7. Laboratory Duplicates – Acceptable except as noted below:

   A laboratory duplicate was performed on sample TMW02-S-091008. The RPD for mercury (51.8%) exceeded the control limit of 30%. The results for mercury in all associated samples are qualified as estimates and flagged 'J'.

6\. Reporting Limits – Acceptable

Overall Assessment

The data reported in these SDGs, as qualified, are considered to be usable for meeting project objectives. The completeness for SDGs K0808627, K0808731, K0808785, K0808869, and K0808948 is 100%.

Data Qualifier Definitions:

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
DNR	Do Not Report. Another result is available that is more reliable or appropriate.

Table 1. Summary of Qualified Data

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
PB65-S-10.5-090808	K0808627-001	Diesel Range Organics (DRO)	mg/Kg	5.5 J	14 U
		Residual Range Organics (RRO)	mg/Kg	23 J	34 U
		Acenaphthene	ug/Kg	1.4 J	1.4 J
		Benz(a)anthracene	ug/Kg	0.52 J	0.52 J
		Chrysemnbne	ug/Kg	0.37 J	0.37 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Dibenzofuran	ug/Kg	1.8 J	1.8 J
		Fluorene	ug/Kg	0.84 J	0.84 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	5.0 U	5.0 UJ
		Phenanthrene	ug/Kg	1.0 J	1.0 J
		Pyrene	ug/Kg	0.46 J	0.46 J
PB65-S-11-090808	K0808627-002	Diesel Range Organics (DRO)	mg/Kg	5.6 J	15 U
		Acenaphthene	ug/Kg	1.9 J	1.9 J
		Benz(a)anthracene	ug/Kg	0.71 J	0.71 J
		Chrysene	ug/Kg	0.31 J	0.31 J
		Dibenz(a,h)anthracene	ug/Kg	4.9 U	4.9 UJ
		Dibenzofuran	ug/Kg	1.5 J	1.5 J
		Fluorene	ug/Kg	0.94 J	0.94 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	4.9 U	4.9 UJ
		Phenanthrene	ug/Kg	1.7 J	1.7 J
		Pyrene	ug/Kg	0.48 J	0.48 J
PB64-S-6-090808	K0808627-003	Dibenz(a,h)anthracene	ug/Kg	31	31 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	200	200 J
PB64-S-11-090808	K0808627-004	Diesel Range Organics (DRO)	mg/Kg	4.1 J	13 U
		Residual Range Organics (RRO)	mg/Kg	13 J	32 U
		2-Methylnaphthalene	ug/Kg	4.4 J	4.4 J
		Acenaphthene	ug/Kg	3.1 J	3.1 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Dibenzofuran	ug/Kg	2.9 J	2.9 J
		Fluorene	ug/Kg	1.8 J	1.8 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	5.0 U	5.0 UJ
		Phenanthrene	ug/Kg	2.5 J	2.5 J
		Pyrene	ug/Kg	0.44 J	0.44 J
PB66-S-2-090808	K0808627-005	Acenaphthylene	ug/Kg	0.93 J	0.93 J
		Anthracene	ug/Kg	2.0 J	2.0 J
		Benz(a)anthracene	ug/Kg	1.9 J	1.9 J
		Benzo(a)pyrene	ug/Kg	1.4 J	1.4 J
		Benzo(b)fluoranthene	ug/Kg	4.6 J	4.6 J
		Benzo(g,h,i)perylene	ug/Kg	3.6 J	3.6 J
		Benzo(k)fluoranthene	ug/Kg	1.3 J	1.3 J
		Chrysene	ug/Kg	3.8 J	3.8 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Fluorene	ug/Kg	3.5 J	3.5 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	2.4 J	2.4 J
PB66-S-7-090808	K0808627-006	Diesel Range Organics (DRO)	mg/Kg	8.0 J	13 U
		Acenaphthylene	ug/Kg	0.96 J	0.96 J
		Anthracene	ug/Kg	2.1 J	2.1 J
		Benz(a)anthracene	ug/Kg	1.0 J	1.0 J
		Benzo(a)pyrene	ug/Kg	0.54 J	0.54 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
PB66-S-7-090808	K0808627-006	Benzo(b)fluoranthene	ug/Kg	1.2 J	1.2 J
		Benzo(g,h,i)perylene	ug/Kg	0.93 J	0.93 J
		Chrysene	ug/Kg	1.5 J	1.5 J
		Dibenz(a,h)anthracene	ug/Kg	1.8 J	1.8 J
		Fluoranthene	ug/Kg	4.3 J	4.3 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	0.72 J	0.72 J
		Phenanthrene	ug/Kg	4.7 J	4.7 J
PB67-S-7-090808	K0808627-007	Dibenz(a,h)anthracene	ug/Kg	140	140 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	630	630 J
PB67-S-9-090808	K0808627-008	Acenaphthylene	ug/Kg	0.64 J	0.64 J
		Anthracene	ug/Kg	1.8 J	1.8 J
		Benz(a)anthracene	ug/Kg	2.3 J	2.3 J
		Benzo(a)pyrene	ug/Kg	1.3 J	1.3 J
		Benzo(b)fluoranthene	ug/Kg	2.2 J	2.2 J
		Benzo(g,h,i)perylene	ug/Kg	1.9 J	1.9 J
		Benzo(k)fluoranthene	ug/Kg	1.4 J	1.4 J
		Chrysene	ug/Kg	2.6 J	2.6 J
		Dibenz(a,h)anthracene	ug/Kg	0.92 J	0.92 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.6 J	1.6 J
PB69-S-3-090808	K0808627-009	Diesel Range Organics (DRO)	mg/Kg	12 J	12 J
		Acenaphthylene	ug/Kg	0.77 J	0.77 J
		Anthracene	ug/Kg	2.6 J	2.6 J
		Benz(a)anthracene	ug/Kg	3.1 J	3.1 J
		Benzo(a)pyrene	ug/Kg	2.6 J	2.6 J
		Benzo(g,h,i)perylene	ug/Kg	3.2 J	3.2 J
		Benzo(k)fluoranthene	ug/Kg	1.7 J	1.7 J
		Dibenz(a,h)anthracene	ug/Kg	0.66 J	0.66 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	2.5 J	2.5 J
PB69-S-7-090808	K0808627-010	Acenaphthylene	ug/Kg	0.46 J	0.46 J
		Anthracene	ug/Kg	0.86 J	0.86 J
		Benz(a)anthracene	ug/Kg	1.2 J	1.2 J
		Benzo(a)pyrene	ug/Kg	1.0 J	1.0 J
		Benzo(b)fluoranthene	ug/Kg	1.2 J	1.2 J
		Benzo(g,h,i)perylene	ug/Kg	1.1 J	1.1 J
		Chrysene	ug/Kg	1.3 J	1.3 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Dibenzofuran	ug/Kg	3.1 J	3.1 J
		Fluoranthene	ug/Kg	3.3 J	3.3 J
		Fluorene	ug/Kg	2.4 J	2.4 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	0.98 J	0.98 J
		Pyrene	ug/Kg	4.0 J	4.0 J
TMW07-S-11.5-090908	K0808731-001	Diesel Range Organics (DRO)	mg/Kg	2.3 J	12 U
		Residual Range Organics (RRO)	mg/Kg	11 J	28 U
		2-Methylnaphthalene	ug/Kg	0.62 J	0.62 J
		Acenaphthene	ug/Kg	0.24 J	0.24 J
		Benz(a)anthracene	ug/Kg	0.95 J	0.95 J
		Benzo(a)pyrene	ug/Kg	0.71 J	0.71 J
		Benzo(b)fluoranthene	ug/Kg	0.76 J	5.0 U
		Benzo(g,h,i)perylene	ug/Kg	2.1 J	5.0 U

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
TMW07-S-11.5-090908	K0808731-001	Benzo(k)fluoranthene	ug/Kg	0.49 J	5.0 U
		Chrysene	ug/Kg	0.94 J	5.0 U
		Dibenz(a,h)anthracene	ug/Kg	0.98 J	5.0 UJ
		Fluoranthene	ug/Kg	1.6 J	5.0 U
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.2 J	5.0 UJ
		Naphthalene	ug/Kg	1.7 J	1.7 J
		Phenanthrene	ug/Kg	1.7 J	1.7 J
		Pyrene	ug/Kg	1.2 J	5.0 U
TMW08-S-10-090908	K0808731-002	Diesel Range Organics (DRO)	mg/Kg	9.3 J	12 U
		2-Methylnaphthalene	ug/Kg	5.0 J	5.0 J
		Dibenz(a,h)anthracene	ug/Kg	5.4	5.4 J
		Dibenzofuran	ug/Kg	3.7 J	3.7 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	22	22 J
TMW09-S-9.5-090908	K0808731-003	Diesel Range Organics (DRO)	mg/Kg	3.9 J	13 U
		Residual Range Organics (RRO)	mg/Kg	19 J	31 U
		2-Methylnaphthalene	ug/Kg	1.1 J	1.1 J
		Anthracene	ug/Kg	0.69 J	0.69 J
		Benz(a)anthracene	ug/Kg	1.7 J	1.7 J
		Benzo(b)fluoranthene	ug/Kg	2.0 J	2.0 J
		Benzo(g,h,i)perylene	ug/Kg	1.4 J	5.0 U
		Benzo(k)fluoranthene	ug/Kg	0.69 J	5.0 U
		Chrysene	ug/Kg	2.4 J	2.4 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Dibenzofuran	ug/Kg	0.65 J	0.65 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.1 J	5.0 UJ
		Naphthalene	ug/Kg	4.9 J	4.9 J
		Phenanthrene	ug/Kg	4.9 J	4.9 J
		Pyrene	ug/Kg	4.0 J	4.0 J
TMW10-S-07-090908	K0808731-004	Diesel Range Organics (DRO)	mg/Kg	4.1 J	12 U
		Residual Range Organics (RRO)	mg/Kg	15 J	29 U
		Acenaphthylene	ug/Kg	0.45 J	0.45 J
		Anthracene	ug/Kg	0.90 J	0.90 J
		Benz(a)anthracene	ug/Kg	1.0 J	1.0 J
		Benzo(b)fluoranthene	ug/Kg	0.84 J	5.0 U
		Chrysene	ug/Kg	1.1 J	5.0 U
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Dibenzofuran	ug/Kg	2.3 J	2.3 J
		Fluoranthene	ug/Kg	2.3 J	5.0 U
		Fluorene	ug/Kg	1.8 J	1.8 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	5.0 U	5.0 UJ
		Pentachlorophenol	ug/Kg	5.0 U	5.0 UJ
		Phenanthrene	ug/Kg	3.0 J	3.0 J
		Pyrene	ug/Kg	1.3 J	5.0 U
TMW01-S-7-091008	K0808731-006	Diesel Range Organics (DRO)	mg/Kg	2.6 J	13 U
		Residual Range Organics (RRO)	mg/Kg	8.5 J	31 U
		2-Methylnaphthalene	ug/Kg	1.7 J	1.7 J
		Acenaphthylene	ug/Kg	0.48 J	0.48 J
		Anthracene	ug/Kg	3.2 J	3.2 J
		Benz(a)anthracene	ug/Kg	1.2 J	1.2 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
TMW01-S-7-091008	K0808731-006	Benzo(b)fluoranthene	ug/Kg	0.76 J	5.4 U
		Chrysene	ug/Kg	0.80 J	5.4 U
		Dibenz(a,h)anthracene	ug/Kg	5.4 U	5.4 UJ
		Dibenzofuran	ug/Kg	2.2 J	2.2 J
		Fluoranthene	ug/Kg	1.9 J	5.4 U
		Indeno(1,2,3-cd)pyrene	ug/Kg	0.35 J	5.4 UJ
		Pyrene	ug/Kg	1.5 J	5.4 U
TMW01-S-13.5-091008	K0808731-007	Diesel Range Organics (DRO)	mg/Kg	5.9 J	18 U
		2-Methylnaphthalene	ug/Kg	1.2 J	1.2 J
		Acenaphthene	ug/Kg	1.6 J	1.6 J
		Acenaphthylene	ug/Kg	0.54 J	0.54 J
		Anthracene	ug/Kg	1.3 J	1.3 J
		Benz(a)anthracene	ug/Kg	1.8 J	1.8 J
		Benzo(a)pyrene	ug/Kg	1.1 J	1.1 J
		Benzo(b)fluoranthene	ug/Kg	2.9 J	2.9 J
		Benzo(g,h,i)perylene	ug/Kg	2.9 J	4.9 U
		Benzo(k)fluoranthene	ug/Kg	0.73 J	4.9 U
		Chrysene	ug/Kg	2.1 J	2.1 J
		Dibenz(a,h)anthracene	ug/Kg	0.33 J	4.9 UJ
		Dibenzofuran	ug/Kg	0.87 J	0.87 J
		Fluorene	ug/Kg	1.4 J	1.4 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	2.6 J	4.9 UJ
TMW02-S-8-091008	K0808731-008	Dibenz(a,h)anthracene	ug/Kg	170	170 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	450	450 J
		Pentachlorophenol	ug/Kg	200 U	200 UJ
		1,2,4-Trimethylbenzene	ug/Kg	1.4 J	1.4 J
		1,4-Dichlorobenzene	ug/Kg	0.35 J	8.4 U
		4-Isopropyltoluene	ug/Kg	0.78 J	0.78 J
		Carbon Disulfide	ug/Kg	0.42 J	0.42 J
		Ethylbenzene	ug/Kg	0.48 J	0.48 J
		m,p-Xylenes	ug/Kg	0.76 J	0.76 J
		Methylene Chloride	ug/Kg	1.3 J	17 U
		Naphthalene	ug/Kg	9.7 J	DNR
		o-Xylene	ug/Kg	0.61 J	0.61 J
		Toluene	ug/Kg	1.9 J	1.9 J
		Cadmium, Total	mg/Kg	0.10 B	0.10 J
		Mercury, Total	mg/Kg	0.175	0.175 J
TMW02-S-11-091008	K0808731-009	Diesel Range Organics (DRO)	mg/Kg	7.2 J	7.2 J
		Residual Range Organics (RRO)	mg/Kg	31 J	31 J
		Acenaphthylene	ug/Kg	0.75 J	0.75 J
		Anthracene	ug/Kg	2.5 J	2.5 J
		Benz(a)anthracene	ug/Kg	2.2 J	2.2 J
		Benzo(a)pyrene	ug/Kg	1.5 J	1.5 J
		Benzo(b)fluoranthene	ug/Kg	2.6 J	2.6 J
		Benzo(g,h,i)perylene	ug/Kg	2.8 J	5.0 U
		Benzo(k)fluoranthene	ug/Kg	0.92 J	0.92 J
		Chrysene	ug/Kg	2.2 J	2.2 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Dibenzofuran	ug/Kg	2.3 J	2.3 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
TMW02-S-11-091008	K0808731-009	Fluorene	ug/Kg	2.0 J	2.0 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.9 J	5.0 UJ
		Pentachlorophenol	ug/Kg	200 U	200 UJ
		1,2,4-Trimethylbenzene	ug/Kg	7.6 J	7.6 J
		1,3,5-Trimethylbenzene	ug/Kg	0.17 J	0.17 J
		1,4-Dichlorobenzene	ug/Kg	0.24 J	6.1 U
		2-Butanone (MEK)	ug/Kg	9.5 J	9.5 J
		4-Isopropyltoluene	ug/Kg	0.12 J	0.12 J
		Carbon Disulfide	ug/Kg	0.22 J	0.22 J
		Ethylbenzene	ug/Kg	0.86 J	0.86 J
		Isopropylbenzene	ug/Kg	0.77 J	0.77 J
		m,p-Xylenes	ug/Kg	0.92 J	0.92 J
		Methylene Chloride	ug/Kg	0.52 J	13 U
		Naphthalene	ug/Kg	3.1 J	DNR
		o-Xylene	ug/Kg	2.9 J	2.9 J
		Styrene	ug/Kg	0.14 J	6.1 U
		Toluene	ug/Kg	1.1 J	1.1 J
		Cadmium, Total	mg/Kg	0.07 B	0.07 J
		Mercury, Total	mg/Kg	0.054	0.054 J
TMW03-S-9-091108	K0808785-001	Diesel Range Organics (DRO)	mg/Kg	6.4 J	13 U
		Residual Range Organics (RRO)	mg/Kg	19 J	19 J
		Acenaphthylene	ug/Kg	0.30 J	0.30 J
		Anthracene	ug/Kg	0.82 J	0.82 J
		Benz(a)anthracene	ug/Kg	1.0 J	5.0 U
		Benzo(b)fluoranthene	ug/Kg	0.82 J	0.82 J
		Chrysene	ug/Kg	0.83 J	5.0 U
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Fluoranthene	ug/Kg	1.7 J	1.7 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	0.47 J	5.0 UJ
		Pentachlorophenol	ug/Kg	200 U	200 UJ
		Pyrene	ug/Kg	1.9 J	1.9 J
PB61-S-6.5-091108	K0808785-002	Acenaphthene	ug/Kg	450	450 J
		Dibenz(a,h)anthracene	ug/Kg	21	21 J
		Dibenzofuran	ug/Kg	250	250 J
		Fluorene	ug/Kg	90	90 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	100	100 J
		Pentachlorophenol	ug/Kg	200 U	200 UJ
PB61-S-8-091108	K0808785-003	Dibenz(a,h)anthracene	ug/Kg	270	270 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	1,000	1,000 J
		Pentachlorophenol	ug/Kg	290 J	290 J
PB60-S-8-091108	K0808785-004	Dibenz(a,h)anthracene	ug/Kg	220	220 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	760	760 J
		Pentachlorophenol	ug/Kg	290 J	290 J
PB60-S-11-091108	K0808785-005	Diesel Range Organics (DRO)	mg/Kg	9.4 J	DNR
		Residual Range Organics (RRO)	mg/Kg	23 J	DNR
		Acenaphthylene	ug/Kg	1.2 J	1.2 J
		Anthracene	ug/Kg	3.6 J	3.6 J
		Benz(a)anthracene	ug/Kg	3.0 J	3.0 J
		Benzo(a)pyrene	ug/Kg	2.4 J	2.4 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
PB60-S-11-091108	K0808785-005	Benzo(b)fluoranthene	ug/Kg	4.5 J	4.5 J
		Benzo(k)fluoranthene	ug/Kg	1.3 J	1.3 J
		Chrysene	ug/Kg	4.0 J	4.0 J
		Dibenz(a,h)anthracene	ug/Kg	0.48 J	4.9 UJ
		Indeno(1,2,3-cd)pyrene	ug/Kg	3.6 J	3.6 J
		Pentachlorophenol	ug/Kg	200 U	200 UJ
PB60-S-11-091108	K0808785-005RE	Diesel Range Organics (DRO)	mg/Kg	18	18 J
		Residual Range Organics (RRO)	mg/Kg	80	80 J
PB59-S-8-091108	K0808785-006	Dibenz(a,h)anthracene	ug/Kg	1,200	1,200 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	4,700	4,700 J
		Pentachlorophenol	ug/Kg	10,000 U	10,000 UJ
PB59-S-10-091108	K0808785-007	Residual Range Organics (RRO)	mg/Kg	33 J	33 J
		Dibenz(a,h)anthracene	ug/Kg	7.3	7.3 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	26	26 J
		Pentachlorophenol	ug/Kg	200 U	200 UJ
TMW04-S-7.5-091208	K0808869-001	Diesel Range Organics (DRO)	mg/Kg	6.6 J	6.6 J
		Residual Range Organics (RRO)	mg/Kg	19 J	19 J
		Acenaphthylene	ug/Kg	3.1 J	3.1 J
		Dibenz(a,h)anthracene	ug/Kg	3.5 J	3.5 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	16	16 J
		Pentachlorophenol	ug/Kg	200 U	200 UJ
TMW05-S-6-091208	K0808869-002	Diesel Range Organics (DRO)	mg/Kg	10 J	10 J
		Acenaphthylene	ug/Kg	0.50 J	0.50 J
		Anthracene	ug/Kg	0.96 J	0.96 J
		Benz(a)anthracene	ug/Kg	1.6 J	5.0 U
		Chrysene	ug/Kg	0.92 J	5.0 U
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Fluoranthene	ug/Kg	3.1 J	3.1 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	5.0 U	5.0 UJ
		Pyrene	ug/Kg	3.0 J	3.0 J
TMW12-S-6.5-091208	K0808869-003	Diesel Range Organics (DRO)	mg/Kg	5.5 J	5.5 J
		Acenaphthylene	ug/Kg	0.41 J	0.41 J
		Anthracene	ug/Kg	0.85 J	0.85 J
		Benz(a)anthracene	ug/Kg	2.7 J	5.0 U
		Benzo(a)pyrene	ug/Kg	1.2 J	1.2 J
		Benzo(b)fluoranthene	ug/Kg	3.1 J	3.1 J
		Benzo(g,h,i)perylene	ug/Kg	2.7 J	2.7 J
		Benzo(k)fluoranthene	ug/Kg	1.1 J	1.1 J
		Chrysene	ug/Kg	3.6 J	3.6 J
		Dibenz(a,h)anthracene	ug/Kg	0.78 J	5.0 UJ
		Dibenzofuran	ug/Kg	4.3 J	4.3 J
		Fluoranthene	ug/Kg	4.8 J	4.8 J
		Fluorene	ug/Kg	2.5 J	2.5 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	2.5 J	2.5 J
		Pentachlorophenol	ug/Kg	200 U	200 UJ
		Pyrene	ug/Kg	4.8 J	4.8 J
TMW11-S-7.5-091208	K0808869-004	Diesel Range Organics (DRO)	mg/Kg	8.6 J	8.6 J
		Acenaphthylene	ug/Kg	0.99 J	0.99 J
		Anthracene	ug/Kg	3.6 J	3.6 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
TMW11-S-7.5-091208	K0808869-004	Benz(a)anthracene	ug/Kg	2.3 J	5.0 U
		Benzo(a)pyrene	ug/Kg	0.71 J	0.71 J
		Benzo(b)fluoranthene	ug/Kg	2.9 J	2.9 J
		Benzo(g,h,i)perylene	ug/Kg	1.2 J	1.2 J
		Benzo(k)fluoranthene	ug/Kg	0.79 J	0.79 J
		Chrysene	ug/Kg	2.2 J	2.2 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.4 J	5.0 UJ
		Pentachlorophenol	ug/Kg	200 U	200 UJ
TMW06-S-7-091208	K0808869-005	Diesel Range Organics (DRO)	mg/Kg	5.6 J	5.6 J
		Acenaphthylene	ug/Kg	0.59 J	0.59 J
		Anthracene	ug/Kg	0.81 J	0.81 J
		Benz(a)anthracene	ug/Kg	1.8 J	5.0 U
		Benzo(b)fluoranthene	ug/Kg	1.3 J	1.3 J
		Benzo(g,h,i)perylene	ug/Kg	0.86 J	0.86 J
		Chrysene	ug/Kg	1.4 J	5.0 U
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Fluoranthene	ug/Kg	3.0 J	3.0 J
		Fluorene	ug/Kg	4.0 J	4.0 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.6 J	5.0 U
		Naphthalene	ug/Kg	55	55 J
		Pyrene	ug/Kg	3.5 J	3.5 J
S-DUP-1-091208	K0808869-006	Diesel Range Organics (DRO)	mg/Kg	4.9 J	4.9 J
		Residual Range Organics (RRO)	mg/Kg	29 J	29 J
		Acenaphthylene	ug/Kg	0.58 J	0.58 J
		Anthracene	ug/Kg	0.81 J	0.81 J
		Benz(a)anthracene	ug/Kg	1.8 J	4.9 U
		Benzo(a)pyrene	ug/Kg	0.76 J	0.76 J
		Benzo(b)fluoranthene	ug/Kg	2.6 J	2.6 J
		Benzo(g,h,i)perylene	ug/Kg	2.0 J	2.0 J
		Benzo(k)fluoranthene	ug/Kg	0.76 J	0.76 J
		Chrysene	ug/Kg	2.9 J	2.9 J
		Dibenz(a,h)anthracene	ug/Kg	4.9 U	4.9 UJ
		Fluoranthene	ug/Kg	3.4 J	3.4 J
		Fluorene	ug/Kg	2.6 J	2.6 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	2.0 J	2.0 J
		Naphthalene	ug/Kg	30	30 J
		Pyrene	ug/Kg	3.2 J	3.2 J
S-Dup-2-091508	K0808948-001	Diesel Range Organics (DRO)	mg/Kg	10 J	10 J
		Residual Range Organics (RRO)	mg/Kg	20 J	20 J
		2-Methylnaphthalene	ug/Kg	3.4 J	3.4 J
		Acenaphthylene	ug/Kg	0.97 J	0.97 J
		Benz(a)anthracene	ug/Kg	3.8 J	3.8 J
		Benzo(k)fluoranthene	ug/Kg	2.5 J	2.5 J
		Chrysene	ug/Kg	1.9 J	1.9 J
		Dibenz(a,h)anthracene	ug/Kg	1.9 J	1.9 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	8.2	8.2 J
S-Dup-3-091508	K0808948-002	Acenaphthylene	ug/Kg	3.9 J	3.9 J
		Benz(a)anthracene	ug/Kg	1.5 J	1.5 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
S-Dup-3-091508	K0808948-002	Benzo(a)pyrene	ug/Kg	0.72 J	0.72 J
		Benzo(b)fluoranthene	ug/Kg	1.3 J	1.3 J
		Benzo(g,h,i)perylene	ug/Kg	1.2 J	1.2 J
		Benzo(k)fluoranthene	ug/Kg	0.37 J	0.37 J
		Chrysene	ug/Kg	2.3 J	2.3 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.0 J	1.0 J
PB68-S-6-091508	K0808948-003	Dibenz(a,h)anthracene	ug/Kg	79	79 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	310	310 J
PB71-S-6.5-091508	K0808948-004	Diesel Range Organics (DRO)	mg/Kg	11 J	11 J
		Acenaphthylene	ug/Kg	2.6 J	2.6 J
		Anthracene	ug/Kg	3.0 J	3.0 J
		Benz(a)anthracene	ug/Kg	1.5 J	1.5 J
		Benzo(a)pyrene	ug/Kg	0.67 J	0.67 J
		Benzo(b)fluoranthene	ug/Kg	1.2 J	1.2 J
		Benzo(g,h,i)perylene	ug/Kg	1.0 J	1.0 J
		Chrysene	ug/Kg	1.5 J	1.5 J
		Dibenz(a,h)anthracene	ug/Kg	5.0 U	5.0 UJ
		Fluoranthene	ug/Kg	4.9 J	4.9 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	0.93 J	0.93 J
PB72-S-8.5-091508	K0808948-005	Acenaphthylene	ug/Kg	0.49 J	0.49 J
		Benz(a)anthracene	ug/Kg	1.7 J	5.0 U
		Benzo(a)pyrene	ug/Kg	2.9 J	5.0 U
		Benzo(b)fluoranthene	ug/Kg	4.5 J	5.0 U
		Benzo(g,h,i)perylene	ug/Kg	8.1	8.1 U
		Chrysene	ug/Kg	5.9	5.9 U
		Dibenz(a,h)anthracene	ug/Kg	1.6 J	5.0 UJ
		Dibenzofuran	ug/Kg	2.5 J	2.5 J
		Fluorene	ug/Kg	4.9 J	4.9 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	2.4 J	5.0 UJ
		Pentachlorophenol	ug/Kg	200 U	200 UJ
PB68-S-8.5-091508	K0808948-006	Acenaphthylene	ug/Kg	2.7 J	2.7 J
		Anthracene	ug/Kg	4.6 J	4.6 J
		Benzo(a)pyrene	ug/Kg	3.6 J	3.6 J
		Benzo(k)fluoranthene	ug/Kg	4.7 J	4.7 J
		Dibenz(a,h)anthracene	ug/Kg	5.6	5.6 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	5.9	5.9 J
PB63-S-8-091508	K0808948-007	Acenaphthylene	ug/Kg	0.57 J	0.57 J
		Benz(a)anthracene	ug/Kg	1.6 J	1.6 J
		Benzo(a)pyrene	ug/Kg	0.70 J	0.70 J
		Benzo(b)fluoranthene	ug/Kg	1.3 J	1.3 J
		Benzo(g,h,i)perylene	ug/Kg	1.1 J	1.1 J
		Benzo(k)fluoranthene	ug/Kg	0.73 J	0.73 J
		Chrysene	ug/Kg	1.9 J	1.9 J
		Dibenz(a,h)anthracene	ug/Kg	0.52 J	0.52 J
		Dibenzofuran	ug/Kg	2.1 J	2.1 J
		Fluoranthene	ug/Kg	3.4 J	3.4 J
		Fluorene	ug/Kg	2.7 J	2.7 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	0.93 J	0.93 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Units	Lab Result	Final Result
PB63-S-8-091508	K0808948-007	Phenanthrene	ug/Kg	4.6 J	4.6 J
		Pyrene	ug/Kg	3.3 J	3.3 J
PB73-S-5-091508	K0808948-008	Diesel Range Organics (DRO)	mg/Kg	3.9 J	3.9 J
		Residual Range Organics (RRO)	mg/Kg	9.4 J	9.4 J
		2-Methylnaphthalene	ug/Kg	4.2 J	4.2 J
		Acenaphthylene	ug/Kg	1.1 J	1.1 J
		Benz(a)anthracene	ug/Kg	4.4 J	5.0 U
		Benzo(b)fluoranthene	ug/Kg	7.5	7.5 U
		Benzo(g,h,i)perylene	ug/Kg	7.6	7.6 U
		Benzo(k)fluoranthene	ug/Kg	2.6 J	5.0 U
		Chrysene	ug/Kg	5.4	5.4 U
		Dibenz(a,h)anthracene	ug/Kg	2.0 J	5.0 UJ
		Indeno(1,2,3-cd)pyrene	ug/Kg	7.9	7.9 UJ
		Pentachlorophenol	ug/Kg	200 U	200 UJ
PB63-S-6.5-091508	K0808948-009	Dibenz(a,h)anthracene	ug/Kg	6.3	6.3 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	27	27 J
PB73-S-6.5-091508	K0808948-010	Diesel Range Organics (DRO)	mg/Kg	6.3 J	6.3 J
		Residual Range Organics (RRO)	mg/Kg	28 J	28 J
		Acenaphthylene	ug/Kg	1.6 J	1.6 J
		Anthracene	ug/Kg	1.3 J	1.3 J
		Benz(a)anthracene	ug/Kg	1.6 J	4.9 U
		Benzo(a)pyrene	ug/Kg	0.87 J	4.9 U
		Benzo(b)fluoranthene	ug/Kg	1.9 J	4.9 U
		Benzo(g,h,i)perylene	ug/Kg	2.2 J	4.9 U
		Benzo(k)fluoranthene	ug/Kg	1.7 J	4.9 U
		Chrysene	ug/Kg	2.2 J	4.9 U
		Dibenz(a,h)anthracene	ug/Kg	1.8 J	4.9 UJ
		Dibenzofuran	ug/Kg	2.5 J	2.5 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	2.7 J	4.9 UJ
		Pentachlorophenol	ug/Kg	200 U	200 UJ
		Phenanthrene	ug/Kg	3.3 J	3.3 J
		Pyrene	ug/Kg	1.9 J	4.9 U
PB62-S-5.5-091508	K0808948-011	Dibenz(a,h)anthracene	ug/Kg	8.3	8.3 J
		Indeno(1,2,3-cd)pyrene	ug/Kg	13	13 J
PB70-S-6-091508	K0808948-012	Diesel Range Organics (DRO)	mg/Kg	13 J	DNR
		Residual Range Organics (RRO)	mg/Kg	26 J	DNR
		Benz(a)anthracene	ug/Kg	1.7 J	5.0 U
		Benzo(a)pyrene	ug/Kg	1.3 J	5.0 U
		Benzo(b)fluoranthene	ug/Kg	2.0 J	5.0 U
		Benzo(g,h,i)perylene	ug/Kg	1.8 J	5.0 U
		Chrysene	ug/Kg	3.0 J	5.0 U
		Dibenz(a,h)anthracene	ug/Kg	0.44 J	5.0 UJ
		Indeno(1,2,3-cd)pyrene	ug/Kg	1.5 J	5.0 UJ
		Pentachlorophenol	ug/Kg	200 U	200 UJ
PB70-S-6-091508	K0808948-012RE	Diesel Range Organics (DRO)	mg/Kg	36	36 J
		Residual Range Organics (RRO)	mg/Kg	79	79 J

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

October 15, 2008

Analytical Report for Service Request No: K0808627

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on September 09, 2008. For your reference, these analyses have been assigned our service request number K0808627.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation		
Project:	IP Longview Geoprobe	**Service Request No.:**	K0808627
Sample Matrix:	Soil	**Date Received:**	9/09/08

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Ten soil samples were received for analysis at Columbia Analytical Services on 9/09/08. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel and Residual Range Organics in sample PB66-S-7-090808 is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: Indeno(1,2,3-cd)pyrene and Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Approved by EMW **Date** 10/17/08

Columbia Analytical Services INC.
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CHAIN OF CUSTODY

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SR#: K0808627

PAGE 1 OF 1 COC #

PROJECT NAME: IP LONGVIEW GEOPROBE
PROJECT NUMBER:
PROJECT MANAGER: PAUL KALINA
COMPANY/ADDRESS: URS 1501 4TH AVE
CITY/STATE/ZIP: SEATTLE WA 98101
E-MAIL ADDRESS: PAUL_KALINA@URSCORP.COM
PHONE #: 206 438 2700
FAX#:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625 ☐ 8270 ☐ 8270LL ☐	Volatile Organics 624 ☐ 8260 ☐	Hydrocarbons (*see below) Gas ☐ 8021 ☐ BTEX ☐ Diesel ☒ Oil ☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM ☐ 1664 SGT ☐	PCB's Aroclors ☐ Congeners ☐	Pesticides/Herbicides 608 ☐ 8081A ☐ 8141A ☐ 8151A ☐	Chlorophenolics - 8151M Tri ☐ Tetra ☐ PCP ☐	PAHS 8310 ☐ SIM ☒	Metals, Total or Dissolved (See list below)	Cyanide ☐ Hex-Chrom ☐	pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020 ☐ AOX 1650 ☐ 506 ☐					REMARKS
PB65-S-10.5-090808	9/8/08	1220		Soil	1				X						X										
PB65-S-11-090808		1230			1				X						X										
PB64-S-6-090808		1350			1				X						X										
PB64-S-11-090808		1420			1				X						X										
PB66-S-2-090808		1500			1				X						X										
PB66-S-7-090808		1550			1				X						X										
PB67-S-7-090808		1620			1				X						X										
PB67-S-9-090808		1635			1				X						X										
PB69-S-3-090808		1645			1				X						X										
PB69-S-7-090808	↓	1700		↓	1				X						X										

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

[redacted]

RELINQUISHED BY:
Signature | Date/Time: 9/8/08
Printed Name: IAN VERMEEREN | Firm: URS

RECEIVED BY:
Signature | Date/Time: 9/8/08 / 7:45pm
Printed Name: Jason Epps | Firm: CAS

RELINQUISHED BY:
Signature | Date/Time
Printed Name | Firm

RECEIVED BY:
Signature: Tracy Black | Date/Time: 9/9/08 0800
Printed Name: Tracy Black | Firm: CAS

RCOC #1 06/03

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC E W

Client / Project: URS Service Request K08 08627

Received: 9/9/08 Opened: 9/9/08 By: BJ

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other NA
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where?
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: [✓ NA] Y N
5. **Temperature of cooler(s) upon receipt (°C):** 1.9
   Temperature Blank (°C): —
6. If applicable, list Chain of Custody Numbers:
7. Packing material used. *Inserts* *Baggies* [✓ *Bubble Wrap*] *Gel Packs* [✓ *Wet Ice*] *Sleeves* *Other* mostly melted
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** [✓ NA] Y N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

**Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).*

Additional Notes, Discrepancies, & Resolutions:

Page 1 of: 1 2

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808627

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
PB65-S-10.5-090808	K0808627-001	35	34	43
PB65-S-11-090808	K0808627-002	54	54	68
PB64-S-6-090808	K0808627-003	57	55	65
PB64-S-11-090808	K0808627-004	60	59	76
PB66-S-2-090808	K0808627-005	64	63	77
PB66-S-7-090808	K0808627-006	54	54	67
PB67-S-7-090808	K0808627-007	95 D	75 D	82 D
PB67-S-9-090808	K0808627-008	59	58	72
PB69-S-3-090808	K0808627-009	52	53	62
PB69-S-7-090808	K0808627-010	61	63	74
Method Blank	KWG0809781-5	63	64	77
PB64-S-6-090808MS	KWG0809781-1	36	37	42
PB64-S-6-090808DMS	KWG0809781-2	59	60	70
Lab Control Sample	KWG0809781-3	64	66	70
Duplicate Lab Control Sample	KWG0809781-4	67	70	73

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-128
Sur2 = Fluoranthene-d10	29-121
Sur3 = Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0809781-5	**Basis:**	Dry
Extraction Method:	EPA 3541		
Analysis Method:	8270C SIM	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.52**	J	3.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	ND	U	3.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	ND	U	3.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	ND	U	3.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	ND	U	3.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	ND	U	3.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	ND	U	3.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	ND	U	3.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	ND	U	3.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	ND	U	3.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	ND	U	3.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	ND	U	3.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	ND	U	3.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	ND	U	3.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	ND	U	3.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	ND	U	3.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	ND	U	3.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	ND	U	3.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	10-128	10/03/08	Acceptable
Fluoranthene-d10	64	29-121	10/03/08	Acceptable
Terphenyl-d14	77	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation		
Project:	IP Longview Geo-probe	**Service Request:**	K0808627
Sample Matrix:	Soil	**Date Collected:**	09/08/2008
		Date Received:	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB65-S-10.5-090808		
Lab Code:	K0808627-001	**Units:**	ug/Kg
		Basis:	Dry
Extraction Method:	EPA 3541		
Analysis Method:	8270C SIM	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**18**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	**7.7**		5.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	ND	U	5.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	**1.4**	J	5.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	**0.84**	J	5.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	**1.8**	J	5.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	**1.0**	J	5.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	ND	U	5.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	ND	U	5.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	**0.46**	J	5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	ND	U	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	**0.52**	J	5.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	**0.37**	J	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	ND	U	5.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	ND	U	5.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	35	10-128	10/03/08	Acceptable
Fluoranthene-d10	34	29-121	10/03/08	Acceptable
Terphenyl-d14	43	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB65-S-11-090808	**Units:**	ug/Kg
Lab Code:	K0808627-002	**Basis:**	Dry
Extraction Method:	EPA 3541		
Analysis Method:	8270C SIM	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**25**		4.9	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	**5.9**		4.9	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	ND	U	4.9	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	**1.9**	J	4.9	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	**0.94**	J	4.9	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	**1.5**	J	4.9	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	**1.7**	J	4.9	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	ND	U	4.9	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	ND	U	4.9	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	**0.48**	J	4.9	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	ND	U	4.9	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	ND	U	4.9	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	**0.71**	J	4.9	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	**0.31**	J	4.9	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	ND	U	4.9	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	ND	U	4.9	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	ND	U	4.9	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	ND	U	4.9	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	54	10-128	10/03/08	Acceptable
Fluoranthene-d10	54	29-121	10/03/08	Acceptable
Terphenyl-d14	68	24-141	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB64-S-6-090808	**Units:**	ug/Kg
Lab Code:	K0808627-003	**Basis:**	Dry
Extraction Method:	EPA 3541		
Analysis Method:	8270C SIM	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**65**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	**28**		5.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	**21**		5.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	**6.7**		5.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	**5.6**		5.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	**17**		5.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	**57**		5.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	**160**		5.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	**94**		5.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	**85**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	**190**		5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	**48**		5.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	**59**		5.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	**36**		5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	**70**		5.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	**200**		5.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	**31**		5.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	**160**		5.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	57	10-128	10/03/08	Acceptable
Fluoranthene-d10	55	29-121	10/03/08	Acceptable
Terphenyl-d14	65	24-141	10/03/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB64-S-11-090808	**Units:**	ug/Kg
Lab Code:	K0808627-004	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5.1**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	**4.4**	J	5.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	ND	U	5.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	**3.1**	J	5.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	**1.8**	J	5.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	**2.9**	J	5.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	**2.5**	J	5.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	ND	U	5.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	ND	U	5.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	**0.44**	J	5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	ND	U	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	ND	U	5.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	ND	U	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	ND	U	5.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	ND	U	5.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	10-128	10/03/08	Acceptable
Fluoranthene-d10	59	29-121	10/03/08	Acceptable
Terphenyl-d14	76	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB66-S-2-090808	**Units:**	ug/Kg
Lab Code:	K0808627-005	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**35**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	**15**		5.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	**0.93**	J	5.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	**6.4**		5.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	**3.5**	J	5.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	**5.7**		5.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	**9.7**		5.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	**2.0**	J	5.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	**9.7**		5.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	**7.3**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	**4.6**	J	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	**1.3**	J	5.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	**1.9**	J	5.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	**3.8**	J	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	**1.4**	J	5.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	**2.4**	J	5.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	**3.6**	J	5.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	10-128	10/03/08	Acceptable
Fluoranthene-d10	63	29-121	10/03/08	Acceptable
Terphenyl-d14	77	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808627
Date Collected: 09/08/2008
Date Received: 09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name: PB66-S-7-090808
Lab Code: K0808627-006

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	610		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	200		5.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	0.96	J	5.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	73		5.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	17		5.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	12		5.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	4.7	J	5.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	2.1	J	5.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	4.3	J	5.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	5.1		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	1.2	J	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	1.0	J	5.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	1.5	J	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	0.54	J	5.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	0.72	J	5.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	1.8	J	5.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	0.93	J	5.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	54	10-128	10/03/08	Acceptable
Fluoranthene-d10	54	29-121	10/03/08	Acceptable
Terphenyl-d14	67	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB67-S-7-090808	**Units:**	ug/Kg
Lab Code:	K0808627-007	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**94000**	D	2500	190	500	09/22/08	10/06/08	KWG0809781	
2-Methylnaphthalene	**180000**	D	2500	200	500	09/22/08	10/06/08	KWG0809781	
Acenaphthylene	**2300**	D	50	2.4	10	09/22/08	10/06/08	KWG0809781	
Acenaphthene	**160000**	D	2500	120	500	09/22/08	10/06/08	KWG0809781	
Fluorene	**79000**	D	2500	250	500	09/22/08	10/06/08	KWG0809781	
Dibenzofuran	**120000**	D	2500	300	500	09/22/08	10/06/08	KWG0809781	
Phenanthrene	**120000**	D	2500	380	500	09/22/08	10/06/08	KWG0809781	
Anthracene	**14000**	D	50	4.7	10	09/22/08	10/06/08	KWG0809781	
Fluoranthene	**60000**	D	2500	310	500	09/22/08	10/06/08	KWG0809781	
Pyrene	**36000**	D	2500	190	500	09/22/08	10/06/08	KWG0809781	
Benzo(b)fluoranthene	**3000**	D	50	2.5	10	09/22/08	10/06/08	KWG0809781	
Benzo(k)fluoranthene	**1200**	D	50	1.5	10	09/22/08	10/06/08	KWG0809781	
Benz(a)anthracene	**7400**	D	50	4.8	10	09/22/08	10/06/08	KWG0809781	
Chrysene	**6800**	D	50	2.5	10	09/22/08	10/06/08	KWG0809781	
Benzo(a)pyrene	**1600**	D	50	1.4	10	09/22/08	10/06/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	**630**	D	50	1.6	10	09/22/08	10/06/08	KWG0809781	
Dibenz(a,h)anthracene	**140**	D	50	2.8	10	09/22/08	10/06/08	KWG0809781	
Benzo(g,h,i)perylene	**460**	D	50	6.4	10	09/22/08	10/06/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	95	10-128	10/06/08	Acceptable
Fluoranthene-d10	75	29-121	10/06/08	Acceptable
Terphenyl-d14	82	24-141	10/06/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation		
Project:	IP Longview Geo-probe	**Service Request:**	K0808627
Sample Matrix:	Soil	**Date Collected:**	09/08/2008
		Date Received:	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB67-S-9-090808		
Lab Code:	K0808627-008	**Units:**	ug/Kg
		Basis:	Dry
Extraction Method:	EPA 3541		
Analysis Method:	8270C SIM	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	8900	D	49	3.7	10	09/22/08	10/06/08	KWG0809781	
2-Methylnaphthalene	550		4.9	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	0.64	J	4.9	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	30		4.9	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	6.5		4.9	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	9.7		4.9	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	8.6		4.9	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	1.8	J	4.9	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	7.5		4.9	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	5.7		4.9	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	2.2	J	4.9	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	1.4	J	4.9	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	2.3	J	4.9	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	2.6	J	4.9	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	1.3	J	4.9	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	1.6	J	4.9	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	0.92	J	4.9	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	1.9	J	4.9	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	59	10-128	10/03/08	Acceptable
Fluoranthene-d10	58	29-121	10/03/08	Acceptable
Terphenyl-d14	72	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808627
Date Collected: 09/08/2008
Date Received: 09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name: PB69-S-3-090808
Lab Code: K0808627-009

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**140**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	**93**		5.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	**0.77**	J	5.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	**20**		5.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	**8.3**		5.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	**17**		5.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	**11**		5.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	**2.6**	J	5.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	**11**		5.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	**12**		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	**5.2**		5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	**1.7**	J	5.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	**3.1**	J	5.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	**6.6**		5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	**2.6**	J	5.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	**2.5**	J	5.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	**0.66**	J	5.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	**3.2**	J	5.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	52	10-128	10/03/08	Acceptable
Fluoranthene-d10	53	29-121	10/03/08	Acceptable
Terphenyl-d14	62	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation		
Project:	IP Longview Geo-probe	**Service Request:**	K0808627
Sample Matrix:	Soil	**Date Collected:**	09/08/2008
		Date Received:	09/09/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB69-S-7-090808	**Units:**	ug/Kg
Lab Code:	K0808627-010	**Basis:**	Dry
Extraction Method:	EPA 3541		
Analysis Method:	8270C SIM	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	300		5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
2-Methylnaphthalene	15		5.0	0.39	1	09/22/08	10/03/08	KWG0809781	
Acenaphthylene	0.46	J	5.0	0.24	1	09/22/08	10/03/08	KWG0809781	
Acenaphthene	7.4		5.0	0.23	1	09/22/08	10/03/08	KWG0809781	
Fluorene	2.4	J	5.0	0.50	1	09/22/08	10/03/08	KWG0809781	
Dibenzofuran	3.1	J	5.0	0.59	1	09/22/08	10/03/08	KWG0809781	
Phenanthrene	6.4		5.0	0.75	1	09/22/08	10/03/08	KWG0809781	
Anthracene	0.86	J	5.0	0.47	1	09/22/08	10/03/08	KWG0809781	
Fluoranthene	3.3	J	5.0	0.61	1	09/22/08	10/03/08	KWG0809781	
Pyrene	4.0	J	5.0	0.37	1	09/22/08	10/03/08	KWG0809781	
Benzo(b)fluoranthene	1.2	J	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/22/08	10/03/08	KWG0809781	
Benz(a)anthracene	1.2	J	5.0	0.48	1	09/22/08	10/03/08	KWG0809781	
Chrysene	1.3	J	5.0	0.25	1	09/22/08	10/03/08	KWG0809781	
Benzo(a)pyrene	1.0	J	5.0	0.14	1	09/22/08	10/03/08	KWG0809781	
Indeno(1,2,3-cd)pyrene	0.98	J	5.0	0.16	1	09/22/08	10/03/08	KWG0809781	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/22/08	10/03/08	KWG0809781	
Benzo(g,h,i)perylene	1.1	J	5.0	0.64	1	09/22/08	10/03/08	KWG0809781	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	10-128	10/03/08	Acceptable
Fluoranthene-d10	63	29-121	10/03/08	Acceptable
Terphenyl-d14	74	24-141	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Extracted:**	09/22/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/03/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	PB64-S-6-090808	**Units:**	ug/Kg
Lab Code:	K0808627-003	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0809781

		PB64-S-6-090808MS KWG0809781-1 **Matrix Spike**			PB64-S-6-090808DMS KWG0809781-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	65	391	495	66	369	497	61	10-129	6	40
2-Methylnaphthalene	28	397	495	75	386	497	72	10-133	3	40
Acenaphthylene	21	380	495	72	370	497	70	37-100	3	40
Acenaphthene	6.7	347	495	69	340	497	67	28-111	2	40
Fluorene	5.6	362	495	72	360	497	71	24-122	1	40
Dibenzofuran	17	384	495	74	381	497	73	37-103	1	40
Phenanthrene	57	420	495	73	396	497	68	23-124	6	40
Anthracene	160	602	495	90	531	497	75	30-114	12	40
Fluoranthene	94	472	495	76	444	497	70	21-145	6	40
Pyrene	85	478	495	79	464	497	76	10-155	3	40
Benzo(b)fluoranthene	190	672	495	98	552	497	73	18-130	20	40
Benzo(k)fluoranthene	48	438	495	79	388	497	68	30-122	12	40
Benz(a)anthracene	59	449	495	79	425	497	74	25-127	5	40
Chrysene	36	492	495	92	460	497	85	28-126	7	40
Benzo(a)pyrene	70	519	495	91	454	497	77	20-132	13	40
Indeno(1,2,3-cd)pyrene	200	727	495	106	638	497	88	20-132	13	40
Dibenz(a,h)anthracene	31	391	495	73	372	497	69	28-124	5	40
Benzo(g,h,i)perylene	160	656	495	101	573	497	84	24-124	14	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Extracted:**	09/22/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/03/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	ug/Kg
Analysis Method:	8270C SIM	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809781

	Lab Control Sample KWG0809781-3			Duplicate Lab Control Sample KWG0809781-4					
	Lab Control Spike			**Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	173	250	69	152	250	61	35-104	13	40
2-Methylnaphthalene	199	250	80	176	250	71	34-110	12	40
Acenaphthylene	184	250	74	166	250	66	46-105	10	40
Acenaphthene	177	250	71	159	250	64	47-104	11	40
Fluorene	187	250	75	164	250	66	52-106	13	40
Dibenzofuran	195	250	78	172	250	69	50-106	13	40
Phenanthrene	186	250	75	165	250	66	48-108	12	40
Anthracene	192	250	77	170	250	68	51-110	12	40
Fluoranthene	195	250	78	172	250	69	54-121	12	40
Pyrene	192	250	77	171	250	68	53-110	12	40
Benzo(b)fluoranthene	190	250	76	168	250	67	51-116	13	40
Benzo(k)fluoranthene	196	250	79	177	250	71	57-114	11	40
Benz(a)anthracene	187	250	75	165	250	66	51-113	12	40
Chrysene	189	250	76	166	250	66	56-112	13	40
Benzo(a)pyrene	194	250	78	172	250	69	53-112	12	40
Indeno(1,2,3-cd)pyrene	164	250	65	132	250	53	42-124	21	40
Dibenz(a,h)anthracene	147	250	59	126	250	51	44-125	15	40
Benzo(g,h,i)perylene	177	250	71	152	250	61	50-115	15	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	PERCENT
Analysis Method:	NWTPH-Dx	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
PB65-S-10.5-090808	K0808627-001	75	73
PB65-S-11-090808	K0808627-002	72	75
PB64-S-6-090808	K0808627-003	74	77
PB64-S-11-090808	K0808627-004	79	82
PB66-S-2-090808	K0808627-005	72	76
PB66-S-7-090808	K0808627-006	77	81
PB67-S-7-090808	K0808627-007	85	79
PB67-S-9-090808	K0808627-008	69	78
PB69-S-3-090808	K0808627-009	71	74
PB69-S-7-090808	K0808627-010	72	80
PB66-S-7-090808DUP	KWG0809778-1	70	74
Method Blank	KWG0809778-3	78	79
Lab Control Sample	KWG0809778-4	83	86

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0809778-3	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1.9**	J	9.8	1.2	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**5.0**	J	25	2.9	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	78	50-150	09/24/08	Acceptable
n-Triacontane	79	50-150	09/24/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB65-S-10.5-090808	**Units:**	mg/Kg
Lab Code:	K0808627-001	**Basis:**	Dry
Extraction Method:	EPA 3550B		
Analysis Method:	NWTPH-Dx	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**5.5**	J	14	1.7	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**23**	J	34	4.0	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	75	50-150	09/24/08	Acceptable
n-Triacontane	73	50-150	09/24/08	Acceptable

Comments:

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Form 1A - Organic

Page 1 of 1

SuperSet Reference: RR93036

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB65-S-11-090808	**Units:**	mg/Kg
Lab Code:	K0808627-002	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**5.6**	J	15	1.8	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**40**	Z	37	4.2	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	09/24/08	Acceptable
n-Triacontane	75	50-150	09/24/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB64-S-6-090808	**Units:**	mg/Kg
Lab Code:	K0808627-003	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**17**	H	12	1.4	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**84**	O	29	3.4	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	74	50-150	09/25/08	Acceptable
n-Triacontane	77	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB64-S-11-090808	**Units:**	mg/Kg
Lab Code:	K0808627-004	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**4.1**	J	13	1.6	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**13**	J	32	3.7	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	09/24/08	Acceptable
n-Triacontane	82	50-150	09/24/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB66-S-2-090808	**Units:**	mg/Kg
Lab Code:	K0808627-005	**Basis:**	Dry
Extraction Method:	EPA 3550B		
Analysis Method:	NWTPH-Dx	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**35**	H	14	1.7	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**170**	O	34	3.9	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	09/24/08	Acceptable
n-Triacontane	76	50-150	09/24/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB66-S-7-090808	**Units:**	mg/Kg
Lab Code:	K0808627-006	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**8.0**	J	13	1.6	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**45**	Z	33	3.8	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	77	50-150	09/24/08	Acceptable
n-Triacontane	81	50-150	09/24/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB67-S-7-090808	**Units:**	mg/Kg
Lab Code:	K0808627-007	**Basis:**	Dry
Extraction Method:	EPA 3550B		
Analysis Method:	NWTPH-Dx	**Level:**	Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**2700**	Y	14	1.7	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**310**	L	34	4.0	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	85	50-150	09/25/08	Acceptable
n-Triacontane	79	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB67-S-9-090808	**Units:**	mg/Kg
Lab Code:	K0808627-008	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**24**	Z	15	1.8	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**87**	Z	37	4.3	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	09/24/08	Acceptable
n-Triacontane	78	50-150	09/24/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB69-S-3-090808	**Units:**	mg/Kg
Lab Code:	K0808627-009	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**12**	J	13	1.6	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**60**	Z	33	3.8	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	71	50-150	09/25/08	Acceptable
n-Triacontane	74	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008

Diesel and Residual Range Organics

Sample Name:	PB69-S-7-090808	**Units:**	mg/Kg
Lab Code:	K0808627-010	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**16**	Z	14	1.6	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**83**	Z	33	3.9	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	09/25/08	Acceptable
n-Triacontane	80	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Extracted:**	09/22/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/24/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	PB66-S-7-090808	**Units:**	mg/Kg
Lab Code:	K0808627-006	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0809778

Analyte Name	MRL	MDL	Sample Result	PB66-S-7-090808DUP KWG0809778-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	14	1.6	8.0	9.6	8.8	18 #	40
Residual Range Organics (RRO)	33	3.8	45	46	45	4 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-probe	**Date Extracted:**	09/22/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/24/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: mg/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0809778

Lab Control Sample
KWG0809778-4

	Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	224	267	84	63-120
Residual Range Organics (RRO)	110	133	83	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-prob
Sample Matrix: Soil

Service Request: K0808627

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
PB65-S-10.5-090808	K0808627-001	09/08/2008	09/09/2008	09/12/2008	72.6	
PB65-S-11-090808	K0808627-002	09/08/2008	09/09/2008	09/12/2008	69.2	
PB64-S-6-090808	K0808627-003	09/08/2008	09/09/2008	09/12/2008	87.4	
PB64-S-11-090808	K0808627-004	09/08/2008	09/09/2008	09/12/2008	79.2	
PB66-S-2-090808	K0808627-005	09/08/2008	09/09/2008	09/12/2008	74.4	
PB66-S-7-090808	K0808627-006	09/08/2008	09/09/2008	09/12/2008	75.8	
PB67-S-7-090808	K0808627-007	09/08/2008	09/09/2008	09/12/2008	73.2	
PB67-S-9-090808	K0808627-008	09/08/2008	09/09/2008	09/12/2008	67.8	
PB69-S-3-090808	K0808627-009	09/08/2008	09/09/2008	09/12/2008	75.7	
PB69-S-7-090808	K0808627-010	09/08/2008	09/09/2008	09/12/2008	74.0	

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808627
Project:	IP Longview Geo-prob	**Date Collected:**	09/08/2008
Sample Matrix:	Soil	**Date Received:**	09/09/2008
		Date Analyzed:	09/12/2008

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
PB65-S-10.5-090808	K0808627-001	72.6	73.1	72.9	<1	

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

November 6, 2008

Analytical Report for Service Request No: K0808731

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on September 11, 2008. For your reference, these analyses have been assigned our service request number K0808731.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/lb

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

December 16, 2008

Analytical Report for Service Request No: K0808731
K0808869
K0808948

RECEIVED
DEC 19 2008
URS CORPORATION
SEATTLE

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the revised pages for the samples submitted to our laboratory on September 11, 13 & 16, 2008. For your reference, these analyses have been assigned our service request number K0808731, K0808869, K0808948.

The reference to the surrogate 2,4,6-Tribromophenol was removed when it did not apply to the sample. Pentachlorophenol replaced the phrase "PCP".

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0808731
Project:	IP Longview	**Date Received:**	9/11/08
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Nine soil samples were received for analysis at Columbia Analytical Services on 9/11/08. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for the replicate analysis of Mercury in sample TMW02-S-8-091008 was outside the normal CAS control limits. The variability in the results is attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel and Residual Range Organics in sample TMW07-S-11.5-090908 and of Residual Range Organics in sample Batch QC is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Volatile Organic Compounds by EPA Method 8260B

No anomalies with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets

Approved by Emw **Date** 12/9/08

the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Polynuclear Aromatic Hydrocarbons and Pentachlorphenol by EPA Method 8270C

Matrix Spike Recovery Exceptions:
The advisory criterion was exceeded for the following analyte in the Matrix Spike Batch QC: Pentachlorophenol. The recovery information reported for this analyte is for advisory purposes only (i.e. to provide additional detail related to the performance of each individual compound). No further corrective action was required.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for Pentachlorophenol in the replicate Laboratory Control Sample (LCS) analyses (KWG0809824-3 and KWG0809824-4) was outside control criteria. There were no hits in the associated samples. Per CAS policy no further corrective action was required.

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: 2,4,6-Tribromophenol, Pentachlorophenol, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Approved by Emw **Date** 12/9/08

Columbia Analytical Services INC.
An Employee - Owned Company

CHAIN OF CUSTODY

SR#: K0808781

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 1 COC #

PROJECT NAME IP LONGVIEW GEOPROBE
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS URS 1501 4th Ave
SEATTLE, WA 98101
CITY/STATE/ZIP
E-MAIL ADDRESS PAUL_KALINA@URSCORP.COM
PHONE # 206-438-2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☒	Hydrocarbons (*see below) Gas☐ 8021☐ BTEX☐ Diesel☒ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒	[✓ Metals, Total] or Dissolved (See list below) RCRA 8	Cyanide☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle) Hex-Chrom☐	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	PCP (PAH's)				REMARKS
TMW07-S-11.5-090908	9/9/08	1350		S	1				X						X										
TMW08-S-10-090908	↓	1500		↓	1				X						X										
TMW09-S-9.5-090908	↓	1555		↓	1				X						X										
TMW10-S-07-090908	↓	1630		↓	1				X						X						X				
TMW10-S-10-090908	↓	1635		↓	1				X						X						X				HOLD
TMW01-S-7-091008	9/10/08	1005		↓	1				X						X										
TMW01-S-13.5-091008	↓	1025		↓	1				X						X										
TMW02-S-8-091008	↓	1445		↓	5			X	X						X	X					X				
TMW02-S-11-091008	↓	1500		↓	5			X	X						X	X					X				
	↓			↓																					

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ____
Bill To: ____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
____ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

[redacted]

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 9-10-08 1720	Signature Jason Epps	Date/Time 91008 5:27pm	Signature	Date/Time	Signature Tracy Black	Date/Time 9/11/08 0930
Printed Name Matt McKibbin	Firm URS	Printed Name Jason Epps	Firm CAS	Printed Name	Firm	Printed Name Tracy Black	Firm CAS

RCOC #1 06/03

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC E W

Client / Project: URS - IP Longview Service Request K08 08731

Received: 9/11/08 Opened: 9/11/08 By: A.J ✓

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other NA
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? 1F
   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N
4. Is shipper's air-bill filed? If not, record air-bill number: NA Y N
5. **Temperature of cooler(s) upon receipt (°C):** 2.2
   Temperature Blank (°C): 1.2
6. If applicable, list Chain of Custody Numbers:
7. Packing material used. [✓ Inserts] Baggies Bubble Wrap Gel Packs [✓ Wet Ice] Sleeves Other
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** [✓ NA] Y N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

**Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).*

Additional Notes, Discrepancies, & Resolutions:

Page 1 of: 1 2

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Volatile Organic Compounds

Extraction Method:	EPA 5035A	**Units:**	PERCENT
Analysis Method:	8260B	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TMW02-S-8-091008	K0808731-008	102	100	85
TMW02-S-11-091008	K0808731-009	103	107	99
Method Blank	KWG0809695-3	99	109	99
Lab Control Sample	KWG0809695-1	101	105	101
Duplicate Lab Control Sample	KWG0809695-2	100	104	101

Surrogate Recovery Control Limits (%)

Sur1 = Dibromofluoromethane	61-116
Sur2 = Toluene-d8	63-116
Sur3 = 4-Bromofluorobenzene	58-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Volatile Organic Compounds

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0809695-3	**Basis:**	Dry
Extraction Method:	EPA 5035A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	5.0	0.072	1	09/19/08	09/19/08	KWG0809695	
Chloromethane	**0.16**	J	5.0	0.057	1	09/19/08	09/19/08	KWG0809695	
Vinyl Chloride	ND	U	5.0	0.057	1	09/19/08	09/19/08	KWG0809695	
Bromomethane	ND	U	5.0	0.42	1	09/19/08	09/19/08	KWG0809695	
Chloroethane	ND	U	5.0	0.30	1	09/19/08	09/19/08	KWG0809695	
Trichlorofluoromethane	ND	U	5.0	0.054	1	09/19/08	09/19/08	KWG0809695	
Acetone	**7.3**	J	20	2.9	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloroethene	ND	U	5.0	0.070	1	09/19/08	09/19/08	KWG0809695	
Carbon Disulfide	ND	U	5.0	0.053	1	09/19/08	09/19/08	KWG0809695	
Methylene Chloride	**4.1**	J	10	0.14	1	09/19/08	09/19/08	KWG0809695	
trans-1,2-Dichloroethene	ND	U	5.0	0.048	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloroethane	ND	U	5.0	0.048	1	09/19/08	09/19/08	KWG0809695	
2-Butanone (MEK)	ND	U	20	1.6	1	09/19/08	09/19/08	KWG0809695	
2,2-Dichloropropane	ND	U	5.0	0.10	1	09/19/08	09/19/08	KWG0809695	
cis-1,2-Dichloroethene	ND	U	5.0	0.081	1	09/19/08	09/19/08	KWG0809695	
Chloroform	ND	U	5.0	0.048	1	09/19/08	09/19/08	KWG0809695	
Bromochloromethane	ND	U	5.0	0.25	1	09/19/08	09/19/08	KWG0809695	
1,1,1-Trichloroethane (TCA)	ND	U	5.0	0.15	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloropropene	ND	U	5.0	0.15	1	09/19/08	09/19/08	KWG0809695	
Carbon Tetrachloride	ND	U	5.0	0.078	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichloroethane (EDC)	ND	U	5.0	0.054	1	09/19/08	09/19/08	KWG0809695	
Benzene	ND	U	5.0	0.14	1	09/19/08	09/19/08	KWG0809695	
Trichloroethene (TCE)	ND	U	5.0	0.13	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichloropropane	ND	U	5.0	0.065	1	09/19/08	09/19/08	KWG0809695	
Bromodichloromethane	ND	U	5.0	0.044	1	09/19/08	09/19/08	KWG0809695	
Dibromomethane	ND	U	5.0	0.18	1	09/19/08	09/19/08	KWG0809695	
2-Hexanone	ND	U	20	0.78	1	09/19/08	09/19/08	KWG0809695	
cis-1,3-Dichloropropene	ND	U	5.0	0.031	1	09/19/08	09/19/08	KWG0809695	
Toluene	**0.19**	J	5.0	0.044	1	09/19/08	09/19/08	KWG0809695	
trans-1,3-Dichloropropene	ND	U	5.0	0.10	1	09/19/08	09/19/08	KWG0809695	
1,1,2-Trichloroethane	ND	U	5.0	0.088	1	09/19/08	09/19/08	KWG0809695	
4-Methyl-2-pentanone (MIBK)	ND	U	20	0.24	1	09/19/08	09/19/08	KWG0809695	
1,3-Dichloropropane	ND	U	5.0	0.059	1	09/19/08	09/19/08	KWG0809695	

Comments:

Client:	URS Corporation		**Service Request:**	K0808731
Project:	IP Longview Geo-probe		**Date Collected:**	NA
Sample Matrix:	Soil		**Date Received:**	NA

Volatile Organic Compounds

Sample Name:	Method Blank		**Units:**	ug/Kg
Lab Code:	KWG0809695-3		**Basis:**	Dry
Extraction Method:	EPA 5035A		**Level:**	Low
Analysis Method:	8260B			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	5.0	0.12	1	09/19/08	09/19/08	KWG0809695	
Dibromochloromethane	ND	U	5.0	0.16	1	09/19/08	09/19/08	KWG0809695	
1,2-Dibromoethane (EDB)	ND	U	20	0.19	1	09/19/08	09/19/08	KWG0809695	
Chlorobenzene	**0.090**	J	5.0	0.054	1	09/19/08	09/19/08	KWG0809695	
1,1,1,2-Tetrachloroethane	ND	U	5.0	0.18	1	09/19/08	09/19/08	KWG0809695	
Ethylbenzene	ND	U	5.0	0.041	1	09/19/08	09/19/08	KWG0809695	
m,p-Xylenes	ND	U	5.0	0.093	1	09/19/08	09/19/08	KWG0809695	
o-Xylene	ND	U	5.0	0.059	1	09/19/08	09/19/08	KWG0809695	
Styrene	**0.090**	J	5.0	0.076	1	09/19/08	09/19/08	KWG0809695	
Bromoform	ND	U	5.0	0.25	1	09/19/08	09/19/08	KWG0809695	
Isopropylbenzene	ND	U	20	0.031	1	09/19/08	09/19/08	KWG0809695	
1,1,2,2-Tetrachloroethane	ND	U	5.0	0.089	1	09/19/08	09/19/08	KWG0809695	
1,2,3-Trichloropropane	ND	U	5.0	0.27	1	09/19/08	09/19/08	KWG0809695	
Bromobenzene	ND	U	5.0	0.092	1	09/19/08	09/19/08	KWG0809695	
n-Propylbenzene	ND	U	20	0.054	1	09/19/08	09/19/08	KWG0809695	
2-Chlorotoluene	ND	U	20	0.051	1	09/19/08	09/19/08	KWG0809695	
4-Chlorotoluene	ND	U	20	0.092	1	09/19/08	09/19/08	KWG0809695	
1,3,5-Trimethylbenzene	ND	U	20	0.040	1	09/19/08	09/19/08	KWG0809695	
tert-Butylbenzene	ND	U	20	0.054	1	09/19/08	09/19/08	KWG0809695	
1,2,4-Trimethylbenzene	ND	U	20	0.093	1	09/19/08	09/19/08	KWG0809695	
sec-Butylbenzene	ND	U	20	0.065	1	09/19/08	09/19/08	KWG0809695	
1,3-Dichlorobenzene	**0.13**	J	5.0	0.070	1	09/19/08	09/19/08	KWG0809695	
4-Isopropyltoluene	ND	U	20	0.083	1	09/19/08	09/19/08	KWG0809695	
1,4-Dichlorobenzene	**0.20**	J	5.0	0.10	1	09/19/08	09/19/08	KWG0809695	
n-Butylbenzene	ND	U	20	0.096	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichlorobenzene	**0.13**	J	5.0	0.063	1	09/19/08	09/19/08	KWG0809695	
1,2-Dibromo-3-chloropropane	ND	U	20	0.78	1	09/19/08	09/19/08	KWG0809695	
1,2,4-Trichlorobenzene	**0.39**	J	20	0.22	1	09/19/08	09/19/08	KWG0809695	
1,2,3-Trichlorobenzene	**0.40**	J	20	0.14	1	09/19/08	09/19/08	KWG0809695	
Naphthalene	**0.62**	J	20	0.32	1	09/19/08	09/19/08	KWG0809695	
Hexachlorobutadiene	ND	U	20	0.17	1	09/19/08	09/19/08	KWG0809695	

Comments:

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808731
Date Collected: NA
Date Received: NA

Volatile Organic Compounds

Sample Name: Method Blank
Lab Code: KWG0809695-3

Units: ug/Kg
Basis: Dry

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	99	61-116	09/19/08	Acceptable
Toluene-d8	109	63-116	09/19/08	Acceptable
4-Bromofluorobenzene	99	58-117	09/19/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Volatile Organic Compounds

Sample Name:	TMW02-S-8-091008	**Units:**	ug/Kg
Lab Code:	K0808731-008	**Basis:**	Dry
Extraction Method:	EPA 5035A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	8.4	0.12	1	09/19/08	09/19/08	KWG0809695	
Chloromethane	ND	U	8.4	0.095	1	09/19/08	09/19/08	KWG0809695	
Vinyl Chloride	ND	U	8.4	0.095	1	09/19/08	09/19/08	KWG0809695	
Bromomethane	ND	U	8.4	0.70	1	09/19/08	09/19/08	KWG0809695	
Chloroethane	ND	U	8.4	0.50	1	09/19/08	09/19/08	KWG0809695	
Trichlorofluoromethane	ND	U	8.4	0.090	1	09/19/08	09/19/08	KWG0809695	
Acetone	**190**		34	4.9	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloroethene	ND	U	8.4	0.12	1	09/19/08	09/19/08	KWG0809695	
Carbon Disulfide	**0.42**	J	8.4	0.089	1	09/19/08	09/19/08	KWG0809695	
Methylene Chloride	**1.3**	J	17	0.24	1	09/19/08	09/19/08	KWG0809695	
trans-1,2-Dichloroethene	ND	U	8.4	0.080	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloroethane	ND	U	8.4	0.080	1	09/19/08	09/19/08	KWG0809695	
2-Butanone (MEK)	**55**		34	2.7	1	09/19/08	09/19/08	KWG0809695	
2,2-Dichloropropane	ND	U	8.4	0.17	1	09/19/08	09/19/08	KWG0809695	
cis-1,2-Dichloroethene	ND	U	8.4	0.14	1	09/19/08	09/19/08	KWG0809695	
Chloroform	ND	U	8.4	0.080	1	09/19/08	09/19/08	KWG0809695	
Bromochloromethane	ND	U	8.4	0.42	1	09/19/08	09/19/08	KWG0809695	
1,1,1-Trichloroethane (TCA)	ND	U	8.4	0.25	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloropropene	ND	U	8.4	0.25	1	09/19/08	09/19/08	KWG0809695	
Carbon Tetrachloride	ND	U	8.4	0.13	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichloroethane (EDC)	ND	U	8.4	0.090	1	09/19/08	09/19/08	KWG0809695	
Benzene	ND	U	8.4	0.24	1	09/19/08	09/19/08	KWG0809695	
Trichloroethene (TCE)	ND	U	8.4	0.22	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichloropropane	ND	U	8.4	0.11	1	09/19/08	09/19/08	KWG0809695	
Bromodichloromethane	ND	U	8.4	0.074	1	09/19/08	09/19/08	KWG0809695	
Dibromomethane	ND	U	8.4	0.30	1	09/19/08	09/19/08	KWG0809695	
2-Hexanone	ND	U	34	1.3	1	09/19/08	09/19/08	KWG0809695	
cis-1,3-Dichloropropene	ND	U	8.4	0.052	1	09/19/08	09/19/08	KWG0809695	
Toluene	**1.9**	J	8.4	0.074	1	09/19/08	09/19/08	KWG0809695	
trans-1,3-Dichloropropene	ND	U	8.4	0.17	1	09/19/08	09/19/08	KWG0809695	
1,1,2-Trichloroethane	ND	U	8.4	0.15	1	09/19/08	09/19/08	KWG0809695	
4-Methyl-2-pentanone (MIBK)	ND	U	34	0.40	1	09/19/08	09/19/08	KWG0809695	
1,3-Dichloropropane	ND	U	8.4	0.098	1	09/19/08	09/19/08	KWG0809695	

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Volatile Organic Compounds

Sample Name:	TMW02-S-8-091008	**Units:**	ug/Kg
Lab Code:	K0808731-008	**Basis:**	Dry
Extraction Method:	EPA 5035A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	8.4	0.20	1	09/19/08	09/19/08	KWG0809695	
Dibromochloromethane	ND	U	8.4	0.27	1	09/19/08	09/19/08	KWG0809695	
1,2-Dibromoethane (EDB)	ND	U	34	0.32	1	09/19/08	09/19/08	KWG0809695	
Chlorobenzene	ND	U	8.4	0.090	1	09/19/08	09/19/08	KWG0809695	
1,1,1,2-Tetrachloroethane	ND	U	8.4	0.30	1	09/19/08	09/19/08	KWG0809695	
Ethylbenzene	**0.48**	J	8.4	0.069	1	09/19/08	09/19/08	KWG0809695	
m,p-Xylenes	**0.76**	J	8.4	0.16	1	09/19/08	09/19/08	KWG0809695	
o-Xylene	**0.61**	J	8.4	0.098	1	09/19/08	09/19/08	KWG0809695	
Styrene	ND	U	8.4	0.13	1	09/19/08	09/19/08	KWG0809695	
Bromoform	ND	U	8.4	0.42	1	09/19/08	09/19/08	KWG0809695	
Isopropylbenzene	ND	U	34	0.052	1	09/19/08	09/19/08	KWG0809695	
1,1,2,2-Tetrachloroethane	ND	U	8.4	0.15	1	09/19/08	09/19/08	KWG0809695	
1,2,3-Trichloropropane	ND	U	8.4	0.45	1	09/19/08	09/19/08	KWG0809695	
Bromobenzene	ND	U	8.4	0.16	1	09/19/08	09/19/08	KWG0809695	
n-Propylbenzene	ND	U	34	0.090	1	09/19/08	09/19/08	KWG0809695	
2-Chlorotoluene	ND	U	34	0.085	1	09/19/08	09/19/08	KWG0809695	
4-Chlorotoluene	ND	U	34	0.16	1	09/19/08	09/19/08	KWG0809695	
1,3,5-Trimethylbenzene	ND	U	34	0.067	1	09/19/08	09/19/08	KWG0809695	
tert-Butylbenzene	ND	U	34	0.090	1	09/19/08	09/19/08	KWG0809695	
1,2,4-Trimethylbenzene	**1.4**	J	34	0.16	1	09/19/08	09/19/08	KWG0809695	
sec-Butylbenzene	ND	U	34	0.11	1	09/19/08	09/19/08	KWG0809695	
1,3-Dichlorobenzene	ND	U	8.4	0.12	1	09/19/08	09/19/08	KWG0809695	
4-Isopropyltoluene	**0.78**	J	34	0.14	1	09/19/08	09/19/08	KWG0809695	
1,4-Dichlorobenzene	**0.35**	J	8.4	0.17	1	09/19/08	09/19/08	KWG0809695	
n-Butylbenzene	ND	U	34	0.16	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichlorobenzene	ND	U	8.4	0.11	1	09/19/08	09/19/08	KWG0809695	
1,2-Dibromo-3-chloropropane	ND	U	34	1.3	1	09/19/08	09/19/08	KWG0809695	
1,2,4-Trichlorobenzene	ND	U	34	0.37	1	09/19/08	09/19/08	KWG0809695	
1,2,3-Trichlorobenzene	ND	U	34	0.24	1	09/19/08	09/19/08	KWG0809695	
Naphthalene	**9.7**	J	34	0.54	1	09/19/08	09/19/08	KWG0809695	
Hexachlorobutadiene	ND	U	34	0.29	1	09/19/08	09/19/08	KWG0809695	

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Volatile Organic Compounds

Sample Name:	TMW02-S-8-091008	**Units:**	ug/Kg
Lab Code:	K0808731-008	**Basis:**	Dry

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	102	61-116	09/19/08	Acceptable
Toluene-d8	100	63-116	09/19/08	Acceptable
4-Bromofluorobenzene	85	58-117	09/19/08	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808731
Date Collected: 09/10/2008
Date Received: 09/11/2008

Volatile Organic Compounds

Sample Name: TMW02-S-11-091008
Lab Code: K0808731-009

Extraction Method: EPA 5035A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	6.1	0.087	1	09/19/08	09/19/08	KWG0809695	
Chloromethane	ND	U	6.1	0.069	1	09/19/08	09/19/08	KWG0809695	
Vinyl Chloride	ND	U	6.1	0.069	1	09/19/08	09/19/08	KWG0809695	
Bromomethane	ND	U	6.1	0.51	1	09/19/08	09/19/08	KWG0809695	
Chloroethane	ND	U	6.1	0.37	1	09/19/08	09/19/08	KWG0809695	
Trichlorofluoromethane	ND	U	6.1	0.066	1	09/19/08	09/19/08	KWG0809695	
Acetone	**44**		25	3.6	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloroethene	ND	U	6.1	0.085	1	09/19/08	09/19/08	KWG0809695	
Carbon Disulfide	**0.22**	J	6.1	0.065	1	09/19/08	09/19/08	KWG0809695	
Methylene Chloride	**0.52**	J	13	0.17	1	09/19/08	09/19/08	KWG0809695	
trans-1,2-Dichloroethene	ND	U	6.1	0.058	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloroethane	ND	U	6.1	0.058	1	09/19/08	09/19/08	KWG0809695	
2-Butanone (MEK)	**9.5**	J	25	2.0	1	09/19/08	09/19/08	KWG0809695	
2,2-Dichloropropane	ND	U	6.1	0.13	1	09/19/08	09/19/08	KWG0809695	
cis-1,2-Dichloroethene	ND	U	6.1	0.098	1	09/19/08	09/19/08	KWG0809695	
Chloroform	ND	U	6.1	0.058	1	09/19/08	09/19/08	KWG0809695	
Bromochloromethane	ND	U	6.1	0.31	1	09/19/08	09/19/08	KWG0809695	
1,1,1-Trichloroethane (TCA)	ND	U	6.1	0.19	1	09/19/08	09/19/08	KWG0809695	
1,1-Dichloropropene	ND	U	6.1	0.19	1	09/19/08	09/19/08	KWG0809695	
Carbon Tetrachloride	ND	U	6.1	0.095	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichloroethane (EDC)	ND	U	6.1	0.066	1	09/19/08	09/19/08	KWG0809695	
Benzene	ND	U	6.1	0.17	1	09/19/08	09/19/08	KWG0809695	
Trichloroethene (TCE)	ND	U	6.1	0.16	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichloropropane	ND	U	6.1	0.079	1	09/19/08	09/19/08	KWG0809695	
Bromodichloromethane	ND	U	6.1	0.054	1	09/19/08	09/19/08	KWG0809695	
Dibromomethane	ND	U	6.1	0.22	1	09/19/08	09/19/08	KWG0809695	
2-Hexanone	ND	U	25	0.95	1	09/19/08	09/19/08	KWG0809695	
cis-1,3-Dichloropropene	ND	U	6.1	0.038	1	09/19/08	09/19/08	KWG0809695	
Toluene	**1.1**	J	6.1	0.054	1	09/19/08	09/19/08	KWG0809695	
trans-1,3-Dichloropropene	ND	U	6.1	0.13	1	09/19/08	09/19/08	KWG0809695	
1,1,2-Trichloroethane	ND	U	6.1	0.11	1	09/19/08	09/19/08	KWG0809695	
4-Methyl-2-pentanone (MIBK)	ND	U	25	0.29	1	09/19/08	09/19/08	KWG0809695	
1,3-Dichloropropane	ND	U	6.1	0.072	1	09/19/08	09/19/08	KWG0809695	

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Volatile Organic Compounds

Sample Name:	TMW02-S-11-091008	**Units:**	ug/Kg
Lab Code:	K0808731-009	**Basis:**	Dry
Extraction Method:	EPA 5035A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	6.1	0.15	1	09/19/08	09/19/08	KWG0809695	
Dibromochloromethane	ND	U	6.1	0.20	1	09/19/08	09/19/08	KWG0809695	
1,2-Dibromoethane (EDB)	ND	U	25	0.23	1	09/19/08	09/19/08	KWG0809695	
Chlorobenzene	ND	U	6.1	0.066	1	09/19/08	09/19/08	KWG0809695	
1,1,1,2-Tetrachloroethane	ND	U	6.1	0.22	1	09/19/08	09/19/08	KWG0809695	
Ethylbenzene	**0.86**	J	6.1	0.050	1	09/19/08	09/19/08	KWG0809695	
m,p-Xylenes	**0.92**	J	6.1	0.12	1	09/19/08	09/19/08	KWG0809695	
o-Xylene	**2.9**	J	6.1	0.072	1	09/19/08	09/19/08	KWG0809695	
Styrene	**0.14**	J	6.1	0.092	1	09/19/08	09/19/08	KWG0809695	
Bromoform	ND	U	6.1	0.31	1	09/19/08	09/19/08	KWG0809695	
Isopropylbenzene	**0.77**	J	25	0.038	1	09/19/08	09/19/08	KWG0809695	
1,1,2,2-Tetrachloroethane	ND	U	6.1	0.11	1	09/19/08	09/19/08	KWG0809695	
1,2,3-Trichloropropane	ND	U	6.1	0.33	1	09/19/08	09/19/08	KWG0809695	
Bromobenzene	ND	U	6.1	0.12	1	09/19/08	09/19/08	KWG0809695	
n-Propylbenzene	ND	U	25	0.066	1	09/19/08	09/19/08	KWG0809695	
2-Chlorotoluene	ND	U	25	0.062	1	09/19/08	09/19/08	KWG0809695	
4-Chlorotoluene	ND	U	25	0.12	1	09/19/08	09/19/08	KWG0809695	
1,3,5-Trimethylbenzene	**0.17**	J	25	0.049	1	09/19/08	09/19/08	KWG0809695	
tert-Butylbenzene	ND	U	25	0.066	1	09/19/08	09/19/08	KWG0809695	
1,2,4-Trimethylbenzene	**7.6**	J	25	0.12	1	09/19/08	09/19/08	KWG0809695	
sec-Butylbenzene	ND	U	25	0.079	1	09/19/08	09/19/08	KWG0809695	
1,3-Dichlorobenzene	ND	U	6.1	0.085	1	09/19/08	09/19/08	KWG0809695	
4-Isopropyltoluene	**0.12**	J	25	0.11	1	09/19/08	09/19/08	KWG0809695	
1,4-Dichlorobenzene	**0.24**	J	6.1	0.13	1	09/19/08	09/19/08	KWG0809695	
n-Butylbenzene	ND	U	25	0.12	1	09/19/08	09/19/08	KWG0809695	
1,2-Dichlorobenzene	ND	U	6.1	0.077	1	09/19/08	09/19/08	KWG0809695	
1,2-Dibromo-3-chloropropane	ND	U	25	0.95	1	09/19/08	09/19/08	KWG0809695	
1,2,4-Trichlorobenzene	ND	U	25	0.27	1	09/19/08	09/19/08	KWG0809695	
1,2,3-Trichlorobenzene	ND	U	25	0.17	1	09/19/08	09/19/08	KWG0809695	
Naphthalene	**3.1**	J	25	0.39	1	09/19/08	09/19/08	KWG0809695	
Hexachlorobutadiene	ND	U	25	0.21	1	09/19/08	09/19/08	KWG0809695	

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Volatile Organic Compounds

Sample Name:	TMW02-S-11-091008	**Units:**	ug/Kg
Lab Code:	K0808731-009	**Basis:**	Dry

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	103	61-116	09/19/08	Acceptable
Toluene-d8	107	63-116	09/19/08	Acceptable
4-Bromofluorobenzene	99	58-117	09/19/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Extracted:**	09/19/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/19/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Volatile Organic Compounds

Extraction Method:	EPA 5035A	**Units:**	ug/Kg
Analysis Method:	8260B	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809695

	Lab Control Sample KWG0809695-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0809695-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Dichlorodifluoromethane	65.4	50.0	131	63.8	50.0	128	34-161	2	40
Chloromethane	58.1	50.0	116	56.3	50.0	113	50-146	3	40
Vinyl Chloride	58.5	50.0	117	56.6	50.0	113	58-136	3	40
Bromomethane	60.3	50.0	121	61.0	50.0	122	54-166	1	40
Chloroethane	59.5	50.0	119	58.9	50.0	118	53-135	1	40
Trichlorofluoromethane	59.6	50.0	119	58.9	50.0	118	57-129	1	40
Acetone	209	250	84	215	250	86	47-110	3	40
1,1-Dichloroethene	59.7	50.0	119	59.5	50.0	119	80-134	0	40
Carbon Disulfide	115	100	115	113	100	113	69-138	1	40
Methylene Chloride	62.6	50.0	125	63.7	50.0	127	47-169	2	40
trans-1,2-Dichloroethene	56.4	50.0	113	56.7	50.0	113	80-118	1	40
1,1-Dichloroethane	55.8	50.0	112	56.4	50.0	113	76-119	1	40
2-Butanone (MEK)	231	250	92	242	250	97	67-111	5	40
2,2-Dichloropropane	57.2	50.0	114	57.7	50.0	115	78-131	1	40
cis-1,2-Dichloroethene	56.1	50.0	112	57.1	50.0	114	84-124	2	40
Chloroform	56.2	50.0	112	57.1	50.0	114	78-117	2	40
Bromochloromethane	54.2	50.0	108	55.0	50.0	110	79-119	2	40
1,1,1-Trichloroethane (TCA)	56.6	50.0	113	57.5	50.0	115	77-126	2	40
1,1-Dichloropropene	57.1	50.0	114	56.9	50.0	114	80-125	0	40
Carbon Tetrachloride	58.7	50.0	117	58.9	50.0	118	77-133	0	40
1,2-Dichloroethane (EDC)	51.6	50.0	103	54.2	50.0	108	72-124	5	40
Benzene	55.7	50.0	111	55.9	50.0	112	75-126	1	40
Trichloroethene (TCE)	55.6	50.0	111	56.1	50.0	112	81-119	1	40
1,2-Dichloropropane	53.5	50.0	107	55.0	50.0	110	79-118	3	40
Bromodichloromethane	57.2	50.0	114	59.0	50.0	118	82-127	3	40
Dibromomethane	51.9	50.0	104	54.5	50.0	109	79-118	5	40
2-Hexanone	198	250	79	209	250	84	55-122	5	40
cis-1,3-Dichloropropene	54.9	50.0	110	57.2	50.0	114	84-121	4	40
Toluene	52.8	50.0	106	52.6	50.0	105	77-115	0	40
trans-1,3-Dichloropropene	42.2	50.0	84	44.3	50.0	89	74-109	5	40
1,1,2-Trichloroethane	43.9	50.0	88	46.3	50.0	93	77-111	5	40
4-Methyl-2-pentanone (MIBK)	229	250	92	237	250	95	67-120	3	40
1,3-Dichloropropane	43.9	50.0	88	46.2	50.0	92	77-112	5	40
Tetrachloroethene (PCE)	49.5	50.0	99	49.6	50.0	99	81-113	0	40
Dibromochloromethane	47.9	50.0	96	50.5	50.0	101	82-116	5	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808731
Date Extracted: 09/19/2008
Date Analyzed: 09/19/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Volatile Organic Compounds

Extraction Method: EPA 5035A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0809695

	Lab Control Sample KWG0809695-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0809695-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
1,2-Dibromoethane (EDB)	44.2	50.0	88	46.5	50.0	93	79-111	5	40
Chlorobenzene	46.0	50.0	92	47.1	50.0	94	78-106	2	40
1,1,1,2-Tetrachloroethane	47.1	50.0	94	48.8	50.0	98	79-113	4	40
Ethylbenzene	46.7	50.0	93	47.1	50.0	94	79-111	1	40
m,p-Xylenes	96.3	100	96	97.5	100	97	80-116	1	40
o-Xylene	47.7	50.0	95	48.7	50.0	97	79-113	2	40
Styrene	49.8	50.0	100	50.5	50.0	101	82-118	1	40
Bromoform	49.3	50.0	99	52.0	50.0	104	81-121	5	40
Isopropylbenzene	46.6	50.0	93	46.9	50.0	94	73-104	1	40
1,1,2,2-Tetrachloroethane	40.6	50.0	81	43.2	50.0	86	69-113	6	40
1,2,3-Trichloropropane	40.8	50.0	82	43.3	50.0	87	74-114	6	40
Bromobenzene	42.1	50.0	84	43.7	50.0	87	76-109	4	40
n-Propylbenzene	44.8	50.0	90	45.2	50.0	90	76-122	1	40
2-Chlorotoluene	43.2	50.0	86	44.4	50.0	89	75-116	3	40
4-Chlorotoluene	43.4	50.0	87	44.2	50.0	88	72-114	2	40
1,3,5-Trimethylbenzene	44.7	50.0	89	45.9	50.0	92	75-116	3	40
tert-Butylbenzene	45.3	50.0	91	46.6	50.0	93	75-117	3	40
1,2,4-Trimethylbenzene	44.9	50.0	90	46.6	50.0	93	76-117	4	40
sec-Butylbenzene	46.5	50.0	93	47.0	50.0	94	81-126	1	40
1,3-Dichlorobenzene	46.0	50.0	92	47.4	50.0	95	76-108	3	40
4-Isopropyltoluene	45.5	50.0	91	46.3	50.0	93	73-114	2	40
1,4-Dichlorobenzene	44.3	50.0	89	45.2	50.0	90	74-108	2	40
n-Butylbenzene	45.7	50.0	91	46.0	50.0	92	75-122	1	40
1,2-Dichlorobenzene	44.1	50.0	88	45.7	50.0	91	76-107	4	40
1,2-Dibromo-3-chloropropane	42.0	50.0	84	43.7	50.0	87	71-112	4	40
1,2,4-Trichlorobenzene	48.5	50.0	97	48.7	50.0	97	78-128	0	40
1,2,3-Trichlorobenzene	47.0	50.0	94	47.7	50.0	95	77-125	1	40
Naphthalene	41.5	50.0	83	42.9	50.0	86	70-124	3	40
Hexachlorobutadiene	50.2	50.0	100	49.5	50.0	99	77-129	1	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	PERCENT
Analysis Method:	NWTPH-Dx	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
TMW07-S-11.5-090908	K0808731-001	69	70
TMW08-S-10-090908	K0808731-002	73	77
TMW09-S-9.5-090908	K0808731-003	72	72
TMW10-S-07-090908	K0808731-004	75	78
TMW01-S-7-091008	K0808731-006	82	79
TMW01-S-13.5-091008	K0808731-007	69	65
TMW02-S-8-091008	K0808731-008	79	90
TMW02-S-11-091008	K0808731-009	65	63
TMW07-S-11.5-090908DUP	KWG0809778-2	71	76
Batch QCDUP	KWG0809816-2	82	79
Method Blank	KWG0809778-3	78	79
Method Blank	KWG0809816-4	83	79
Batch QC	K0808928-006	69	65
Lab Control Sample	KWG0809778-4	83	86
Lab Control Sample	KWG0809816-3	89	83

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0809778-3	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1.9**	J	9.8	1.2	1	09/22/08	09/24/08	KWG0809778	
Residual Range Organics (RRO)	**5.0**	J	25	2.9	1	09/22/08	09/24/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	78	50-150	09/24/08	Acceptable
n-Triacontane	79	50-150	09/24/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0809816-4	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1.4**	J	9.8	1.2	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**3.1**	J	25	2.9	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	83	50-150	09/25/08	Acceptable
n-Triacontane	79	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW07-S-11.5-090908	**Units:**	mg/Kg
Lab Code:	K0808731-001	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**2.3**	J	12	1.4	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**11**	J	28	3.2	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	09/25/08	Acceptable
n-Triacontane	70	50-150	09/25/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW08-S-10-090908	**Units:**	mg/Kg
Lab Code:	K0808731-002	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**9.3**	J	12	1.4	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**59**	O	29	3.4	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	50-150	09/25/08	Acceptable
n-Triacontane	77	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW09-S-9.5-090908	**Units:**	mg/Kg
Lab Code:	K0808731-003	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**3.9**	J	13	1.5	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**19**	J	31	3.6	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	09/25/08	Acceptable
n-Triacontane	72	50-150	09/25/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW10-S-07-090908	**Units:**	mg/Kg
Lab Code:	K0808731-004	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**4.1**	J	12	1.4	1	09/22/08	09/25/08	KWG0809778	
Residual Range Organics (RRO)	**15**	J	29	3.3	1	09/22/08	09/25/08	KWG0809778	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	75	50-150	09/25/08	Acceptable
n-Triacontane	78	50-150	09/25/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0808731
Project:	IP Longview Geo-probe		**Date Collected:**	09/10/2008
Sample Matrix:	Soil		**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW01-S-7-091008		**Units:**	mg/Kg
Lab Code:	K0808731-006		**Basis:**	Dry
Extraction Method:	EPA 3550B		**Level:**	Low
Analysis Method:	NWTPH-Dx			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**2.6**	J	13	1.5	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**8.5**	J	31	3.6	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	82	50-150	09/25/08	Acceptable
n-Triacontane	79	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW01-S-13.5-091008	**Units:**	mg/Kg
Lab Code:	K0808731-007	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**5.9**	J	18	2.1	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**46**	Z	43	5.0	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	09/25/08	Acceptable
n-Triacontane	65	50-150	09/25/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW02-S-8-091008	**Units:**	mg/Kg
Lab Code:	K0808731-008	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**180**	H	15	1.8	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**920**	O	37	4.3	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	09/25/08	Acceptable
n-Triacontane	90	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW02-S-11-091008	**Units:**	mg/Kg
Lab Code:	K0808731-009	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**7.2**	J	14	1.7	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**31**	J	35	4.0	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	65	50-150	09/25/08	Acceptable
n-Triacontane	63	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Extracted:**	09/22/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/25/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TMW07-S-11.5-090908	**Units:**	mg/Kg
Lab Code:	K0808731-001	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0809778

				TMW07-S-11.5-090908DUP KWG0809778-2 Duplicate Sample			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	12	1.4	2.3	2.3	2.3	0 #	40
Residual Range Organics (RRO)	28	3.3	11	8.2	9.6	28 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/25/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	Batch QC	**Units:**	mg/Kg
Lab Code:	K0808928-006	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0809816

Analyte Name	**MRL**	**MDL**	**Sample Result**	Batch QCDUP KWG0809816-2 **Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	12	1.5	75	84	80	11	40
Residual Range Organics (RRO)	30	3.5	31	35	33	13 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Extracted:**	09/22/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/24/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809778

	Lab Control Sample KWG0809778-4 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	224	267	84	63-120
Residual Range Organics (RRO)	110	133	83	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/25/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809816

	Lab Control Sample KWG0809816-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	218	267	82	63-120
Residual Range Organics (RRO)	104	133	78	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	PERCENT
Analysis Method:	8270C SIM	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TMW07-S-11.5-090908	K0808731-001	114	118	140
TMW08-S-10-090908	K0808731-002	61	61	71
TMW09-S-9.5-090908	K0808731-003	64	72	86
TMW01-S-7-091008	K0808731-006	54	57	70
TMW01-S-13.5-091008	K0808731-007	51	58	68
Method Blank	KWG0809824-5	51	68	82
Batch QC	K0808965-004	47	61	67
Batch QCMS	KWG0809824-1	66	78	82
Batch QCDMS	KWG0809824-2	67	79	84
Lab Control Sample	KWG0809824-3	63	73	76
Duplicate Lab Control Sample	KWG0809824-4	69	76	79

Surrogate Recovery Control Limits (%)

Sur1	= Fluorene-d10	10-128
Sur2	= Fluoranthene-d10	29-121
Sur3	= Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808731

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4
TMW10-S-07-090908	K0808731-004	53	48	56	67
TMW02-S-8-091008	K0808731-008	75	92	84	88
TMW02-S-11-091008	K0808731-009	66	78	66	80
Method Blank	KWG0809824-5	51	55	68	82
Batch QC	K0808965-004	47	51	61	67
Batch QCMS	KWG0809824-1	66	66	78	82
Batch QCDMS	KWG0809824-2	67	59	79	84
Lab Control Sample	KWG0809824-3	63	54	73	76
Duplicate Lab Control Sample	KWG0809824-4	69	61	76	79

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-128
Sur2 = 2,4,6-Tribromophenol	12-152
Sur3 = Fluoranthene-d10	29-121
Sur4 = Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0809824-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	2.9	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	ND	U	2.9	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	ND	U	2.9	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	ND	U	2.9	0.23	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	ND	U	2.9	0.59	1	09/23/08	10/02/08	KWG0809824	
Fluorene	ND	U	2.9	0.50	1	09/23/08	10/02/08	KWG0809824	
Pentachlorophenol	ND	U	120	2.9	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	ND	U	2.9	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	ND	U	2.9	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**0.91**	J	2.9	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**0.66**	J	2.9	0.37	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	ND	U	2.9	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**0.33**	J	2.9	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**0.33**	J	2.9	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	**0.16**	J	2.9	0.15	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	ND	U	2.9	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**0.56**	J	2.9	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	**0.42**	J	2.9	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	**0.90**	J	2.9	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	51	10-128	10/02/08	Acceptable
2,4,6-Tribromophenol	55	12-152	10/02/08	Acceptable
Fluoranthene-d10	68	29-121	10/02/08	Acceptable
Terphenyl-d14	82	24-141	10/02/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0808731
Project:	IP Longview Geo-probe		**Date Collected:**	09/09/2008
Sample Matrix:	Soil		**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW07-S-11.5-090908		**Units:**	ug/Kg
Lab Code:	K0808731-001		**Basis:**	Dry
Extraction Method:	EPA 3541		**Level:**	Low
Analysis Method:	8270C SIM			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.7**	J	5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**0.62**	J	5.0	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	ND	U	5.0	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	**0.24**	J	5.0	0.23	1	09/23/08	10/02/08	KWG0809824	
Fluorene	ND	U	5.0	0.50	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	ND	U	5.0	0.59	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**1.7**	J	5.0	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	ND	U	5.0	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**1.6**	J	5.0	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**1.2**	J	5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**0.76**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	**0.49**	J	5.0	0.15	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**0.95**	J	5.0	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**0.94**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	**0.71**	J	5.0	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**1.2**	J	5.0	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	**0.98**	J	5.0	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	**2.1**	J	5.0	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	114	10-128	10/02/08	Acceptable
Fluoranthene-d10	118	29-121	10/02/08	Acceptable
Terphenyl-d14	140	24-141	10/02/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW08-S-10-090908	**Units:**	ug/Kg
Lab Code:	K0808731-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**6.8**		5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**5.0**	J	5.0	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	**7.7**		5.0	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	**5.9**		5.0	0.23	1	09/23/08	10/02/08	KWG0809824	
Fluorene	**11**		5.0	0.50	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	**3.7**	J	5.0	0.59	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**120**		5.0	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	**23**		5.0	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**95**		5.0	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**130**		5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**39**		5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	**14**		5.0	0.15	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**54**		5.0	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**64**		5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	**40**		5.0	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**22**		5.0	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	**5.4**		5.0	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	**22**		5.0	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	10-128	10/02/08	Acceptable
Fluoranthene-d10	61	29-121	10/02/08	Acceptable
Terphenyl-d14	71	24-141	10/02/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW09-S-9.5-090908	**Units:**	ug/Kg
Lab Code:	K0808731-003	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4.9**	J	5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**1.1**	J	5.0	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	ND	U	5.0	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	ND	U	5.0	0.23	1	09/23/08	10/02/08	KWG0809824	
Fluorene	ND	U	5.0	0.50	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	**0.65**	J	5.0	0.59	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**4.9**	J	5.0	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	**0.69**	J	5.0	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**5.2**		5.0	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**4.0**	J	5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**2.0**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	**0.69**	J	5.0	0.15	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**1.7**	J	5.0	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**2.4**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	ND	U	5.0	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**1.1**	J	5.0	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	**1.4**	J	5.0	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	10-128	10/02/08	Acceptable
Fluoranthene-d10	72	29-121	10/02/08	Acceptable
Terphenyl-d14	86	24-141	10/02/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW10-S-07-090908	**Units:**	ug/Kg
Lab Code:	K0808731-004	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**16**		5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**14**		5.0	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	**0.45**	J	5.0	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	**9.5**		5.0	0.23	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	**2.3**	J	5.0	0.59	1	09/23/08	10/02/08	KWG0809824	
Fluorene	**1.8**	J	5.0	0.50	1	09/23/08	10/02/08	KWG0809824	
Pentachlorophenol	ND	U	200	2.9	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**3.0**	J	5.0	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	**0.90**	J	5.0	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**2.3**	J	5.0	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**1.3**	J	5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**1.0**	J	5.0	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**1.1**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**0.84**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	ND	U	5.0	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	ND	U	5.0	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	10-128	10/02/08	Acceptable
2,4,6-Tribromophenol	48	12-152	10/02/08	Acceptable
Fluoranthene-d10	56	29-121	10/02/08	Acceptable
Terphenyl-d14	67	24-141	10/02/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW01-S-7-091008	**Units:**	ug/Kg
Lab Code:	K0808731-006	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**6.0**		5.4	0.40	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**1.7**	J	5.4	0.42	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	**0.48**	J	5.4	0.26	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	**15**		5.4	0.25	1	09/23/08	10/02/08	KWG0809824	
Fluorene	**21**		5.4	0.54	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	**2.2**	J	5.4	0.63	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**15**		5.4	0.81	1	09/23/08	10/02/08	KWG0809824	
Anthracene	**3.2**	J	5.4	0.51	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**1.9**	J	5.4	0.66	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**1.5**	J	5.4	0.40	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**0.76**	J	5.4	0.27	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	ND	U	5.4	0.17	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**1.2**	J	5.4	0.52	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**0.80**	J	5.4	0.27	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	ND	U	5.4	0.15	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**0.35**	J	5.4	0.18	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	ND	U	5.4	0.30	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	ND	U	5.4	0.69	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	54	10-128	10/02/08	Acceptable
Fluoranthene-d10	57	29-121	10/02/08	Acceptable
Terphenyl-d14	70	24-141	10/02/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW01-S-13.5-091008	**Units:**	ug/Kg
Lab Code:	K0808731-007	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**17**		4.9	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**1.2**	J	4.9	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	**0.54**	J	4.9	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	**1.6**	J	4.9	0.23	1	09/23/08	10/02/08	KWG0809824	
Fluorene	**1.4**	J	4.9	0.50	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	**0.87**	J	4.9	0.59	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**9.2**		4.9	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	**1.3**	J	4.9	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**7.8**		4.9	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**7.1**		4.9	0.37	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**2.9**	J	4.9	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	**0.73**	J	4.9	0.15	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**1.8**	J	4.9	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**2.1**	J	4.9	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	**1.1**	J	4.9	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**2.6**	J	4.9	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	**0.33**	J	4.9	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	**2.9**	J	4.9	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	51	10-128	10/02/08	Acceptable
Fluoranthene-d10	58	29-121	10/02/08	Acceptable
Terphenyl-d14	68	24-141	10/02/08	Acceptable

Comments: ______________________________

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW02-S-8-091008	**Units:**	ug/Kg
Lab Code:	K0808731-008	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**670**		5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**240**		5.0	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	**190**		5.0	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	**78**		5.0	0.23	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	**170**		5.0	0.59	1	09/23/08	10/02/08	KWG0809824	
Fluorene	**98**		5.0	0.50	1	09/23/08	10/02/08	KWG0809824	
Pentachlorophenol	ND	U	200	2.9	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**530**		5.0	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	**1000**		5.0	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**1200**		5.0	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**740**		5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**400**		5.0	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**480**		5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**1300**		5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	**260**		5.0	0.15	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	**240**		5.0	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**450**		5.0	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	**170**		5.0	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	**280**		5.0	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	10-128	10/02/08	Acceptable
2,4,6-Tribromophenol	92	12-152	10/02/08	Acceptable
Fluoranthene-d10	84	29-121	10/02/08	Acceptable
Terphenyl-d14	88	24-141	10/02/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Collected:**	09/10/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW02-S-11-091008	**Units:**	ug/Kg
Lab Code:	K0808731-009	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**100**		5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
2-Methylnaphthalene	**7.3**		5.0	0.39	1	09/23/08	10/02/08	KWG0809824	
Acenaphthylene	**0.75**	J	5.0	0.24	1	09/23/08	10/02/08	KWG0809824	
Acenaphthene	**9.0**		5.0	0.23	1	09/23/08	10/02/08	KWG0809824	
Dibenzofuran	**2.3**	J	5.0	0.59	1	09/23/08	10/02/08	KWG0809824	
Fluorene	**2.0**	J	5.0	0.50	1	09/23/08	10/02/08	KWG0809824	
Pentachlorophenol	ND	U	200	2.9	1	09/23/08	10/02/08	KWG0809824	
Phenanthrene	**7.6**		5.0	0.75	1	09/23/08	10/02/08	KWG0809824	
Anthracene	**2.5**	J	5.0	0.47	1	09/23/08	10/02/08	KWG0809824	
Fluoranthene	**5.3**		5.0	0.61	1	09/23/08	10/02/08	KWG0809824	
Pyrene	**6.3**		5.0	0.37	1	09/23/08	10/02/08	KWG0809824	
Benz(a)anthracene	**2.2**	J	5.0	0.48	1	09/23/08	10/02/08	KWG0809824	
Chrysene	**2.2**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(b)fluoranthene	**2.6**	J	5.0	0.25	1	09/23/08	10/02/08	KWG0809824	
Benzo(k)fluoranthene	**0.92**	J	5.0	0.15	1	09/23/08	10/02/08	KWG0809824	
Benzo(a)pyrene	**1.5**	J	5.0	0.14	1	09/23/08	10/02/08	KWG0809824	
Indeno(1,2,3-cd)pyrene	**1.9**	J	5.0	0.16	1	09/23/08	10/02/08	KWG0809824	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/23/08	10/02/08	KWG0809824	
Benzo(g,h,i)perylene	**2.8**	J	5.0	0.64	1	09/23/08	10/02/08	KWG0809824	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	66	10-128	10/02/08	Acceptable
2,4,6-Tribromophenol	78	12-152	10/02/08	Acceptable
Fluoranthene-d10	66	29-121	10/02/08	Acceptable
Terphenyl-d14	80	24-141	10/02/08	Acceptable

Comments:

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Sediment

Service Request: K0808731
Date Extracted: 09/23/2008
Date Analyzed: 10/02/2008 - 10/03/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name: Batch QC
Lab Code: K0808965-004

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low
Extraction Lot: KWG0809824

Analyte Name	Sample Result	Batch QCMS KWG0809824-1 Matrix Spike			Batch QCDMS KWG0809824-2 Duplicate Matrix Spike			%Rec Limits	RPD	RPD Limit
		Result	Expected	%Rec	Result	Expected	%Rec			
Naphthalene	0.56	320	493	65	309	484	64	10-129	4	40
2-Methylnaphthalene	ND	360	493	73	347	484	72	10-133	4	40
Acenaphthylene	ND	333	493	68	326	484	67	37-100	2	40
Acenaphthene	0.38	321	493	65	314	484	65	28-111	2	40
Dibenzofuran	ND	350	493	71	343	484	71	37-103	2	40
Fluorene	ND	335	493	68	331	484	68	24-122	1	40
Pentachlorophenol	ND	564	986	57 *	476	969	49 *	70-130	17	40
Phenanthrene	7.0	338	493	67	337	484	68	23-124	0	40
Anthracene	2.5	340	493	68	331	484	68	30-114	3	40
Fluoranthene	29	365	493	68	360	484	68	21-145	1	40
Pyrene	24	352	493	66	356	484	68	10-155	1	40
Benz(a)anthracene	17	362	493	70	362	484	71	25-127	0	40
Chrysene	15	365	493	71	358	484	71	28-126	2	40
Benzo(b)fluoranthene	14	353	493	69	355	484	70	18-130	1	40
Benzo(k)fluoranthene	6.1	369	493	74	363	484	74	30-122	2	40
Benzo(a)pyrene	12	386	493	76	375	484	75	20-132	3	40
Indeno(1,2,3-cd)pyrene	4.8	385	493	77	328	484	67	20-132	16	40
Dibenz(a,h)anthracene	1.2	387	493	78	317	484	65	28-124	20	40
Benzo(g,h,i)perylene	4.5	362	493	73	312	484	63	24-124	15	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Sediment	**Date Analyzed:**	10/02/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	ug/Kg
Analysis Method:	8270C SIM	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809824

	Lab Control Sample KWG0809824-3 **Lab Control Spike**			Duplicate Lab Control Sample KWG0809824-4 **Duplicate Lab Control Spike**						
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**		**RPD Limit**
Naphthalene	320	500	64	346	500	69	35-104	8		40
2-Methylnaphthalene	361	500	72	388	500	78	34-110	7		40
Acenaphthylene	334	500	67	363	500	73	46-105	8		40
Acenaphthene	322	500	64	351	500	70	47-104	9		40
Dibenzofuran	349	500	70	379	500	76	50-106	8		40
Fluorene	334	500	67	363	500	73	52-106	8		40
Pentachlorophenol	130	1000	13	243	1000	24	10-150	61	*	40
Phenanthrene	339	500	68	379	500	76	48-108	11		40
Anthracene	353	500	71	380	500	76	51-110	7		40
Fluoranthene	390	500	78	405	500	81	54-121	4		40
Pyrene	372	500	74	388	500	78	53-110	4		40
Benz(a)anthracene	380	500	76	396	500	79	51-113	4		40
Chrysene	389	500	78	390	500	78	56-112	0		40
Benzo(b)fluoranthene	374	500	75	389	500	78	51-116	4		40
Benzo(k)fluoranthene	393	500	79	403	500	81	57-114	2		40
Benzo(a)pyrene	409	500	82	423	500	85	53-112	3		40
Indeno(1,2,3-cd)pyrene	396	500	79	413	500	83	42-124	4		40
Dibenz(a,h)anthracene	402	500	80	414	500	83	44-125	3		40
Benzo(g,h,i)perylene	411	500	82	420	500	84	50-115	2		40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client: URS Corporation
Service Request: K0808731
Project No.: NA
Date Collected:
Project Name: IP Longview Geo-probe
Date Received:
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: K0808345-MB
Lab Code: K0808731-MB

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010B	2.0	0.6	2.0	09/17/08	09/24/08	0.6	U	
Barium	6010B	0.6	0.2	2.0	09/17/08	09/24/08	0.2	U	
Cadmium	6010B	0.20	0.04	2.0	09/17/08	09/24/08	0.04	U	
Chromium	6010B	0.9	0.3	2.0	09/17/08	09/24/08	0.3	U	
Lead	6010B	3.0	1.0	2.0	09/17/08	09/24/08	1.0	U	
Mercury	7471A	0.017	0.002	1.0	10/01/08	10/04/08	0.002	U	*
Selenium	6010B	6.0	2.0	2.0	09/17/08	09/24/08	2.0	U	
Silver	6010B	0.9	0.3	2.0	09/17/08	09/24/08	0.3	U	

% Solids: 100.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0808731
Project No.:	NA	**Date Collected:**	09/10/08
Project Name:	IP Longview Geo-probe	**Date Received:**	09/11/08
Matrix:	SOIL	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: TMW02-S-8-091008 **Lab Code:** K0808731-008

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010B	2.5	0.7	2.0	09/17/08	09/24/08	2.8		
Barium	6010B	0.7	0.2	2.0	09/17/08	09/24/08	59.1		
Cadmium	6010B	0.25	0.05	2.0	09/17/08	09/24/08	0.10	B	
Chromium	6010B	1.1	0.4	2.0	09/17/08	09/24/08	9.2		
Lead	6010B	3.7	1.2	2.0	09/17/08	09/24/08	18.5		
Mercury	7471A	0.020	0.002	1.0	10/01/08	10/04/08	0.175		*
Selenium	6010B	7.4	2.5	2.0	09/17/08	09/24/08	2.5	U	
Silver	6010B	1.1	0.4	2.0	09/17/08	09/24/08	0.4	U	

% Solids: 66.9

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0808731
Project No.:	NA	**Date Collected:**	09/10/08
Project Name:	IP Longview Geo-probe	**Date Received:**	09/11/08
Matrix:	SOIL	**Units:**	mg/Kg
		Basis:	DRY

Sample Name: TMW02-S-11-091008 **Lab Code:** K0808731-009

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010B	2.0	0.6	2.0	09/17/08	09/24/08	2.7		
Barium	6010B	0.6	0.2	2.0	09/17/08	09/24/08	66.1		
Cadmium	6010B	0.20	0.04	2.0	09/17/08	09/24/08	0.07	B	
Chromium	6010B	0.9	0.3	2.0	09/17/08	09/24/08	13.3		
Lead	6010B	3.0	1.0	2.0	09/17/08	09/24/08	4.3		
Mercury	7471A	0.019	0.002	1.0	10/01/08	10/04/08	0.054		*
Selenium	6010B	6.0	2.0	2.0	09/17/08	09/24/08	2.0	U	
Silver	6010B	0.9	0.3	2.0	09/17/08	09/24/08	0.3	U	

% Solids: 71.1

Comments:

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K0808731
Project No.:	NA	**Units:**	MG/KG
Project Name:	IP Longview Geo-probe	**Basis:**	DRY
Matrix:	SOIL	**% Solids:**	66.9

Sample Name: TMW02-S-8-091008S **Lab Code:** K0808731-008S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	50 - 135	122		2.8		124.56	95.7		6010B
Barium	76 - 127	552		59.1		498.26	98.9		6010B
Cadmium	65 - 135	11.6		0.10	B	12.46	92.3		6010B
Chromium	48 - 156	57.6		9.2		49.83	97.1		6010B
Lead	45 - 150	131		18.5		124.56	90.3		6010B
Mercury	64 - 127	0.766		0.175		0.50	118.2		7471A
Selenium	67 - 125	109		2.5	U	124.56	87.5		6010B
Silver	70 - 130	12.9		0.4	U	12.46	103.5		6010B

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

- 6 -

DUPLICATES

Client:	URS Corporation	**Service Request:**	K0808731
Project No.:	NA	**Units:**	MG/KG
Project Name:	IP Longview Geo-probe	**Basis:**	DRY
Matrix:	SOIL	**% Solids:**	66.9

Sample Name: TMW02-S-8-091008D **Lab Code:** K0808731-008D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Arsenic		2.8		2.1	B	28.6		6010B
Barium	30	59.1		62.6		5.8		6010B
Cadmium		0.1	B	0.1	B	0.0		6010B
Chromium	30	9.2		9.7		5.3		6010B
Lead		18.5		19.7		6.3		6010B
Mercury	30	0.175		0.103		51.8	*	7471A
Selenium		2.5	U	2.5	U			6010B
Silver		0.4	U	0.4	U			6010B

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

-7-

LABORATORY CONTROL SAMPLE

Client: URS Corporation

Service Request: K0808731

Project No.: NA

Project Name: IP Longview Geo-probe

Aqueous LCS Source:

Solid LCS Source: ERA D045540

Analyte	Aqueous (ug/L)			Solid (mg/kg)					
	True	Found	%R	True	Found	C	Limits		%R
Arsenic				146	148		83	124	101.4
Barium				351	335		81	134	95.4
Cadmium				91.9	86.4		92	125	94.0
Chromium				176	165		93	125	93.8
Lead				68.1	65.1		76	138	95.6
Mercury				1.77	1.650		76	121	93.2
Selenium				73	69.5		67	159	95.2
Silver				93	96.9		85	115	104.2

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-prob		
Sample Matrix:	Soil		

Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
TMW07-S-11.5-090908	K0808731-001	09/09/2008	09/11/2008	09/18/2008	89.0	
TMW08-S-10-090908	K0808731-002	09/09/2008	09/11/2008	09/18/2008	86.0	
TMW09-S-9.5-090908	K0808731-003	09/09/2008	09/11/2008	09/18/2008	80.2	
TMW10-S-07-090908	K0808731-004	09/09/2008	09/11/2008	09/18/2008	86.3	
TMW01-S-7-091008	K0808731-006	09/10/2008	09/11/2008	09/18/2008	79.5	
TMW01-S-13.5-091008	K0808731-007	09/10/2008	09/11/2008	09/18/2008	58.1	
TMW02-S-8-091008	K0808731-008	09/10/2008	09/11/2008	09/18/2008	66.9	
TMW02-S-11-091008	K0808731-009	09/10/2008	09/11/2008	09/18/2008	71.1	

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SuperSet Reference: W0809677

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808731
Project:	IP Longview Geo-prob	**Date Collected:**	09/09/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008
		Date Analyzed:	09/18/2008

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
TMW07-S-11.5-090908	K0808731-001	89.0	88.9	89.0	<1	

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

November 14, 2008 Analytical Report for Service Request No: K0808785

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on September 11, 2008. For your reference, these analyses have been assigned our service request number K0808785.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Ed Wallace
Project Chemist

EW/lb

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Water

Service Request No.: K0808785
Date Received: 9/11/08

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Seven soil samples were received for analysis at Columbia Analytical Services on 9/12/03. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Elevated Method Reporting Limits:
Sample PB59-S-8-091108 required dilution due to the presence of elevated levels of Residual Range Organics. The reporting limits are adjusted to reflect the dilution.

Surrogate Exceptions:
The upper control criteria were exceeded for the following surrogate in sample PB59-S-8-091108 due to matrix interferences: o-Terphenyl. Due to the presence of Diesel Range Organics components that prevented adequate resolution of the surrogate, accurate quantitation was not possible. No further corrective action was appropriate.

The lower control criteria were exceeded for the following surrogate in sample PB60-S-11-091108 due to matrix interferences: n-Tricontane. The other surrogate was just barely in control. Due to the presence of Diesel Range Organics components that prevented adequate resolution of the surrogate, accurate quantitation was not possible. The sample was re-extracted past hold time and gave higher results for both Diesel and Residual Range Organics, but the surrogates were in control. Both sets of data are published. No further correction action was possible.

Polynuclear Aromatic Hydrocarbons and Pentachlorophenol by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: 2,4,6-Tribromophenol, Pentachlorophenol, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Surrogate Exceptions:
The control criteria were exceeded for the following surrogate in PB60-S-11-091108: 2,4,6-Tribromophenol. Since the problem may indicate a potential bias in the analytical results, the sample was re-extracted 20 days past the

Approved by EMW **Date** 11/17/08

recommended hold time and reanalyzed. The surrogates met control criteria for the reanalysis. Note the results for the field samples were comparable for both determinations, which indicates the problem with the initial analysis was restricted to the surrogate recovery. Therefore, the results from the original analysis are reported. The data is flagged to indicate the problem.

The control criteria for the surrogates in sample PB59-S-8-091108 are not applicable. The analysis of the sample required a dilution, which resulted in a surrogate concentration below the Method Reporting Limit (MRL). No further corrective action was appropriate.

The control criteria were exceeded for the following surrogate in LCS KWG0809892-3: 2,4,6-Tribromophenol. The associated matrix spike recoveries of target compounds were in control, indicating the analysis was in control. The surrogate outlier is flagged accordingly. No further corrective action was appropriate.

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recoveries of Naphthalene and 2-Methylnaphthalene for sample PB61-S-6.5-091108 are not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

The matrix spike recoveries of Acenaphthene, Dibenzofuran, Fluorene, and Pentachlorophenol for sample PB61-S-6.5-091108 were outside control criteria. Recovery in the replicate Laboratory Control Samples (LCS/DLCS) were acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential high bias in this matrix. No further corrective action was appropriate.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for the following analyte in the replicate Laboratory Control Sample (LCS/DLCS) analyses (KWG0809892-3 and KWG0809892-4) was outside control criteria: Pentachlorophenol. All spike recoveries in the LCS/DLCS were within acceptance limits, indicating the analytical batch was in control. The analyte in question was not detected at levels greater than the MRL in the associated field samples. The data quality is not significantly affected. No further corrective action was taken.

Approved by EM W **Date** 11/17/08

Columbia Analytical Services INC.
An Employee - Owned Company

CHAIN OF COUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K0808784
PAGE 1 OF 1 COC #

PROJECT NAME IP LONGVIEW GEOPROBE
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS URS 1501 4th Ave, Ste 1400
CITY/STATE/ZIP SEATTLE, WA 98101
E-MAIL ADDRESS PAUL_KALINA@URSCORP.COM
PHONE # 206-438-2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☐ BTEX☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020 ☐ AOX 1650☐ 506☐	PCP (PAHs)				REMARKS
TMW03-S-9-091108	9/11/08	1045		S	1				X						X						X				
PB61-S-6.5-091108		1225			1				X						X						X				
PB61-S-8-091108		1235			1				X						X						X				
PB60-S-8-091108		1310			1				X						X						X				
PB60-S-11-091108		1330			1				X						X						X				
PB59-S-8-091108		1420			1				X						X						X				
PB59-S-10-091108	↓	1430		↓	1				X						X						X				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg
Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

[redacted]

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 9/11/08 1800	Signature	Date/Time 9/11/08 6:53pm	Signature	Date/Time	Signature Tracy Black	Date/Time 9/11/08 1909
Printed Name Matt McKibbin	Firm URS Corp.	Printed Name Jason Epps	Firm CAS	Printed Name	Firm	Printed Name Tracy Black	Firm CAS

RCOC #1 06/03

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed

Client / Project: URS

Service Request K08 8785

Received: 9/4/08 Opened: 9/4/08 By:

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other NA
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? front
   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? [✓ Y] N
4. Is shipper's air-bill filed? If not, record air-bill number: NA Y [✓ N]
5. **Temperature of cooler(s) upon receipt (°C):** 1.6
   Temperature Blank (°C): n/a
6. If applicable, list Chain of Custody Numbers:
7. Packing material used. *Inserts* *Baggies* [✓ *Bubble Wrap*] *Gel Packs* [✓ *Wet Ice*] *Sleeves* *Other*
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** [✓ NA] Y N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

**Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).*

Additional Notes, Discrepancies, & Resolutions:

Page 1 of: 1 2

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808785

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4
TMW03-S-9-091108	K0808785-001	69	58	75	91
PB61-S-6.5-091108	K0808785-002	72	27	73	83
PB61-S-8-091108	K0808785-003	75 D	24 D	74 D	110 D
PB60-S-8-091108	K0808785-004	80 D	23 D	70 D	107 D
PB60-S-11-091108	K0808785-005	63	7 *	65	77
PB59-S-8-091108	K0808785-006	263 D *	77 D #	149 D *	155 D *
PB59-S-10-091108	K0808785-007	70	54	71	80
Method Blank	KWG0809892-5	80	71	85	98
PB61-S-6.5-091108MS	KWG0809892-1	75	72	71	78
PB61-S-6.5-091108DMS	KWG0809892-2	73	33	72	78
Lab Control Sample	KWG0809892-3	73	8 *	82	89
Duplicate Lab Control Sample	KWG0809892-4	72	41	78	83

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-128
Sur2 = 2,4,6-Tribromophenol	12-152
Sur3 = Fluoranthene-d10	29-121
Sur4 = Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0809892-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.96**	J	3.0	0.37	1	09/24/08	10/08/08	KWG0809892	
2-Methylnaphthalene	**0.44**	J	3.0	0.39	1	09/24/08	10/08/08	KWG0809892	
Acenaphthylene	ND	U	3.0	0.24	1	09/24/08	10/08/08	KWG0809892	
Acenaphthene	ND	U	3.0	0.23	1	09/24/08	10/08/08	KWG0809892	
Dibenzofuran	ND	U	3.0	0.59	1	09/24/08	10/08/08	KWG0809892	
Fluorene	ND	U	3.0	0.50	1	09/24/08	10/08/08	KWG0809892	
Pentachlorophenol	ND	U	120	2.9	1	09/24/08	10/08/08	KWG0809892	
Phenanthrene	ND	U	3.0	0.75	1	09/24/08	10/08/08	KWG0809892	
Anthracene	ND	U	3.0	0.47	1	09/24/08	10/08/08	KWG0809892	
Fluoranthene	ND	U	3.0	0.61	1	09/24/08	10/08/08	KWG0809892	
Pyrene	ND	U	3.0	0.37	1	09/24/08	10/08/08	KWG0809892	
Benz(a)anthracene	**0.56**	J	3.0	0.48	1	09/24/08	10/08/08	KWG0809892	
Chrysene	**0.30**	J	3.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	ND	U	3.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	ND	U	3.0	0.15	1	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	ND	U	3.0	0.14	1	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**0.36**	J	3.0	0.16	1	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	**0.36**	J	3.0	0.28	1	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	ND	U	3.0	0.64	1	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	71	12-152	10/08/08	Acceptable
Fluoranthene-d10	85	29-121	10/08/08	Acceptable
Terphenyl-d14	98	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW03-S-9-091108	**Units:**	ug/Kg
Lab Code:	K0808785-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**65**		5.0	0.37	1	09/24/08	10/08/08	KWG0809892	
2-Methylnaphthalene	**27**		5.0	0.39	1	09/24/08	10/08/08	KWG0809892	
Acenaphthylene	**0.30**	J	5.0	0.24	1	09/24/08	10/08/08	KWG0809892	
Acenaphthene	**9.2**		5.0	0.23	1	09/24/08	10/08/08	KWG0809892	
Dibenzofuran	**7.7**		5.0	0.59	1	09/24/08	10/08/08	KWG0809892	
Fluorene	**5.0**		5.0	0.50	1	09/24/08	10/08/08	KWG0809892	
Pentachlorophenol	ND	U	200	2.9	1	09/24/08	10/08/08	KWG0809892	
Phenanthrene	**6.6**		5.0	0.75	1	09/24/08	10/08/08	KWG0809892	
Anthracene	**0.82**	J	5.0	0.47	1	09/24/08	10/08/08	KWG0809892	
Fluoranthene	**1.7**	J	5.0	0.61	1	09/24/08	10/08/08	KWG0809892	
Pyrene	**1.9**	J	5.0	0.37	1	09/24/08	10/08/08	KWG0809892	
Benz(a)anthracene	**1.0**	J	5.0	0.48	1	09/24/08	10/08/08	KWG0809892	
Chrysene	**0.83**	J	5.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	**0.82**	J	5.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	ND	U	5.0	0.14	1	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**0.47**	J	5.0	0.16	1	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	**6.3**		5.0	0.64	1	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	69	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	58	12-152	10/08/08	Acceptable
Fluoranthene-d10	75	29-121	10/08/08	Acceptable
Terphenyl-d14	91	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB61-S-6.5-091108	**Units:**	ug/Kg
Lab Code:	K0808785-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**3800**	D	25	1.9	5	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	**2600**	D	25	2.0	5	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	**50**		5.0	0.24	1	09/24/08	10/08/08	KWG0809892	
Acenaphthene	**450**		5.0	0.23	1	09/24/08	10/08/08	KWG0809892	
Dibenzofuran	**250**		5.0	0.59	1	09/24/08	10/08/08	KWG0809892	
Fluorene	**90**		5.0	0.50	1	09/24/08	10/08/08	KWG0809892	
Pentachlorophenol	ND	U	200	2.9	1	09/24/08	10/08/08	KWG0809892	
Phenanthrene	**110**		5.0	0.75	1	09/24/08	10/08/08	KWG0809892	
Anthracene	**170**		5.0	0.47	1	09/24/08	10/08/08	KWG0809892	
Fluoranthene	**85**		5.0	0.61	1	09/24/08	10/08/08	KWG0809892	
Pyrene	**59**		5.0	0.37	1	09/24/08	10/08/08	KWG0809892	
Benz(a)anthracene	**46**		5.0	0.48	1	09/24/08	10/08/08	KWG0809892	
Chrysene	**65**		5.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	**150**		5.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	**39**		5.0	0.15	1	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	**36**		5.0	0.14	1	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**100**		5.0	0.16	1	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	**21**		5.0	0.28	1	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	**76**		5.0	0.64	1	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	27	12-152	10/08/08	Acceptable
Fluoranthene-d10	73	29-121	10/08/08	Acceptable
Terphenyl-d14	83	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808785
Date Collected: 09/11/2008
Date Received: 09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name: PB61-S-8-091108
Lab Code: K0808785-003

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**190000**	D	4900	370	1000	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	**680000**	D	4900	390	1000	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	**1800**	D	49	2.4	10	09/24/08	10/08/08	KWG0809892	
Acenaphthene	**200000**	D	4900	230	1000	09/24/08	10/10/08	KWG0809892	
Dibenzofuran	**160000**	D	490	59	100	09/24/08	10/11/08	KWG0809892	
Fluorene	**110000**	D	490	50	100	09/24/08	10/11/08	KWG0809892	
Pentachlorophenol	**290**	JD	2000	29	10	09/24/08	10/08/08	KWG0809892	
Phenanthrene	**190000**	D	4900	750	1000	09/24/08	10/10/08	KWG0809892	
Anthracene	**12000**	D	49	4.7	10	09/24/08	10/08/08	KWG0809892	
Fluoranthene	**69000**	D	490	61	100	09/24/08	10/11/08	KWG0809892	
Pyrene	**38000**	D	490	37	100	09/24/08	10/11/08	KWG0809892	
Benz(a)anthracene	**7600**	D	49	4.8	10	09/24/08	10/08/08	KWG0809892	
Chrysene	**6800**	D	49	2.5	10	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	**3500**	D	49	2.5	10	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	**1300**	D	49	1.5	10	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	**2000**	D	49	1.4	10	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**1000**	D	49	1.6	10	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	**270**	D	49	2.8	10	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	**740**	D	49	6.4	10	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	24	12-152	10/08/08	Acceptable
Fluoranthene-d10	74	29-121	10/08/08	Acceptable
Terphenyl-d14	110	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808785
Date Collected: 09/11/2008
Date Received: 09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name: PB60-S-8-091108
Lab Code: K0808785-004

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**140000**	D	490	37	100	09/24/08	10/11/08	KWG0809892	
2-Methylnaphthalene	**240000**	D	4900	390	1000	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	**1600**	D	49	2.4	10	09/24/08	10/08/08	KWG0809892	
Acenaphthene	**170000**	D	490	23	100	09/24/08	10/11/08	KWG0809892	
Dibenzofuran	**120000**	D	490	59	100	09/24/08	10/11/08	KWG0809892	
Fluorene	**90000**	D	490	50	100	09/24/08	10/11/08	KWG0809892	
Pentachlorophenol	**290**	JD	2000	29	10	09/24/08	10/08/08	KWG0809892	
Phenanthrene	**160000**	D	490	75	100	09/24/08	10/11/08	KWG0809892	
Anthracene	**12000**	D	49	4.7	10	09/24/08	10/08/08	KWG0809892	
Fluoranthene	**54000**	D	490	61	100	09/24/08	10/11/08	KWG0809892	
Pyrene	**31000**	D	490	37	100	09/24/08	10/11/08	KWG0809892	
Benz(a)anthracene	**6300**	D	49	4.8	10	09/24/08	10/08/08	KWG0809892	
Chrysene	**5500**	D	49	2.5	10	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	**2900**	D	49	2.5	10	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	**1100**	D	49	1.5	10	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	**1600**	D	49	1.4	10	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**760**	D	49	1.6	10	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	**220**	D	49	2.8	10	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	**620**	D	49	6.4	10	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	23	12-152	10/08/08	Acceptable
Fluoranthene-d10	70	29-121	10/08/08	Acceptable
Terphenyl-d14	107	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB60-S-11-091108	**Units:**	ug/Kg
Lab Code:	K0808785-005	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4600**	D	25	1.9	5	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	**180**		4.9	0.39	1	09/24/08	10/08/08	KWG0809892	
Acenaphthylene	**1.2**	J	4.9	0.24	1	09/24/08	10/08/08	KWG0809892	
Acenaphthene	**41**		4.9	0.23	1	09/24/08	10/08/08	KWG0809892	
Dibenzofuran	**25**		4.9	0.59	1	09/24/08	10/08/08	KWG0809892	
Fluorene	**25**		4.9	0.50	1	09/24/08	10/08/08	KWG0809892	
Pentachlorophenol	ND	U	200	2.9	1	09/24/08	10/08/08	KWG0809892	
Phenanthrene	**38**		4.9	0.75	1	09/24/08	10/08/08	KWG0809892	
Anthracene	**3.6**	J	4.9	0.47	1	09/24/08	10/08/08	KWG0809892	
Fluoranthene	**16**		4.9	0.61	1	09/24/08	10/08/08	KWG0809892	
Pyrene	**16**		4.9	0.37	1	09/24/08	10/08/08	KWG0809892	
Benz(a)anthracene	**3.0**	J	4.9	0.48	1	09/24/08	10/08/08	KWG0809892	
Chrysene	**4.0**	J	4.9	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	**4.5**	J	4.9	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	**1.3**	J	4.9	0.15	1	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	**2.4**	J	4.9	0.14	1	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**3.6**	J	4.9	0.16	1	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	**0.48**	J	4.9	0.28	1	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	**16**		4.9	0.64	1	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	7	12-152	10/08/08	Outside Control Limits
Fluoranthene-d10	65	29-121	10/08/08	Acceptable
Terphenyl-d14	77	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB59-S-8-091108	**Units:**	ug/Kg
Lab Code:	K0808785-006	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	1700000	D	5000	370	1000	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	720000	D	5000	390	1000	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	4800	D	250	12	50	09/24/08	10/08/08	KWG0809892	
Acenaphthene	390000	D	5000	230	1000	09/24/08	10/10/08	KWG0809892	
Dibenzofuran	300000	D	5000	590	1000	09/24/08	10/10/08	KWG0809892	
Fluorene	330000	D	5000	500	1000	09/24/08	10/10/08	KWG0809892	
Pentachlorophenol	ND	U	10000	150	50	09/24/08	10/08/08	KWG0809892	
Phenanthrene	860000	D	5000	750	1000	09/24/08	10/10/08	KWG0809892	
Anthracene	96000	D	250	24	50	09/24/08	10/08/08	KWG0809892	
Fluoranthene	340000	D	5000	610	1000	09/24/08	10/10/08	KWG0809892	
Pyrene	210000	D	5000	370	1000	09/24/08	10/10/08	KWG0809892	
Benz(a)anthracene	44000	D	250	24	50	09/24/08	10/08/08	KWG0809892	
Chrysene	37000	D	250	13	50	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	18000	D	250	13	50	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	6800	D	250	7.5	50	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	12000	D	250	7.0	50	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	4700	D	250	8.0	50	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	1200	D	250	14	50	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	3200	D	250	32	50	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	263	10-128	10/08/08	Outside Control Limits
2,4,6-Tribromophenol	77	12-152	10/08/08	Acceptable
Fluoranthene-d10	149	29-121	10/08/08	Outside Control Limits
Terphenyl-d14	155	24-141	10/08/08	Outside Control Limits

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB59-S-10-091108	**Units:**	ug/Kg
Lab Code:	K0808785-007	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4700**	D	50	3.7	10	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	**2500**	D	50	3.9	10	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	**21**		5.0	0.24	1	09/24/08	10/08/08	KWG0809892	
Acenaphthene	**2500**	D	50	2.3	10	09/24/08	10/10/08	KWG0809892	
Dibenzofuran	**2800**	D	50	5.9	10	09/24/08	10/10/08	KWG0809892	
Fluorene	**3000**	D	50	5.0	10	09/24/08	10/10/08	KWG0809892	
Pentachlorophenol	ND	U	200	2.9	1	09/24/08	10/08/08	KWG0809892	
Phenanthrene	**7400**	D	50	7.5	10	09/24/08	10/10/08	KWG0809892	
Anthracene	**770**		5.0	0.47	1	09/24/08	10/08/08	KWG0809892	
Fluoranthene	**2100**	D	50	6.1	10	09/24/08	10/10/08	KWG0809892	
Pyrene	**1300**		5.0	0.37	1	09/24/08	10/08/08	KWG0809892	
Benz(a)anthracene	**270**		5.0	0.48	1	09/24/08	10/08/08	KWG0809892	
Chrysene	**220**		5.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	**110**		5.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	**41**		5.0	0.15	1	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	**77**		5.0	0.14	1	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**26**		5.0	0.16	1	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	**7.3**		5.0	0.28	1	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	**79**		5.0	0.64	1	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	70	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	54	12-152	10/08/08	Acceptable
Fluoranthene-d10	71	29-121	10/08/08	Acceptable
Terphenyl-d14	80	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Extracted:**	09/24/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/08/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	PB61-S-6.5-091108	**Units:**	ug/Kg
Lab Code:	K0808785-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0809892

		PB61-S-6.5-091108MS KWG0809892-1 **Matrix Spike**			PB61-S-6.5-091108DMS KWG0809892-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	3800	5950E	499	435 #	4500E	499	146 #	10-129	28	40
2-Methylnaphthalene	2600	5230E	499	532 #	3970E	499	281 #	10-133	27	40
Acenaphthylene	50	513	499	93	531	499	96	37-100	3	40
Acenaphthene	450	1340	499	179 *	1410	499	193 *	28-111	5	40
Dibenzofuran	250	1090	499	169 *	1180	499	186 *	37-103	8	40
Fluorene	90	709	499	124 *	770	499	136 *	24-122	8	40
Pentachlorophenol	ND	875	499	175 *	864	499	173 *	70-130	1	40
Phenanthrene	110	676	499	113	692	499	116	23-124	2	40
Anthracene	170	582	499	82	585	499	82	30-114	0	40
Fluoranthene	85	591	499	101	620	499	107	21-145	5	40
Pyrene	59	566	499	102	581	499	105	10-155	3	40
Benz(a)anthracene	46	527	499	96	572	499	105	25-127	8	40
Chrysene	65	552	499	98	588	499	105	28-126	6	40
Benzo(b)fluoranthene	150	585	499	88	632	499	97	18-130	8	40
Benzo(k)fluoranthene	39	488	499	90	548	499	102	30-122	12	40
Benzo(a)pyrene	36	499	499	93	515	499	96	20-132	3	40
Indeno(1,2,3-cd)pyrene	100	652	499	110	683	499	116	20-132	5	40
Dibenz(a,h)anthracene	21	599	499	116	608	499	118	28-124	1	40
Benzo(g,h,i)perylene	76	501	499	85	540	499	93	24-124	8	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808785
Date Extracted: 09/24/2008
Date Analyzed: 10/08/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0809892

	Lab Control Sample KWG0809892-3 **Lab Control Spike**			Duplicate Lab Control Sample KWG0809892-4 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	442	500	88	438	500	88	35-104	1	40
2-Methylnaphthalene	503	500	101	494	500	99	34-110	2	40
Acenaphthylene	462	500	92	473	500	95	46-105	3	40
Acenaphthene	448	500	90	455	500	91	47-104	2	40
Dibenzofuran	490	500	98	494	500	99	50-106	1	40
Fluorene	474	500	95	486	500	97	52-106	2	40
Pentachlorophenol	232	1000	23	512	1000	51	10-150	75 *	40
Phenanthrene	489	500	98	485	500	97	48-108	1	40
Anthracene	465	500	93	487	500	97	51-110	5	40
Fluoranthene	514	500	103	523	500	105	54-121	2	40
Pyrene	515	500	103	510	500	102	53-110	1	40
Benz(a)anthracene	516	500	103	501	500	100	51-113	3	40
Chrysene	519	500	104	508	500	102	56-112	2	40
Benzo(b)fluoranthene	457	500	91	454	500	91	51-116	0	40
Benzo(k)fluoranthene	486	500	97	488	500	98	57-114	0	40
Benzo(a)pyrene	508	500	102	518	500	104	53-112	2	40
Indeno(1,2,3-cd)pyrene	563	500	113	556	500	111	42-124	1	40
Dibenz(a,h)anthracene	588	500	118	584	500	117	44-125	1	40
Benzo(g,h,i)perylene	520	500	104	514	500	103	50-115	1	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	PERCENT
Analysis Method:	NWTPH-Dx	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
TMW03-S-9-091108	K0808785-001	70	69
PB61-S-6.5-091108	K0808785-002	71	63
PB61-S-8-091108	K0808785-003	101	85
PB60-S-8-091108	K0808785-004	89	77
PB60-S-11-091108	K0808785-005	50	48 *
PB59-S-8-091108	K0808785-006	205 *	89
PB59-S-10-091108	K0808785-007	71	68
PB60-S-8-091108DUP	KWG0809816-1	95	82
Method Blank	KWG0809816-4	83	79
Lab Control Sample	KWG0809816-3	89	83

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808785

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
PB60-S-11-091108	K0808785-005	57	63
Batch QCDUP	KWG0810581-1	64	69
Method Blank	KWG0810581-3	75	85
Batch QC	K0808948-012	73	79
Lab Control Sample	KWG0810581-2	79	85

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

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Form 2A - Organic

SuperSet Reference: RR93639

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0809816-4	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1.4**	J	9.8	1.2	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**3.1**	J	25	2.9	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	83	50-150	09/25/08	Acceptable
n-Triacontane	79	50-150	09/25/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0810581-3	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	9.9	1.2	1	10/08/08	10/09/08	KWG0810581	
Residual Range Organics (RRO)	ND	U	25	2.9	1	10/08/08	10/09/08	KWG0810581	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	75	50-150	10/09/08	Acceptable
n-Triacontane	85	50-150	10/09/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	TMW03-S-9-091108	**Units:**	mg/Kg
Lab Code:	K0808785-001	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**6.4**	J	13	1.5	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**19**	J	31	3.6	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	09/25/08	Acceptable
n-Triacontane	69	50-150	09/25/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	PB61-S-6.5-091108	**Units:**	mg/Kg
Lab Code:	K0808785-002	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**16**	Z	12	1.4	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**67**	Z	30	3.4	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	71	50-150	09/25/08	Acceptable
n-Triacontane	63	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	PB61-S-8-091108	**Units:**	mg/Kg
Lab Code:	K0808785-003	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**5100**	Z	13	1.5	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**370**	Z	31	3.6	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	101	50-150	09/25/08	Acceptable
n-Triacontane	85	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	PB60-S-8-091108	**Units:**	mg/Kg
Lab Code:	K0808785-004	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**3300**	Z	13	1.5	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**260**	Z	31	3.6	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	89	50-150	09/25/08	Acceptable
n-Triacontane	77	50-150	09/25/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	PB60-S-11-091108	**Units:**	mg/Kg
Lab Code:	K0808785-005	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**9.4**	J	15	1.7	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**23**	J	36	4.1	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	50	50-150	09/25/08	Acceptable
n-Triacontane	48	50-150	09/25/08	Outside Control Limits

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	PB60-S-11-091108	**Units:**	mg/Kg
Lab Code:	K0808785-005	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**18**	Z	14	1.7	1	10/08/08	10/09/08	KWG0810581	*
Residual Range Organics (RRO)	**80**	Z	35	4.1	1	10/08/08	10/09/08	KWG0810581	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	57	50-150	10/09/08	Acceptable
n-Triacontane	63	50-150	10/09/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	PB59-S-8-091108	**Units:**	mg/Kg
Lab Code:	K0808785-006	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**14000**	Z	12	1.5	1	09/23/08	09/26/08	KWG0809816	
Residual Range Organics (RRO)	**2000**	DZ	59	6.9	2	09/23/08	09/26/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	205	50-150	09/26/08	Outside Control Limits
n-Triacontane	89	50-150	09/26/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Collected:**	09/11/2008
Sample Matrix:	Soil	**Date Received:**	09/11/2008

Diesel and Residual Range Organics

Sample Name:	PB59-S-10-091108	**Units:**	mg/Kg
Lab Code:	K0808785-007	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	77	Z	14	1.7	1	09/23/08	09/25/08	KWG0809816	
Residual Range Organics (RRO)	**33**	J	35	4.1	1	09/23/08	09/25/08	KWG0809816	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	71	50-150	09/25/08	Acceptable
n-Triacontane	68	50-150	09/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/25/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	PB60-S-8-091108	**Units:**	mg/Kg
Lab Code:	K0808785-004	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0809816

Analyte Name	**MRL**	**MDL**	**Sample Result**	PB60-S-8-091108DUP KWG0809816-1 **Duplicate Sample** **Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	13	1.5	3300	3700	3500	12	40
Residual Range Organics (RRO)	31	3.5	260	280	270	8	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Extracted:**	10/08/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/09/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	Batch QC	**Units:**	mg/Kg
Lab Code:	K0808948-012	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0810581

				Batch QCDUP KWG0810581-1 Duplicate Sample			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	15	1.8	36	35	35	5	40
Residual Range Organics (RRO)	36	4.2	79	73	76	9	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/25/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809816

	Lab Control Sample KWG0809816-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	218	267	82	63-120
Residual Range Organics (RRO)	104	133	78	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808785
Project:	IP Longview Geo-probe	**Date Extracted:**	10/08/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/09/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0810581

	Lab Control Sample KWG0810581-2 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	200	267	75	63-120
Residual Range Organics (RRO)	112	133	84	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Geo-prob
Sample Matrix: Soil

Service Request: K0808785

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
TMW03-S-9-091108	K0808785-001	09/11/2008	09/11/2008	09/18/2008	79.8	
PB61-S-6.5-091108	K0808785-002	09/11/2008	09/11/2008	09/18/2008	86.1	
PB61-S-8-091108	K0808785-003	09/11/2008	09/11/2008	09/18/2008	80.8	
PB60-S-8-091108	K0808785-004	09/11/2008	09/11/2008	09/18/2008	81.9	
PB60-S-11-091108	K0808785-005	09/11/2008	09/11/2008	09/18/2008	70.8	
PB59-S-8-091108	K0808785-006	09/11/2008	09/11/2008	09/18/2008	83.2	
PB59-S-10-091108	K0808785-007	09/11/2008	09/11/2008	09/18/2008	71.9	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-prob
Sample Matrix: Soil

Service Request: K0808785
Date Collected: 09/11/2008
Date Received: 09/11/2008
Date Analyzed: 09/18/2008

Duplicate Sample Summary
Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
TMW03-S-9-091108	K0808785-001	79.8	80.0	79.9	<1	

Printed: 09/23/2008 09:39
u:\Stealth\Crystal.rpt\Solids.rpt

SuperSet Reference: W0809677

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

October 15, 2008 Analytical Report for Service Request No: K0808869

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on September 13, 2008. For your reference, these analyses have been assigned our service request number K0808869.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/ln

Page 1 of 998

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

December 16, 2008

Analytical Report for Service Request No: K0808731
K0808869
K0808948

RECEIVED
DEC 19 2008
URS CORPORATION
SEATTLE

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the revised pages for the samples submitted to our laboratory on September 11, 13 & 16, 2008. For your reference, these analyses have been assigned our service request number K0808731, K0808869, K0808948.

The reference to the surrogate 2,4,6-Tribromophenol was removed when it did not apply to the sample. Pentachlorophenol replaced the phrase "PCP".

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

Page 1 of ______

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0808869
Project:	IP Longview Geoprobe	**Date Received:**	9/13/08
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six soil samples were received for analysis at Columbia Analytical Services on 9/13/08. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel and Residual Range Organics in sample TMW06-S-7-091208 is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons and Pentachlorophenol by EPA Method 8270C

Surrogate Exceptions:
The control criteria were exceeded for the following surrogate in the LCS KWG0809893-3: 2,4,6-Tribromophenol. The associated matrix spike recoveries of target compounds were in control, indicating the analysis was in control. The surrogate outlier is flagged accordingly. No further corrective action was appropriate.

Matrix Spike Recovery Exceptions:
The matrix spike recoveries of several analytes for sample Batch QC were outside control criteria. Recovery in the Laboratory Control Sample (LCS) was acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential high bias in this matrix. No further corrective action was appropriate.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for Pentachlorophenol in the replicate Laboratory Control Sample (LCS) analyses (KWG0809893-3 and KWG0809892-4) was outside control criteria. The recoveries for this analyte are within control criteria. There were no hits for this analyte in the associated samples, therefore per CAS policy, re-extraction is not required.

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: 2,4,6-Tribromophenol, Pentachlorophenol, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In

Approved by Emw **Date** 12/9/08

accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:

The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Matrix Spike Recovery Exceptions:

The matrix spike recoveries of several analytes for sample Batch QC were outside control criteria. Recovery in the Laboratory Control Sample (LCS) was acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential high bias in this matrix. No further corrective action was appropriate.

Approved by______________________________ **Date** 12/9/08

Columbia Analytical Services INC.
An Employee - Owned Company

CHAIN OF CUSTODY

SR#: K0808864

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 1 COC #

PROJECT NAME IP Longview Geoprobe
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS URS 1501 4th Ave, Ste #1400
CITY/STATE/ZIP Seattle, WA 98101
E-MAIL ADDRESS PAUL_KALINA@URSCORP.COM
PHONE # 206-438-2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020☐ AOX 1650☐ 506☐	PCP (PAH's)				REMARKS
TMW04-S-7.5-091208	9/12/08	0904		S	1				X						X						X				
TMW05-S-6-091208		0915			1				X						X										
TMW12-S-6.5-091208		0935			1				X						X						X				
TMW11-S-7.5-091208		1110			1				X						X						X				
TMW06-S-7-091208		1345			1				X						X										
S-DUP-1-091208		1845			1				X						X										

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
☒ Standard (10-15 working days)
___ Provide FAX Results
______
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

[redacted]

Cooler temp 3.2 Temp blank 2.1

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 9/12/08 1730	Signature	Date/Time 9/12/08 5:34pm	Signature	Date/Time	Signature	Date/Time 9/13/08 0800
Printed Name Matt McKibbin	Firm URS	Printed Name Jason Epps	Firm CAS	Printed Name	Firm	Printed Name A Rymarcia	Firm CAS

RCOC #1 06/03

Columbia Analytical Services, Inc.

PC Ed W.

Cooler Receipt and Preservation Form

Client / Project: URS

Service Request K08 08869

Received: 9/12/08 Opened: 9/13/08 By: KO

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ________ NA
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where? ________
   If present, were custody seals intact? Y [✓ N] If present, were they signed and dated? Y [✓ N]
4. Is shipper's air-bill filed? If not, record air-bill number: ________ [✓ NA] Y N
5. Temperature of cooler(s) upon receipt (°C): 3.2
   Temperature Blank (°C): 2.1
6. If applicable, list Chain of Custody Numbers: ________
7. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
8. Packing material used. Inserts [✓ Baggies] Bubble Wrap Gel Packs [✓ Wet Ice] Sleeves Other ________
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* [✓ Y] N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N
15. Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection? [✓ NA] Y N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions: ________

Page 1 of: 1 2

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808869

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4
TMW04-S-7.5-091208	K0808869-001	78	49	87	94
TMW12-S-6.5-091208	K0808869-003	74	42	73	89
TMW11-S-7.5-091208	K0808869-004	68	50	71	83
Method Blank	KWG0809892-5	80	71	85	98
Batch QC	K0808785-002	72	27	73	83
Batch QCMS	KWG0809892-1	75	72	71	78
Batch QCDMS	KWG0809892-2	73	33	72	78
Lab Control Sample	KWG0809892-3	73	8 *	82	89
Duplicate Lab Control Sample	KWG0809892-4	72	41	78	83

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-128
Sur2 = 2,4,6-Tribromophenol	12-152
Sur3 = Fluoranthene-d10	29-121
Sur4 = Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808869

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TMW05-S-6-091208	K0808869-002	75	75	84
TMW06-S-7-091208	K0808869-005	73	74	87
S-DUP-1-091208	K0808869-006	59	58	70
Method Blank	KWG0809892-5	80	85	98
Batch QC	K0808785-002	72	73	83
Batch QCMS	KWG0809892-1	75	71	78
Batch QCDMS	KWG0809892-2	73	72	78
Lab Control Sample	KWG0809892-3	73	82	89
Duplicate Lab Control Sample	KWG0809892-4	72	78	83

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-128
Sur2 = Fluoranthene-d10	29-121
Sur3 = Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

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u:\Stealth\Crystal.rpt\Form2.rpt

Form 2A - Organic

Page 1 of 1

SuperSet Reference: RR93736

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0809892-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.96**	J	3.0	0.37	1	09/24/08	10/08/08	KWG0809892	
2-Methylnaphthalene	**0.44**	J	3.0	0.39	1	09/24/08	10/08/08	KWG0809892	
Acenaphthylene	ND	U	3.0	0.24	1	09/24/08	10/08/08	KWG0809892	
Acenaphthene	ND	U	3.0	0.23	1	09/24/08	10/08/08	KWG0809892	
Dibenzofuran	ND	U	3.0	0.59	1	09/24/08	10/08/08	KWG0809892	
Fluorene	ND	U	3.0	0.50	1	09/24/08	10/08/08	KWG0809892	
Pentachlorophenol	ND	U	120	2.9	1	09/24/08	10/08/08	KWG0809892	
Phenanthrene	ND	U	3.0	0.75	1	09/24/08	10/08/08	KWG0809892	
Anthracene	ND	U	3.0	0.47	1	09/24/08	10/08/08	KWG0809892	
Fluoranthene	ND	U	3.0	0.61	1	09/24/08	10/08/08	KWG0809892	
Pyrene	ND	U	3.0	0.37	1	09/24/08	10/08/08	KWG0809892	
Benz(a)anthracene	**0.56**	J	3.0	0.48	1	09/24/08	10/08/08	KWG0809892	
Chrysene	**0.30**	J	3.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(b)fluoranthene	ND	U	3.0	0.25	1	09/24/08	10/08/08	KWG0809892	
Benzo(k)fluoranthene	ND	U	3.0	0.15	1	09/24/08	10/08/08	KWG0809892	
Benzo(a)pyrene	ND	U	3.0	0.14	1	09/24/08	10/08/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**0.36**	J	3.0	0.16	1	09/24/08	10/08/08	KWG0809892	
Dibenz(a,h)anthracene	**0.36**	J	3.0	0.28	1	09/24/08	10/08/08	KWG0809892	
Benzo(g,h,i)perylene	ND	U	3.0	0.64	1	09/24/08	10/08/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	10-128	10/08/08	Acceptable
2,4,6-Tribromophenol	71	12-152	10/08/08	Acceptable
Fluoranthene-d10	85	29-121	10/08/08	Acceptable
Terphenyl-d14	98	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW04-S-7.5-091208	**Units:**	ug/Kg
Lab Code:	K0808869-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**41**		5.0	0.37	1	09/24/08	10/09/08	KWG0809892	
2-Methylnaphthalene	**69**		5.0	0.39	1	09/24/08	10/09/08	KWG0809892	
Acenaphthylene	**3.1**	J	5.0	0.24	1	09/24/08	10/09/08	KWG0809892	
Acenaphthene	**15**		5.0	0.23	1	09/24/08	10/09/08	KWG0809892	
Dibenzofuran	**15**		5.0	0.59	1	09/24/08	10/09/08	KWG0809892	
Fluorene	**7.7**		5.0	0.50	1	09/24/08	10/09/08	KWG0809892	
Pentachlorophenol	ND	U	200	2.9	1	09/24/08	10/09/08	KWG0809892	
Phenanthrene	**17**		5.0	0.75	1	09/24/08	10/09/08	KWG0809892	
Anthracene	**14**		5.0	0.47	1	09/24/08	10/09/08	KWG0809892	
Fluoranthene	**22**		5.0	0.61	1	09/24/08	10/09/08	KWG0809892	
Pyrene	**13**		5.0	0.37	1	09/24/08	10/09/08	KWG0809892	
Benz(a)anthracene	**8.7**		5.0	0.48	1	09/24/08	10/09/08	KWG0809892	
Chrysene	**20**		5.0	0.25	1	09/24/08	10/09/08	KWG0809892	
Benzo(b)fluoranthene	**24**		5.0	0.25	1	09/24/08	10/09/08	KWG0809892	
Benzo(k)fluoranthene	**6.5**		5.0	0.15	1	09/24/08	10/09/08	KWG0809892	
Benzo(a)pyrene	**6.5**		5.0	0.14	1	09/24/08	10/09/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**16**		5.0	0.16	1	09/24/08	10/09/08	KWG0809892	
Dibenz(a,h)anthracene	**3.5**	J	5.0	0.28	1	09/24/08	10/09/08	KWG0809892	
Benzo(g,h,i)perylene	**11**		5.0	0.64	1	09/24/08	10/09/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	78	10-128	10/09/08	Acceptable
2,4,6-Tribromophenol	49	12-152	10/09/08	Acceptable
Fluoranthene-d10	87	29-121	10/09/08	Acceptable
Terphenyl-d14	94	24-141	10/09/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW05-S-6-091208	**Units:**	ug/Kg
Lab Code:	K0808869-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**65**		5.0	0.37	1	09/24/08	10/09/08	KWG0809892	
2-Methylnaphthalene	**130**		5.0	0.39	1	09/24/08	10/09/08	KWG0809892	
Acenaphthylene	**0.50**	J	5.0	0.24	1	09/24/08	10/09/08	KWG0809892	
Acenaphthene	**22**		5.0	0.23	1	09/24/08	10/09/08	KWG0809892	
Fluorene	**9.6**		5.0	0.50	1	09/24/08	10/09/08	KWG0809892	
Dibenzofuran	**19**		5.0	0.59	1	09/24/08	10/09/08	KWG0809892	
Phenanthrene	**12**		5.0	0.75	1	09/24/08	10/09/08	KWG0809892	
Anthracene	**0.96**	J	5.0	0.47	1	09/24/08	10/09/08	KWG0809892	
Fluoranthene	**3.1**	J	5.0	0.61	1	09/24/08	10/09/08	KWG0809892	
Pyrene	**3.0**	J	5.0	0.37	1	09/24/08	10/09/08	KWG0809892	
Benzo(b)fluoranthene	ND	U	5.0	0.25	1	09/24/08	10/09/08	KWG0809892	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/24/08	10/09/08	KWG0809892	
Benz(a)anthracene	**1.6**	J	5.0	0.48	1	09/24/08	10/09/08	KWG0809892	
Chrysene	**0.92**	J	5.0	0.25	1	09/24/08	10/09/08	KWG0809892	
Benzo(a)pyrene	ND	U	5.0	0.14	1	09/24/08	10/09/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	ND	U	5.0	0.16	1	09/24/08	10/09/08	KWG0809892	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/24/08	10/09/08	KWG0809892	
Benzo(g,h,i)perylene	ND	U	5.0	0.64	1	09/24/08	10/09/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	10-128	10/09/08	Acceptable
Fluoranthene-d10	75	29-121	10/09/08	Acceptable
Terphenyl-d14	84	24-141	10/09/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW12-S-6.5-091208	**Units:**	ug/Kg
Lab Code:	K0808869-003	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**40**		5.0	0.37	1	09/24/08	10/09/08	KWG0809892	
2-Methylnaphthalene	**21**		5.0	0.39	1	09/24/08	10/09/08	KWG0809892	
Acenaphthylene	**0.41**	J	5.0	0.24	1	09/24/08	10/09/08	KWG0809892	
Acenaphthene	**9.1**		5.0	0.23	1	09/24/08	10/09/08	KWG0809892	
Dibenzofuran	**4.3**	J	5.0	0.59	1	09/24/08	10/09/08	KWG0809892	
Fluorene	**2.5**	J	5.0	0.50	1	09/24/08	10/09/08	KWG0809892	
Pentachlorophenol	ND	U	200	2.9	1	09/24/08	10/09/08	KWG0809892	
Phenanthrene	**5.3**		5.0	0.75	1	09/24/08	10/09/08	KWG0809892	
Anthracene	**0.85**	J	5.0	0.47	1	09/24/08	10/09/08	KWG0809892	
Fluoranthene	**4.8**	J	5.0	0.61	1	09/24/08	10/09/08	KWG0809892	
Pyrene	**4.8**	J	5.0	0.37	1	09/24/08	10/09/08	KWG0809892	
Benz(a)anthracene	**2.7**	J	5.0	0.48	1	09/24/08	10/09/08	KWG0809892	
Chrysene	**3.6**	J	5.0	0.25	1	09/24/08	10/09/08	KWG0809892	
Benzo(b)fluoranthene	**3.1**	J	5.0	0.25	1	09/24/08	10/09/08	KWG0809892	
Benzo(k)fluoranthene	**1.1**	J	5.0	0.15	1	09/24/08	10/09/08	KWG0809892	
Benzo(a)pyrene	**1.2**	J	5.0	0.14	1	09/24/08	10/09/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**2.5**	J	5.0	0.16	1	09/24/08	10/09/08	KWG0809892	
Dibenz(a,h)anthracene	**0.78**	J	5.0	0.28	1	09/24/08	10/09/08	KWG0809892	
Benzo(g,h,i)perylene	**2.7**	J	5.0	0.64	1	09/24/08	10/09/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	10-128	10/09/08	Acceptable
2,4,6-Tribromophenol	42	12-152	10/09/08	Acceptable
Fluoranthene-d10	73	29-121	10/09/08	Acceptable
Terphenyl-d14	89	24-141	10/09/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW11-S-7.5-091208	**Units:**	ug/Kg
Lab Code:	K0808869-004	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**130**		5.0	0.37	1	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	**72**		5.0	0.39	1	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	**0.99**	J	5.0	0.24	1	09/24/08	10/10/08	KWG0809892	
Acenaphthene	**23**		5.0	0.23	1	09/24/08	10/10/08	KWG0809892	
Dibenzofuran	**17**		5.0	0.59	1	09/24/08	10/10/08	KWG0809892	
Fluorene	**13**		5.0	0.50	1	09/24/08	10/10/08	KWG0809892	
Pentachlorophenol	ND	U	200	2.9	1	09/24/08	10/10/08	KWG0809892	
Phenanthrene	**18**		5.0	0.75	1	09/24/08	10/10/08	KWG0809892	
Anthracene	**3.6**	J	5.0	0.47	1	09/24/08	10/10/08	KWG0809892	
Fluoranthene	**9.3**		5.0	0.61	1	09/24/08	10/10/08	KWG0809892	
Pyrene	**6.3**		5.0	0.37	1	09/24/08	10/10/08	KWG0809892	
Benz(a)anthracene	**2.3**	J	5.0	0.48	1	09/24/08	10/10/08	KWG0809892	
Chrysene	**2.2**	J	5.0	0.25	1	09/24/08	10/10/08	KWG0809892	
Benzo(b)fluoranthene	**2.9**	J	5.0	0.25	1	09/24/08	10/10/08	KWG0809892	
Benzo(k)fluoranthene	**0.79**	J	5.0	0.15	1	09/24/08	10/10/08	KWG0809892	
Benzo(a)pyrene	**0.71**	J	5.0	0.14	1	09/24/08	10/10/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**1.4**	J	5.0	0.16	1	09/24/08	10/10/08	KWG0809892	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/24/08	10/10/08	KWG0809892	
Benzo(g,h,i)perylene	**1.2**	J	5.0	0.64	1	09/24/08	10/10/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	10-128	10/10/08	Acceptable
2,4,6-Tribromophenol	50	12-152	10/10/08	Acceptable
Fluoranthene-d10	71	29-121	10/10/08	Acceptable
Terphenyl-d14	83	24-141	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW06-S-7-091208	**Units:**	ug/Kg
Lab Code:	K0808869-005	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**55**		5.0	0.37	1	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	**43**		5.0	0.39	1	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	**0.59**	J	5.0	0.24	1	09/24/08	10/10/08	KWG0809892	
Acenaphthene	**8.2**		5.0	0.23	1	09/24/08	10/10/08	KWG0809892	
Fluorene	**4.0**	J	5.0	0.50	1	09/24/08	10/10/08	KWG0809892	
Dibenzofuran	**6.9**		5.0	0.59	1	09/24/08	10/10/08	KWG0809892	
Phenanthrene	**7.0**		5.0	0.75	1	09/24/08	10/10/08	KWG0809892	
Anthracene	**0.81**	J	5.0	0.47	1	09/24/08	10/10/08	KWG0809892	
Fluoranthene	**3.0**	J	5.0	0.61	1	09/24/08	10/10/08	KWG0809892	
Pyrene	**3.5**	J	5.0	0.37	1	09/24/08	10/10/08	KWG0809892	
Benzo(b)fluoranthene	**1.3**	J	5.0	0.25	1	09/24/08	10/10/08	KWG0809892	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/24/08	10/10/08	KWG0809892	
Benz(a)anthracene	**1.8**	J	5.0	0.48	1	09/24/08	10/10/08	KWG0809892	
Chrysene	**1.4**	J	5.0	0.25	1	09/24/08	10/10/08	KWG0809892	
Benzo(a)pyrene	ND	U	5.0	0.14	1	09/24/08	10/10/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**1.6**	J	5.0	0.16	1	09/24/08	10/10/08	KWG0809892	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/24/08	10/10/08	KWG0809892	
Benzo(g,h,i)perylene	**0.86**	J	5.0	0.64	1	09/24/08	10/10/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	10-128	10/10/08	Acceptable
Fluoranthene-d10	74	29-121	10/10/08	Acceptable
Terphenyl-d14	87	24-141	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	S-DUP-1-091208	**Units:**	ug/Kg
Lab Code:	K0808869-006	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**30**		4.9	0.37	1	09/24/08	10/10/08	KWG0809892	
2-Methylnaphthalene	**29**		4.9	0.39	1	09/24/08	10/10/08	KWG0809892	
Acenaphthylene	**0.58**	J	4.9	0.24	1	09/24/08	10/10/08	KWG0809892	
Acenaphthene	**5.7**		4.9	0.23	1	09/24/08	10/10/08	KWG0809892	
Fluorene	**2.6**	J	4.9	0.50	1	09/24/08	10/10/08	KWG0809892	
Dibenzofuran	**5.1**		4.9	0.59	1	09/24/08	10/10/08	KWG0809892	
Phenanthrene	**5.5**		4.9	0.75	1	09/24/08	10/10/08	KWG0809892	
Anthracene	**0.81**	J	4.9	0.47	1	09/24/08	10/10/08	KWG0809892	
Fluoranthene	**3.4**	J	4.9	0.61	1	09/24/08	10/10/08	KWG0809892	
Pyrene	**3.2**	J	4.9	0.37	1	09/24/08	10/10/08	KWG0809892	
Benzo(b)fluoranthene	**2.6**	J	4.9	0.25	1	09/24/08	10/10/08	KWG0809892	
Benzo(k)fluoranthene	**0.76**	J	4.9	0.15	1	09/24/08	10/10/08	KWG0809892	
Benz(a)anthracene	**1.8**	J	4.9	0.48	1	09/24/08	10/10/08	KWG0809892	
Chrysene	**2.9**	J	4.9	0.25	1	09/24/08	10/10/08	KWG0809892	
Benzo(a)pyrene	**0.76**	J	4.9	0.14	1	09/24/08	10/10/08	KWG0809892	
Indeno(1,2,3-cd)pyrene	**2.0**	J	4.9	0.16	1	09/24/08	10/10/08	KWG0809892	
Dibenz(a,h)anthracene	ND	U	4.9	0.28	1	09/24/08	10/10/08	KWG0809892	
Benzo(g,h,i)perylene	**2.0**	J	4.9	0.64	1	09/24/08	10/10/08	KWG0809892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	59	10-128	10/10/08	Acceptable
Fluoranthene-d10	58	29-121	10/10/08	Acceptable
Terphenyl-d14	70	24-141	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Extracted:**	09/24/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/08/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	Batch QC	**Units:**	ug/Kg
Lab Code:	K0808785-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0809892

		Batch QCMS KWG0809892-1 **Matrix Spike**			Batch QCDMS KWG0809892-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	3800	5950E	499	435 #	4500E	499	146 #	10-129	28	40
2-Methylnaphthalene	2600	5230E	499	532 #	3970E	499	281 #	10-133	27	40
Acenaphthylene	50	513	499	93	531	499	96	37-100	3	40
Acenaphthene	450	1340	499	179 *	1410	499	193 *	28-111	5	40
Dibenzofuran	250	1090	499	169 *	1180	499	186 *	37-103	8	40
Fluorene	90	709	499	124 *	770	499	136 *	24-122	8	40
Pentachlorophenol	ND	875	499	175 *	864	499	173 *	70-130	1	40
Phenanthrene	110	676	499	113	692	499	116	23-124	2	40
Anthracene	170	582	499	82	585	499	82	30-114	0	40
Fluoranthene	85	591	499	101	620	499	107	21-145	5	40
Pyrene	59	566	499	102	581	499	105	10-155	3	40
Benz(a)anthracene	46	527	499	96	572	499	105	25-127	8	40
Chrysene	65	552	499	98	588	499	105	28-126	6	40
Benzo(b)fluoranthene	150	585	499	88	632	499	97	18-130	8	40
Benzo(k)fluoranthene	39	488	499	90	548	499	102	30-122	12	40
Benzo(a)pyrene	36	499	499	93	515	499	96	20-132	3	40
Indeno(1,2,3-cd)pyrene	100	652	499	110	683	499	116	20-132	5	40
Dibenz(a,h)anthracene	21	599	499	116	608	499	118	28-124	1	40
Benzo(g,h,i)perylene	76	501	499	85	540	499	93	24-124	8	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0808869
Project:	IP Longview Geo-probe		**Date Extracted:**	09/24/2008
Sample Matrix:	Soil		**Date Analyzed:**	10/08/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0809892

	Lab Control Sample KWG0809892-3 **Lab Control Spike**			Duplicate Lab Control Sample KWG0809892-4 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	442	500	88	438	500	88	35-104	1	40
2-Methylnaphthalene	503	500	101	494	500	99	34-110	2	40
Acenaphthylene	462	500	92	473	500	95	46-105	3	40
Acenaphthene	448	500	90	455	500	91	47-104	2	40
Dibenzofuran	490	500	98	494	500	99	50-106	1	40
Fluorene	474	500	95	486	500	97	52-106	2	40
Pentachlorophenol	232	1000	23	512	1000	51	10-150	75 *	40
Phenanthrene	489	500	98	485	500	97	48-108	1	40
Anthracene	465	500	93	487	500	97	51-110	5	40
Fluoranthene	514	500	103	523	500	105	54-121	2	40
Pyrene	515	500	103	510	500	102	53-110	1	40
Benz(a)anthracene	516	500	103	501	500	100	51-113	3	40
Chrysene	519	500	104	508	500	102	56-112	2	40
Benzo(b)fluoranthene	457	500	91	454	500	91	51-116	0	40
Benzo(k)fluoranthene	486	500	97	488	500	98	57-114	0	40
Benzo(a)pyrene	508	500	102	518	500	104	53-112	2	40
Indeno(1,2,3-cd)pyrene	563	500	113	556	500	111	42-124	1	40
Dibenz(a,h)anthracene	588	500	118	584	500	117	44-125	1	40
Benzo(g,h,i)perylene	520	500	104	514	500	103	50-115	1	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	PERCENT
Analysis Method:	NWTPH-Dx	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
TMW04-S-7.5-091208	K0808869-001	57	51
TMW05-S-6-091208	K0808869-002	63	68
TMW12-S-6.5-091208	K0808869-003	65	74
TMW11-S-7.5-091208	K0808869-004	70	72
TMW06-S-7-091208	K0808869-005	73	73
S-DUP-1-091208	K0808869-006	67	75
TMW06-S-7-091208DUP	KWG0809815-2	64	68
Method Blank	KWG0809815-4	69	76
Lab Control Sample	KWG0809815-3	75	76

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0809815-4	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	9.8	1.2	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	ND	U	25	2.9	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	09/27/08	Acceptable
n-Triacontane	76	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Diesel and Residual Range Organics

Sample Name:	TMW04-S-7.5-091208	**Units:**	mg/Kg
Lab Code:	K0808869-001	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**6.6**	J	12	1.5	1	09/23/08	09/30/08	KWG0809815	
Residual Range Organics (RRO)	**19**	J	30	3.5	1	09/23/08	09/30/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	57	50-150	09/30/08	Acceptable
n-Triacontane	51	50-150	09/30/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Diesel and Residual Range Organics

Sample Name:	TMW05-S-6-091208	**Units:**	mg/Kg
Lab Code:	K0808869-002	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**10**	J	14	1.7	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**44**	Z	34	3.9	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	63	50-150	09/27/08	Acceptable
n-Triacontane	68	50-150	09/27/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Diesel and Residual Range Organics

Sample Name:	TMW12-S-6.5-091208	**Units:**	mg/Kg
Lab Code:	K0808869-003	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**5.5**	J	17	2.0	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**76**	Z	41	4.8	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	65	50-150	09/27/08	Acceptable
n-Triacontane	74	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Diesel and Residual Range Organics

Sample Name:	TMW11-S-7.5-091208	**Units:**	mg/Kg
Lab Code:	K0808869-004	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**8.6**	J	12	1.4	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**42**	Z	29	3.4	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	09/27/08	Acceptable
n-Triacontane	72	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Diesel and Residual Range Organics

Sample Name:	TMW06-S-7-091208	**Units:**	mg/Kg
Lab Code:	K0808869-005	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**5.6**	J	14	1.6	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**36**	Z	34	3.9	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	50-150	09/27/08	Acceptable
n-Triacontane	73	50-150	09/27/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008

Diesel and Residual Range Organics

Sample Name:	S-DUP-1-091208	**Units:**	mg/Kg
Lab Code:	K0808869-006	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**4.9**	J	14	1.7	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**29**	J	34	3.9	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	67	50-150	09/27/08	Acceptable
n-Triacontane	75	50-150	09/27/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/27/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TMW06-S-7-091208	**Units:**	mg/Kg
Lab Code:	K0808869-005	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0809815

				TMW06-S-7-091208DUP KWG0809815-2 Duplicate Sample			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	14	1.6	5.6	18	12	107 #	40
Residual Range Organics (RRO)	34	3.9	36	57	46	46 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/27/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809815

	Lab Control Sample KWG0809815-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	198	267	74	63-120
Residual Range Organics (RRO)	104	133	78	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-prob
Sample Matrix: Soil

Service Request: K0808869

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
TMW04-S-7.5-091208	K0808869-001	09/12/2008	09/13/2008	09/18/2008	81.6	
TMW05-S-6-091208	K0808869-002	09/12/2008	09/13/2008	09/18/2008	73.6	
TMW12-S-6.5-091208	K0808869-003	09/12/2008	09/13/2008	09/18/2008	60.8	
TMW11-S-7.5-091208	K0808869-004	09/12/2008	09/13/2008	09/18/2008	86.0	
TMW06-S-7-091208	K0808869-005	09/12/2008	09/13/2008	09/18/2008	74.8	
S-DUP-1-091208	K0808869-006	09/12/2008	09/13/2008	09/18/2008	74.7	

Client:	URS Corporation	**Service Request:**	K0808869
Project:	IP Longview Geo-prob	**Date Collected:**	09/12/2008
Sample Matrix:	Soil	**Date Received:**	09/13/2008
		Date Analyzed:	09/18/2008

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
TMW04-S-7.5-091208	K0808869-001	81.6	82.6	82.1	1	

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Columbia Analytical Services INC.
An Employee - Owned Company

November 5, 2008

Analytical Report for Service Request No: K0808948

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on September 16, 2008. For your reference, these analyses have been assigned our service request number K0808948.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

FOR

Ed Wallace
Project Chemist

EW/lb

Page 1 of 1275

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Columbia Analytical Services INC.
An Employee - Owned Company

December 16, 2008

Analytical Report for Service Request No: K0808731
K0808869
K0808948

RECEIVED
DEC 19 2008
URS CORPORATION
SEATTLE

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview Geo-probe

Dear Paul:

Enclosed are the revised pages for the samples submitted to our laboratory on September 11, 13 & 16, 2008. For your reference, these analyses have been assigned our service request number K0808731, K0808869, K0808948.

The reference to the surrogate 2,4,6-Tribromophenol was removed when it did not apply to the sample. Pentachlorophenol replaced the phrase "PCP".

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request No.: K0808948
Date Received: 09/16/08

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Twelve soil samples were received for analysis at Columbia Analytical Services on 09/16/08. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by EPA Method 8015B

Surrogate Exceptions:
The control criteria were exceeded for o-Terphenyl and n-Triacontane in sample PB70-S-6-091508. Since the problem may indicate a potential bias in the analytical batch, the sample was re-extracted and reanalyzed 9 days past the recommended hold time. The surrogate met control criteria for the reanalysis. The reanalysis confirmed an error with the original results. Both sets of results are reported. The data is flagged to indicate the problem.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel and Residual Range Organics in samples PB68-S-8.5-091508 and Batch QC is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons and Pentachlorophenol by EPA Method 8270C

Lab Control Sample Exceptions:
The control criterion was exceeded for Pentachlorophenol in Laboratory Control Sample (LCS) KWG0810166. Since the problem may indicate a potential bias in the analytical batch, all associated field samples were re-extracted and reanalyzed 35 days past the recommended hold time. The LCS met control criteria for the reanalysis. Note the results for the field samples were comparable for both determinations, which indicates the problem with the initial analysis was restricted to the LCS. Therefore, the results from the original analysis are reported. The data is flagged to indicate the problem.

Elevated Method Reporting Limits:
Sample PB70-S-6-091508 required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

Approved by Emw **Date** 12/9/08

Matrix Spike Recovery Exceptions:
The EPA advisory criterion was exceeded for Pentachlorophenol in the matrix spike PB-S-5-091508. The laboratory does not have sufficient data points to establish control limits and is using EPA advisory limits until they can be calculated. The samples were re-extracted although no corrective action is necessary for exceeding these advisory limits.

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for 2,4,6-Tribromophenol, Pentachlorophenol, Indeno(1,2,3-cd)pyrene and Dibenz(a,h)anthracene in Initial Calibration (ICAL) ID CAL7814. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

No other anomalies associated with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

The primary evaluation criterion was exceeded for Indeno(1,2,3-cd)pyrene and Dibenz(a,h)anthracene in Initial Calibration (ICAL) ID CAL7814. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

No other anomalies associated with the analysis of these samples were observed.

Approved by EMW **Date** 12/9/08

Columbia Analytical Services INC.
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CHAIN OF CUSTODY

SR#: K0808948

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PAGE 1 OF 2 COC #

PROJECT NAME IP LONGVIEW GEOPROBE
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS URS 1501 4TH AVE
SUITE 1400
CITY/STATE/ZIP SEATTLE / WA / 98101
E-MAIL ADDRESS PAUL-KALINA@URSCORP.COM
PHONE # 206 438 2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020☐ AOX 1650☐ 506☐	PAH's (PCP)				REMARKS
S-DUP-2-091508	9/15/08	—		SOIL					X						X										
2 S-DUP-3-091508		—							X						X										
PB68-S-6-091508		1320							X						X										
4 PB71-S-6.5-091508		1250							X						X										
PB72-S-8.5-091508		1050							X						X						X				
6 PB68-S-8.5-091508		1345							X						X										
PB63-S-8-091508		1425							X						X										
8 PB73-S-5-091508		1120							X						X						X				
PB63-S-6.5-091508		1420							X						X										
PB73-S-6.5-091508	↓	1130							X						X						X				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

[redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature	Signature K. Bailey	Signature K. Bailey	Signature
Date/Time 9/15/08	Date/Time 9/15/08 6:25PM	Date/Time 9/15/08 6:25PM	Date/Time 9-16-8 1200
Printed Name IAN VERMEEREN	Printed Name K. Bailey	Printed Name K. Bailey	Printed Name JMARTIN
Firm URS	Firm CAS	Firm CAS	Firm CAS

RCOC #1 06/03

Columbia Analytical Services INC.
An Employee - Owned Company

CHAIN OF CUSTODY

SR#: K0808948

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 2 OF 2 COC #

PROJECT NAME IP LONGVIEW GEOPROBE
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS URS 1501 4TH AVE
SUITE 1400
CITY/STATE/ZIP SEATTLE, WA, 98101
E-MAIL ADDRESS PAUL_KALINA@URSCORP
PHONE # 206 438 2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☐ 8021☐ BTEX☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	PAH's PCP				REMARKS
PB62-S-5.5-091508	9/15/08	1300		Soil					X						X										
PB70-S-6-091508	↓	1220		↓					X						X						X				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

[redacted]

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 9/15/08	Signature K. Bailey	Date/Time 9/15/08 6:25PM	Signature K. Bailey	Date/Time 9/15/08 6:25PM	Signature	Date/Time 9-16-8 1200
Printed Name JAN VERMEERAN	Firm URS	Printed Name K. Bailey	Firm CAS	Printed Name K. Bailey	Firm CAS	Printed Name W MARTIN	Firm CAS

RCOC #1 06/03

PC EV

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

Client / Project: URS Corp Service Request K08 08948 12/9/08

Received: 9/15/08 Opened: 9/16/08 By: KG

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* *Courier* [✓ *Hand Delivered*]
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA [✓ Y] N If yes, how many and where? one, front

   If present, were custody seals intact? [✓ Y] N If present, were they signed and dated? Y [✓ N]
4. Is shipper's air-bill filed? If not, record air-bill number: ______ [✓ NA] Y N
5. **Temperature of cooler(s) upon receipt (°C):**

   Temperature Blank (°C):
6. If applicable, list Chain of Custody Numbers:
7. Packing material used. *Inserts* [✓ *Baggies*] *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other* ______
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** [✓ NA] Y N
16. Was Cl2/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

**Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).*

Additional Notes, Discrepancies, & Resolutions: ______

Page 1 of: 1 2

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	PERCENT
Analysis Method:	8270C SIM	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4
PB72-S-8.5-091508	K0808948-005	60	37	62	63
PB73-S-5-091508	K0808948-008	64	62	64	72
PB73-S-6.5-091508	K0808948-010	61	58	60	69
PB70-S-6-091508	K0808948-012	62	53	63	72
Method Blank	KWG0810166-5	67	60	67	83
PB73-S-5-091508MS	KWG0810166-1	64	60	66	71
PB73-S-5-091508DMS	KWG0810166-2	66	58	72	76
Lab Control Sample	KWG0810166-3	64	55	67	74
Duplicate Lab Control Sample	KWG0810166-4	69	52	72	77

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-128
Sur2 = 2,4,6-Tribromophenol	12-152
Sur3 = Fluoranthene-d10	29-121
Sur4 = Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	PERCENT
Analysis Method:	8270C SIM	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
S-Dup-2-091508	K0808948-001	56	58	77
S-Dup-3-091508	K0808948-002	60	62	73
PB68-S-6-091508	K0808948-003	48	67	54
PB71-S-6.5-091508	K0808948-004	65	65	81
PB68-S-8.5-091508	K0808948-006	62	62	76
PB63-S-8-091508	K0808948-007	63	67	75
PB63-S-6.5-091508	K0808948-009	62	62	73
PB62-S-5.5-091508	K0808948-011	64	65	80
Method Blank	KWG0810165-5	52	59	64
S-Dup-2-091508MS	KWG0810165-1	73	76	78
S-Dup-2-091508DMS	KWG0810165-2	65	68	69
Lab Control Sample	KWG0810165-3	71	69	76
Duplicate Lab Control Sample	KWG0810165-4	57	54	59

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-128
Sur2 = Fluoranthene-d10	29-121
Sur3 = Terphenyl-d14	24-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0810166-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	2.6	0.37	1	09/29/08	10/15/08	KWG0810166	
2-Methylnaphthalene	ND	U	2.6	0.39	1	09/29/08	10/15/08	KWG0810166	
Acenaphthylene	ND	U	2.6	0.24	1	09/29/08	10/15/08	KWG0810166	
Acenaphthene	ND	U	2.6	0.23	1	09/29/08	10/15/08	KWG0810166	
Dibenzofuran	ND	U	2.6	0.59	1	09/29/08	10/15/08	KWG0810166	
Fluorene	ND	U	2.6	0.50	1	09/29/08	10/15/08	KWG0810166	
Pentachlorophenol	ND	U	110	2.9	1	09/29/08	10/15/08	KWG0810166	*
Phenanthrene	ND	U	2.6	0.75	1	09/29/08	10/15/08	KWG0810166	
Anthracene	ND	U	2.6	0.47	1	09/29/08	10/15/08	KWG0810166	
Fluoranthene	**0.70**	J	2.6	0.61	1	09/29/08	10/15/08	KWG0810166	
Pyrene	**0.70**	J	2.6	0.37	1	09/29/08	10/15/08	KWG0810166	
Benz(a)anthracene	**1.5**	J	2.6	0.48	1	09/29/08	10/15/08	KWG0810166	
Chrysene	**1.8**	J	2.6	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(b)fluoranthene	**1.6**	J	2.6	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(k)fluoranthene	**2.0**	J	2.6	0.15	1	09/29/08	10/15/08	KWG0810166	
Benzo(a)pyrene	**0.95**	J	2.6	0.14	1	09/29/08	10/15/08	KWG0810166	
Indeno(1,2,3-cd)pyrene	**2.4**	J	2.6	0.16	1	09/29/08	10/15/08	KWG0810166	
Dibenz(a,h)anthracene	**1.9**	J	2.6	0.28	1	09/29/08	10/15/08	KWG0810166	
Benzo(g,h,i)perylene	**2.0**	J	2.6	0.64	1	09/29/08	10/15/08	KWG0810166	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	10-128	10/15/08	Acceptable
2,4,6-Tribromophenol	60	12-152	10/15/08	Acceptable
Fluoranthene-d10	67	29-121	10/15/08	Acceptable
Terphenyl-d14	83	24-141	10/15/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0810165-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	2.5	0.37	1	09/29/08	10/07/08	KWG0810165	
2-Methylnaphthalene	ND	U	2.5	0.39	1	09/29/08	10/07/08	KWG0810165	
Acenaphthylene	ND	U	2.5	0.24	1	09/29/08	10/07/08	KWG0810165	
Acenaphthene	ND	U	2.5	0.23	1	09/29/08	10/07/08	KWG0810165	
Fluorene	ND	U	2.5	0.50	1	09/29/08	10/07/08	KWG0810165	
Dibenzofuran	ND	U	2.5	0.59	1	09/29/08	10/07/08	KWG0810165	
Phenanthrene	ND	U	2.5	0.75	1	09/29/08	10/07/08	KWG0810165	
Anthracene	ND	U	2.5	0.47	1	09/29/08	10/07/08	KWG0810165	
Fluoranthene	ND	U	2.5	0.61	1	09/29/08	10/07/08	KWG0810165	
Pyrene	ND	U	2.5	0.37	1	09/29/08	10/07/08	KWG0810165	
Benzo(b)fluoranthene	ND	U	2.5	0.25	1	09/29/08	10/07/08	KWG0810165	
Benzo(k)fluoranthene	ND	U	2.5	0.15	1	09/29/08	10/07/08	KWG0810165	
Benz(a)anthracene	ND	U	2.5	0.48	1	09/29/08	10/07/08	KWG0810165	
Chrysene	ND	U	2.5	0.25	1	09/29/08	10/07/08	KWG0810165	
Benzo(a)pyrene	ND	U	2.5	0.14	1	09/29/08	10/07/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	ND	U	2.5	0.16	1	09/29/08	10/07/08	KWG0810165	
Dibenz(a,h)anthracene	ND	U	2.5	0.28	1	09/29/08	10/07/08	KWG0810165	
Benzo(g,h,i)perylene	ND	U	2.5	0.64	1	09/29/08	10/07/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	52	10-128	10/07/08	Acceptable
Fluoranthene-d10	59	29-121	10/07/08	Acceptable
Terphenyl-d14	64	24-141	10/07/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	S-Dup-2-091508	**Units:**	ug/Kg
Lab Code:	K0808948-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**67**		5.0	0.37	1	09/29/08	10/07/08	KWG0810165	
2-Methylnaphthalene	**3.4**	J	5.0	0.39	1	09/29/08	10/07/08	KWG0810165	
Acenaphthylene	**0.97**	J	5.0	0.24	1	09/29/08	10/07/08	KWG0810165	
Acenaphthene	**35**		5.0	0.23	1	09/29/08	10/07/08	KWG0810165	
Fluorene	**26**		5.0	0.50	1	09/29/08	10/07/08	KWG0810165	
Dibenzofuran	**33**		5.0	0.59	1	09/29/08	10/07/08	KWG0810165	
Phenanthrene	**48**		5.0	0.75	1	09/29/08	10/07/08	KWG0810165	
Anthracene	**14**		5.0	0.47	1	09/29/08	10/07/08	KWG0810165	
Fluoranthene	**76**		5.0	0.61	1	09/29/08	10/07/08	KWG0810165	
Pyrene	**55**		5.0	0.37	1	09/29/08	10/07/08	KWG0810165	
Benzo(b)fluoranthene	**7.2**		5.0	0.25	1	09/29/08	10/07/08	KWG0810165	
Benzo(k)fluoranthene	**2.5**	J	5.0	0.15	1	09/29/08	10/07/08	KWG0810165	
Benz(a)anthracene	**3.8**	J	5.0	0.48	1	09/29/08	10/07/08	KWG0810165	
Chrysene	**1.9**	J	5.0	0.25	1	09/29/08	10/07/08	KWG0810165	
Benzo(a)pyrene	**6.8**		5.0	0.14	1	09/29/08	10/07/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**8.2**		5.0	0.16	1	09/29/08	10/07/08	KWG0810165	
Dibenz(a,h)anthracene	**1.9**	J	5.0	0.28	1	09/29/08	10/07/08	KWG0810165	
Benzo(g,h,i)perylene	**8.5**		5.0	0.64	1	09/29/08	10/07/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	56	10-128	10/07/08	Acceptable
Fluoranthene-d10	58	29-121	10/07/08	Acceptable
Terphenyl-d14	77	24-141	10/07/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	S-Dup-3-091508	**Units:**	ug/Kg
Lab Code:	K0808948-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1300**		5.0	0.37	1	09/29/08	10/07/08	KWG0810165	
2-Methylnaphthalene	**3400**	D	25	2.0	5	09/29/08	10/10/08	KWG0810165	
Acenaphthylene	**3.9**	J	5.0	0.24	1	09/29/08	10/07/08	KWG0810165	
Acenaphthene	**1000**		5.0	0.23	1	09/29/08	10/07/08	KWG0810165	
Fluorene	**230**		5.0	0.50	1	09/29/08	10/07/08	KWG0810165	
Dibenzofuran	**220**		5.0	0.59	1	09/29/08	10/07/08	KWG0810165	
Phenanthrene	**77**		5.0	0.75	1	09/29/08	10/07/08	KWG0810165	
Anthracene	**9.8**		5.0	0.47	1	09/29/08	10/07/08	KWG0810165	
Fluoranthene	**6.6**		5.0	0.61	1	09/29/08	10/07/08	KWG0810165	
Pyrene	**5.5**		5.0	0.37	1	09/29/08	10/07/08	KWG0810165	
Benzo(b)fluoranthene	**1.3**	J	5.0	0.25	1	09/29/08	10/07/08	KWG0810165	
Benzo(k)fluoranthene	**0.37**	J	5.0	0.15	1	09/29/08	10/07/08	KWG0810165	
Benz(a)anthracene	**1.5**	J	5.0	0.48	1	09/29/08	10/07/08	KWG0810165	
Chrysene	**2.3**	J	5.0	0.25	1	09/29/08	10/07/08	KWG0810165	
Benzo(a)pyrene	**0.72**	J	5.0	0.14	1	09/29/08	10/07/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**1.0**	J	5.0	0.16	1	09/29/08	10/07/08	KWG0810165	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/29/08	10/07/08	KWG0810165	
Benzo(g,h,i)perylene	**1.2**	J	5.0	0.64	1	09/29/08	10/07/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	10-128	10/07/08	Acceptable
Fluoranthene-d10	62	29-121	10/07/08	Acceptable
Terphenyl-d14	73	24-141	10/07/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB68-S-6-091508	**Units:**	ug/Kg
Lab Code:	K0808948-003	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**130**		5.0	0.37	1	09/29/08	10/08/08	KWG0810165	
2-Methylnaphthalene	**5500**	D	50	3.9	10	09/29/08	10/10/08	KWG0810165	
Acenaphthylene	**750**		5.0	0.24	1	09/29/08	10/08/08	KWG0810165	
Acenaphthene	**38000**	D	1000	46	200	09/29/08	10/11/08	KWG0810165	
Fluorene	**19000**	D	50	5.0	10	09/29/08	10/10/08	KWG0810165	
Dibenzofuran	**16000**	D	50	5.9	10	09/29/08	10/10/08	KWG0810165	
Phenanthrene	**27000**	D	1000	150	200	09/29/08	10/11/08	KWG0810165	
Anthracene	**3500**	D	50	4.7	10	09/29/08	10/10/08	KWG0810165	
Fluoranthene	**19000**	D	1000	130	200	09/29/08	10/11/08	KWG0810165	
Pyrene	**18000**	D	50	3.7	10	09/29/08	10/10/08	KWG0810165	
Benzo(b)fluoranthene	**1300**		5.0	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(k)fluoranthene	**430**		5.0	0.15	1	09/29/08	10/08/08	KWG0810165	
Benz(a)anthracene	**2400**	D	50	4.8	10	09/29/08	10/10/08	KWG0810165	
Chrysene	**2700**	D	50	2.5	10	09/29/08	10/10/08	KWG0810165	
Benzo(a)pyrene	**640**		5.0	0.14	1	09/29/08	10/08/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**310**		5.0	0.16	1	09/29/08	10/08/08	KWG0810165	
Dibenz(a,h)anthracene	**79**		5.0	0.28	1	09/29/08	10/08/08	KWG0810165	
Benzo(g,h,i)perylene	**230**		5.0	0.64	1	09/29/08	10/08/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	48	10-128	10/08/08	Acceptable
Fluoranthene-d10	67	29-121	10/08/08	Acceptable
Terphenyl-d14	54	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB71-S-6.5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-004	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**330**		5.0	0.37	1	09/29/08	10/08/08	KWG0810165	
2-Methylnaphthalene	**42**		5.0	0.39	1	09/29/08	10/08/08	KWG0810165	
Acenaphthylene	**2.6**	J	5.0	0.24	1	09/29/08	10/08/08	KWG0810165	
Acenaphthene	**550**		5.0	0.23	1	09/29/08	10/08/08	KWG0810165	
Fluorene	**49**		5.0	0.50	1	09/29/08	10/08/08	KWG0810165	
Dibenzofuran	**21**		5.0	0.59	1	09/29/08	10/08/08	KWG0810165	
Phenanthrene	**12**		5.0	0.75	1	09/29/08	10/08/08	KWG0810165	
Anthracene	**3.0**	J	5.0	0.47	1	09/29/08	10/08/08	KWG0810165	
Fluoranthene	**4.9**	J	5.0	0.61	1	09/29/08	10/08/08	KWG0810165	
Pyrene	**5.1**		5.0	0.37	1	09/29/08	10/08/08	KWG0810165	
Benzo(b)fluoranthene	**1.2**	J	5.0	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/29/08	10/08/08	KWG0810165	
Benz(a)anthracene	**1.5**	J	5.0	0.48	1	09/29/08	10/08/08	KWG0810165	
Chrysene	**1.5**	J	5.0	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(a)pyrene	**0.67**	J	5.0	0.14	1	09/29/08	10/08/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**0.93**	J	5.0	0.16	1	09/29/08	10/08/08	KWG0810165	
Dibenz(a,h)anthracene	ND	U	5.0	0.28	1	09/29/08	10/08/08	KWG0810165	
Benzo(g,h,i)perylene	**1.0**	J	5.0	0.64	1	09/29/08	10/08/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	65	10-128	10/08/08	Acceptable
Fluoranthene-d10	65	29-121	10/08/08	Acceptable
Terphenyl-d14	81	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB72-S-8.5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-005	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**380**		5.0	0.37	1	09/29/08	10/15/08	KWG0810166	
2-Methylnaphthalene	**350**		5.0	0.39	1	09/29/08	10/15/08	KWG0810166	
Acenaphthylene	**0.49**	J	5.0	0.24	1	09/29/08	10/15/08	KWG0810166	
Acenaphthene	**32**		5.0	0.23	1	09/29/08	10/15/08	KWG0810166	
Dibenzofuran	**2.5**	J	5.0	0.59	1	09/29/08	10/15/08	KWG0810166	
Fluorene	**4.9**	J	5.0	0.50	1	09/29/08	10/15/08	KWG0810166	
Pentachlorophenol	ND	U	200	2.9	1	09/29/08	10/15/08	KWG0810166	*
Phenanthrene	**22**		5.0	0.75	1	09/29/08	10/15/08	KWG0810166	
Anthracene	ND	U	5.0	0.47	1	09/29/08	10/15/08	KWG0810166	
Fluoranthene	**6.0**		5.0	0.61	1	09/29/08	10/15/08	KWG0810166	
Pyrene	**7.9**		5.0	0.37	1	09/29/08	10/15/08	KWG0810166	
Benz(a)anthracene	**1.7**	J	5.0	0.48	1	09/29/08	10/15/08	KWG0810166	
Chrysene	**5.9**		5.0	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(b)fluoranthene	**4.5**	J	5.0	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/29/08	10/15/08	KWG0810166	
Benzo(a)pyrene	**2.9**	J	5.0	0.14	1	09/29/08	10/15/08	KWG0810166	
Indeno(1,2,3-cd)pyrene	**2.4**	J	5.0	0.16	1	09/29/08	10/15/08	KWG0810166	
Dibenz(a,h)anthracene	**1.6**	J	5.0	0.28	1	09/29/08	10/15/08	KWG0810166	
Benzo(g,h,i)perylene	**8.1**		5.0	0.64	1	09/29/08	10/15/08	KWG0810166	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	10-128	10/15/08	Acceptable
2,4,6-Tribromophenol	37	12-152	10/15/08	Acceptable
Fluoranthene-d10	62	29-121	10/15/08	Acceptable
Terphenyl-d14	63	24-141	10/15/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB68-S-8.5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-006	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**720**		4.9	0.37	1	09/29/08	10/08/08	KWG0810165	
2-Methylnaphthalene	**490**		4.9	0.39	1	09/29/08	10/08/08	KWG0810165	
Acenaphthylene	**2.7**	J	4.9	0.24	1	09/29/08	10/08/08	KWG0810165	
Acenaphthene	**580**		4.9	0.23	1	09/29/08	10/08/08	KWG0810165	
Fluorene	**140**		4.9	0.50	1	09/29/08	10/08/08	KWG0810165	
Dibenzofuran	**310**		4.9	0.59	1	09/29/08	10/08/08	KWG0810165	
Phenanthrene	**45**		4.9	0.75	1	09/29/08	10/08/08	KWG0810165	
Anthracene	**4.6**	J	4.9	0.47	1	09/29/08	10/08/08	KWG0810165	
Fluoranthene	**11**		4.9	0.61	1	09/29/08	10/08/08	KWG0810165	
Pyrene	**8.3**		4.9	0.37	1	09/29/08	10/08/08	KWG0810165	
Benzo(b)fluoranthene	**5.1**		4.9	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(k)fluoranthene	**4.7**	J	4.9	0.15	1	09/29/08	10/08/08	KWG0810165	
Benz(a)anthracene	**5.1**		4.9	0.48	1	09/29/08	10/08/08	KWG0810165	
Chrysene	**5.9**		4.9	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(a)pyrene	**3.6**	J	4.9	0.14	1	09/29/08	10/08/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**5.9**		4.9	0.16	1	09/29/08	10/08/08	KWG0810165	
Dibenz(a,h)anthracene	**5.6**		4.9	0.28	1	09/29/08	10/08/08	KWG0810165	
Benzo(g,h,i)perylene	**6.1**		4.9	0.64	1	09/29/08	10/08/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	10-128	10/08/08	Acceptable
Fluoranthene-d10	62	29-121	10/08/08	Acceptable
Terphenyl-d14	76	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB63-S-8-091508	**Units:**	ug/Kg
Lab Code:	K0808948-007	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**930**		5.0	0.37	1	09/29/08	10/08/08	KWG0810165	
2-Methylnaphthalene	**220**		5.0	0.39	1	09/29/08	10/08/08	KWG0810165	
Acenaphthylene	**0.57**	J	5.0	0.24	1	09/29/08	10/08/08	KWG0810165	
Acenaphthene	**130**		5.0	0.23	1	09/29/08	10/08/08	KWG0810165	
Fluorene	**2.7**	J	5.0	0.50	1	09/29/08	10/08/08	KWG0810165	
Dibenzofuran	**2.1**	J	5.0	0.59	1	09/29/08	10/08/08	KWG0810165	
Phenanthrene	**4.6**	J	5.0	0.75	1	09/29/08	10/08/08	KWG0810165	
Anthracene	ND	U	5.0	0.47	1	09/29/08	10/08/08	KWG0810165	
Fluoranthene	**3.4**	J	5.0	0.61	1	09/29/08	10/08/08	KWG0810165	
Pyrene	**3.3**	J	5.0	0.37	1	09/29/08	10/08/08	KWG0810165	
Benzo(b)fluoranthene	**1.3**	J	5.0	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(k)fluoranthene	**0.73**	J	5.0	0.15	1	09/29/08	10/08/08	KWG0810165	
Benz(a)anthracene	**1.6**	J	5.0	0.48	1	09/29/08	10/08/08	KWG0810165	
Chrysene	**1.9**	J	5.0	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(a)pyrene	**0.70**	J	5.0	0.14	1	09/29/08	10/08/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**0.93**	J	5.0	0.16	1	09/29/08	10/08/08	KWG0810165	
Dibenz(a,h)anthracene	**0.52**	J	5.0	0.28	1	09/29/08	10/08/08	KWG0810165	
Benzo(g,h,i)perylene	**1.1**	J	5.0	0.64	1	09/29/08	10/08/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	10-128	10/08/08	Acceptable
Fluoranthene-d10	67	29-121	10/08/08	Acceptable
Terphenyl-d14	75	24-141	10/08/08	Acceptable

Comments: ____________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB73-S-5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-008	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**84**		5.0	0.37	1	09/29/08	10/15/08	KWG0810166	
2-Methylnaphthalene	**4.2**	J	5.0	0.39	1	09/29/08	10/15/08	KWG0810166	
Acenaphthylene	**1.1**	J	5.0	0.24	1	09/29/08	10/15/08	KWG0810166	
Acenaphthene	**35**		5.0	0.23	1	09/29/08	10/15/08	KWG0810166	
Dibenzofuran	**36**		5.0	0.59	1	09/29/08	10/15/08	KWG0810166	
Fluorene	**29**		5.0	0.50	1	09/29/08	10/15/08	KWG0810166	
Pentachlorophenol	ND	U	200	2.9	1	09/29/08	10/15/08	KWG0810166	*
Phenanthrene	**55**		5.0	0.75	1	09/29/08	10/15/08	KWG0810166	
Anthracene	**16**		5.0	0.47	1	09/29/08	10/15/08	KWG0810166	
Fluoranthene	**85**		5.0	0.61	1	09/29/08	10/15/08	KWG0810166	
Pyrene	**56**		5.0	0.37	1	09/29/08	10/15/08	KWG0810166	
Benz(a)anthracene	**4.4**	J	5.0	0.48	1	09/29/08	10/15/08	KWG0810166	
Chrysene	**5.4**		5.0	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(b)fluoranthene	**7.5**		5.0	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(k)fluoranthene	**2.6**	J	5.0	0.15	1	09/29/08	10/15/08	KWG0810166	
Benzo(a)pyrene	**6.9**		5.0	0.14	1	09/29/08	10/15/08	KWG0810166	
Indeno(1,2,3-cd)pyrene	**7.9**		5.0	0.16	1	09/29/08	10/15/08	KWG0810166	
Dibenz(a,h)anthracene	**2.0**	J	5.0	0.28	1	09/29/08	10/15/08	KWG0810166	
Benzo(g,h,i)perylene	**7.6**		5.0	0.64	1	09/29/08	10/15/08	KWG0810166	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	10-128	10/15/08	Acceptable
2,4,6-Tribromophenol	62	12-152	10/15/08	Acceptable
Fluoranthene-d10	64	29-121	10/15/08	Acceptable
Terphenyl-d14	72	24-141	10/15/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB63-S-6.5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-009	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1800**		4.9	0.37	1	09/29/08	10/08/08	KWG0810165	
2-Methylnaphthalene	**560**		4.9	0.39	1	09/29/08	10/08/08	KWG0810165	
Acenaphthylene	**19**		4.9	0.24	1	09/29/08	10/08/08	KWG0810165	
Acenaphthene	**1800**	D	9.7	0.46	2	09/29/08	10/11/08	KWG0810165	
Fluorene	**820**		4.9	0.50	1	09/29/08	10/08/08	KWG0810165	
Dibenzofuran	**1400**		4.9	0.59	1	09/29/08	10/08/08	KWG0810165	
Phenanthrene	**450**		4.9	0.75	1	09/29/08	10/08/08	KWG0810165	
Anthracene	**30**		4.9	0.47	1	09/29/08	10/08/08	KWG0810165	
Fluoranthene	**390**		4.9	0.61	1	09/29/08	10/08/08	KWG0810165	
Pyrene	**280**		4.9	0.37	1	09/29/08	10/08/08	KWG0810165	
Benzo(b)fluoranthene	**62**		4.9	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(k)fluoranthene	**24**		4.9	0.15	1	09/29/08	10/08/08	KWG0810165	
Benz(a)anthracene	**88**		4.9	0.48	1	09/29/08	10/08/08	KWG0810165	
Chrysene	**92**		4.9	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(a)pyrene	**49**		4.9	0.14	1	09/29/08	10/08/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**27**		4.9	0.16	1	09/29/08	10/08/08	KWG0810165	
Dibenz(a,h)anthracene	**6.3**		4.9	0.28	1	09/29/08	10/08/08	KWG0810165	
Benzo(g,h,i)perylene	**22**		4.9	0.64	1	09/29/08	10/08/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	10-128	10/08/08	Acceptable
Fluoranthene-d10	62	29-121	10/08/08	Acceptable
Terphenyl-d14	73	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB73-S-6.5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-010	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**110**		4.9	0.37	1	09/29/08	10/15/08	KWG0810166	
2-Methylnaphthalene	**44**		4.9	0.39	1	09/29/08	10/15/08	KWG0810166	
Acenaphthylene	**1.6**	J	4.9	0.24	1	09/29/08	10/15/08	KWG0810166	
Acenaphthene	**440**		4.9	0.23	1	09/29/08	10/15/08	KWG0810166	
Dibenzofuran	**2.5**	J	4.9	0.59	1	09/29/08	10/15/08	KWG0810166	
Fluorene	**92**		4.9	0.50	1	09/29/08	10/15/08	KWG0810166	
Pentachlorophenol	ND	U	200	2.9	1	09/29/08	10/15/08	KWG0810166	*
Phenanthrene	**3.3**	J	4.9	0.75	1	09/29/08	10/15/08	KWG0810166	
Anthracene	**1.3**	J	4.9	0.47	1	09/29/08	10/15/08	KWG0810166	
Fluoranthene	**7.5**		4.9	0.61	1	09/29/08	10/15/08	KWG0810166	
Pyrene	**1.9**	J	4.9	0.37	1	09/29/08	10/15/08	KWG0810166	
Benz(a)anthracene	**1.6**	J	4.9	0.48	1	09/29/08	10/15/08	KWG0810166	
Chrysene	**2.2**	J	4.9	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(b)fluoranthene	**1.9**	J	4.9	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(k)fluoranthene	**1.7**	J	4.9	0.15	1	09/29/08	10/15/08	KWG0810166	
Benzo(a)pyrene	**0.87**	J	4.9	0.14	1	09/29/08	10/15/08	KWG0810166	
Indeno(1,2,3-cd)pyrene	**2.7**	J	4.9	0.16	1	09/29/08	10/15/08	KWG0810166	
Dibenz(a,h)anthracene	**1.8**	J	4.9	0.28	1	09/29/08	10/15/08	KWG0810166	
Benzo(g,h,i)perylene	**2.2**	J	4.9	0.64	1	09/29/08	10/15/08	KWG0810166	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	10-128	10/15/08	Acceptable
2,4,6-Tribromophenol	58	12-152	10/15/08	Acceptable
Fluoranthene-d10	60	29-121	10/15/08	Acceptable
Terphenyl-d14	69	24-141	10/15/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB62-S-5.5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-011	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**170**		4.8	0.37	1	09/29/08	10/08/08	KWG0810165	
2-Methylnaphthalene	**320**		4.8	0.39	1	09/29/08	10/08/08	KWG0810165	
Acenaphthylene	**6.6**		4.8	0.24	1	09/29/08	10/08/08	KWG0810165	
Acenaphthene	**1600**		4.8	0.23	1	09/29/08	10/08/08	KWG0810165	
Fluorene	**260**		4.8	0.50	1	09/29/08	10/08/08	KWG0810165	
Dibenzofuran	**290**		4.8	0.59	1	09/29/08	10/08/08	KWG0810165	
Phenanthrene	**14**		4.8	0.75	1	09/29/08	10/08/08	KWG0810165	
Anthracene	**9.6**		4.8	0.47	1	09/29/08	10/08/08	KWG0810165	
Fluoranthene	**13**		4.8	0.61	1	09/29/08	10/08/08	KWG0810165	
Pyrene	**17**		4.8	0.37	1	09/29/08	10/08/08	KWG0810165	
Benzo(b)fluoranthene	**14**		4.8	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(k)fluoranthene	**9.4**		4.8	0.15	1	09/29/08	10/08/08	KWG0810165	
Benz(a)anthracene	**13**		4.8	0.48	1	09/29/08	10/08/08	KWG0810165	
Chrysene	**17**		4.8	0.25	1	09/29/08	10/08/08	KWG0810165	
Benzo(a)pyrene	**15**		4.8	0.14	1	09/29/08	10/08/08	KWG0810165	
Indeno(1,2,3-cd)pyrene	**13**		4.8	0.16	1	09/29/08	10/08/08	KWG0810165	
Dibenz(a,h)anthracene	**8.3**		4.8	0.28	1	09/29/08	10/08/08	KWG0810165	
Benzo(g,h,i)perylene	**14**		4.8	0.64	1	09/29/08	10/08/08	KWG0810165	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	10-128	10/08/08	Acceptable
Fluoranthene-d10	65	29-121	10/08/08	Acceptable
Terphenyl-d14	80	24-141	10/08/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	PB70-S-6-091508	**Units:**	ug/Kg
Lab Code:	K0808948-012	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1900**		5.0	0.37	1	09/29/08	10/15/08	KWG0810166	
2-Methylnaphthalene	**3900**	D	25	2.0	5	09/29/08	10/16/08	KWG0810166	
Acenaphthylene	**6.9**		5.0	0.24	1	09/29/08	10/15/08	KWG0810166	
Acenaphthene	**1300**		5.0	0.23	1	09/29/08	10/15/08	KWG0810166	
Dibenzofuran	**270**		5.0	0.59	1	09/29/08	10/15/08	KWG0810166	
Fluorene	**290**		5.0	0.50	1	09/29/08	10/15/08	KWG0810166	
Pentachlorophenol	ND	U	200	2.9	1	09/29/08	10/15/08	KWG0810166	*
Phenanthrene	**93**		5.0	0.75	1	09/29/08	10/15/08	KWG0810166	
Anthracene	**9.6**		5.0	0.47	1	09/29/08	10/15/08	KWG0810166	
Fluoranthene	**9.1**		5.0	0.61	1	09/29/08	10/15/08	KWG0810166	
Pyrene	**7.2**		5.0	0.37	1	09/29/08	10/15/08	KWG0810166	
Benz(a)anthracene	**1.7**	J	5.0	0.48	1	09/29/08	10/15/08	KWG0810166	
Chrysene	**3.0**	J	5.0	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(b)fluoranthene	**2.0**	J	5.0	0.25	1	09/29/08	10/15/08	KWG0810166	
Benzo(k)fluoranthene	ND	U	5.0	0.15	1	09/29/08	10/15/08	KWG0810166	
Benzo(a)pyrene	**1.3**	J	5.0	0.14	1	09/29/08	10/15/08	KWG0810166	
Indeno(1,2,3-cd)pyrene	**1.5**	J	5.0	0.16	1	09/29/08	10/15/08	KWG0810166	
Dibenz(a,h)anthracene	**0.44**	J	5.0	0.28	1	09/29/08	10/15/08	KWG0810166	
Benzo(g,h,i)perylene	**1.8**	J	5.0	0.64	1	09/29/08	10/15/08	KWG0810166	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	10-128	10/15/08	Acceptable
2,4,6-Tribromophenol	53	12-152	10/15/08	Acceptable
Fluoranthene-d10	63	29-121	10/15/08	Acceptable
Terphenyl-d14	72	24-141	10/15/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Extracted:**	09/29/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/15/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	PB73-S-5-091508	**Units:**	ug/Kg
Lab Code:	K0808948-008	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0810166

		PB73-S-5-091508MS KWG0810166-1 **Matrix Spike**			PB73-S-5-091508DMS KWG0810166-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	84	451	495	74	678	497	119	10-129	40	40
2-Methylnaphthalene	4.2	373	495	74	385	497	77	10-133	3	40
Acenaphthylene	1.1	341	495	69	348	497	70	37-100	2	40
Acenaphthene	35	378	495	69	429	497	79	28-111	13	40
Dibenzofuran	36	403	495	74	448	497	83	37-103	11	40
Fluorene	29	385	495	72	436	497	82	24-122	12	40
Pentachlorophenol	ND	395	991	40 *	366	994	37 *	70-130	8	40
Phenanthrene	55	423	495	74	501	497	90	23-124	17	40
Anthracene	16	374	495	72	419	497	81	30-114	11	40
Fluoranthene	85	468	495	77	536	497	91	21-145	13	40
Pyrene	56	432	495	76	488	497	87	10-155	12	40
Benz(a)anthracene	4.4	368	495	73	399	497	79	25-127	8	40
Chrysene	5.4	368	495	73	392	497	78	28-126	6	40
Benzo(b)fluoranthene	7.5	335	495	66	370	497	73	18-130	10	40
Benzo(k)fluoranthene	2.6	361	495	72	373	497	75	30-122	3	40
Benzo(a)pyrene	6.9	381	495	76	410	497	81	20-132	7	40
Indeno(1,2,3-cd)pyrene	7.9	414	495	82	442	497	87	20-132	7	40
Dibenz(a,h)anthracene	2.0	442	495	89	473	497	95	28-124	7	40
Benzo(g,h,i)perylene	7.6	418	495	83	451	497	89	24-124	8	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Extracted:**	09/29/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/07/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	S-Dup-2-091508	**Units:**	ug/Kg
Lab Code:	K0808948-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0810165

		S-Dup-2-091508MS KWG0810165-1 **Matrix Spike**			S-Dup-2-091508DMS KWG0810165-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	67	497	493	87	421	492	72	10-129	17	40
2-Methylnaphthalene	3.4	336	493	67	369	492	74	10-133	10	40
Acenaphthylene	0.97	304	493	61	342	492	69	37-100	12	40
Acenaphthene	35	365	493	67	432	492	81	28-111	17	40
Fluorene	26	367	493	69	433	492	83	24-122	17	40
Dibenzofuran	33	398	493	74	456	492	86	37-103	13	40
Phenanthrene	48	373	493	66	469	492	86	23-124	23	40
Anthracene	14	343	493	67	374	492	73	30-114	9	40
Fluoranthene	76	427	493	71	487	492	83	21-145	13	40
Pyrene	55	353	493	60	409	492	72	10-155	15	40
Benzo(b)fluoranthene	7.2	315	493	62	350	492	70	18-130	11	40
Benzo(k)fluoranthene	2.5	344	493	69	377	492	76	30-122	9	40
Benz(a)anthracene	3.8	307	493	61	348	492	70	25-127	13	40
Chrysene	1.9	328	493	66	364	492	74	28-126	11	40
Benzo(a)pyrene	6.8	343	493	68	381	492	76	20-132	11	40
Indeno(1,2,3-cd)pyrene	8.2	354	493	70	397	492	79	20-132	12	40
Dibenz(a,h)anthracene	1.9	367	493	74	401	492	81	28-124	9	40
Benzo(g,h,i)perylene	8.5	372	493	74	408	492	81	24-124	9	40

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QA/QC Report

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808948
Date Extracted: 09/29/2008
Date Analyzed: 10/15/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0810166

	Lab Control Sample KWG0810166-3 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810166-4 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	309	500	62	352	500	70	35-104	13	40
2-Methylnaphthalene	347	500	69	397	500	79	34-110	13	40
Acenaphthylene	330	500	66	373	500	75	46-105	12	40
Acenaphthene	322	500	64	359	500	72	47-104	11	40
Dibenzofuran	345	500	69	388	500	78	50-106	12	40
Fluorene	331	500	66	376	500	75	52-106	13	40
Pentachlorophenol	91.3	1000	9 *	223	1000	22	10-150	84 *	40
Phenanthrene	327	500	65	389	500	78	48-108	17	40
Anthracene	336	500	67	389	500	78	51-110	14	40
Fluoranthene	347	500	69	400	500	80	54-121	14	40
Pyrene	359	500	72	402	500	80	53-110	11	40
Benz(a)anthracene	351	500	70	395	500	79	51-113	12	40
Chrysene	358	500	72	390	500	78	56-112	9	40
Benzo(b)fluoranthene	329	500	66	363	500	73	51-116	10	40
Benzo(k)fluoranthene	352	500	70	386	500	77	57-114	9	40
Benzo(a)pyrene	366	500	73	402	500	80	53-112	9	40
Indeno(1,2,3-cd)pyrene	392	500	78	440	500	88	42-124	12	40
Dibenz(a,h)anthracene	432	500	86	468	500	94	44-125	8	40
Benzo(g,h,i)perylene	387	500	77	416	500	83	50-115	7	40

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Extracted:**	09/29/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/07/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	ug/Kg
Analysis Method:	8270C SIM	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0810165

	Lab Control Sample KWG0810165-3 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810165-4 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	295	500	59	336	500	67	35-104	13	40
2-Methylnaphthalene	344	500	69	380	500	76	34-110	10	40
Acenaphthylene	336	500	67	368	500	74	46-105	9	40
Acenaphthene	322	500	64	357	500	71	47-104	10	40
Fluorene	342	500	68	373	500	75	52-106	9	40
Dibenzofuran	356	500	71	391	500	78	50-106	10	40
Phenanthrene	316	500	63	341	500	68	48-108	8	40
Anthracene	335	500	67	364	500	73	51-110	9	40
Fluoranthene	343	500	69	367	500	73	54-121	7	40
Pyrene	332	500	66	355	500	71	53-110	7	40
Benzo(b)fluoranthene	336	500	67	358	500	72	51-116	6	40
Benzo(k)fluoranthene	356	500	71	396	500	79	57-114	11	40
Benz(a)anthracene	335	500	67	358	500	72	51-113	7	40
Chrysene	347	500	69	375	500	75	56-112	8	40
Benzo(a)pyrene	363	500	73	391	500	78	53-112	7	40
Indeno(1,2,3-cd)pyrene	386	500	77	392	500	78	42-124	1	40
Dibenz(a,h)anthracene	393	500	79	424	500	85	44-125	8	40
Benzo(g,h,i)perylene	387	500	77	413	500	83	50-115	7	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe		
Sample Matrix:	Soil		

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	PERCENT
Analysis Method:	NWTPH-Dx	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
S-Dup-2-091508	K0808948-001	76	98
S-Dup-3-091508	K0808948-002	69	73
PB68-S-6-091508	K0808948-003	89	81
PB71-S-6.5-091508	K0808948-004	58	58
PB72-S-8.5-091508	K0808948-005	65	73
PB68-S-8.5-091508	K0808948-006	57	64
PB63-S-8-091508	K0808948-007	66	76
PB73-S-5-091508	K0808948-008	69	74
PB63-S-6.5-091508	K0808948-009	70	70
PB73-S-6.5-091508	K0808948-010	74	77
PB62-S-5.5-091508	K0808948-011	70	76
PB70-S-6-091508	K0808948-012	49 *	33 *
PB68-S-8.5-091508DUP	KWG0809815-1	64	71
Batch QCDUP	KWG0809815-2	64	68
Method Blank	KWG0809815-4	69	76
Batch QC	K0808869-005	73	73
Lab Control Sample	KWG0809815-3	75	76

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Geo-probe
Sample Matrix: Soil

Service Request: K0808948

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
PB70-S-6-091508	K0808948-012	73	79
PB70-S-6-091508DUP	KWG0810581-1	64	69
Method Blank	KWG0810581-3	75	85
Lab Control Sample	KWG0810581-2	79	85

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0809815-4	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	9.8	1.2	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	ND	U	25	2.9	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	09/27/08	Acceptable
n-Triacontane	76	50-150	09/27/08	Acceptable

Comments: ______________________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG0810581-3	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	9.9	1.2	1	10/08/08	10/09/08	KWG0810581	
Residual Range Organics (RRO)	ND	U	25	2.9	1	10/08/08	10/09/08	KWG0810581	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	75	50-150	10/09/08	Acceptable
n-Triacontane	85	50-150	10/09/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	S-Dup-2-091508	**Units:**	mg/Kg
Lab Code:	K0808948-001	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**10**	J	12	1.4	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**20**	J	29	3.4	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	09/27/08	Acceptable
n-Triacontane	98	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	S-Dup-3-091508	**Units:**	mg/Kg
Lab Code:	K0808948-002	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**28**	Z	15	1.7	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**55**	Z	36	4.2	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	09/27/08	Acceptable
n-Triacontane	73	50-150	09/27/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB68-S-6-091508	**Units:**	mg/Kg
Lab Code:	K0808948-003	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1700**	Y	12	1.5	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**240**	L	30	3.4	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	89	50-150	09/27/08	Acceptable
n-Triacontane	81	50-150	09/27/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB71-S-6.5-091508	**Units:**	mg/Kg
Lab Code:	K0808948-004	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	11	J	14	1.7	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	55	Z	34	3.9	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	58	50-150	09/27/08	Acceptable
n-Triacontane	58	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB72-S-8.5-091508	**Units:**	mg/Kg
Lab Code:	K0808948-005	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**20**	Z	19	2.3	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**210**	Z	48	5.5	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	65	50-150	09/27/08	Acceptable
n-Triacontane	73	50-150	09/27/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB68-S-8.5-091508	**Units:**	mg/Kg
Lab Code:	K0808948-006	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**21**	Z	15	1.8	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**61**	Z	37	4.3	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	57	50-150	09/27/08	Acceptable
n-Triacontane	64	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB63-S-8-091508	**Units:**	mg/Kg
Lab Code:	K0808948-007	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**20**	H	14	1.7	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**66**	O	35	4.0	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	66	50-150	09/27/08	Acceptable
n-Triacontane	76	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB73-S-5-091508	**Units:**	mg/Kg
Lab Code:	K0808948-008	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**3.9**	J	12	1.4	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**9.4**	J	29	3.4	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	09/27/08	Acceptable
n-Triacontane	74	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB63-S-6.5-091508	**Units:**	mg/Kg
Lab Code:	K0808948-009	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**37**	Z	14	1.6	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**49**	Z	33	3.9	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	09/27/08	Acceptable
n-Triacontane	70	50-150	09/27/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB73-S-6.5-091508	**Units:**	mg/Kg
Lab Code:	K0808948-010	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**6.3**	J	14	1.7	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**28**	J	35	4.1	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	74	50-150	09/27/08	Acceptable
n-Triacontane	77	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB62-S-5.5-091508	**Units:**	mg/Kg
Lab Code:	K0808948-011	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**22**	H	14	1.7	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**73**	O	35	4.0	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	09/27/08	Acceptable
n-Triacontane	76	50-150	09/27/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB70-S-6-091508	**Units:**	mg/Kg
Lab Code:	K0808948-012	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**13**	J	15	1.8	1	09/23/08	09/27/08	KWG0809815	
Residual Range Organics (RRO)	**26**	J	36	4.2	1	09/23/08	09/27/08	KWG0809815	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	49	50-150	09/27/08	Outside Control Limits
n-Triacontane	33	50-150	09/27/08	Outside Control Limits

Comments:

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008

Diesel and Residual Range Organics

Sample Name:	PB70-S-6-091508	**Units:**	mg/Kg
Lab Code:	K0808948-012	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**36**	Z	15	1.8	1	10/08/08	10/09/08	KWG0810581	*
Residual Range Organics (RRO)	**79**	Z	36	4.2	1	10/08/08	10/09/08	KWG0810581	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	50-150	10/09/08	Acceptable
n-Triacontane	79	50-150	10/09/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0808948
Project:	IP Longview Geo-probe		**Date Extracted:**	09/23/2008
Sample Matrix:	Soil		**Date Analyzed:**	09/27/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	PB68-S-8.5-091508		**Units:**	mg/Kg
Lab Code:	K0808948-006		**Basis:**	Dry
Extraction Method:	EPA 3550B		**Level:**	Low
Analysis Method:	NWTPH-Dx		**Extraction Lot:**	KWG0809815

Analyte Name	MRL	MDL	Sample Result	PB68-S-8.5-091508DUP KWG0809815-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	15	1.8	21	19	20	8 #	40
Residual Range Organics (RRO)	36	4.2	61	59	60	4 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/27/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	Batch QC	**Units:**	mg/Kg
Lab Code:	K0808869-005	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0809815

				Batch QCDUP KWG0809815-2 Duplicate Sample			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	14	1.6	5.6	18	12	107 #	40
Residual Range Organics (RRO)	34	3.9	36	57	46	46 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Extracted:**	10/08/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/09/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	PB70-S-6-091508	**Units:**	mg/Kg
Lab Code:	K0808948-012	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0810581

				PB70-S-6-091508DUP KWG0810581-1 Duplicate Sample			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	15	1.8	36	35	35	5	40
Residual Range Organics (RRO)	36	4.2	79	73	76	9	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Extracted:**	09/23/2008
Sample Matrix:	Soil	**Date Analyzed:**	09/27/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0809815

	Lab Control Sample KWG0809815-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	198	267	74	63-120
Residual Range Organics (RRO)	104	133	78	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-probe	**Date Extracted:**	10/08/2008
Sample Matrix:	Soil	**Date Analyzed:**	10/09/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3550B	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG0810581

	Lab Control Sample KWG0810581-2 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	200	267	75	63-120
Residual Range Organics (RRO)	112	133	84	60-131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Analytical Results

Client: URS Corporation
Project: IP Longview Geo-prob
Sample Matrix: Soil

Service Request: K0808948

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
S-Dup-2-091508	K0808948-001	09/15/2008	09/16/2008	09/18/2008	86.1	
S-Dup-3-091508	K0808948-002	09/15/2008	09/16/2008	09/18/2008	70.5	
PB68-S-6-091508	K0808948-003	09/15/2008	09/16/2008	09/18/2008	83.9	
PB71-S-6.5-091508	K0808948-004	09/15/2008	09/16/2008	09/18/2008	74.1	
PB72-S-8.5-091508	K0808948-005	09/15/2008	09/16/2008	09/18/2008	52.2	
PB68-S-8.5-091508	K0808948-006	09/15/2008	09/16/2008	09/18/2008	68.8	
PB63-S-8-091508	K0808948-007	09/15/2008	09/16/2008	09/18/2008	72.4	
PB73-S-5-091508	K0808948-008	09/15/2008	09/16/2008	09/18/2008	85.9	
PB63-S-6.5-091508	K0808948-009	09/15/2008	09/16/2008	09/18/2008	75.7	
PB73-S-6.5-091508	K0808948-010	09/15/2008	09/16/2008	09/18/2008	71.1	
PB62-S-5.5-091508	K0808948-011	09/15/2008	09/16/2008	09/18/2008	71.5	
PB70-S-6-091508	K0808948-012	09/15/2008	09/16/2008	09/18/2008	69.0	

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-prob	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008
		Date Analyzed:	09/18/2008

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
S-Dup-2-091508	K0808948-001	86.1	85.7	85.9	<1	

Client:	URS Corporation	**Service Request:**	K0808948
Project:	IP Longview Geo-prob	**Date Collected:**	09/15/2008
Sample Matrix:	Soil	**Date Received:**	09/16/2008
		Date Analyzed:	09/18/2008

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
PB70-S-6-091508	K0808948-012	69.0	69.0	69.0	<1	

URS

Memo

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To: Paul Kalina, Project Manager

Info: **FINAL**

From: Tressa K Pearson-Franks, Chemist
Jennifer Garner, Chemist

Date: February 17, 2010

RE: **Quality Assurance Review**
IP Longview – September 2008 Groundwater Monitoring
CAS SDGs K0809222, K0809281, and K0809344

The summary data quality review of 34 groundwater samples and one trip blank collected between September 22 and 25, 2008 has been completed. The samples were submitted to Columbia Analytical Services (CAS), a Washington State Department of Ecology (Ecology) accredited laboratory, located in Kelso, Washington. Samples were analyzed for total petroleum hydrocarbons (TPH- diesel and residual range) by Ecology Method NWTPH-Dx, polynuclear aromatic hydrocarbons and pentachlorophenol (PAHs+PCP) by Environmental Protection Agency (EPA) Method 8270C modified by select ion monitoring (SIM), organochlorine pesticides by EPA Method 8081A, polychlorinated biphenyls (PCBs) by EPA Method 8082, volatile organic compounds (VOCs) by EPA Method 8260B, semi-volatile organic compounds (SVOCs) by EPA Method 8270C, nitrate-nitrite (NO_3+NO_2) by EPA Method 353.2, total phosphorus by EPA Method 365.3, sulfate (SO_4) by EPA Method 300.0, total organic carbon (TOC) by EPA Method 415.1, hydrocarbon degrading bacteria (HDB) by ApplEnvMic12-90-3895-3896, and/or heterotrophic plate count (HPC) by Standard Method (SM) 9215B as described in the cross reference below. The analyses were performed in general accordance with methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846) Update IIIB*, June 2005, *Methods for Chemical Analysis of Water and Wastes*, March 1983, Ecology's *Analytical Methods for Petroleum Hydrocarbons*, June 1997, Standard Methods for the Examination of Water and Wastewater, 20th edition, 1998, and Brown, EJ., Braddock, JF. Sheen Screen, a Miniaturized Most-Probable-Number Method for Enumeration of Oil-Degrading Microorganisms, *Appl. Environ. Microbiol.* 1990 56: 3895-3896. The following samples are associated with CAS sample delivery groups (SDGs) K0809222, K0809281, and K0809344:

Sample ID	CAS ID	Parameters
97-1A	K0809222-001	TPH, PAH
97-3A	K0809222-002	TPH, PAH
97-5A	K0809222-003	TPH, PAH
97-6B	K0809222-004	TPH, PAH
LL-01.15	K0809222-005	TPH, PAH
AV-11	K0809281-001	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
AV-02	K0809281-002	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
AV-08	K0809281-003	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
04-6A	K0809281-004	TPH, PAH
97-6C (Duplicate of 04-6A)	K0809281-005	TPH, PAH
AV-09	K0809281-006	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
TMW-02	K0809281-007	TPH, PAH, PCP
TMW-05	K0809281-008	TPH, PAH
TMW-04	K0809281-009	TPH, PAH, PCP
99EA-3A	K0809281-010	TPH, PAH, PCP, SVOCs, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC

Sample ID	CAS ID	Parameters
TMW-02 (resample)	K0809344-001	VOCs, Total Metals (Arsenic, Barium, Chromium, Cadmium, Lead, Mercury, Selenium, Silver)
99EA-2A	K0809344-002	TPH, PCBs, Pesticides, VOCs, SVOCs, Total and Dissolved Metals (Arsenic, Chromium)
99EA-1A	K0809344-003	TPH, PCBs, Pesticides, VOCs, SVOCs, Total and Dissolved Metals (Arsenic, Chromium)
99EA-3A (resample)	K0809344-004	Pesticides, PCBs, VOCs, SVOCs, Total and Dissolved Metals (Arsenic, Chromium)
TMW-07	K0809344-005	TPH, PAH
AV-13	K0809344-006	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
AV-14 (Duplicate of AV-13)	K0809344-007	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
TMW-08	K0809344-008	TPH, PAH
TMW-09	K0809344-009	TPH, PAH
TMW-10	K0809344-010	TPH, PAH, PCP
TMW-11	K0809344-011	TPH, PAH, PCP
Trip Blank	K0809344-012	VOCs
AV-01	K0809344-013	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
AV-12	K0809344-014	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
AV-10	K0809344-015	TPH, PAH, PCP, Sulfate, Nitrate, Phosphorus, TOC, HDB, HPC
TMW-06	K0809344-016	TPH, PAH
TMW-03	K0809344-017	TPH, PAH, PCP
TMW-13 (Duplicate of TMW-03)	K0809344-018	TPH, PAH, PCP
TMW-01	K0809344-019	TPH, PAH
TMW-12	K0809344-020	TPH, PAH, PCP

Upon receipt by CAS, the sample jar information was compared to the associated chain-of-custody (COC). Sample containers for TMW-06 were incorrectly labeled TMW-02; sample containers were relabeled by correlating the sample time to those listed on the COC. No other discrepancies relating to sample identification were noted. The temperature blank and cooler temperatures were recorded as part of the check-in procedure. Temperature blanks (0.2, 9.9, 13.2, 11.2°C) and cooler blank temperatures (-0.2, 0.1, 1.4, 1.2, 17.8, 9, 11.6, 1.2°C) were outside the EPA recommended limits of 4ºC±2ºC. Data were not qualified based on the cooler and cooler blank temperatures.

Samples TMW-02 and 99EA-3A were originally submitted in SDG K0809281. Additional sample containers for both samples were submitted in SDG K0809344 with additional requested analytes. Sample 99EA-3A was analyzed for SVOCs in both SDGs K0809281 and K0809344. For all results that did not meet the laboratory duplicate criteria, the higher result was reported in SDG K0809344. Therefore, all results have been reported from the SVOC analysis of sample 99EA-3A in SDG K0809344 and all SVOC results for this sample in SDG K0809281 have been flagged ‘DNR’ for Do Not Report.

Data validation is based on method performance criteria and QC criteria as documented in the *Agency Draft Quality Assurance Project Plan (QAPP), Appendix A of the Performance and Compliance Monitoring Plan, Former Treated Wood Products Area, International Paper Facility / Longview, Washington* (Woodward Clyde, 1997). The laboratory provided EPA Contract Laboratory Program-equivalent validatable data packages. The data review conducted on this sample delivery group (SDG) included a review of summarized results and QA/QC data, per the requirements set forth in Section A.10 of the QAPP. Hold times, initial and continuing calibrations, method blanks, surrogate recoveries, laboratory control sample (LCS) results, matrix duplicate results, matrix spike/matrix spike duplicate (MS/MSD) results, field duplicates, and reporting limits were reviewed to assess compliance with applicable methods. Calculation checks and review of the raw data were not included in the data review. If data qualification was required, data were qualified in accordance with *USEPA Contract Laboratory Program National*

Functional Guidelines for Organic Data Review, October 1999 and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004.

Organic Analyses

Samples were analyzed for TPH (diesel and residual range), PAHs, PCP, pesticides, PCBs, VOCs, and/or SVOCs by the methods identified in the introduction to this report.

1. Holding Times – Acceptable except as noted below:

   SVOCs by Method 8270C – Sample 99EA-3A was requested for SVOCs past the EPA recommended holding time of seven days. All associated SVOC results for this sample are qualified as estimated and flagged 'UJ' when reported as not detected and 'J' when reported as detected based on the holding time exceedance.

   PAHs by Method 8270C-SIM – Sample TMW-07 was extracted past the EPA recommended holding time of seven days. All associated PAH results for this sample are qualified as estimated and flagged 'UJ' or 'J' based on the holding time exceedance.

   Organochlorine Pesticides by Method 8081A – Due to an LCS failure, samples 99EA-1A and 99EA-2A were re-extracted and reanalyzed outside of the EPA recommended holding time of seven days. Reported results from the reanalyses are qualified as estimated and flagged 'UJ' based on the hold time exceedance. See Section 8 (Laboratory Control Samples) for further details.

2. Instrument Performance (Tunes – applicable to PAHs, PCP, VOCs, and SVOCs only) – Acceptable

3. Initial Calibrations – Acceptable except as noted below:

   PAHs by Method 8270C-SIM – Several analytes exceeded the relative standard deviation (RSD) method control limit of 15% for the initial calibration analyzed on October 1, 2008 as shown below:

Analyte	% RSD
Pentachlorophenol	28.9
Indeno(1,2,3-cd)pyrene	21.4
Dibenzo(a,h)anthracene	16.8
2,4,6-Tribromophenol (surrogate)	18.3

   In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard allowing analysis to proceed. The results for PCP, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene are qualified as estimated and flagged 'J' or 'UJ' in the associated samples based on the initial calibration. Results for the surrogate 2,4,6-tribromophenol are not qualified.

   VOCs by Method 8260B – Several analytes exceeded the RSD method control limit of 15% for the initial calibration analyzed on September 19, 2008 for as shown below:

Analyte	% RSD
Dichlorodifluoromethane	16.8
Trichlorofluoromethane	16.9

In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard allowing analysis to proceed. Dichlorodifluoromethane and trichlorofluoromethane are qualified as estimated and flagged ‘J’ or ‘UJ’ in the associated samples based on the initial calibration.

4. Continuing Calibrations – Acceptable except as noted below:

Organochlorine Pesticides by Method 8081A – The percent differences (%Ds) for several analytes associated with SDG K0809344 did not meet the method control limit of ±15% for one or more continuing calibration verification (CCV) samples as shown below:

Analysis Date	Column ID	Analyte	RSD (%)
10/17/08	DB-XLB	Heptachlor	-19
10/17/08	DB-XLB	Heptachlor	-16
		4,4’-DDE	-26
10/17/08	DB-XLB	Heptachlor	-16

In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard allowing the analyses to proceed. Heptachlor and 4,4’-DDE are qualified as estimated and flagged ‘J’ or ‘UJ’ in samples 99EA-1A, 99EA-2A, and 99ES-3A based on the continuing calibration results.

PCBs by EPA Method 8082 – The %D for decachlorobiphenyl for several continuing calibrations did not meet the method control limit of ±15% as shown below:

Analysis Date	Column ID	Analyte	%D
10/17/08	DB-XLB	Decachlorobiphenyl	-19
10/17/08	DB-XLB	Decachlorobiphenyl	-23

In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard allowing analysis to proceed. Data were not qualified based on surrogates in the continuing calibrations.

5. Blanks – Acceptable except as noted below:

VOCs by Method 8260B – 1,2,4-Trimethylbenzene was detected in the method blank analyzed on October 6, 2008 at a concentration less than the laboratory reporting limit, but above the method detection limit (MDL). 1,2,4-Trimethylbenzene was not detected in any associated samples. No results have been qualified based on this method blank detection.

Chloromethane (0.10 ug/L) was detected in the trip blank associated with SDG K0809344 at a concentration less than the laboratory reporting limit, but above the MDL. Per CLP guidelines, results reported at concentrations less than five times (5x) the method blank concentration are qualified as not detected and flagged with a ‘U’. When the associated sample results are reported between the MDL and the reporting limit, and are less than 5x the method blank concentration, the results are qualified as not detected at the reporting limit. Chloromethane was detected in samples 99EA-2A and 99EA-3A at concentrations between the MDL and reporting limit and less than 5x the method blank concentration; therefore, the results for chloromethane in samples 99EA-2A and 99EA-3A are qualified as not detected and flagged with a ‘U’ at the reporting limit.

<u>SVOCs by Method 8270C</u> – Several analytes were detected in several method blanks extracted on September 30, 2008 at concentrations less than the laboratory reporting limits, but above the MDLs as shown below:

Analysis Batch Number	Analyte	MB Concentration (ug/L)
KWG0810224	1,3-Dichlorobenzene	0.028 J
	1,4-Dichlorobenzene	0.037 J
	1,2-Dichlorobenzene	0.028 J
	2-Methylnaphthalene	0.028 J
	Acenaphthalene	0.026 J
	Dimethyl phthalate	0.032 J
	Dibenzofuran	0.029 J
	Fluorene	0.027 J
	Diethyl phthalate	0.045 J
	Phenanthrene	0.036 J
	Anthracene	0.027 J
	Di-n-butyl phthalate	0.062 J
	Fluoranthene	0.038 J
	Pyrene	0.033 J
	Butyl benzyl phthalate	0.045 J
	Benz(a)anthracene	0.037 J
	Benzo(b)fluoranthene	0.028 J
	Benzo(k)fluoranthene	0.027 J
	Indeno(1,2,30cd)pyrene	0.030 J
	Dibenz(a,h)antrhacene	0.022 J
	Benzo(g,h,i)perylene	0.026 J
KWG0810258	Diethyl phthalate	0.019 J
	Di-n-butyl phthalate	0.071 J
	Butyl benzyl phthalate	0.031 J

MB = Method blank
J = Result reported between the laboratory reporting limit and the MDL.

Diethyl phthalate was detected at a concentration between the MDL and reporting limit in sample 99EA-1A. The result for diethyl phthalate in this sample is qualified as not detected and flagged ‘U’ at the reporting limit. Di-n-butyl phthalate was detected at concentrations between the MDL and reporting limit in samples 99EA-1A and 99EA-2A. The results for di-n-butyl phthalate in these samples are qualified as not detected and flagged ‘U’ at the reporting limit.

No sample results were reported from the analysis of batch number KWG0810258. See Section 12 for details.

Diethyl phthalate (0.016 ug/L) and di-n-butyl phthalate (0.042 ug/L) were detected in the method blank extracted on October 8, 2008 at concentrations less than the laboratory reporting limits, but above the MDLs. The result for diethyl phthalate in sample 99EA-3A was reported at not detected; therefore, no qualification based on this method blank is required. The result for di-n-butyl phthalate in sample 99EA-3A was between the reporting limit and the MDL; therefore, this result for di-n-butyl phthalate in this sample is qualified as not detected and flagged ‘U’ at the reporting limit.

PAHs+PCP by Method 8270C-SIM – Several analytes were detected at concentrations less than the laboratory reporting limits, but above the MDLs in method blanks associated with these samples as shown below:

Preparation Date	Analyte	MB Concentration (ug/L)
9/30/08	Naphthalene	0.0071
	Indeno(1,2,3-cd)pyrene	0.0042
9/29/08	Indeno(1,2,3-cd)pyrene	0.0047
10/1/08	Dibenzo(a,h)anthracene	0.0025
10/1/08	Indeno(1,2,3-cd)pyrene	0.0044
	Dibenzo(a,h)anthracene	0.0036
	Benzo(g,h,i)perylene	0.0069
10/2/08	Benzo(a)anthracene	0.0046
	Benzo(b)fluoranthene	0.0040
	Benzo(k)fluoranthene	0.0042
	Indeno(1,2,3-cd)pyrene	0.0046
	Dibenzo(a,h)anthracene	0.0036
	Benzo(g,h,i)perylene	0.0053

Naphthalene was detected at a concentration between the MDL and reporting limit in sample TMW-05. The result for naphthalene in this sample is qualified as not detected and flagged ‘U’ at the reporting limit. Indeno(1,2,3-cd)pyrene was detected at a concentration between the MDL and reporting limit in sample LL-01.15. The result for indeno(1,2,3-cd)pyrene in this sample is qualified as not detected and flagged ‘U’ at the reporting limit.

Benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene were detected at concentrations between the MDLs and reporting limits in sample TMW-06. The results for these analytes in sample TMW-06 are qualified as not detected and flagged ‘U’ at the reporting limits.

Dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene were reported as not detected in all samples associated with the method blanks prepared on October 1, 2008; therefore, no qualification for these analytes is required based on the associated method blank.

TPH by NWTPH-Dx – Residual-range hydrocarbons (32 ug/L) were detected in the method blank extracted on October 2, 2008 at a concentration between the MDL and the reporting limit. The concentrations for residual-range hydrocarbons in samples AV-11, AV-09, AV-08, TMW-02, TMW-04, TMW-05, 99EA-3A, 97-1A, 97-3A, and 97-5A were less than 5x the method blank and were between the method detection limit and reporting limit; therefore, the results for residual-range hydrocarbons in these samples are qualified as not detected and flagged with a ‘U’ at the reporting limit. Residual-range hydrocarbons were either not detected or detected at concentrations greater than 5x the blank concentration in the other associated samples.

6. Surrogates – Acceptable except as noted below:

PAHs+PCP by Method 8270C-SIM – The percent recovery for one or more surrogates did not meet the laboratory control limits for several samples as shown below:

Sample	2,4,6-Tribromophenol % Recovery	Fluoranthene-d10 % Recovery	Terphenyl-d14 % Recovery
Control Limits	*42-122*	*35-110*	*35-110*
TMW-11	27	ok	ok
AV-12	35	ok	ok
MB-(KWG0810359)	ok	ok	115
LCS-(KWG0810286)	ok	117	132
LCS-(KWG0810359)	16	ok	ok

MB – Method blank LCS = Laboratory control sample

No sample results are qualified based on surrogate recoveries in quality control samples (method blanks and LCS). The surrogate 2,4,6-tribromophenol only applies to pentachlorophenol. The pentachlorophenol results for samples TMW-11 and AV-12 are qualified as estimated and flagged ‘UJ’.

7. Internal Standards (applicable to GC/MS only) – Acceptable

8. Laboratory Control/ Laboratory Control Duplicate Samples (LCS/LCSD) – Acceptable except as noted below:

VOCs by Method 8260B – The percent recovery for carbon disulfide (63%) in the LCS analyzed on October 6, 2008 did not meet the control limits of 64-129%. The carbon disulfide results for all associated samples are qualified as estimated and flagged ‘J’ or ‘UJ’ based on the LCS recovery.

Organochlorine Pesticides by Method 8081A – The percent recoveries for several analytes in the LCS prepared on September 29, 2008 were below the laboratory control limits as shown below:

Analyte	LCS Recovery (%)	Control Limit (%)
Endosulfan II	14	32-123
Endrin aldehyde	1	30-114
Endosulfan sulfate	0	46-120
Endrin ketone	21	45-127

Samples 99EA-1A and 99EA-2A were re-extracted and reanalyzed with acceptable LCS results. These analytes have been reported from the reanalysis. The results for these analytes in the original analyses have been flagged ‘DNR’ for Do Not Report. Sample 99EA-3A was not reanalyzed due to limited sample volume. Typically, endrin aldehyde and endosulfan sulfate would be rejected in the associated samples due to the low percent recoveries in the LCS; however, the percent recoveries for these compounds were acceptable in the associated MS/MSD. The results for endosulfan II, endrin aldehyde, endosulfan sulfate, and endrin ketone are qualified as estimated and flagged ‘UJ’ based on the LCS failure.

SVOCs by Method 8270C – The percent recoveries for several analytes in the LCS/LCSDs prepared on September 30, 2008 and October 8, 2008 were outside the laboratory control limits as shown below:

Preparation Date	Analyte	LCS Recovery (%)	LCSD Recovery (%)	Control Limit (%)	RPD (%)	RPD CL (%)
9/30/08	2,4-Dimethylphenol	ok	6	10-113	100	30
	Benzo(b)fluoranthene	ok	121	45-115	ok	30
	Indeno(1,2,3-cd)pyrene	ok	123	44-119	ok	30
9/30/08	1,3-Dichlorobenzene	74	ok	18-71	ok	30
	1,4-Dichlorobenzene	76	ok	19-73	ok	30
	Hexachloroethane	74	65	11-62	ok	30
	Benzoic acid	ok	ok	10-102	37	30
	Hexachlorobutadiene	72	63	10-61	ok	30
	2,4-Dinitrophenol	ok	ok	10-121	35	30
10/8/08	Benzoic acid	0	0	10-102	ok	30
	Hexachlorocyclopentadiene	8	9	10-39	ok	30
	2,4-Dinitrophenol	0	ok	10-121	NC	30
	2-Methyl-4,6-dinitrophenol	ok	ok	19-127	41	30

CL – Control Limit NC – Not Calculable

As the LCS percent recoveries and the LCS/LCSD relative percent differences (RPDs) were acceptable for both benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene, no qualification is required. All 2,4-dimethylphenol results associated with this failing LCS/LCSD are qualified as estimated and flagged ‘J’ or ‘UJ’ based on the LCSD recovery.

As the LCSD percent recovery and the RPD for the LCS/LCSD pair were acceptable, no data are qualified based on the LCS exceedance for 1,3-dichlorobenzene and 1,4-dichlorobenzene. As the LCS and LCSD percent recoveries were acceptable, no data are qualified based on the LCS/LCSD RPD exceedance for benzoic acid and 2,4-dinitrophenol. As the LCS and LCSD percent recoveries were high for hexachloroethane and hexachlorobutadiene, and all associated sample results were reported as not detected for these analytes, no sample results are qualified based on the elevated LCS/LCSD recoveries.

As the associated MS/MSDs were acceptable, results for benzoic acid, hexachlorocyclopentadiene, and 2,4-dinitrophenol were not rejected based on the LCS/LCSD percent recoveries below 10%. The results for benzoic acid, hexachlorocyclopentadiene, and 2,4-dinitrophenol in samples associated with the LCS prepared on October 8, 2008 are qualified as estimated and flagged with a ‘J’ or ‘UJ’ based on the low LCS percent recovery. As the LCS and LCSD percent recoveries for 2-methyl-4,6-dinitrophenol were acceptable, no results are qualified based on the RPD exceedance.

PAHs+PCP by Method 8270C-SIM – The percent recoveries for several analytes in the LCS/LCSD samples prepared September 30 and October 2, 2008 were below the laboratory control limits as shown below:

Preparation Date	Analyte	LCS Recovery (%)	LCSD Recovery (%)	Control Limit (%)	RPD (%)	RPD CL (%)
10/2/08	Pentachlorophenol	1	NA	10-130	NA	NA

As the associated MS/MSD for pentachlorophenol was acceptable, results were not rejected based on the LCS/LCSD percent recovery below 10%. Based on the low LCS percent recovery for pentachlorophenol, all associated sample results have been qualified as estimated and flagged ‘J’ or ‘UJ’.

9. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable

PAHs+PCP by Method 8270C-SIM – MS/MSDs were performed on four samples from unrelated projects. Results were acceptable.

VOCs by Method 8260B – An MS/MSD was performed on a sample from an unrelated project. Results were acceptable.

SVOCs by Method 8270D – An MS/MSD was performed on a sample from an unrelated project. Results were acceptable.

PCBs by EPA Method 8082 – An MS/MSD was performed on a sample from an unrelated project. Results were acceptable.

Organochlorine Pesticides by Method 8081A – An MS/MSD was performed on a sample from an unrelated project. Results were acceptable.

10. Laboratory Duplicate – Acceptable except as noted below:

TPH by NWTPH-Dx – Laboratory duplicates were performed on samples 99EA-2A, TMW-09, TMW-06, TMW-12, and a sample from an unrelated project. Results were acceptable.

11. Field Duplicate – Acceptable except as noted below:

General – Field duplicates were submitted for samples AV-13, 04-6A, and TMW-03 and identified as AV-14, 97-6C, and TMW-13, respectively. Results were comparable for all organic analyses.

12. Reporting Limits – Acceptable except as noted below:

General – One or more analytes were analyzed by multiple methods. As a conservative measure, the highest detected result or the lowest reporting limit for results reported as not detected by the laboratory are reported. All other results are flagged 'DNR'.

PAHs+PCP by Method 8270C-SIM – The reporting limits for several PAHs and/or PCP were raised in several samples due to dilutions for target analytes or matrix interferences. The elevated reporting limits do not adversely impact the use of the data for project objectives.

The results for one or more PAHs in sample 97-5A were assigned a 'D' qualifier by the laboratory to indicate the result was reported from a dilution of the sample. No additional qualifiers were necessary based on the 'D' qualifiers assigned by the laboratory.

The results for one or more PAHs in all samples were assigned a 'J' qualifier by the laboratory to indicate that the reported concentration is above the MDL, but below the MRL. All J-flagged results are considered estimated.

TPH by NWTPH-Dx – The reporting limits for several TPHs were raised in several samples due to dilutions for target analytes or matrix interferences. The elevated reporting limits do not adversely impact the use of the data for project objectives.

The results for one or more TPHs in several samples were assigned a 'J' qualifier by the laboratory to indicate that the reported concentration is above the MDL, but below the MRL. All J-flagged results are considered estimated unless previously qualified based on quality control issues as described within this report.

The results for diesel-range and/or residual-range hydrocarbons in several samples were assigned an 'L' or 'Y' qualifier by the laboratory to indicate that the chromatographic fingerprint does not resemble a petroleum product. Qualitative information is included in the summary data tables in the report as a footnote. No additional qualifiers were necessary based on the 'L' or 'Y' qualifiers assigned by the laboratory.

SVOCs by Method 8270C – Sample 99EA-3A was analyzed for SVOCs in both SDGs K0809281 and K0809344. Sample results were reported for the sample associated with SDG K0809344; all SVOC results for the sample associated with SDG K0809281 are flagged 'DNR'.

Conventional Analyses

Samples were analyzed for NO_3+NO_2, total phosphorus, SO_4, TOC, HDB, and HPC by the methods specified in the introduction to this report.

1. Holding Times – Acceptable

2. Initial Calibrations – Acceptable where applicable

3. Continuing Calibrations – Acceptable where applicable

4. Blanks – Acceptable except as noted below:

   NO_3+NO_2 by Method 353.2 – Nitrate+nitrite was detected in the method blank (0.028 mg/L) analyzed on September 25, 2008 at a concentration between the MDL and reporting limit. Per CLP guidelines, results reported at concentrations less than ten times (10x) the method blank concentration are qualified as not detected and flagged with a 'J+' if reported above the reporting limit. Results reported as not detected or at concentrations greater than 10x the concentration found in the method blank do not require qualification. Nitrate+nitrite was detected in sample AV-11 at a concentration greater than the MDL but below the reporting limit. Nitrate+nitrite in sample AV-11 is qualified as not detected and flagged 'U' at the reporting limit. Nitrate+nitrite was detected in sample 99EA-3A at a concentration greater than the reporting limit but less than 10x the method blank concentration. Nitrate+nitrite in sample 99EA-3A is qualified as estimated high and flagged 'J+' at the reported result.

5. Laboratory Control Samples (LCS) – Acceptable where applicable

6. Matrix Spike (MS) – Acceptable where applicable

   NO_3+NO_2 by Method 353.2 – Matrix spikes were performed on sample AV-11 and a sample from an unrelated project. Results were acceptable.

   Total Phosphorus by Method 365.3 – Matrix spikes were performed on two samples from unrelated projects. Results were acceptable.

   Sulfate by Method 300.0 – Matrix spikes were performed on two samples from unrelated projects. Results were acceptable.

   TOC by Method 415.1 – Matrix spikes were performed on samples AV-11 and AV-13. Results were acceptable.

7. Laboratory Duplicates – Acceptable except as noted below:

   NO_3+NO_2 by Method 353.2 – Laboratory duplicates were performed on sample AV-11 and a sample from an unrelated project. Results were acceptable.

Total Phosphorus by Method 365.3 – Laboratory duplicates were performed on two samples from unrelated projects. Results were acceptable.

Sulfate by Method 300.0 – Laboratory duplicates were performed on two samples from unrelated projects. Results were acceptable.

TOC by Method 415.1 – Laboratory duplicates were performed on samples AV-11 and AV-13. Results were acceptable.

HDB by SM9221C – Laboratory duplicates were performed on samples AV-09 and AV-10. The RPD for the sample/duplicate pair for AV-09 (197%) and AV-10 (179%) did not meet the acceptance criterion of 40%. All associated sample results are qualified as estimated and flagged ‘J’.

HPC by SM9215B – A laboratory duplicate was performed on sample AV-12. Results were acceptable. A laboratory duplicate was performed on sample AV-09. The RPD for the sample/duplicate pair for AV-09 (42%) did not meet the acceptance criterion of 40%. All associated sample results are qualified as estimated and flagged ‘J’.

8. Field Duplicate – Acceptable

General – A field duplicate was submitted for sample AV-13 and identified as AV-14. Results were comparable.

9. Reporting Limits – Acceptable except as noted below:

General – Detection limit goals were not specified in the QAPP. With the exceptions noted below, the reporting limits provided by the laboratory are common levels reported by environmental laboratories and acceptable for project objectives.

HDB by SM9221C – The reporting limits for HDB in sample AV-10 were reported as ≥ 8,000,000 mpn/100 mL. The result for HDB in this sample is qualified as estimated and flagged with a ‘J’.

Overall Assessment

The data reported in these SDGs, as qualified, are considered to be usable for meeting project objectives. The completeness for SDGs K0809222, K0809281, and K0809344 is 100%.

Data Qualifier Definitions:

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
DNR	Do Not Report. Another result is available that is more reliable.

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
97-1A	K0809222-001	Diesel Range Organics (DRO)	17 J	ug/L	17 J
		Indeno(1,2,3-cd)pyrene	0.019 U	ug/L	0.019 UJ
		Residual Range Organics (RRO)	33 J	ug/L	500 U
97-3A	K0809222-002	Diesel Range Organics (DRO)	75 J	ug/L	75 J
		Indeno(1,2,3-cd)pyrene	0.019 U	ug/L	0.019 UJ
		Naphthalene	0.0046 J	ug/L	0.0046 J
		Residual Range Organics (RRO)	55 J	ug/L	500 U
97-5A	K0809222-003	Dibenzofuran	0.0094 J	ug/L	0.0094 J
		Diesel Range Organics (DRO)	77 J	ug/L	77 J
		Indeno(1,2,3-cd)pyrene	0.048	ug/L	0.048 J
		Residual Range Organics (RRO)	62 J	ug/L	500 U
97-6B	K0809222-004	2-Methylnaphthalene	0.0089 J	ug/L	0.0089 J
		Dibenzofuran	0.0096 J	ug/L	0.0096 J
		Indeno(1,2,3-cd)pyrene	0.53	ug/L	0.53 J
		Residual Range Organics (RRO)	260 J	ug/L	260 J
LL-01.15	K0809222-005	2-Methylnaphthalene	0.0040 J	ug/L	0.0040 J
		Benz(a)anthracene	0.0079 J	ug/L	0.0079 J
		Benzo(b)fluoranthene	0.0055 J	ug/L	0.0055 J
		Chrysene	0.0053 J	ug/L	0.0053 J
		Indeno(1,2,3-cd)pyrene	0.0028 J	ug/L	0.020 UJ
AV-11	K0809281-001	Benz(a)anthracene	0.0061 J	ug/L	0.0061 J
		Benzo(a)pyrene	0.0044 J	ug/L	0.0044 J
		Benzo(b)fluoranthene	0.0054 J	ug/L	0.0054 J
		Benzo(g,h,i)perylene	0.0045 J	ug/L	0.0045 J
		Chrysene	0.0040 J	ug/L	0.0040 J
		Dibenz(a,h)anthracene	0.019 U	ug/L	0.019 UJ
		Diesel Range Organics (DRO)	12 J	ug/L	12 J
		Fluoranthene	0.0050 J	ug/L	0.0050 J
		Heterotrophic Plate Count	14.0	CFU/mL	14.0 J
		Hydrocarbon Degrading Bacteria	450,000	MPN/100mL	450,000 J
		Indeno(1,2,3-cd)pyrene	0.0043 J	ug/L	0.0043 J
		Naphthalene	0.0033 J	ug/L	0.0033 J
		Nitrate+Nitrite as Nitrogen	0.024 J	mg/L	0.05 U
		Pentachlorophenol	0.95 U	ug/L	0.95 UJ
		Pyrene	0.0057 J	ug/L	0.0057 J
		Residual Range Organics (RRO)	32 J	ug/L	530 U
AV-02	K0809281-002	Benzo(g,h,i)perylene	0.0044 J	ug/L	0.0044 J
		Dibenz(a,h)anthracene	0.10 U	ug/L	0.10 UJ
		Heterotrophic Plate Count	455	CFU/mL	455 J
		Hydrocarbon Degrading Bacteria	40,000	MPN/100mL	40,000 J
		Indeno(1,2,3-cd)pyrene	0.059 J	ug/L	0.059 J
		Pentachlorophenol	50 U	ug/L	50 UJ

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
AV-08	K0809281-003	Benz(a)anthracene	0.0077 J	ug/L	0.0077 J
		Benzo(a)pyrene	0.0095 J	ug/L	0.0095 J
		Benzo(b)fluoranthene	0.012 J	ug/L	0.012 J
		Benzo(g,h,i)perylene	0.0077 J	ug/L	0.0077 J
		Chrysene	0.0065 J	ug/L	0.0065 J
		Dibenz(a,h)anthracene	0.020 U	ug/L	0.020 UJ
		Heterotrophic Plate Count	330	CFU/mL	330 J
		Hydrocarbon Degrading Bacteria	5,810	MPN/100mL	5,810 J
		Indeno(1,2,3-cd)pyrene	0.0090 J	ug/L	0.0090 J
		Pentachlorophenol	1.0 U	ug/L	1.0 UJ
		Residual Range Organics (RRO)	130 J	ug/L	530 U
04-6A	K0809281-004	Indeno(1,2,3-cd)pyrene	0.044	ug/L	0.044 J
		Residual Range Organics (RRO)	220 J	ug/L	220 J
97-6C	K0809281-005	Indeno(1,2,3-cd)pyrene	0.060	ug/L	0.060 J
		Residual Range Organics (RRO)	210 J	ug/L	210 J
AV-09	K0809281-006	Anthracene	0.0075 J	ug/L	0.0075 J
		Benzo(k)fluoranthene	0.010 J	ug/L	0.010 J
		Dibenz(a,h)anthracene	0.0052 J	ug/L	0.0052 J
		Diesel Range Organics (DRO)	32 J	ug/L	32 J
		Heterotrophic Plate Count	9.5	CFU/mL	9.5 J
		Hydrocarbon Degrading Bacteria	800,000	MPN/100mL	800,000 J
		Indeno(1,2,3-cd)pyrene	0.024	ug/L	0.024 J
		Naphthalene	0.011 J	ug/L	0.011 J
		Pentachlorophenol	0.98 U	ug/L	0.98 UJ
		Phenanthrene	0.011 J	ug/L	0.011 J
		Residual Range Organics (RRO)	67 J	ug/L	520 U
TMW-02	K0809281-007	Benz(a)anthracene	0.020 J	ug/L	0.020 J
		Benzo(a)pyrene	0.019 J	ug/L	0.019 J
		Benzo(g,h,i)perylene	0.017 J	ug/L	0.017 J
		Benzo(k)fluoranthene	0.0088 J	ug/L	0.0088 J
		Chrysene	0.016 J	ug/L	0.016 J
		Dibenz(a,h)anthracene	0.0043 J	ug/L	0.0043 J
		Dibenzofuran	0.0089 J	ug/L	0.0089 J
		Diesel Range Organics (DRO)	160 J	ug/L	160 J
		Indeno(1,2,3-cd)pyrene	0.018 J	ug/L	0.018 J
		Pentachlorophenol	1.1 U	ug/L	1.1 UJ
		Phenanthrene	0.015 J	ug/L	0.015 J
		Pyrene	0.020 J	ug/L	0.020 J
		Residual Range Organics (RRO)	89 J	ug/L	520 U

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-05	K0809281-008	Dibenzofuran	0.0056 J	ug/L	0.0056 J
		Diesel Range Organics (DRO)	19 J	ug/L	19 J
		Indeno(1,2,3-cd)pyrene	0.020 U	ug/L	0.020 UJ
		Naphthalene	0.0063 J	ug/L	0.020 U
		Residual Range Organics (RRO)	49 J	ug/L	520 U
TMW-04	K0809281-009	Benz(a)anthracene	0.0088 J	ug/L	0.0088 J
		Benzo(a)pyrene	0.0054 J	ug/L	0.0054 J
		Benzo(b)fluoranthene	0.0069 J	ug/L	0.0069 J
		Benzo(g,h,i)perylene	0.0054 J	ug/L	0.0054 J
		Chrysene	0.0063 J	ug/L	0.0063 J
		Dibenz(a,h)anthracene	0.020 U	ug/L	0.020 UJ
		Dibenzofuran	0.0083 J	ug/L	0.0083 J
		Diesel Range Organics (DRO)	130 J	ug/L	130 J
		Fluoranthene	0.0098 J	ug/L	0.0098 J
		Indeno(1,2,3-cd)pyrene	0.0061 J	ug/L	0.0061 J
		Pentachlorophenol	0.96 U	ug/L	0.96 UJ
		Pyrene	0.0087 J	ug/L	0.0087 J
		Residual Range Organics (RRO)	100 J	ug/L	520 U
99EA-3A	K0809281-010	1,2,4-Trichlorobenzene	0.20 U	ug/L	DNR
		1,2-Dichlorobenzene	0.20 U	ug/L	DNR
		1,3-Dichlorobenzene	0.20 U	ug/L	DNR
		1,4-Dichlorobenzene	0.20 U	ug/L	DNR
		2,4,5-Trichlorophenol	0.49 U	ug/L	DNR
		2,4,6-Trichlorophenol	0.49 U	ug/L	DNR
		2,4-Dichlorophenol	0.49 U	ug/L	DNR
		2,4-Dimethylphenol	3.9 U	ug/L	DNR
		2,4-Dinitrophenol	3.9 U	ug/L	DNR
		2,4-Dinitrotoluene	0.20 U	ug/L	DNR
		2,6-Dinitrotoluene	0.20 U	ug/L	DNR
		2-Chloronaphthalene	0.20 U	ug/L	DNR
		2-Chlorophenol	0.49 U	ug/L	DNR
		2-Methyl-4,6-dinitrophenol	2.0 U	ug/L	DNR
		2-Methylnaphthalene	0.029 J	ug/L	DNR
		2-Methylphenol	0.49 U	ug/L	DNR
		2-Nitroaniline	0.20 U	ug/L	DNR
		2-Nitrophenol	0.49 U	ug/L	DNR
		3,3'-Dichlorobenzidine	2.0 U	ug/L	DNR
		3-Nitroaniline	0.98 U	ug/L	DNR
		4-Bromophenyl Phenyl Ether	0.20 U	ug/L	DNR
		4-Chloro-3-methylphenol	0.49 U	ug/L	DNR
		4-Chloroaniline	0.20 U	ug/L	DNR
		4-Chlorophenyl Phenyl Ether	0.20 U	ug/L	DNR
		4-Methylphenol	0.49 U	ug/L	DNR
		4-Nitroaniline	0.98 U	ug/L	DNR
		4-Nitrophenol	2.0 U	ug/L	DNR
		Acenaphthene	1.9	ug/L	DNR
		Acenaphthylene	0.21 J	ug/L	DNR
		Anthracene	0.096 J	ug/L	DNR

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
99EA-3A	K0809281-010	Benz(a)anthracene	0.40	ug/L	DNR
		Benzo(a)pyrene	0.50	ug/L	DNR
		Benzo(b)fluoranthene	0.71	ug/L	DNR
		Benzo(g,h,i)perylene	0.44	ug/L	DNR
		Benzo(k)fluoranthene	0.22	ug/L	DNR
		Benzoic Acid	4.9 U	ug/L	DNR
		Benzyl Alcohol	0.49 U	ug/L	DNR
		Bis(2-chloroethoxy)methane	0.20 U	ug/L	DNR
		Bis(2-chloroethyl) Ether	0.20 U	ug/L	DNR
		Bis(2-chloroisopropyl) Ether	0.20 U	ug/L	DNR
		Bis(2-ethylhexyl) Phthalate	0.98 U	ug/L	DNR
		Butyl Benzyl Phthalate	0.20 U	ug/L	DNR
		Chrysene	0.47	ug/L	DNR
		Dibenz(a,h)anthracene	0.093 J	ug/L	DNR
		Dibenzofuran	0.20 U	ug/L	DNR
		Diesel Range Organics (DRO)	120 J	ug/L	120 J
		Diethyl Phthalate	0.029 J	ug/L	DNR
		Dimethyl Phthalate	0.20 U	ug/L	DNR
		Di-n-butyl Phthalate	0.066 J	ug/L	DNR
		Di-n-octyl Phthalate	0.20 U	ug/L	DNR
		Fluoranthene	0.63	ug/L	DNR
		Fluorene	0.80	ug/L	DNR
		Heterotrophic Plate Count	21.5	CFU/mL	21.5 J
		Hexachlorobenzene	0.20 U	ug/L	DNR
		Hexachlorobutadiene	0.20 U	ug/L	DNR
		Hexachlorocyclopentadiene	0.98 U	ug/L	DNR
		Hexachloroethane	0.20 U	ug/L	DNR
		Hydrocarbon Degrading Bacteria	13,000	MPN/100mL	13,000 J
		Indeno(1,2,3-cd)pyrene	0.43	ug/L	DNR
		Isophorone	0.20 U	ug/L	DNR
		Naphthalene	0.031 J	ug/L	DNR
		Nitrate+Nitrite as Nitrogen	0.13	mg/L	0.13 J+
		Nitrobenzene	0.20 U	ug/L	DNR
		N-Nitrosodi-n-propylamine	0.20 U	ug/L	DNR
		N-Nitrosodiphenylamine	0.20 U	ug/L	DNR
		Pentachlorophenol	0.98 U	ug/L	DNR
		Phenanthrene	0.23	ug/L	DNR
		Phenol	0.49 U	ug/L	DNR
		Pyrene	0.51	ug/L	DNR
		Residual Range Organics (RRO)	85 J	ug/L	520 U

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-02	K0809344-001	Carbon Disulfide	0.19 J	ug/L	0.19 J
		Dichlorodifluoromethane	0.50 U	ug/L	0.50 UJ
		Isopropylbenzene	0.060 J	ug/L	0.060 J
		Naphthalene	0.37 J	ug/L	0.37 J
		Toluene	0.050 J	ug/L	0.050 J
		Trichlorofluoromethane	0.50 U	ug/L	0.50 UJ
99EA-2A	K0809344-002	2,4-Dimethylphenol	3.9 U	ug/L	3.9 UJ
		Benzoic Acid	2.0 J	ug/L	2.0 J
		Carbon Disulfide	0.50 U	ug/L	0.50 UJ
		Chloromethane	0.090 J	ug/L	0.50 U
		Dichlorodifluoromethane	0.50 U	ug/L	0.50 UJ
		Di-n-butyl Phthalate	0.042 J	ug/L	0.20 U
		Endosulfan II	0.50 U	ng/L	DNR
		Endosulfan Sulfate	0.50 U	ng/L	DNR
		Endrin Aldehyde	0.50 U	ng/L	DNR
		Endrin Ketone	0.50 U	ng/L	DNR
		Naphthalene	2.0 U	ug/L	DNR
		Trichlorofluoromethane	0.50 U	ug/L	0.50 UJ
	K0809344-002RE	4,4'-DDD	0.77 U	ng/L	DNR
		4,4'-DDE	0.77 U	ng/L	DNR
		4,4'-DDT	0.77 U	ng/L	DNR
		Aldrin	0.77 U	ng/L	DNR
		alpha-BHC	0.77 U	ng/L	DNR
		alpha-Chlordane	0.77 U	ng/L	DNR
		beta-BHC	0.77 U	ng/L	DNR
		delta-BHC	0.77 U	ng/L	DNR
		Dieldrin	0.77 U	ng/L	DNR
		Endosulfan I	0.77 U	ng/L	DNR
		Endosulfan II	0.77 U	ng/L	0.77 UJ
		Endosulfan Sulfate	0.77 U	ng/L	0.77 UJ
		Endrin	0.77 U	ng/L	DNR
		Endrin Aldehyde	0.77 U	ng/L	0.77 UJ
		Endrin Ketone	0.77 U	ng/L	0.77 UJ
		gamma-BHC (Lindane)	0.77 U	ng/L	DNR
		gamma-Chlordane	0.77 U	ng/L	DNR
		Heptachlor	0.77 U	ng/L	DNR
		Heptachlor Epoxide	0.77 U	ng/L	DNR
		Methoxychlor	0.77 U	ng/L	DNR
		Toxaphene	39 U	ng/L	DNR

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
99EA-1A	K0809344-003	2,4-Dimethylphenol	3.9 U	ug/L	3.9 UJ
		Benzoic Acid	1.7 J	ug/L	1.7 J
		Carbon Disulfide	0.50 U	ug/L	0.50 UJ
		Dichlorodifluoromethane	0.50 U	ug/L	0.50 UJ
		Diethyl Phthalate	0.019 J	ug/L	0.20 U
		Di-n-butyl Phthalate	0.042 J	ug/L	0.20 U
		Endosulfan II	0.49 U	ng/L	DNR
		Endosulfan Sulfate	0.49 U	ng/L	DNR
		Endrin Aldehyde	0.49 U	ng/L	DNR
		Endrin Ketone	0.49 U	ng/L	DNR
		Trichlorofluoromethane	0.50 U	ug/L	0.50 UJ
	K0809344-003RE	4,4'-DDD	0.72 U	ng/L	DNR
		4,4'-DDE	0.72 U	ng/L	DNR
		4,4'-DDT	0.72 U	ng/L	DNR
		Aldrin	0.72 U	ng/L	DNR
		alpha-BHC	0.72 U	ng/L	DNR
		alpha-Chlordane	0.72 U	ng/L	DNR
		beta-BHC	0.72 U	ng/L	DNR
		delta-BHC	0.72 U	ng/L	DNR
		Dieldrin	0.72 U	ng/L	DNR
		Endosulfan I	0.72 U	ng/L	DNR
		Endosulfan II	0.72 U	ng/L	0.72 UJ
		Endosulfan Sulfate	0.72 U	ng/L	0.72 UJ
		Endrin	0.72 U	ng/L	DNR
		Endrin Aldehyde	0.72 U	ng/L	0.72 UJ
		Endrin Ketone	0.72 U	ng/L	0.72 UJ
		gamma-BHC (Lindane)	0.72 U	ng/L	DNR
		gamma-Chlordane	0.72 U	ng/L	DNR
		Heptachlor	0.72 U	ng/L	DNR
		Heptachlor Epoxide	0.72 U	ng/L	DNR
		Methoxychlor	0.72 U	ng/L	DNR
		Toxaphene	36 U	ng/L	DNR

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
99EA-3A	K0809344-004	1,2,4-Trichlorobenzene (8260B)	2.0 U	ug/L	DNR
		1,2,4-Trichlorobenzene (8270C)	0.19 U	ug/L	0.19 UJ
		1,2-Dichlorobenzene (8260B)	0.50 U	ug/L	DNR
		1,2-Dichlorobenzene (8270C)	0.19 U	ug/L	0.19 UJ
		1,3-Dichlorobenzene (8260B)	0.50 U	ug/L	DNR
		1,3-Dichlorobenzene (8270C)	0.19 U	ug/L	0.19 UJ
		1,4-Dichlorobenzene (8260B)	0.50 U	ug/L	DNR
		1,4-Dichlorobenzene (8270C)	0.19 U	ug/L	0.19 UJ
		2,4,5-Trichlorophenol	0.48 U	ug/L	0.48 UJ
		2,4,6-Trichlorophenol	0.48 U	ug/L	0.48 UJ
		2,4-Dichlorophenol	0.48 U	ug/L	0.48 UJ
		2,4-Dimethylphenol	3.8 U	ug/L	3.8 UJ
		2,4-Dinitrophenol	3.8 U	ug/L	3.8 UJ
		2,4-Dinitrotoluene	0.19 U	ug/L	0.19 UJ
		2,6-Dinitrotoluene	0.19 U	ug/L	0.19 UJ
		2-Chloronaphthalene	0.19 U	ug/L	0.19 UJ
		2-Chlorophenol	0.48 U	ug/L	0.48 UJ
		2-Methyl-4,6-dinitrophenol	1.9 U	ug/L	1.9 UJ
		2-Methylnaphthalene	0.078 J	ug/L	0.078 J
		2-Methylphenol	0.48 U	ug/L	0.48 UJ
		2-Nitroaniline	0.19 U	ug/L	0.19 UJ
		2-Nitrophenol	0.48 U	ug/L	0.48 UJ
		3,3'-Dichlorobenzidine	1.9 U	ug/L	1.9 UJ
		3-Nitroaniline	0.95 U	ug/L	0.95 UJ
		4-Bromophenyl Phenyl Ether	0.19 U	ug/L	0.19 UJ
		4-Chloro-3-methylphenol	0.48 U	ug/L	0.48 UJ
		4-Chloroaniline	0.19 U	ug/L	0.19 UJ
		4-Chlorophenyl Phenyl Ether	0.19 U	ug/L	0.19 UJ
		4-Methylphenol	0.48 U	ug/L	0.48 UJ
		4-Nitroaniline	0.95 U	ug/L	0.95 UJ
		4-Nitrophenol	1.9 U	ug/L	1.9 UJ
		Acenaphthene	3.6	ug/L	3.6 J
		Acenaphthylene	0.19 U	ug/L	0.19 UJ
		Anthracene	0.24	ug/L	0.24 J
		Benz(a)anthracene	1.5	ug/L	1.5 J
		Benzene	0.012 J	ug/L	0.012 J
		Benzo(a)pyrene	1.9	ug/L	1.9 J
		Benzo(b)fluoranthene	2.8	ug/L	2.8 J
		Benzo(g,h,i)perylene	1.6	ug/L	1.6 J
		Benzo(k)fluoranthene	0.84	ug/L	0.84 J
		Benzoic Acid	1.8 J	ug/L	1.8 J
		Benzyl Alcohol	0.48 U	ug/L	0.48 UJ
		Bis(2-chloroethoxy)methane	0.19 U	ug/L	0.19 UJ
		Bis(2-chloroethyl) Ether	0.19 U	ug/L	0.19 UJ
		Bis(2-chloroisopropyl) Ether	0.19 U	ug/L	0.19 UJ
		Bis(2-ethylhexyl) Phthalate	0.14 J	ug/L	0.14 J
		Butyl Benzyl Phthalate	0.19 U	ug/L	0.19 UJ

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
99EA-3A	K0809344-004	Carbon Disulfide	0.50 U	ug/L	0.50 UJ
		Chloromethane	0.10 J	ug/L	0.50 U
		Chrysene	1.7	ug/L	1.7 J
		Dibenz(a,h)anthracene	0.38	ug/L	0.38 J
		Dibenzofuran	0.034 J	ug/L	0.034 J
		Dichlorodifluoromethane	0.50 U	ug/L	0.50 UJ
		Diethyl Phthalate	0.19 U	ug/L	0.19 UJ
		Dimethyl Phthalate	0.19 U	ug/L	0.19 UJ
		Di-n-butyl Phthalate	0.046 J	ug/L	0.19 U
		Di-n-octyl Phthalate	0.19 U	ug/L	0.19 UJ
		Endosulfan II	0.49 U	ng/L	0.49 UJ
		Endosulfan Sulfate	0.49 U	ng/L	0.49 UJ
		Endrin Aldehyde	0.49 U	ng/L	0.49 UJ
		Endrin Ketone	0.49 U	ng/L	0.49 UJ
		Fluoranthene	2.0	ug/L	2.0 J
		Fluorene	1.6	ug/L	1.6 J
		Hexachlorobenzene	0.19 U	ug/L	0.19 UJ
		Hexachlorobutadiene (8260B)	2.0 U	ug/L	DNR
		Hexachlorobutadiene (8270C)	0.19 U	ug/L	0.19 UJ
		Hexachlorocyclopentadiene	0.95 U	ug/L	0.95 UJ
		Hexachloroethane	0.19 U	ug/L	0.19 UJ
		Indeno(1,2,3-cd)pyrene	1.6	ug/L	1.6 J
		Isophorone	0.19 U	ug/L	0.19 UJ
		Naphthalene (8260B)	2.0 U	ug/L	DNR
		Naphthalene (8270C)	0.051 J	ug/L	0.051 J
		Nitrobenzene	0.19 U	ug/L	0.19 UJ
		N-Nitrosodi-n-propylamine	0.19 U	ug/L	0.19 UJ
		N-Nitrosodiphenylamine	0.19 U	ug/L	0.19 UJ
		Pentachlorophenol	0.95 U	ug/L	0.95 UJ
		Phenanthrene	0.78	ug/L	0.78 J
		Phenol	0.48 U	ug/L	0.48 UJ
		Pyrene	1.8	ug/L	1.8 J
		Toluene	0.050 J	ug/L	0.050 J
		Trichlorofluoromethane	0.50 U	ug/L	0.50 UJ

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-07	K0809344-005	2-Methylnaphthalene	0.027	ug/L	0.027 J
		Acenaphthene	0.066	ug/L	0.066 J
		Acenaphthylene	0.020 U	ug/L	0.020 UJ
		Anthracene	0.017 J	ug/L	0.017 J
		Benz(a)anthracene	0.0050 J	ug/L	0.0050 J
		Benzo(a)pyrene	0.020 U	ug/L	0.020 UJ
		Benzo(b)fluoranthene	0.020 U	ug/L	0.020 UJ
		Benzo(g,h,i)perylene	0.020 U	ug/L	0.020 UJ
		Benzo(k)fluoranthene	0.020 U	ug/L	0.020 UJ
		Chrysene	0.0049 J	ug/L	0.0049 J
		Dibenz(a,h)anthracene	0.020 U	ug/L	0.020 UJ
		Dibenzofuran	0.033	ug/L	0.033 J
		Fluoranthene	0.025	ug/L	0.025 J
		Fluorene	0.031	ug/L	0.031 J
		Indeno(1,2,3-cd)pyrene	0.020 U	ug/L	0.020 UJ
		Naphthalene	0.057	ug/L	0.057 J
		Phenanthrene	0.072	ug/L	0.072 J
		Pyrene	0.012 J	ug/L	0.012 J
AV-13	K0809344-006	2-Methylnaphthalene	0.0056 J	ug/L	0.0056 J
		Acenaphthylene	0.021 J	ug/L	0.021 J
		Fluorene	0.011 J	ug/L	0.011 J
		Hydrocarbon Degrading Bacteria	45,000	MPN/100mL	45,000 J
		Naphthalene	0.015 J	ug/L	0.015 J
		Phenanthrene	0.0077 J	ug/L	0.0077 J
		Pyrene	0.019 J	ug/L	0.019 J
AV-14	K0809344-007	2-Methylnaphthalene	0.0051 J	ug/L	0.0051 J
		Acenaphthylene	0.019 J	ug/L	0.019 J
		Fluoranthene	0.017 J	ug/L	0.017 J
		Fluorene	0.0093 J	ug/L	0.0093 J
		Hydrocarbon Degrading Bacteria	25,000	MPN/100mL	25,000 J
		Naphthalene	0.016 J	ug/L	0.016 J
		Phenanthrene	0.0081 J	ug/L	0.0081 J
		Pyrene	0.010 J	ug/L	0.010 J
TMW-08	K0809344-008	2-Methylnaphthalene	0.0046 J	ug/L	0.0046 J
		Acenaphthylene	0.015 J	ug/L	0.015 J
		Anthracene	0.015 J	ug/L	0.015 J
		Benz(a)anthracene	0.0053 J	ug/L	0.0053 J
		Benzo(b)fluoranthene	0.0036 J	ug/L	0.0036 J
		Chrysene	0.0046 J	ug/L	0.0046 J
		Fluoranthene	0.012 J	ug/L	0.012 J
		Fluorene	0.0041 J	ug/L	0.0041 J
		Naphthalene	0.011 J	ug/L	0.011 J
		Phenanthrene	0.0064 J	ug/L	0.0064 J
		Pyrene	0.0087 J	ug/L	0.0087 J

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-09	K0809344-009	2-Methylnaphthalene	0.0094 J	ug/L	0.0094 J
		Benz(a)anthracene	0.0045 J	ug/L	0.0045 J
		Chrysene	0.0051 J	ug/L	0.0051 J
		Fluoranthene	0.0057 J	ug/L	0.0057 J
		Naphthalene	0.015 J	ug/L	0.015 J
		Phenanthrene	0.0067 J	ug/L	0.0067 J
		Pyrene	0.0042 J	ug/L	0.0042 J
TMW-10	K0809344-010	2-Methylnaphthalene	0.0095 J	ug/L	0.0095 J
		Acenaphthylene	0.0037 J	ug/L	0.0037 J
		Anthracene	0.010 J	ug/L	0.010 J
		Fluoranthene	0.013 J	ug/L	0.013 J
		Naphthalene	0.018 J	ug/L	0.018 J
		Phenanthrene	0.0088 J	ug/L	0.0088 J
		Pyrene	0.010 J	ug/L	0.010 J
TMW-11	K0809344-011	Pentachlorophenol	0.99 U	ug/L	0.99 UJ
Trip Blank	K0809344-012	Carbon Disulfide	0.50 U	ug/L	0.50 UJ
		Chloromethane	0.10 J	ug/L	0.10 J
		Dichlorodifluoromethane	0.50 U	ug/L	0.50 UJ
		Trichlorofluoromethane	0.50 U	ug/L	0.50 UJ
AV-01	K0809344-013	2-Methylnaphthalene	0.0065 J	ug/L	0.0065 J
		Benz(a)anthracene	0.015 J	ug/L	0.015 J
		Benzo(a)pyrene	0.017 J	ug/L	0.017 J
		Benzo(b)fluoranthene	0.018 J	ug/L	0.018 J
		Benzo(g,h,i)perylene	0.012 J	ug/L	0.012 J
		Benzo(k)fluoranthene	0.0075 J	ug/L	0.0075 J
		Chrysene	0.010 J	ug/L	0.010 J
		Hydrocarbon Degrading Bacteria	5,500	MPN/100mL	5,500 J
		Indeno(1,2,3-cd)pyrene	0.012 J	ug/L	0.012 J
		Naphthalene	0.019 J	ug/L	0.019 J
		Pentachlorophenol	0.23 J	ug/L	0.23 J
		Phenanthrene	0.011 J	ug/L	0.011 J
AV-12	K0809344-014	Benz(a)anthracene	0.0077 J	ug/L	0.0077 J
		Benzo(a)pyrene	0.0081 J	ug/L	0.0081 J
		Benzo(b)fluoranthene	0.0095 J	ug/L	0.0095 J
		Benzo(g,h,i)perylene	0.0070 J	ug/L	0.0070 J
		Chrysene	0.0068 J	ug/L	0.0068 J
		Fluoranthene	0.0096 J	ug/L	0.0096 J
		Hydrocarbon Degrading Bacteria	9,740 J	MPN/100mL	9,740 J
		Indeno(1,2,3-cd)pyrene	0.0079 J	ug/L	0.0079 J
		Naphthalene	0.0067 J	ug/L	0.0067 J
		Pentachlorophenol	0.95 U	ug/L	0.95 UJ
		Phenanthrene	0.0091 J	ug/L	0.0091 J
		Pyrene	0.013 J	ug/L	0.013 J

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
AV-10	K0809344-015	Dibenz(a,h)anthracene	0.020 J	ug/L	0.020 J
		Hydrocarbon Degrading Bacteria	≥800000	MPN/100mL	≥800000 J
		Pentachlorophenol	0.80 J	ug/L	0.80 J
TMW-06	K0809344-016	2-Methylnaphthalene	0.0037 J	ug/L	0.0037 J
		Anthracene	0.0039 J	ug/L	0.0039 J
		Benz(a)anthracene	0.0063 J	ug/L	0.021 U
		Benzo(b)fluoranthene	0.0055 J	ug/L	0.021 U
		Benzo(g,h,i)perylene	0.0039 J	ug/L	0.021 U
		Chrysene	0.0062 J	ug/L	0.0062 J
		Fluoranthene	0.013 J	ug/L	0.013 J
		Fluorene	0.0092 J	ug/L	0.0092 J
		Indeno(1,2,3-cd)pyrene	0.0045 J	ug/L	0.021 U
		Naphthalene	0.018 J	ug/L	0.018 J
		Phenanthrene	0.015 J	ug/L	0.015 J
		Pyrene	0.011 J	ug/L	0.011 J
TMW-03	K0809344-017	2-Methylnaphthalene	0.022 J	ug/L	0.022 J
		Dibenzofuran	0.0073 J	ug/L	0.0073 J
		Pentachlorophenol	0.053 J	ug/L	0.053 J
		Phenanthrene	0.017 J	ug/L	0.017 J
TMW-13	K0809344-018	2-Methylnaphthalene	0.021 J	ug/L	0.021 J
		Dibenzofuran	0.0061 J	ug/L	0.0061 J
		Pentachlorophenol	0.056 J	ug/L	0.056 J
		Phenanthrene	0.015 J	ug/L	0.015 J
		Pyrene	0.0037 J	ug/L	0.0037 J
TMW-01	K0809344-019	2-Methylnaphthalene	0.013 J	ug/L	0.013 J
		Acenaphthylene	0.020 J	ug/L	0.020 J
		Dibenzofuran	0.012 J	ug/L	0.012 J
		Pyrene	0.0070 J	ug/L	0.0070 J
TMW-12	K0809344-020	2-Methylnaphthalene	0.011 J	ug/L	0.011 J
		Benz(a)anthracene	0.0054 J	ug/L	0.0054 J
		Dibenzofuran	0.0099 J	ug/L	0.0099 J
		Fluorene	0.013 J	ug/L	0.013 J
		Pentachlorophenol	0.046 J	ug/L	0.046 J
		Pyrene	0.021 J	ug/L	0.021 J

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

October 15, 2008 Analytical Report for Service Request No: K0809222

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview/33751076.00030

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on September 23, 2008. For your reference, these analyses have been assigned our service request number K0809222.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0809222
Project:	IP Longview	**Date Received:**	9/23/08
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Five water samples were received for analysis at Columbia Analytical Services on 9/23/08. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel and Residual Range Organics in sample Batch QC is not applicable because the analyte concentration was less than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: Indeno(1,2,3-cd)pyrene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Elevated Method Reporting Limits:
Sample 97-5A required a dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

Approved by EMW **Date** 10/17/08

Columbia Analytical Services INC.
An Employee - Owned Company

CHAIN OF CUSTODY

SR#: K0804221

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE 1 OF 1 COC #

PROJECT NAME IP LONGVIEW
PROJECT NUMBER 33751076.00030
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS 1501 4TH AVE.
SUITE 1400
CITY/STATE/ZIP SEATTLE WA
E-MAIL ADDRESS PAUL_KALINA@URSCORP.COM
PHONE # 206 438 2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ Diesel☒ Oil☐ BTEX☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☑ 8270C SHORT LIST	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐	506☐				REMARKS
97-1A	9/22/08	1410		GW	3				X						X										
97-3A	↓	1445		↓	3				X						X										
97-5A	↓	1710		↓	3				X						X										
97-6B	↓			↓	3				X						X										
LL-01.15	↓	1545		↓	3				X						X										

REPORT REQUIREMENTS

- __ I. Routine Report: Method Blank, Surrogate, as required
- __ II. Report Dup., MS, MSD as required
- __ III. Data Validation Report (includes all raw data)
- __ IV. CLP Deliverable Report
- __ V. EDD

INVOICE INFORMATION

P.O. #
Bill To:

TURNAROUND REQUIREMENTS

__ 24 hr. __ 48 hr.
__ 5 Day
X Standard (10-15 working days)
__ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature Date/Time 9/22/08	Signature Rosa Ma Romero Date/Time 9/22/08 18:35	Signature Rosa Ma Romero Date/Time 9/22/08 18:40	Signature Date/Time 9/23/08 0800
Printed Name IAN V Firm URS	Printed Name ROSA ROMERO Firm CAS	Printed Name ROSA ROMERO Firm CAS	Printed Name [illegible] Firm CAS

RCOC #1 06/03

Cooler Receipt and Preservation Form

lient / Project: URI Service Request K08 09225

eceived: 9/23/08 Opened: 9/23/08 By: BI

. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]

. Samples were received in: (circle) [✓ Cooler] Box Envelope Other______ NA

. Were custody seals on coolers? [✓ NA] Y N If yes, how many and where?______

If present, were custody seals intact? Y N If present, were they signed and dated? Y N

. Is shipper's air-bill filed? If not, record air-bill number:______ [✓ NA] Y N

. Temperature of cooler(s) upon receipt (°C): 0.1

Temperature Blank (°C): 4.9

. If applicable, list Chain of Custody Numbers:______

. Packing material used. Inserts Baggies Bubble Wrap Gel Packs Wet Ice Sleeves Other______

. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N

. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N

0. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N

1. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N

2. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N

3. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N

4. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N

5. Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection? [✓ NA] Y N

6. Was Cl2/Res negative? NA [✓ Y] N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

*dditional Notes, Discrepancies, & Resolutions:*______

Client: URS Corporation
Project: IP Longview/33751076.00030
Sample Matrix: Water

Service Request: K0809222

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
97-1A	K0809222-001	69	80
97-3A	K0809222-002	75	82
97-5A	K0809222-003	73	81
97-6B	K0809222-004	77	82
LL-01.15	K0809222-005	81	85
Batch QCDUP	KWG0810361-1	71	78
Method Blank	KWG0810361-4	73	80
Batch QC	K0809333-001	70	78
Lab Control Sample	KWG0810361-2	74	75
Duplicate Lab Control Sample	KWG0810361-3	75	78

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation		**Service Request:**	K0809222
Project:	IP Longview/33751076.00030		**Date Collected:**	NA
Sample Matrix:	Aqueous equip b		**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank		**Units:**	ug/L
Lab Code:	KWG0810361-4		**Basis:**	NA
Extraction Method:	EPA 3510C		**Level:**	Low
Analysis Method:	NWTPH-Dx			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**32**	J	500	19	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	50-150	10/03/08	Acceptable
n-Triacontane	80	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0809222
Project:	IP Longview/33751076.00030		**Date Collected:**	09/22/2008
Sample Matrix:	Water		**Date Received:**	09/23/2008

Diesel and Residual Range Organics

Sample Name:	97-1A		**Units:**	ug/L
Lab Code:	K0809222-001		**Basis:**	NA
Extraction Method:	EPA 3510C		**Level:**	Low
Analysis Method:	NWTPH-Dx			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	17	J	250	11	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	33	J	500	19	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	10/03/08	Acceptable
n-Triacontane	80	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Collected:**	09/22/2008
Sample Matrix:	Water	**Date Received:**	09/23/2008

Diesel and Residual Range Organics

Sample Name:	97-3A	**Units:**	ug/L
Lab Code:	K0809222-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	75	J	250	11	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	55	J	500	19	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	75	50-150	10/03/08	Acceptable
n-Triacontane	82	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0809222
Project:	IP Longview/33751076.00030		**Date Collected:**	09/22/2008
Sample Matrix:	Water		**Date Received:**	09/23/2008

Diesel and Residual Range Organics

Sample Name:	97-5A		**Units:**	ug/L
Lab Code:	K0809222-003		**Basis:**	NA
Extraction Method:	EPA 3510C		**Level:**	Low
Analysis Method:	NWTPH-Dx			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	77	J	250	11	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**62**	J	500	19	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	50-150	10/03/08	Acceptable
n-Triacontane	81	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0809222
Project:	IP Longview/33751076.00030		**Date Collected:**	09/22/2008
Sample Matrix:	Water		**Date Received:**	09/23/2008

Diesel and Residual Range Organics

Sample Name:	97-6B		**Units:**	ug/L
Lab Code:	K0809222-004		**Basis:**	NA
Extraction Method:	EPA 3510C		**Level:**	Low
Analysis Method:	NWTPH-Dx			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**390**	Y	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**260**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	77	50-150	10/03/08	Acceptable
n-Triacontane	82	50-150	10/03/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Collected:**	09/22/2008
Sample Matrix:	Water	**Date Received:**	09/23/2008

Diesel and Residual Range Organics

Sample Name:	LL-01.15	**Units:**	ug/L
Lab Code:	K0809222-005	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**300**	Z	270	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**550**	Z	530	21	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	81	50-150	10/03/08	Acceptable
n-Triacontane	85	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Extracted:**	10/02/2008
Sample Matrix:	Aqueous equip b	**Date Analyzed:**	10/04/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809333-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0810361

Analyte Name	**MRL**	**MDL**	**Sample Result**	Batch QCDUP KWG0810361-1 **Duplicate Sample** **Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	250	11	49	38	44	25 #	30
Residual Range Organics (RRO)	500	19	36	32	34	13 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Extracted:**	10/02/2008
Sample Matrix:	Aqueous equip b	**Date Analyzed:**	10/03/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810361

	Lab Control Sample KWG0810361-2 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810361-3 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	2210	3200	69	2240	3200	70	55-132	1	30
Residual Range Organics (RRO)	1190	1600	74	1240	1600	78	54-141	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030		
Sample Matrix:	Water		

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	PERCENT
Analysis Method:	8270C SIM	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
97-1A	K0809222-001	65	67	79
97-3A	K0809222-002	61	61	66
97-5A	K0809222-003	61	63	72
97-6B	K0809222-004	73	75	94
LL-01.15	K0809222-005	54	69	76
Method Blank	KWG0810124-4	80	79	93
Batch QC	K0809270-017	78	79	94
Batch QCMS	KWG0810124-1	67	70	72
Batch QCDMS	KWG0810124-2	54	58	59
Lab Control Sample	KWG0810124-3	59	60	64

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	39-122
Sur2 = Fluoranthene-d10	36-132
Sur3 = Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810124-4	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	09/29/08	10/03/08	KWG0810124	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	09/29/08	10/03/08	KWG0810124	
Dibenzofuran	ND	U	0.019	0.0046	1	09/29/08	10/03/08	KWG0810124	
Benz(a)anthracene	ND	U	0.019	0.0026	1	09/29/08	10/03/08	KWG0810124	
Chrysene	ND	U	0.019	0.0034	1	09/29/08	10/03/08	KWG0810124	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	09/29/08	10/03/08	KWG0810124	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	09/29/08	10/03/08	KWG0810124	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	09/29/08	10/03/08	KWG0810124	
Indeno(1,2,3-cd)pyrene	**0.0047**	J	0.019	0.0026	1	09/29/08	10/03/08	KWG0810124	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	39-122	10/03/08	Acceptable
Fluoranthene-d10	79	36-132	10/03/08	Acceptable
Terphenyl-d14	93	31-140	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Collected:**	09/22/2008
Sample Matrix:	Water	**Date Received:**	09/23/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	97-1A	**Units:**	ug/L
Lab Code:	K0809222-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	09/29/08	10/04/08	KWG0810124	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	09/29/08	10/04/08	KWG0810124	
Dibenzofuran	ND	U	0.019	0.0046	1	09/29/08	10/04/08	KWG0810124	
Benz(a)anthracene	ND	U	0.019	0.0026	1	09/29/08	10/04/08	KWG0810124	
Chrysene	ND	U	0.019	0.0034	1	09/29/08	10/04/08	KWG0810124	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	09/29/08	10/04/08	KWG0810124	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	09/29/08	10/04/08	KWG0810124	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	09/29/08	10/04/08	KWG0810124	
Indeno(1,2,3-cd)pyrene	ND	U	0.019	0.0026	1	09/29/08	10/04/08	KWG0810124	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	65	39-122	10/04/08	Acceptable
Fluoranthene-d10	67	36-132	10/04/08	Acceptable
Terphenyl-d14	79	31-140	10/04/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Collected:**	09/22/2008
Sample Matrix:	Water	**Date Received:**	09/23/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	97-3A	**Units:**	ug/L
Lab Code:	K0809222-002	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.0046**	J	0.019	0.0030	1	09/29/08	10/03/08	KWG0810124	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	09/29/08	10/03/08	KWG0810124	
Dibenzofuran	ND	U	0.019	0.0046	1	09/29/08	10/03/08	KWG0810124	
Benz(a)anthracene	ND	U	0.019	0.0026	1	09/29/08	10/03/08	KWG0810124	
Chrysene	ND	U	0.019	0.0034	1	09/29/08	10/03/08	KWG0810124	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	09/29/08	10/03/08	KWG0810124	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	09/29/08	10/03/08	KWG0810124	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	09/29/08	10/03/08	KWG0810124	
Indeno(1,2,3-cd)pyrene	ND	U	0.019	0.0026	1	09/29/08	10/03/08	KWG0810124	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	39-122	10/03/08	Acceptable
Fluoranthene-d10	61	36-132	10/03/08	Acceptable
Terphenyl-d14	66	31-140	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Collected:**	09/22/2008
Sample Matrix:	Water	**Date Received:**	09/23/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	97-5A	**Units:**	ug/L
Lab Code:	K0809222-003	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**10**	D	0.040	0.0060	2	09/29/08	10/08/08	KWG0810124	
2-Methylnaphthalene	**0.025**		0.020	0.0023	1	09/29/08	10/03/08	KWG0810124	
Dibenzofuran	**0.0094**	J	0.020	0.0046	1	09/29/08	10/03/08	KWG0810124	
Benz(a)anthracene	**0.042**		0.020	0.0026	1	09/29/08	10/03/08	KWG0810124	
Chrysene	**0.049**		0.020	0.0034	1	09/29/08	10/03/08	KWG0810124	
Benzo(b)fluoranthene	**0.068**		0.020	0.0023	1	09/29/08	10/03/08	KWG0810124	
Benzo(k)fluoranthene	**0.025**		0.020	0.0025	1	09/29/08	10/03/08	KWG0810124	
Benzo(a)pyrene	**0.051**		0.020	0.0043	1	09/29/08	10/03/08	KWG0810124	
Indeno(1,2,3-cd)pyrene	**0.048**		0.020	0.0026	1	09/29/08	10/03/08	KWG0810124	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	39-122	10/03/08	Acceptable
Fluoranthene-d10	63	36-132	10/03/08	Acceptable
Terphenyl-d14	72	31-140	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Collected:**	09/22/2008
Sample Matrix:	Water	**Date Received:**	09/23/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	97-6B	**Units:**	ug/L
Lab Code:	K0809222-004	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.060**		0.019	0.0030	1	09/29/08	10/03/08	KWG0810124	
2-Methylnaphthalene	**0.0089**	J	0.019	0.0023	1	09/29/08	10/03/08	KWG0810124	
Dibenzofuran	**0.0096**	J	0.019	0.0046	1	09/29/08	10/03/08	KWG0810124	
Benz(a)anthracene	**0.44**		0.019	0.0026	1	09/29/08	10/03/08	KWG0810124	
Chrysene	**0.54**		0.019	0.0034	1	09/29/08	10/03/08	KWG0810124	
Benzo(b)fluoranthene	**0.70**		0.019	0.0023	1	09/29/08	10/03/08	KWG0810124	
Benzo(k)fluoranthene	**0.23**		0.019	0.0025	1	09/29/08	10/03/08	KWG0810124	
Benzo(a)pyrene	**0.55**		0.019	0.0043	1	09/29/08	10/03/08	KWG0810124	
Indeno(1,2,3-cd)pyrene	**0.53**		0.019	0.0026	1	09/29/08	10/03/08	KWG0810124	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	39-122	10/03/08	Acceptable
Fluoranthene-d10	75	36-132	10/03/08	Acceptable
Terphenyl-d14	94	31-140	10/03/08	Acceptable

Comments:

Analytical Results

Client: URS Corporation
Project: IP Longview/33751076.00030
Sample Matrix: Water

Service Request: K0809222
Date Collected: 09/22/2008
Date Received: 09/23/2008

Polynuclear Aromatic Hydrocarbons

Sample Name: LL-01.15
Lab Code: K0809222-005

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.13**		0.020	0.0030	1	09/29/08	10/03/08	KWG0810124	
2-Methylnaphthalene	**0.0040**	J	0.020	0.0023	1	09/29/08	10/03/08	KWG0810124	
Dibenzofuran	ND	U	0.020	0.0046	1	09/29/08	10/03/08	KWG0810124	
Benz(a)anthracene	**0.0079**	J	0.020	0.0026	1	09/29/08	10/03/08	KWG0810124	
Chrysene	**0.0053**	J	0.020	0.0034	1	09/29/08	10/03/08	KWG0810124	
Benzo(b)fluoranthene	**0.0055**	J	0.020	0.0023	1	09/29/08	10/03/08	KWG0810124	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	09/29/08	10/03/08	KWG0810124	
Benzo(a)pyrene	ND	U	0.020	0.0043	1	09/29/08	10/03/08	KWG0810124	
Indeno(1,2,3-cd)pyrene	**0.0028**	J	0.020	0.0026	1	09/29/08	10/03/08	KWG0810124	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	54	39-122	10/03/08	Acceptable
Fluoranthene-d10	69	36-132	10/03/08	Acceptable
Terphenyl-d14	76	31-140	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809222
Project:	IP Longview/33751076.00030	**Date Extracted:**	09/29/2008
Sample Matrix:	Water	**Date Analyzed:**	10/03/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809270-017	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0810124

		Batch QCMS KWG0810124-1 Matrix Spike			Batch QCDMS KWG0810124-2 Duplicate Matrix Spike					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.0033	2.00	2.36	85	2.31	2.43	95	41-119	14	30
2-Methylnaphthalene	ND	2.16	2.36	91	2.47	2.43	102	34-118	14	30
Dibenzofuran	ND	2.27	2.36	96	2.54	2.43	105	43-126	11	30
Benz(a)anthracene	ND	2.26	2.36	96	2.54	2.43	105	37-131	12	30
Chrysene	ND	2.24	2.36	95	2.53	2.43	104	44-131	12	30
Benzo(b)fluoranthene	ND	2.19	2.36	93	2.53	2.43	104	29-145	14	30
Benzo(k)fluoranthene	ND	2.28	2.36	96	2.67	2.43	110	33-143	16	30
Benzo(a)pyrene	ND	2.35	2.36	100	2.65	2.43	109	23-137	12	30
Indeno(1,2,3-cd)pyrene	0.0065	2.19	2.36	93	2.48	2.43	102	25-144	12	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client:	URS Corporation		**Service Request:**	K0809222
Project:	IP Longview/33751076.00030		**Date Extracted:**	09/29/2008
Sample Matrix:	Water		**Date Analyzed:**	10/03/2008

Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C		**Units:**	ug/L
Analysis Method:	8270C SIM		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0810124

	Lab Control Sample KWG0810124-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Naphthalene	2.18	2.50	87	49-108
2-Methylnaphthalene	2.45	2.50	98	40-113
Dibenzofuran	2.65	2.50	106	59-114
Benz(a)anthracene	2.56	2.50	102	55-118
Chrysene	2.51	2.50	100	61-119
Benzo(b)fluoranthene	2.48	2.50	99	57-124
Benzo(k)fluoranthene	2.56	2.50	102	65-121
Benzo(a)pyrene	2.63	2.50	105	44-122
Indeno(1,2,3-cd)pyrene	2.52	2.50	101	44-132

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

January 5, 2009

Analytical Report for Service Request No: K0809281

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview

Dear Paul:

Enclosed is the revised report for the samples submitted to our laboratory on September 24, 2008. For your reference, these analyses have been assigned our service request number K0809281.

The Case Narrative was revised by adding comments regarding the bacterial testing. Sample AV-09 for Hydrocarbon Degrading Bacteria was corrected to 800,000 MPN/100mL. The PAHs and PAHs plus Pentachlorophenol were re-reported using statistical control limits for the surrogates. The corrected hardcopy pages are attached. The PDF and EDD have been revised and the corrected pages have been inserted in the original PDF file.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/afs

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0809281
Project:	IP Longview	**Date Received:**	9/24/08
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Ten water samples were received for analysis at Columbia Analytical Services on 9/12/03. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Heterotrophic Plate Count
The Relative Percent Difference (RPD) control limits for the replicate analysis are not applicable because microbiological analyses are not subject to the same precision as other analytical tests. No corrective action was needed.

Hydrocarbon Degrading Bacteria
The RPD for the duplicate measurement is not applicable. However the range of the results is beyond the 95% Confidence Interval for MPN tests suggesting that the sample was not uniform due to clumping of bacteria. Since the test takes 28 days, no further corrective action was possible.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel and Residual Range Organics in sample Batch QC is not applicable because the analyte concentration was less than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons and Pentachlorophenol by EPA Method 8270C SIM

Elevated Method Reporting Limits:
The reporting limit is elevated for Phenanthrene in sample AV-03. The chromatogram indicated the presence of non-target background components. The matrix interference prevented adequate resolution of the target compound at the reporting limit. The result is flagged to indicate the matrix interference.

Several samples required a dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

Approved by Emw **Date** 1/2/09

The reporting limit is elevated for samples AV-02. The sample extract was diluted prior to instrumental analysis due to relatively high levels of non-target background components. The extract was highly colored and viscous, which indicated the need to perform a dilution prior to injection into the instrument. Clean-up of the extract was performed within the scope of the method, but did not eliminate enough of the background components to prevent dilution.

Internal Standard Exceptions:

The internal standard recovery of Acenaphthene-d10 in sample AV-02 was outside control criteria because of matrix interference. The sample was re-analyzed at a dilution to reduce the matrix interferences. The MRls for the associated analytes are elevated to reflect the dilution.

Initial Calibration Exceptions:

The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: 2,4,6-Tribromophenol, Pentachlorophenol, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

No anomalies with the analysis of these samples were observed.

Semivolatile Organics by EPA Method 8270C

Lab Control Sample Exceptions:

The upper control criterion was exceeded for the following analytes in the replicate Laboratory Control Samples (LCS/DLCS) KWG0810258-1 and KWG0810258-2. The analytes in question were not detected in the associated field samples. The error associated with elevated recovery equates to a high bias. The sample data is not significantly affected. No further corrective action was appropriate.

Relative Percent Difference Exceptions:

The Relative Percent Difference (RPD) for the following analytes in the replicate Laboratory Control Sample (LCS) analyses (KWG0810258-1 and KWG0810258-2) was outside control criteria: Benzoic Acid, 2,4-Dinitrophenol. All spike recoveries for the analytes in question were within acceptance limits in the LCS/DLCS, indicating the analytical batch was in control. No further corrective action was appropriate.

Sample Notes and Discussion

Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by____________________ **Date** 1/2/09

Columbia Analytical Services INC.
An Employee - Owned Company

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

CHAIN OF CUSTODY

SR#: K0809281

PAGE 1 OF 1 COC #

PROJECT NAME IP LONGVIEW
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS 1501 4TH AVE
SUITE 1400
CITY/STATE/ZIP SEATTLE WA 98101
E-MAIL ADDRESS PAULKALINA@URSCORP.COM
PHONE # 206 438 2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ Diesel☒ Oil☐ BTEX☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒ 8270C SIM	Metals, Total or Dissolved (See list below)	Cyanide☐	pH, Cond., Cl, [✓ SO4], PO4, F, NO2, NO3, BOD, TSS, TDS (circle) Hex-Chrom☐	NH3-N, COD, [✓ Total-P], TKN, [✓ TOC], DOC (circle) [✓ NO2+NO3]	TOX 9020☐ AOX 1650☐ 506☐	PAHs (PCP)	HDB/HPC			REMARKS
AV-11	9/23/08	1700	1	GW	7			X						X			X	X		X	X			
AV-02	~~[illegible]~~	1200	2		7			X						X			X	X		X	X			
AV-08	~~[illegible]~~	1045	3		7			X						X			X	X		X	X			
04-6A		0920	4		3			X						X										
97-6C		0900	5		3			X						X										
AV-09		1445	6		7			X						X			X	X		X	X			
TMW-02		1345	7		3			X						X						X				
TMW-05		1730	8		3			X						X						~~X~~				No PCP
TMW-04		1810	9		3			X						X						X				
99 EA3A		1550	10		7			X						X			X	X		X	X			

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ___
Bill To: ___

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
___
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:___ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature	Signature Rosa Ma Romero	Signature Rosa Ma Romero	Signature
Date/Time 9/23/08	Date/Time 9/23/08 18:45	Date/Time 9/23/08 19:10	Date/Time 9/24/08 0800
Printed Name IAN V.	Printed Name Rosa Romero	Printed Name ROSA Romero.	Printed Name [illegible]
Firm URS	Firm CAS	Firm CAS.	Firm CAS

RCOC #1 06/03

PC ED

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

lient / Project: URS Service Request K08 09281

eceived: 9/23/08 Opened: 9/24/08 By:

SHORT HOLD TIME

Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]

Samples were received in: (circle) [✓ Cooler] Box Envelope Other______ NA

Were custody seals on coolers? [✓ NA] Y N If yes, how many and where?______

If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Is shipper's air-bill filed? If not, record air-bill number:______ [✓ NA] Y N

Temperature of cooler(s) upon receipt (°C):	4.3	3.2	1.2	
Temperature Blank (°C):	3.6	2.9	3.3	
If applicable, list Chain of Custody Numbers:				

Packing material used. Inserts Baggies Bubble Wrap Gel Packs [✓ Wet Ice] Sleeves Other______

Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N

Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N

0. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N

1. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N

2. Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N

3. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N

4. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N

5. Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection? [✓ NA] Y N

5. Was Cl2/Res negative? NA [✓ Y] N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

*dditional Notes, Discrepancies, & Resolutions:*______

Page 1 of: 1 2

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	PERCENT
Analysis Method:	NWTPH-Dx	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
AV-11	K0809281-001	70	79
AV-02	K0809281-002	133	81
AV-08	K0809281-003	79	83
04-6A	K0809281-004	81	82
97-6C	K0809281-005	85	84
AV-09	K0809281-006	79	88
TMW-02	K0809281-007	68	78
TMW-05	K0809281-008	70	79
TMW-04	K0809281-009	72	82
99EA3A	K0809281-010	69	78
Batch QCDUP	KWG0810361-1	71	78
Method Blank	KWG0810361-4	73	80
Batch QC	K0809333-001	70	78
Lab Control Sample	KWG0810361-2	74	75
Duplicate Lab Control Sample	KWG0810361-3	75	78

Surrogate Recovery Control Limits (%)

Sur1 =	o-Terphenyl	50-150
Sur2 =	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Aqueous equip b	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810361-4	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**32**	J	500	19	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	73	50-150	10/03/08	Acceptable
n-Triacontane	80	50-150	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	AV-11	**Units:**	ug/L
Lab Code:	K0809281-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Metbod:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**12**	J	270	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**32**	J	530	21	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	10/03/08	Acceptable
n-Triacontane	79	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	AV-02	**Units:**	ug/L
Lab Code:	K0809281-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Metbod:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**14000**	Y	270	12	1	10/02/08	10/04/08	KWG0810361	
Residual Range Organics (RRO)	**1200**	L	530	21	1	10/02/08	10/04/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	133	50-150	10/04/08	Acceptable
n-Triacontane	81	50-150	10/04/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	AV-08	**Units:**	ug/L
Lab Code:	K0809281-003	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**940**	Y	270	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**130**	J	530	21	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	10/03/08	Acceptable
n-Triacontane	83	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	04-6A	**Units:**	ug/L
Lab Code:	K0809281-004	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1100**	Y	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**220**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	81	50-150	10/03/08	Acceptable
n-Triacontane	82	50-150	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	97-6C	**Units:**	ug/L
Lab Code:	K0809281-005	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1100**	Y	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**210**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	85	50-150	10/03/08	Acceptable
n-Triacontane	84	50-150	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	AV-09	**Units:**	ug/L
Lab Code:	K0809281-006	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**32**	J	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**67**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	10/03/08	Acceptable
n-Triacontane	88	50-150	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	TMW-02	**Units:**	ug/L
Lab Code:	K0809281-007	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**160**	J	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**89**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	68	50-150	10/03/08	Acceptable
n-Triacontane	78	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	TMW-05	**Units:**	ug/L
Lab Code:	K0809281-008	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**19**	J	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**49**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	10/03/08	Acceptable
n-Triacontane	79	50-150	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	TMW-04	**Units:**	ug/L
Lab Code:	K0809281-009	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**130**	J	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**100**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	10/03/08	Acceptable
n-Triacontane	82	50-150	10/03/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Diesel and Residual Range Organics

Sample Name:	99EA3A	**Units:**	ug/L
Lab Code:	K0809281-010	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**120**	J	260	12	1	10/02/08	10/03/08	KWG0810361	
Residual Range Organics (RRO)	**85**	J	520	20	1	10/02/08	10/03/08	KWG0810361	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	69	50-150	10/03/08	Acceptable
n-Triacontane	78	50-150	10/03/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Extracted:**	10/02/2008
Sample Matrix:	Aqueous equip b	**Date Analyzed:**	10/04/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809333-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0810361

				Batch QCDUP KWG0810361-1 **Duplicate Sample**			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	250	11	49	38	44	25 #	30
Residual Range Organics (RRO)	500	19	36	32	34	13 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Extracted:**	10/02/2008
Sample Matrix:	Aqueous equip b	**Date Analyzed:**	10/03/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810361

	Lab Control Sample KWG0810361-2 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810361-3 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	2210	3200	69	2240	3200	70	55-132	1	30
Residual Range Organics (RRO)	1190	1600	74	1240	1600	78	54-141	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	PERCENT
Analysis Method:	8270C SIM	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
04-6A	K0809281-004	69	79	82
97-6C	K0809281-005	75	80	91
TMW-05	K0809281-008	101	103	121
Method Blank	KWG0810232-3	84	89	101
Lab Control Sample	KWG0810232-1	70	70	76
Duplicate Lab Control Sample	KWG0810232-2	83	85	96

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	39-122
Sur2 = Fluoranthene-d10	36-132
Sur3 = Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	PERCENT
Analysis Method:	8270C SIM	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4
AV-11	K0809281-001	73	69	72	85
AV-02	K0809281-002	102 D	75 D	111 D	66 D
AV-08	K0809281-003	54	66	89	106
AV-09	K0809281-006	74	81	73	86
TMW-02	K0809281-007	82	99	79	90
TMW-04	K0809281-009	90	105	87	98
Method Blank	KWG0810227-4	100	102	101	114
Batch QC	K0809295-001	82	95	81	95
Batch QCMS	KWG0810227-1	76	89	76	84
Batch QCDMS	KWG0810227-2	78	92	82	88
Lab Control Sample	KWG0810227-3	77	71	81	86

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	39-122
Sur2 = 2,4,6-Tribromophenol	10-177
Sur3 = Fluoranthene-d10	36-132
Sur4 = Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810227-4	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	09/30/08	10/11/08	KWG0810227	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	09/30/08	10/11/08	KWG0810227	
Acenaphthylene	ND	U	0.019	0.0034	1	09/30/08	10/11/08	KWG0810227	
Acenaphthene	ND	U	0.019	0.0044	1	09/30/08	10/11/08	KWG0810227	
Dibenzofuran	ND	U	0.019	0.0046	1	09/30/08	10/11/08	KWG0810227	
Fluorene	ND	U	0.019	0.0038	1	09/30/08	10/11/08	KWG0810227	
Pentachlorophenol	ND	U	0.95	0.017	1	09/30/08	10/11/08	KWG0810227	
Phenanthrene	ND	U	0.019	0.0050	1	09/30/08	10/11/08	KWG0810227	
Anthracene	ND	U	0.019	0.0036	1	09/30/08	10/11/08	KWG0810227	
Fluoranthene	ND	U	0.019	0.0044	1	09/30/08	10/11/08	KWG0810227	
Pyrene	ND	U	0.019	0.0035	1	09/30/08	10/11/08	KWG0810227	
Benz(a)anthracene	ND	U	0.019	0.0026	1	09/30/08	10/11/08	KWG0810227	
Chrysene	ND	U	0.019	0.0034	1	09/30/08	10/11/08	KWG0810227	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	09/30/08	10/11/08	KWG0810227	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	09/30/08	10/11/08	KWG0810227	
Indeno(1,2,3-cd)pyrene	ND	U	0.019	0.0026	1	09/30/08	10/11/08	KWG0810227	
Dibenz(a,h)anthracene	ND	U	0.019	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(g,h,i)perylene	ND	U	0.019	0.0029	1	09/30/08	10/11/08	KWG0810227	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	100	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	102	10-177	10/11/08	Acceptable
Fluoranthene-d10	101	36-132	10/11/08	Acceptable
Terphenyl-d14	114	31-140	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810232-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.0071**	J	0.019	0.0030	1	09/30/08	10/17/08	KWG0810232	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	09/30/08	10/17/08	KWG0810232	
Dibenzofuran	ND	U	0.019	0.0046	1	09/30/08	10/17/08	KWG0810232	
Benz(a)anthracene	ND	U	0.019	0.0026	1	09/30/08	10/17/08	KWG0810232	
Chrysene	ND	U	0.019	0.0034	1	09/30/08	10/17/08	KWG0810232	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	09/30/08	10/17/08	KWG0810232	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	09/30/08	10/17/08	KWG0810232	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	09/30/08	10/17/08	KWG0810232	
Indeno(1,2,3-cd)pyrene	**0.0042**	J	0.019	0.0026	1	09/30/08	10/17/08	KWG0810232	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	84	39-122	10/17/08	Acceptable
Fluoranthene-d10	89	36-132	10/17/08	Acceptable
Terphenyl-d14	101	31-140	10/17/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-11	**Units:**	ug/L
Lab Code:	K0809281-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.0033**	J	0.019	0.0030	1	09/30/08	10/11/08	KWG0810227	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	09/30/08	10/11/08	KWG0810227	
Acenaphthylene	ND	U	0.019	0.0034	1	09/30/08	10/11/08	KWG0810227	
Acenaphthene	ND	U	0.019	0.0044	1	09/30/08	10/11/08	KWG0810227	
Dibenzofuran	ND	U	0.019	0.0046	1	09/30/08	10/11/08	KWG0810227	
Fluorene	ND	U	0.019	0.0038	1	09/30/08	10/11/08	KWG0810227	
Pentachlorophenol	ND	U	0.95	0.017	1	09/30/08	10/11/08	KWG0810227	
Phenanthrene	ND	U	0.019	0.0050	1	09/30/08	10/11/08	KWG0810227	
Anthracene	ND	U	0.019	0.0036	1	09/30/08	10/11/08	KWG0810227	
Fluoranthene	**0.0050**	J	0.019	0.0044	1	09/30/08	10/11/08	KWG0810227	
Pyrene	**0.0057**	J	0.019	0.0035	1	09/30/08	10/11/08	KWG0810227	
Benz(a)anthracene	**0.0061**	J	0.019	0.0026	1	09/30/08	10/11/08	KWG0810227	
Chrysene	**0.0040**	J	0.019	0.0034	1	09/30/08	10/11/08	KWG0810227	
Benzo(b)fluoranthene	**0.0054**	J	0.019	0.0023	1	09/30/08	10/11/08	KWG0810227	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(a)pyrene	**0.0044**	J	0.019	0.0043	1	09/30/08	10/11/08	KWG0810227	
Indeno(1,2,3-cd)pyrene	**0.0043**	J	0.019	0.0026	1	09/30/08	10/11/08	KWG0810227	
Dibenz(a,h)anthracene	ND	U	0.019	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(g,h,i)perylene	**0.0045**	J	0.019	0.0029	1	09/30/08	10/11/08	KWG0810227	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	69	10-177	10/11/08	Acceptable
Fluoranthene-d10	72	36-132	10/11/08	Acceptable
Terphenyl-d14	85	31-140	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-02	**Units:**	ug/L
Lab Code:	K0809281-002	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**46**	D	0.10	0.015	5	09/30/08	10/15/08	KWG0810227	
2-Methylnaphthalene	**0.94**	D	0.10	0.012	5	09/30/08	10/15/08	KWG0810227	
Acenaphthylene	**1.3**	D	1.0	0.17	50	09/30/08	10/12/08	KWG0810227	
Acenaphthene	**25**	D	1.0	0.22	50	09/30/08	10/12/08	KWG0810227	
Dibenzofuran	**24**	D	1.0	0.23	50	09/30/08	10/12/08	KWG0810227	
Fluorene	**17**	D	1.0	0.19	50	09/30/08	10/12/08	KWG0810227	
Pentachlorophenol	ND	U	50	0.85	50	09/30/08	10/12/08	KWG0810227	
Phenanthrene	ND	Ui	0.19	0.19	5	09/30/08	10/15/08	KWG0810227	
Anthracene	**4.1**	D	0.10	0.018	5	09/30/08	10/15/08	KWG0810227	
Fluoranthene	**6.1**	D	0.10	0.022	5	09/30/08	10/15/08	KWG0810227	
Pyrene	**2.3**	D	0.10	0.018	5	09/30/08	10/15/08	KWG0810227	
Benz(a)anthracene	**0.18**	D	0.10	0.013	5	09/30/08	10/15/08	KWG0810227	
Chrysene	**0.20**	D	0.10	0.017	5	09/30/08	10/15/08	KWG0810227	
Benzo(b)fluoranthene	**0.11**	D	0.10	0.012	5	09/30/08	10/15/08	KWG0810227	
Benzo(k)fluoranthene	ND	U	0.10	0.013	5	09/30/08	10/15/08	KWG0810227	
Benzo(a)pyrene	ND	U	0.10	0.022	5	09/30/08	10/15/08	KWG0810227	
Indeno(1,2,3-cd)pyrene	**0.059**	JD	0.10	0.013	5	09/30/08	10/15/08	KWG0810227	
Dibenz(a,h)anthracene	ND	U	0.10	0.013	5	09/30/08	10/15/08	KWG0810227	
Benzo(g,h,i)perylene	**0.044**	JD	0.10	0.015	5	09/30/08	10/15/08	KWG0810227	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	102	39-122	10/12/08	Acceptable
2,4,6-Tribromophenol	75	10-177	10/12/08	Acceptable
Fluoranthene-d10	111	36-132	10/15/08	Acceptable
Terphenyl-d14	66	31-140	10/15/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809281
Date Collected: 09/23/2008
Date Received: 09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name: AV-08
Lab Code: K0809281-003

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**11**	D	0.040	0.0060	2	09/30/08	10/16/08	KWG0810227	
2-Methylnaphthalene	**0.11**		0.020	0.0023	1	09/30/08	10/11/08	KWG0810227	
Acenaphthylene	**0.14**		0.020	0.0034	1	09/30/08	10/11/08	KWG0810227	
Acenaphthene	**1.8**		0.020	0.0044	1	09/30/08	10/11/08	KWG0810227	
Dibenzofuran	**0.043**		0.020	0.0046	1	09/30/08	10/11/08	KWG0810227	
Fluorene	**0.030**		0.020	0.0038	1	09/30/08	10/11/08	KWG0810227	
Pentachlorophenol	ND	U	1.0	0.017	1	09/30/08	10/11/08	KWG0810227	
Phenanthrene	ND	U	0.020	0.0050	1	09/30/08	10/11/08	KWG0810227	
Anthracene	**0.34**		0.020	0.0036	1	09/30/08	10/11/08	KWG0810227	
Fluoranthene	**0.023**		0.020	0.0044	1	09/30/08	10/11/08	KWG0810227	
Pyrene	**0.023**		0.020	0.0035	1	09/30/08	10/11/08	KWG0810227	
Benz(a)anthracene	**0.0077**	J	0.020	0.0026	1	09/30/08	10/11/08	KWG0810227	
Chrysene	**0.0065**	J	0.020	0.0034	1	09/30/08	10/11/08	KWG0810227	
Benzo(b)fluoranthene	**0.012**	J	0.020	0.0023	1	09/30/08	10/11/08	KWG0810227	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(a)pyrene	**0.0095**	J	0.020	0.0043	1	09/30/08	10/11/08	KWG0810227	
Indeno(1,2,3-cd)pyrene	**0.0090**	J	0.020	0.0026	1	09/30/08	10/11/08	KWG0810227	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(g,h,i)perylene	**0.0077**	J	0.020	0.0029	1	09/30/08	10/11/08	KWG0810227	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	54	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	66	10-177	10/11/08	Acceptable
Fluoranthene-d10	89	36-132	10/11/08	Acceptable
Terphenyl-d14	106	31-140	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	04-6A	**Units:**	ug/L
Lab Code:	K0809281-004	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	16	D	0.40	0.060	20	09/30/08	10/19/08	KWG0810232	
2-Methylnaphthalene	**0.039**		0.020	0.0023	1	09/30/08	10/17/08	KWG0810232	
Dibenzofuran	62	D	0.40	0.092	20	09/30/08	10/19/08	KWG0810232	
Benz(a)anthracene	**0.27**		0.020	0.0026	1	09/30/08	10/17/08	KWG0810232	
Chrysene	**0.22**		0.020	0.0034	1	09/30/08	10/17/08	KWG0810232	
Benzo(b)fluoranthene	**0.090**		0.020	0.0023	1	09/30/08	10/17/08	KWG0810232	
Benzo(k)fluoranthene	**0.030**		0.020	0.0025	1	09/30/08	10/17/08	KWG0810232	
Benzo(a)pyrene	**0.067**		0.020	0.0043	1	09/30/08	10/17/08	KWG0810232	
Indeno(1,2,3-cd)pyrene	**0.044**		0.020	0.0026	1	09/30/08	10/17/08	KWG0810232	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	69	39-122	10/17/08	Acceptable
Fluoranthene-d10	79	36-132	10/17/08	Acceptable
Terphenyl-d14	82	31-140	10/17/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	97-6C	**Units:**	ug/L
Lab Code:	K0809281-005	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**17**	D	0.40	0.060	20	09/30/08	10/19/08	KWG0810232	
2-Methylnaphthalene	**0.039**		0.020	0.0023	1	09/30/08	10/17/08	KWG0810232	
Dibenzofuran	**61**	D	0.40	0.092	20	09/30/08	10/19/08	KWG0810232	
Benz(a)anthracene	**0.29**		0.020	0.0026	1	09/30/08	10/17/08	KWG0810232	
Chrysene	**0.25**		0.020	0.0034	1	09/30/08	10/17/08	KWG0810232	
Benzo(b)fluoranthene	**0.11**		0.020	0.0023	1	09/30/08	10/17/08	KWG0810232	
Benzo(k)fluoranthene	**0.042**		0.020	0.0025	1	09/30/08	10/17/08	KWG0810232	
Benzo(a)pyrene	**0.082**		0.020	0.0043	1	09/30/08	10/17/08	KWG0810232	
Indeno(1,2,3-cd)pyrene	**0.060**		0.020	0.0026	1	09/30/08	10/17/08	KWG0810232	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	39-122	10/17/08	Acceptable
Fluoranthene-d10	80	36-132	10/17/08	Acceptable
Terphenyl-d14	91	31-140	10/17/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-09	**Units:**	ug/L
Lab Code:	K0809281-006	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.011**	J	0.020	0.0030	1	09/30/08	10/11/08	KWG0810227	
2-Methylnaphthalene	ND	U	0.020	0.0023	1	09/30/08	10/11/08	KWG0810227	
Acenaphthylene	ND	U	0.020	0.0034	1	09/30/08	10/11/08	KWG0810227	
Acenaphthene	ND	U	0.020	0.0044	1	09/30/08	10/11/08	KWG0810227	
Dibenzofuran	ND	U	0.020	0.0046	1	09/30/08	10/11/08	KWG0810227	
Fluorene	ND	U	0.020	0.0038	1	09/30/08	10/11/08	KWG0810227	
Pentachlorophenol	ND	U	0.98	0.017	1	09/30/08	10/11/08	KWG0810227	
Phenanthrene	**0.011**	J	0.020	0.0050	1	09/30/08	10/11/08	KWG0810227	
Anthracene	**0.0075**	J	0.020	0.0036	1	09/30/08	10/11/08	KWG0810227	
Fluoranthene	**0.025**		0.020	0.0044	1	09/30/08	10/11/08	KWG0810227	
Pyrene	**0.023**		0.020	0.0035	1	09/30/08	10/11/08	KWG0810227	
Benz(a)anthracene	**0.020**		0.020	0.0026	1	09/30/08	10/11/08	KWG0810227	
Chrysene	**0.022**		0.020	0.0034	1	09/30/08	10/11/08	KWG0810227	
Benzo(b)fluoranthene	**0.032**		0.020	0.0023	1	09/30/08	10/11/08	KWG0810227	
Benzo(k)fluoranthene	**0.010**	J	0.020	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(a)pyrene	**0.025**		0.020	0.0043	1	09/30/08	10/11/08	KWG0810227	
Indeno(1,2,3-cd)pyrene	**0.024**		0.020	0.0026	1	09/30/08	10/11/08	KWG0810227	
Dibenz(a,h)anthracene	**0.0052**	J	0.020	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(g,h,i)perylene	**0.023**		0.020	0.0029	1	09/30/08	10/11/08	KWG0810227	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	81	10-177	10/11/08	Acceptable
Fluoranthene-d10	73	36-132	10/11/08	Acceptable
Terphenyl-d14	86	31-140	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-02	**Units:**	ug/L
Lab Code:	K0809281-007	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.074**		0.022	0.0032	1	09/30/08	10/11/08	KWG0810227	
2-Methylnaphthalene	**0.032**		0.022	0.0025	1	09/30/08	10/11/08	KWG0810227	
Acenaphthylene	**0.23**		0.022	0.0036	1	09/30/08	10/11/08	KWG0810227	
Acenaphthene	**13**	D	0.043	0.0093	2	09/30/08	10/16/08	KWG0810227	
Dibenzofuran	**0.0089**	J	0.022	0.0049	1	09/30/08	10/11/08	KWG0810227	
Fluorene	**0.48**		0.022	0.0040	1	09/30/08	10/11/08	KWG0810227	
Pentachlorophenol	ND	U	1.1	0.018	1	09/30/08	10/11/08	KWG0810227	
Phenanthrene	**0.015**	J	0.022	0.0053	1	09/30/08	10/11/08	KWG0810227	
Anthracene	**0.069**		0.022	0.0038	1	09/30/08	10/11/08	KWG0810227	
Fluoranthene	**0.023**		0.022	0.0047	1	09/30/08	10/11/08	KWG0810227	
Pyrene	**0.020**	J	0.022	0.0037	1	09/30/08	10/11/08	KWG0810227	
Benz(a)anthracene	**0.020**	J	0.022	0.0028	1	09/30/08	10/11/08	KWG0810227	
Chrysene	**0.016**	J	0.022	0.0036	1	09/30/08	10/11/08	KWG0810227	
Benzo(b)fluoranthene	**0.025**		0.022	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(k)fluoranthene	**0.0088**	J	0.022	0.0027	1	09/30/08	10/11/08	KWG0810227	
Benzo(a)pyrene	**0.019**	J	0.022	0.0046	1	09/30/08	10/11/08	KWG0810227	
Indeno(1,2,3-cd)pyrene	**0.018**	J	0.022	0.0028	1	09/30/08	10/11/08	KWG0810227	
Dibenz(a,h)anthracene	**0.0043**	J	0.022	0.0027	1	09/30/08	10/11/08	KWG0810227	
Benzo(g,h,i)perylene	**0.017**	J	0.022	0.0031	1	09/30/08	10/11/08	KWG0810227	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	82	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	99	10-177	10/11/08	Acceptable
Fluoranthene-d10	79	36-132	10/11/08	Acceptable
Terphenyl-d14	90	31-140	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-05	**Units:**	ug/L
Lab Code:	K0809281-008	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.0063**	J	0.020	0.0030	1	09/30/08	10/17/08	KWG0810232	
2-Methylnaphthalene	ND	U	0.020	0.0023	1	09/30/08	10/17/08	KWG0810232	
Dibenzofuran	**0.0056**	J	0.020	0.0046	1	09/30/08	10/17/08	KWG0810232	
Benz(a)anthracene	ND	U	0.020	0.0026	1	09/30/08	10/17/08	KWG0810232	
Chrysene	ND	U	0.020	0.0034	1	09/30/08	10/17/08	KWG0810232	
Benzo(b)fluoranthene	ND	U	0.020	0.0023	1	09/30/08	10/17/08	KWG0810232	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	09/30/08	10/17/08	KWG0810232	
Benzo(a)pyrene	ND	U	0.020	0.0043	1	09/30/08	10/17/08	KWG0810232	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0026	1	09/30/08	10/17/08	KWG0810232	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	101	39-122	10/17/08	Acceptable
Fluoranthene-d10	103	36-132	10/17/08	Acceptable
Terphenyl-d14	121	31-140	10/17/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-04	**Units:**	ug/L
Lab Code:	K0809281-009	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.052**		0.020	0.0030	1	09/30/08	10/11/08	KWG0810227	
2-Methylnaphthalene	**0.024**		0.020	0.0023	1	09/30/08	10/11/08	KWG0810227	
Acenaphthylene	**0.039**		0.020	0.0034	1	09/30/08	10/11/08	KWG0810227	
Acenaphthene	**7.3**		0.020	0.0044	1	09/30/08	10/11/08	KWG0810227	
Dibenzofuran	**0.0083**	J	0.020	0.0046	1	09/30/08	10/11/08	KWG0810227	
Fluorene	**1.5**		0.020	0.0038	1	09/30/08	10/11/08	KWG0810227	
Pentachlorophenol	ND	U	0.96	0.017	1	09/30/08	10/11/08	KWG0810227	
Phenanthrene	**0.020**		0.020	0.0050	1	09/30/08	10/11/08	KWG0810227	
Anthracene	**0.032**		0.020	0.0036	1	09/30/08	10/11/08	KWG0810227	
Fluoranthene	**0.0098**	J	0.020	0.0044	1	09/30/08	10/11/08	KWG0810227	
Pyrene	**0.0087**	J	0.020	0.0035	1	09/30/08	10/11/08	KWG0810227	
Benz(a)anthracene	**0.0088**	J	0.020	0.0026	1	09/30/08	10/11/08	KWG0810227	
Chrysene	**0.0063**	J	0.020	0.0034	1	09/30/08	10/11/08	KWG0810227	
Benzo(b)fluoranthene	**0.0069**	J	0.020	0.0023	1	09/30/08	10/11/08	KWG0810227	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(a)pyrene	**0.0054**	J	0.020	0.0043	1	09/30/08	10/11/08	KWG0810227	
Indeno(1,2,3-cd)pyrene	**0.0061**	J	0.020	0.0026	1	09/30/08	10/11/08	KWG0810227	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	09/30/08	10/11/08	KWG0810227	
Benzo(g,h,i)perylene	**0.0054**	J	0.020	0.0029	1	09/30/08	10/11/08	KWG0810227	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	90	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	105	10-177	10/11/08	Acceptable
Fluoranthene-d10	87	36-132	10/11/08	Acceptable
Terphenyl-d14	98	31-140	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Extracted:**	09/30/2008
Sample Matrix:	Water	**Date Analyzed:**	10/11/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809295-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0810227

		Batch QCMS KWG0810227-1 **Matrix Spike**			Batch QCDMS KWG0810227-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.055	1.96	2.36	81	1.74	2.36	72	27-109	12	30
2-Methylnaphthalene	0.013	2.19	2.36	92	1.96	2.36	82	27-115	11	30
Acenaphthylene	0.0088	2.02	2.36	85	1.80	2.36	76	30-118	12	30
Acenaphthene	0.019	1.95	2.36	82	1.73	2.36	72	28-115	12	30
Dibenzofuran	0.016	2.25	2.36	95	2.00	2.36	84	26-121	12	30
Fluorene	0.017	2.22	2.36	93	1.94	2.36	82	28-122	13	30
Pentachlorophenol	0.90	8.88	9.43	84	8.56	9.43	81	20-167	4	30
Phenanthrene	0.064	2.26	2.36	93	2.06	2.36	85	24-129	9	30
Anthracene	0.27	2.31	2.36	86	2.09	2.36	77	26-118	10	30
Fluoranthene	0.019	2.19	2.36	92	1.97	2.36	83	18-133	10	30
Pyrene	0.0093	2.31	2.36	97	2.07	2.36	87	19-133	11	30
Benz(a)anthracene	0.0097	2.17	2.36	92	1.96	2.36	83	19-136	10	30
Chrysene	ND	2.16	2.36	91	1.95	2.36	83	22-129	10	30
Benzo(b)fluoranthene	ND	2.04	2.36	86	1.80	2.36	76	19-141	12	30
Benzo(k)fluoranthene	ND	2.15	2.36	91	1.89	2.36	80	19-138	13	30
Benzo(a)pyrene	ND	2.09	2.36	88	1.91	2.36	81	10-142	9	30
Indeno(1,2,3-cd)pyrene	0.0036	2.34	2.36	99	2.16	2.36	92	19-151	8	30
Dibenz(a,h)anthracene	ND	2.43	2.36	103	2.22	2.36	94	16-146	9	30
Benzo(g,h,i)perylene	0.0032	2.30	2.36	98	2.07	2.36	87	22-134	11	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Extracted:**	09/30/2008
Sample Matrix:	Water	**Date Analyzed:**	10/11/2008

Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	ug/L
Analysis Method:	8270C SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810227

Lab Control Sample
KWG0810227-3

	Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Naphthalene	1.94	2.50	78	49-108
2-Methylnaphthalene	2.13	2.50	85	40-113
Acenaphthylene	2.09	2.50	84	56-113
Acenaphthene	1.98	2.50	79	56-111
Dibenzofuran	2.17	2.50	87	59-114
Fluorene	2.10	2.50	84	61-114
Pentachlorophenol	1.28	10.0	13	10-130
Phenanthrene	2.08	2.50	83	58-116
Anthracene	1.99	2.50	80	48-115
Fluoranthene	2.13	2.50	85	61-130
Pyrene	2.19	2.50	88	56-118
Benz(a)anthracene	2.11	2.50	84	55-118
Chrysene	2.07	2.50	83	61-119
Benzo(b)fluoranthene	1.95	2.50	78	57-124
Benzo(k)fluoranthene	2.05	2.50	82	65-121
Benzo(a)pyrene	2.18	2.50	87	44-122
Indeno(1,2,3-cd)pyrene	2.40	2.50	96	44-132
Dibenz(a,h)anthracene	2.40	2.50	96	51-131
Benzo(g,h,i)perylene	2.23	2.50	89	55-122

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Extracted:**	09/30/2008
Sample Matrix:	Water	**Date Analyzed:**	10/17/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	ug/L
Analysis Method:	8270C SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810232

	Lab Control Sample KWG0810232-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810232-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	2.19	2.50	88	2.12	2.50	85	49-108	3	30
2-Methylnaphthalene	2.41	2.50	96	2.30	2.50	92	40-113	4	30
Dibenzofuran	2.35	2.50	94	2.33	2.50	93	59-114	1	30
Benz(a)anthracene	2.39	2.50	96	2.47	2.50	99	55-118	3	30
Chrysene	2.37	2.50	95	2.48	2.50	99	61-119	5	30
Benzo(b)fluoranthene	2.19	2.50	88	2.33	2.50	93	57-124	6	30
Benzo(k)fluoranthene	2.31	2.50	92	2.43	2.50	97	65-121	5	30
Benzo(a)pyrene	2.43	2.50	97	2.52	2.50	101	44-122	4	30
Indeno(1,2,3-cd)pyrene	2.50	2.50	100	2.53	2.50	101	44-132	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809281

Surrogate Recovery Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method: EPA 3520C
Analysis Method: 8270C

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4	Sur5	Sur6
99EA3A	K0809281-010	65	71	79	75	88	90
Method Blank	KWG0810258-3	85	90	100	99	90	110
Lab Control Sample	KWG0810258-1	92	95	100	94	109	105
Duplicate Lab Control Sample	KWG0810258-2	81	82	88	86	92	91

Surrogate Recovery Control Limits (%)

Sur1 = 2-Fluorophenol	21-119	Sur5 = 2,4,6-Tribromophenol	30-131
Sur2 = Phenol-d6	31-121	Sur6 = Terphenyl-d14	20-140
Sur3 = Nitrobenzene-d5	29-121		
Sur4 = 2-Fluorobiphenyl	25-109		

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810258-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Bis(2-chloroethyl) Ether	ND	U	0.20	0.035	1	09/30/08	10/09/08	KWG0810258	
Phenol	ND	U	0.49	0.063	1	09/30/08	10/09/08	KWG0810258	
2-Chlorophenol	ND	U	0.49	0.054	1	09/30/08	10/09/08	KWG0810258	
1,3-Dichlorobenzene	ND	U	0.20	0.021	1	09/30/08	10/09/08	KWG0810258	*
1,4-Dichlorobenzene	ND	U	0.20	0.029	1	09/30/08	10/09/08	KWG0810258	*
1,2-Dichlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
Benzyl Alcohol	ND	U	0.49	0.073	1	09/30/08	10/09/08	KWG0810258	
Bis(2-chloroisopropyl) Ether	ND	U	0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
2-Methylphenol	ND	U	0.49	0.11	1	09/30/08	10/09/08	KWG0810258	
Hexachloroethane	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	*
N-Nitrosodi-n-propylamine	ND	U	0.20	0.037	1	09/30/08	10/09/08	KWG0810258	
4-Methylphenol†	ND	U	0.49	0.12	1	09/30/08	10/09/08	KWG0810258	
Nitrobenzene	ND	U	0.20	0.028	1	09/30/08	10/09/08	KWG0810258	
Isophorone	ND	U	0.20	0.016	1	09/30/08	10/09/08	KWG0810258	
2-Nitrophenol	ND	U	0.49	0.063	1	09/30/08	10/09/08	KWG0810258	
2,4-Dimethylphenol	ND	U	3.9	2.2	1	09/30/08	10/09/08	KWG0810258	
Bis(2-chloroethoxy)methane	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
2,4-Dichlorophenol	ND	U	0.49	0.047	1	09/30/08	10/09/08	KWG0810258	
Benzoic Acid	ND	U	4.9	1.1	1	09/30/08	10/09/08	KWG0810258	
1,2,4-Trichlorobenzene	ND	U	0.20	0.016	1	09/30/08	10/09/08	KWG0810258	
Naphthalene	ND	U	0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
4-Chloroaniline	ND	U	0.20	0.025	1	09/30/08	10/09/08	KWG0810258	
Hexachlorobutadiene	ND	U	0.20	0.027	1	09/30/08	10/09/08	KWG0810258	*
4-Chloro-3-methylphenol	ND	U	0.49	0.037	1	09/30/08	10/09/08	KWG0810258	
2-Methylnaphthalene	ND	U	0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
Hexachlorocyclopentadiene	ND	U	0.98	0.19	1	09/30/08	10/09/08	KWG0810258	
2,4,6-Trichlorophenol	ND	U	0.49	0.058	1	09/30/08	10/09/08	KWG0810258	
2,4,5-Trichlorophenol	ND	U	0.49	0.031	1	09/30/08	10/09/08	KWG0810258	
2-Chloronaphthalene	ND	U	0.20	0.041	1	09/30/08	10/09/08	KWG0810258	
2-Nitroaniline	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
Acenaphthylene	ND	U	0.20	0.015	1	09/30/08	10/09/08	KWG0810258	
Dimethyl Phthalate	ND	U	0.20	0.021	1	09/30/08	10/09/08	KWG0810258	
2,6-Dinitrotoluene	ND	U	0.20	0.033	1	09/30/08	10/09/08	KWG0810258	

Comments:

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810258-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Acenaphthene	ND	U	0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
3-Nitroaniline	ND	U	0.98	0.029	1	09/30/08	10/09/08	KWG0810258	
2,4-Dinitrophenol	ND	U	3.9	0.17	1	09/30/08	10/09/08	KWG0810258	
Dibenzofuran	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
4-Nitrophenol	ND	U	2.0	0.28	1	09/30/08	10/09/08	KWG0810258	
2,4-Dinitrotoluene	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
Fluorene	ND	U	0.20	0.027	1	09/30/08	10/09/08	KWG0810258	
4-Chlorophenyl Phenyl Ether	ND	U	0.20	0.027	1	09/30/08	10/09/08	KWG0810258	
Diethyl Phthalate	**0.019**	J	0.20	0.012	1	09/30/08	10/09/08	KWG0810258	
4-Nitroaniline	ND	U	0.98	0.019	1	09/30/08	10/09/08	KWG0810258	
2-Methyl-4,6-dinitrophenol	ND	U	2.0	0.025	1	09/30/08	10/09/08	KWG0810258	
N-Nitrosodiphenylamine	ND	U	0.20	0.048	1	09/30/08	10/09/08	KWG0810258	
4-Bromophenyl Phenyl Ether	ND	U	0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
Hexachlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
Pentachlorophenol	ND	U	0.98	0.34	1	09/30/08	10/09/08	KWG0810258	
Phenanthrene	ND	U	0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
Anthracene	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
Di-n-butyl Phthalate	**0.071**	J	0.20	0.023	1	09/30/08	10/09/08	KWG0810258	
Fluoranthene	ND	U	0.20	0.020	1	09/30/08	10/09/08	KWG0810258	
Pyrene	ND	U	0.20	0.019	1	09/30/08	10/09/08	KWG0810258	
Butyl Benzyl Phthalate	**0.031**	J	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
3,3'-Dichlorobenzidine	ND	U	2.0	0.43	1	09/30/08	10/09/08	KWG0810258	
Benz(a)anthracene	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
Chrysene	ND	U	0.20	0.028	1	09/30/08	10/09/08	KWG0810258	
Bis(2-ethylhexyl) Phthalate	ND	U	0.98	0.13	1	09/30/08	10/09/08	KWG0810258	
Di-n-octyl Phthalate	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
Benzo(b)fluoranthene	ND	U	0.20	0.017	1	09/30/08	10/09/08	KWG0810258	
Benzo(k)fluoranthene	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
Benzo(a)pyrene	ND	U	0.20	0.031	1	09/30/08	10/09/08	KWG0810258	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.021	1	09/30/08	10/09/08	KWG0810258	
Dibenz(a,h)anthracene	ND	U	0.20	0.017	1	09/30/08	10/09/08	KWG0810258	
Benzo(g,h,i)perylene	ND	U	0.20	0.019	1	09/30/08	10/09/08	KWG0810258	

* See Case Narrative

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810258-3	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	85	21-119	10/09/08	Acceptable
Phenol-d6	90	31-121	10/09/08	Acceptable
Nitrobenzene-d5	100	29-121	10/09/08	Acceptable
2-Fluorobiphenyl	99	25-109	10/09/08	Acceptable
2,4,6-Tribromophenol	90	30-131	10/09/08	Acceptable
Terphenyl-d14	110	20-140	10/09/08	Acceptable

† Analyte Comments

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA3A	**Units:**	ug/L
Lab Code:	K0809281-010	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Bis(2-chloroethyl) Ether	ND	U	0.20	0.035	1	09/30/08	10/09/08	KWG0810258	
Phenol	ND	U	0.49	0.063	1	09/30/08	10/09/08	KWG0810258	
2-Chlorophenol	ND	U	0.49	0.054	1	09/30/08	10/09/08	KWG0810258	
1,3-Dichlorobenzene	ND	U	0.20	0.021	1	09/30/08	10/09/08	KWG0810258	*
1,4-Dichlorobenzene	ND	U	0.20	0.029	1	09/30/08	10/09/08	KWG0810258	*
1,2-Dichlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
Benzyl Alcohol	ND	U	0.49	0.073	1	09/30/08	10/09/08	KWG0810258	
Bis(2-chloroisopropyl) Ether	ND	U	0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
2-Methylphenol	ND	U	0.49	0.11	1	09/30/08	10/09/08	KWG0810258	
Hexachloroethane	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	*
N-Nitrosodi-n-propylamine	ND	U	0.20	0.037	1	09/30/08	10/09/08	KWG0810258	
4-Methylphenol†	ND	U	0.49	0.12	1	09/30/08	10/09/08	KWG0810258	
Nitrobenzene	ND	U	0.20	0.028	1	09/30/08	10/09/08	KWG0810258	
Isophorone	ND	U	0.20	0.016	1	09/30/08	10/09/08	KWG0810258	
2-Nitrophenol	ND	U	0.49	0.063	1	09/30/08	10/09/08	KWG0810258	
2,4-Dimethylphenol	ND	U	3.9	2.2	1	09/30/08	10/09/08	KWG0810258	
Bis(2-chloroethoxy)methane	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
2,4-Dichlorophenol	ND	U	0.49	0.047	1	09/30/08	10/09/08	KWG0810258	
Benzoic Acid	ND	U	4.9	1.1	1	09/30/08	10/09/08	KWG0810258	
1,2,4-Trichlorobenzene	ND	U	0.20	0.016	1	09/30/08	10/09/08	KWG0810258	
Naphthalene	**0.031**	J	0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
4-Chloroaniline	ND	U	0.20	0.025	1	09/30/08	10/09/08	KWG0810258	
Hexachlorobutadiene	ND	U	0.20	0.027	1	09/30/08	10/09/08	KWG0810258	*
4-Chloro-3-methylphenol	ND	U	0.49	0.037	1	09/30/08	10/09/08	KWG0810258	
2-Methylnaphthalene	**0.029**	J	0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
Hexachlorocyclopentadiene	ND	U	0.98	0.19	1	09/30/08	10/09/08	KWG0810258	
2,4,6-Trichlorophenol	ND	U	0.49	0.058	1	09/30/08	10/09/08	KWG0810258	
2,4,5-Trichlorophenol	ND	U	0.49	0.031	1	09/30/08	10/09/08	KWG0810258	
2-Chloronaphthalene	ND	U	0.20	0.041	1	09/30/08	10/09/08	KWG0810258	
2-Nitroaniline	ND	U	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
Acenaphthylene	**0.021**	J	0.20	0.015	1	09/30/08	10/09/08	KWG0810258	
Dimethyl Phthalate	ND	U	0.20	0.021	1	09/30/08	10/09/08	KWG0810258	
2,6-Dinitrotoluene	ND	U	0.20	0.033	1	09/30/08	10/09/08	KWG0810258	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA3A	**Units:**	ug/L
Lab Code:	K0809281-010	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Acenaphthene	**1.9**		0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
3-Nitroaniline	ND	U	0.98	0.029	1	09/30/08	10/09/08	KWG0810258	
2,4-Dinitrophenol	ND	U	3.9	0.17	1	09/30/08	10/09/08	KWG0810258	
Dibenzofuran	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
4-Nitrophenol	ND	U	2.0	0.28	1	09/30/08	10/09/08	KWG0810258	
2,4-Dinitrotoluene	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
Fluorene	**0.80**		0.20	0.027	1	09/30/08	10/09/08	KWG0810258	
4-Chlorophenyl Phenyl Ether	ND	U	0.20	0.027	1	09/30/08	10/09/08	KWG0810258	
Diethyl Phthalate	**0.029**	J	0.20	0.012	1	09/30/08	10/09/08	KWG0810258	
4-Nitroaniline	ND	U	0.98	0.019	1	09/30/08	10/09/08	KWG0810258	
2-Methyl-4,6-dinitrophenol	ND	U	2.0	0.025	1	09/30/08	10/09/08	KWG0810258	
N-Nitrosodiphenylamine	ND	U	0.20	0.048	1	09/30/08	10/09/08	KWG0810258	
4-Bromophenyl Phenyl Ether	ND	U	0.20	0.026	1	09/30/08	10/09/08	KWG0810258	
Hexachlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
Pentachlorophenol	ND	U	0.98	0.34	1	09/30/08	10/09/08	KWG0810258	
Phenanthrene	**0.23**		0.20	0.022	1	09/30/08	10/09/08	KWG0810258	
Anthracene	**0.096**	J	0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
Di-n-butyl Phthalate	**0.066**	J	0.20	0.023	1	09/30/08	10/09/08	KWG0810258	
Fluoranthene	**0.63**		0.20	0.020	1	09/30/08	10/09/08	KWG0810258	
Pyrene	**0.51**		0.20	0.019	1	09/30/08	10/09/08	KWG0810258	
Butyl Benzyl Phthalate	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
3,3'-Dichlorobenzidine	ND	U	2.0	0.43	1	09/30/08	10/09/08	KWG0810258	
Benz(a)anthracene	**0.40**		0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
Chrysene	**0.47**		0.20	0.028	1	09/30/08	10/09/08	KWG0810258	
Bis(2-ethylhexyl) Phthalate	ND	U	0.98	0.13	1	09/30/08	10/09/08	KWG0810258	
Di-n-octyl Phthalate	ND	U	0.20	0.018	1	09/30/08	10/09/08	KWG0810258	
Benzo(b)fluoranthene	**0.71**		0.20	0.017	1	09/30/08	10/09/08	KWG0810258	
Benzo(k)fluoranthene	**0.22**		0.20	0.024	1	09/30/08	10/09/08	KWG0810258	
Benzo(a)pyrene	**0.50**		0.20	0.031	1	09/30/08	10/09/08	KWG0810258	
Indeno(1,2,3-cd)pyrene	**0.43**		0.20	0.021	1	09/30/08	10/09/08	KWG0810258	
Dibenz(a,h)anthracene	**0.093**	J	0.20	0.017	1	09/30/08	10/09/08	KWG0810258	
Benzo(g,h,i)perylene	**0.44**		0.20	0.019	1	09/30/08	10/09/08	KWG0810258	

* See Case Narrative

Comments:

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Collected:**	09/23/2008
Sample Matrix:	Water	**Date Received:**	09/24/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA3A	**Units:**	ug/L
Lab Code:	K0809281-010	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	65	21-119	10/09/08	Acceptable
Phenol-d6	71	31-121	10/09/08	Acceptable
Nitrobenzene-d5	79	29-121	10/09/08	Acceptable
2-Fluorobiphenyl	75	25-109	10/09/08	Acceptable
2,4,6-Tribromophenol	88	30-131	10/09/08	Acceptable
Terphenyl-d14	90	20-140	10/09/08	Acceptable

† Analyte Comments	
4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809281
Project:	IP Longview	**Date Extracted:**	09/30/2008
Sample Matrix:	Water	**Date Analyzed:**	10/09/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method:	EPA 3520C	**Units:**	ug/L
Analysis Method:	8270C	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810258

	Lab Control Sample KWG0810258-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810258-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Bis(2-chloroethyl) Ether	4.29	4.90	87	4.11	4.90	84	39-115	4	30
Phenol	4.45	4.90	91	4.24	4.90	87	39-117	5	30
2-Chlorophenol	4.38	4.90	89	4.32	4.90	88	40-113	1	30
1,3-Dichlorobenzene	3.65	4.90	74 *	3.46	4.90	71	18-71	5	30
1,4-Dichlorobenzene	3.71	4.90	76 *	3.54	4.90	72	19-73	5	30
1,2-Dichlorobenzene	3.78	4.90	77	3.63	4.90	74	22-78	4	30
Benzyl Alcohol	4.95	4.90	101	4.69	4.90	96	37-119	5	30
Bis(2-chloroisopropyl) Ether	4.47	4.90	91	4.39	4.90	90	35-113	2	30
2-Methylphenol	3.63	4.90	74	3.44	4.90	70	26-113	5	30
Hexachloroethane	3.64	4.90	74 *	3.17	4.90	65 *	11-62	14	30
N-Nitrosodi-n-propylamine	4.57	4.90	93	4.38	4.90	89	32-117	4	30
4-Methylphenol	3.93	4.90	80	3.71	4.90	76	25-118	6	30
Nitrobenzene	4.49	4.90	92	4.39	4.90	90	37-116	2	30
Isophorone	4.08	4.90	83	3.96	4.90	81	39-112	3	30
2-Nitrophenol	4.60	4.90	94	4.46	4.90	91	42-116	3	30
2,4-Dimethylphenol	1.94	4.90	40	1.68	4.90	34	10-113	15	30
Bis(2-chloroethoxy)methane	4.57	4.90	93	4.46	4.90	91	40-113	2	30
2,4-Dichlorophenol	4.50	4.90	92	4.24	4.90	86	39-115	6	30
Benzoic Acid	2.97	14.7	20	2.05	14.7	14	10-102	37 *	30
1,2,4-Trichlorobenzene	3.75	4.90	77	3.63	4.90	74	21-78	3	30
Naphthalene	4.02	4.90	82	4.04	4.90	83	33-98	1	30
4-Chloroaniline	3.41	4.90	70	2.59	4.90	53	10-119	27	30
Hexachlorobutadiene	3.53	4.90	72 *	3.08	4.90	63 *	10-61	14	30
4-Chloro-3-methylphenol	4.57	4.90	93	4.31	4.90	88	37-119	6	30
2-Methylnaphthalene	4.21	4.90	86	4.15	4.90	85	32-95	2	30
Hexachlorocyclopentadiene	1.13	4.90	23	0.856	4.90	17	10-39	28	30
2,4,6-Trichlorophenol	4.61	4.90	94	4.41	4.90	90	40-117	4	30
2,4,5-Trichlorophenol	4.57	4.90	93	4.43	4.90	90	44-116	3	30
2-Chloronaphthalene	4.22	4.90	86	4.13	4.90	84	21-115	2	30
2-Nitroaniline	4.82	4.90	98	4.59	4.90	94	43-124	5	30
Acenaphthylene	4.31	4.90	88	4.18	4.90	85	41-114	3	30
Dimethyl Phthalate	4.61	4.90	94	4.44	4.90	91	47-117	4	30
2,6-Dinitrotoluene	4.90	4.90	100	4.66	4.90	95	45-120	5	30
Acenaphthene	4.37	4.90	89	4.23	4.90	86	38-106	3	30
3-Nitroaniline	4.90	4.90	100	4.57	4.90	93	31-125	7	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809281
Date Extracted: 09/30/2008
Date Analyzed: 10/09/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method: EPA 3520C
Analysis Method: 8270C

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG0810258

	Lab Control Sample KWG0810258-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810258-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
2,4-Dinitrophenol	3.27	4.90	67	2.29	4.90	47	10-121	35 *	30
Dibenzofuran	4.40	4.90	90	4.27	4.90	87	40-107	3	30
4-Nitrophenol	5.12	4.90	104	4.46	4.90	91	43-133	14	30
2,4-Dinitrotoluene	4.99	4.90	102	4.78	4.90	98	47-125	4	30
Fluorene	4.64	4.90	95	4.40	4.90	90	40-112	5	30
4-Chlorophenyl Phenyl Ether	4.60	4.90	94	4.26	4.90	87	39-108	8	30
Diethyl Phthalate	4.78	4.90	98	4.54	4.90	93	47-120	5	30
4-Nitroaniline	4.78	4.90	97	4.46	4.90	91	36-128	7	30
2-Methyl-4,6-dinitrophenol	4.80	4.90	98	4.18	4.90	85	19-127	14	30
N-Nitrosodiphenylamine	4.82	4.90	98	4.51	4.90	92	36-114	7	30
4-Bromophenyl Phenyl Ether	4.57	4.90	93	4.21	4.90	86	43-110	8	30
Hexachlorobenzene	4.50	4.90	92	4.03	4.90	82	42-107	11	30
Pentachlorophenol	3.76	4.90	77	3.28	4.90	67	28-114	13	30
Phenanthrene	4.67	4.90	95	4.27	4.90	87	43-110	9	30
Anthracene	4.63	4.90	94	4.25	4.90	87	40-110	9	30
Di-n-butyl Phthalate	5.05	4.90	103	4.67	4.90	95	45-135	8	30
Fluoranthene	4.84	4.90	99	4.38	4.90	89	42-119	10	30
Pyrene	4.72	4.90	96	4.41	4.90	90	43-118	7	30
Butyl Benzyl Phthalate	4.98	4.90	102	4.50	4.90	92	48-124	10	30
3,3'-Dichlorobenzidine	4.07	4.90	83	3.78	4.90	77	15-108	7	30
Benz(a)anthracene	4.74	4.90	97	4.34	4.90	89	45-112	9	30
Chrysene	4.79	4.90	98	4.37	4.90	89	47-112	9	30
Bis(2-ethylhexyl) Phthalate	5.13	4.90	105	4.59	4.90	94	32-149	11	30
Di-n-octyl Phthalate	5.21	4.90	106	4.69	4.90	96	49-127	10	30
Benzo(b)fluoranthene	4.72	4.90	96	4.37	4.90	89	45-115	8	30
Benzo(k)fluoranthene	4.83	4.90	99	4.47	4.90	91	46-115	8	30
Benzo(a)pyrene	4.71	4.90	96	4.29	4.90	87	40-117	9	30
Indeno(1,2,3-cd)pyrene	4.68	4.90	95	4.33	4.90	88	44-119	8	30
Dibenz(a,h)anthracene	4.81	4.90	98	4.50	4.90	92	45-118	7	30
Benzo(g,h,i)perylene	4.69	4.90	96	4.37	4.90	89	45-116	7	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0809281
Date Collected : 09/23/08
Date Received : 09/24/08

Heterotrophic Plate Count

Units : CFU/mL
Basis : NA

Analysis Method : SM 9215 B
Test Notes :

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date/Time Analyzed	Result	Result Notes
AV-11	K0809281-001	0.5	0.5	1	09/24/08 10:15	14.0	
AV-02	K0809281-002	0.5	0.5	1	09/24/08 10:15	455	
AV-08	K0809281-003	0.5	0.5	1	09/24/08 10:15	330	
AV-09	K0809281-006	0.5	0.5	1	09/24/08 10:15	9.5	
99EA3A	K0809281-010	0.5	0.5	1	09/24/08 10:15	21.5	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	9/23/2008
Project Number :	NA	**Date Received :**	9/24/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/24/08

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-09	Units :	CFU/mL
Lab Code :	K0809281-006DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Heterotrophic Plate Count	SM 9215 B	0.5	9.5	14.5	12.0	42	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	09/23/08
Project Number :	NA	**Date Received :**	09/24/08
Sample Matrix :	WATER		

Nitrate+Nitrite as Nitrogen

Units : mg/L
Basis : NA

Analysis Method : 353.2
Test Notes :

Sample Name	**Lab Code**	**MRL**	**MDL**	**Dilution Factor**	**Date Analyzed**	**Result**	**Result Notes**
AV-11	K0809281-001	0.05	0.005	1	09/25/08	0.024	J
AV-02	K0809281-002	0.05	0.005	1	09/25/08	0.14	
AV-08	K0809281-003	0.05	0.005	1	09/25/08	0.19	
AV-09	K0809281-006	0.05	0.005	1	09/25/08	0.24	
99EA3A	K0809281-010	0.05	0.005	1	09/25/08	0.13	
Method Blank	K0809281-MB	0.05	0.005	1	09/25/08	0.028	J

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	9/23/2008
Project Number :	NA	**Date Received :**	9/24/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/25/08

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-11	Units :	mg/L
Lab Code :	K0809281-001DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	0.024	0.023	0.024	4	J

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	9/23/2008
Project Number :	NA	**Date Received :**	9/24/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/25/08

Matrix Spike Summary
Inorganic Parameters

Sample Name :	AV-11	Units :	mg/L
Lab Code :	K0809281-001MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Metbod**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	2.00	0.024	1.95	96	90-110	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	AQUEOUS LIQUID	**Date Prepared :**	NA
		Date Analyzed :	09/25/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0809281-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	NONE	353.2	1.70	1.62	95	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	09/23/08
Project Number :	NA	**Date Received :**	09/24/08
Sample Matrix :	WATER		

Phosphorus, Total

Prep Method :	Method	Units :	mg/L
Analysis Method :	365.3	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-11	K0809281-001	0.01	0.004	1	9/30/2008	10/01/08	0.10	
AV-02	K0809281-002	0.05	0.020	5	9/30/2008	10/01/08	0.91	
AV-08	K0809281-003	0.01	0.004	1	9/30/2008	10/01/08	0.07	
AV-09	K0809281-006	0.01	0.004	1	9/30/2008	10/01/08	0.01	
99EA3A	K0809281-010	0.01	0.004	1	9/30/2008	10/01/08	0.30	
Method Blank	K0809281-MB	0.01	0.004	1	9/30/2008	10/01/08	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	09/30/08
		Date Analyzed :	10/01/08

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0809270-001DUP	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Phosphorus, Total	Method	365.3	0.01	0.40	0.44	0.43	9	

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	09/30/08
		Date Analyzed :	10/01/08

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0809270-001MS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Phosphorus, Total	Method	365.3	0.02	0.50	0.40	0.91	102	75-115	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0809281
Date Collected : NA
Date Received : NA
Date Prepared : 09/30/08
Date Analyzed : 10/01/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name : Lab Control Sample
Lab Code : K0809281-LCS
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Phosphorus, Total	Method	365.3	4.68	4.86	104	85-115	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation
Project Name :	IP Longview
Project Number :	NA
Sample Matrix :	WATER

Service Request :	K0809281
Date Collected :	09/23/08
Date Received :	09/24/08

Hydrocarbon Degrading Bacteria

Analysis Method : ApplEnvMic12-90-3895-3896
Test Notes :

Units : MPN/100mL
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
AV-11	K0809281-001	2	2	1	09/24/08	450000	
AV-02	K0809281-002	2	2	1	09/24/08	40000	
AV-08	K0809281-003	2	2	1	09/24/08	5810	
AV-09	K0809281-006	2	2	1	09/24/08	800000	
99EA3A	K0809281-010	2	2	1	09/24/08	13000	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	9/23/2008
Project Number :	NA	**Date Received :**	9/24/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/24/08

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-09	Units :	MPN/100mL
Lab Code :	K0809281-006DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Hydrocarbon Degrading Bacteria	ApplEnvMic12-90-3895-3896	2	800000	5100	403000	197	*

Report By:MKANALY

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	09/23/08
Project Number :	NA	**Date Received :**	09/24/08
Sample Matrix :	WATER		

Sulfate

Units : mg/L
Basis : NA

Analysis Method : 300.0
Test Notes :

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
AV-11	K0809281-001	2.0	0.060	10	09/25/08	42.7	
AV-02	K0809281-002	2.0	0.060	10	09/25/08	26.3	
AV-08	K0809281-003	10	0.30	50	09/25/08	462	
AV-09	K0809281-006	10	0.30	50	09/25/08	235	
99EA3A	K0809281-010	1.0	0.030	5	09/26/08	23.5	
Method Blank	K0809281-MB	0.2	0.006	1	09/25/08	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/25/08

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0809270-001DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Sulfate	300.0	10	446	449	448	<1	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/25/08

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0809270-001MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Sulfate	300.0	10	200	446	621	88	80-120	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation		**Service Request :**	K0809281
Project Name :	IP Longview		**Date Collected :**	NA
Project Number :	NA		**Date Received :**	NA
Sample Matrix :	WATER		**Date Prepared :**	NA
			Date Analyzed :	09/25/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample		Units :	mg/L
Lab Code :	K0809281-LCS		Basis :	NA
Test Notes :				

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Sulfate	NONE	300.0	5.0	4.9	98	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	09/23/08
Project Number :	NA	**Date Received :**	09/24/08
Sample Matrix :	WATER		

Carbon, Total Organic

Units : mg/L
Basis : NA

Analysis Method : 415.1
Test Notes :

Sample Name	**Lab Code**	**MRL**	**MDL**	**Dilution Factor**	**Date Analyzed**	**Result**	**Result Notes**
AV-11	K0809281-001	0.5	0.07	1	10/14/08	1.5	
AV-02	K0809281-002	1.0	0.14	2	10/14/08	17.5	
AV-08	K0809281-003	0.5	0.07	1	10/14/08	7.4	
AV-09	K0809281-006	0.5	0.07	1	10/14/08	1.8	
99EA3A	K0809281-010	0.5	0.07	1	10/14/08	8.8	
Method Blank	K0809281-MB	0.5	0.07	1	10/14/08	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	9/23/2008
Project Number :	NA	**Date Received :**	9/24/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	10/14/08

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-11	Units :	mg/L
Lab Code :	K0809281-001DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Carbon, Total Organic	415.1	0.5	1.5	1.4	1.5	7	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	9/23/2008
Project Number :	NA	**Date Received :**	9/24/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	10/14/08

Matrix Spike Summary
Inorganic Parameters

Sample Name :	AV-11	Units :	mg/L
Lab Code :	K0809281-001MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	415.1	0.5	25.0	1.5	26.1	98	68-132	

Report By:MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809281
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	10/14/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0809281-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	NONE	415.1	24.0	24.0	100	90-109	

Report By: MKANALY

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

November 24, 2008 Analytical Report for Service Request No: K0809344

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on September 25, 2008. For your reference, these analyses have been assigned our service request number K0809344.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0809344
Project:	IP Longview	**Date Received:**	9/25/08
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Twenty water samples were received for analysis at Columbia Analytical Services on 9/25/08. Minor discrepancies were noted upon initial sample inspection. The exceptions are noted on the cooler receipt and preservation form included in this data package. Otherwise, the samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

No anomalies with the analysis of these samples were observed.

Total and Dissolved Metals

No anomalies associated with the analysis of these samples were observed

Diesel Range Organics by NWTPH-Dx

No anomalies with the analysis of these samples were observed.

Organochlorine Pesticides by EPA Method 8081A

Continuing Calibration Verification Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Continuing Calibration Verification (CCV) 1017F002: Heptachlor and Chlorpyrifos. 1016F018: Chlorpyrifos. 1030F026: Aldrin, alpha-BHC and Dieldrin. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Laboratory Control Sample (LCS) Exceptions:
The control criterion was exceeded for Endosulfan sulfate, Endosulfan II, Endrin Ketone and Endrin Aldehyde. in LCS KWG0810148-3. Since the problem may indicate a potential bias in the analytical batch, all associated field samples (except 99EA-3A, which had no sample remaining) were re-extracted and reanalyzed 22 days past the recommended hold time. The LCS met control criteria for the reanalysis. Note the results for the field samples were

Approved by Emw **Date** 1/7/09

comparable for both determinations, which indicates the problem with the initial analysis was restricted to the LCS. Results from both analyses are reported. The data is flagged to indicate the problem.

PCB Aroclors by EPA Method 8082

Second Source Exceptions:

The analysis of PCB Aroclors by EPA 8082 requires the use of dual column confirmation. When the Initial Calibration Verification (ICV) criteria are met for both columns, the higher of the two sample results is generally reported. The primary evaluation criteria were not met on the confirmation column for Aroclor 1248 in the ICV for CAL7632. The ICV results are reported from the acceptable column. The data quality is not affected. No further corrective action was necessary.

Continuing Calibration Verification Exceptions:

The analysis of PCB Aroclors by EPA 8082 requires the use of dual column confirmation. When the Continuing Calibration Verification (CCV) criteria are met for both columns, the higher of the two sample results is generally reported. The primary evaluation criterion was exceeded for the following analyte in Continuing Calibration Verification (CCV) 1016F020: Decachlorobiphenyl. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria. The results are reported from the column with an acceptable CCV. The data quality is not affected. No further corrective action was necessary.

Volatile Organic Compounds by EPA Method 8260B

Initial Calibration Exceptions:

The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID 7782: Dichlorodifluoromethane and Trichlorofluoromethane. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 7.9%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Lab Control Sample Exceptions:

The advisory criterion was exceeded for the following analyte in Laboratory Control Sample (LCS) KWG0810573-1: Carbon Disulfide. As per the CAS/Kelso Standard Operating Procedure (SOP) for this method, this compound is not included in the subset of analytes used to control the analysis. The recovery information reported for this analyte is for advisory purposes only (i.e. to provide additional detail related to the performance of each individual compound). No further corrective action was required.

Semi Volatile Organic Compounds by EPA Method 8270C

Holding Time Exceptions:

The revised service request for sample 99EA-3A was received past the recommended holding time. The extraction was performed 14 days after its holding time. The data is flagged to indicate the holding time violation.

Lab Control Sample Exceptions:

The advisory criterion was exceeded for the following analytes in Laboratory Control Sample (LCS) KWG0810224: 2,4-Dimethylphenol, Benzo(b)fluoranthene, and Indeno(1,2,3-cd)pyrene. As per the CAS/Kelso Standard Operating Procedure (SOP) for this method, these compounds are not included in the subset of analytes used to control the analysis. The recovery information reported for these analytes is for advisory purposes only (i.e. to provide additional detail related to the performance of each individual compound). No further corrective action was required.

The advisory criterion was exceeded for the following analytes in Laboratory Control Sample (LCS) KWG0810662: Benzoic acid, Hexachlorocyclopentadiene, and 2,4-Dinitrophenol. As per the CAS/Kelso Standard Operating Procedure (SOP) for this method, these compounds are not included in the subset of analytes used to control the analysis. The recovery information reported for these analytes is for advisory purposes only (i.e. to provide additional detail related to the performance of each individual compound). No further corrective action was required.

Polynuclear Aromatic Hydrocarbons and Pentachlorophenol by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: 2,4,6-Tribromophenol, Pentachlorophenol, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Surrogate Exceptions:
The upper control criterion was exceeded for the following surrogate in Method Blank KWG0810359-8: Terphenyl-d14. No target analytes were detected in the Method Blank. Since the apparent problem equates to a high bias, the data quality is not significantly affected. No further corrective action was appropriate.

The client specified control criteria were exceeded for the following surrogate in TMW-11 and AV-12: 2,4,6-Tribromophenol. The recoveries were within CAS charted control limits, indicating the samples were in control. No further corrective action was taken.

The control criteria were exceeded for the following surrogates in LCS KWG0810286-1: Fluoranthene-d10, Terphenyl-d14. The associated matrix spike recoveries of target compounds were in control, indicating the analysis was in control. The surrogate outlier is flagged accordingly. No further corrective action was appropriate.

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of Acenaphthene for sample Batch QC are not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Lab Control Sample Exceptions:
The control criteria were exceeded for the following analyte in Laboratory Control Sample (LCS) KWG0810359-7: Pentachlorophenol. Since the problem may indicate a potential bias in the analytical batch, all associated field samples were re-extracted 33 days past the recommended hold time and reanalyzed. The analytes recovery met control criteria for the reanalysis. Note the results for the field samples were comparable for both determinations, which indicates the problem with the initial analysis was restricted to the LCS. Therefore, the results from the original analysis are reported. The data is flagged to indicate the problem.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Holding Time Exceptions:
The extraction for sample TMW-07 was issued past the recommended holding time. The analysis was performed as soon as possible after receipt by the laboratory. The data is flagged to indicate the holding time violation.

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL7814: Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.8%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Approved by Emw **Date** 1/7/09

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CHAIN OF CUSTODY

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SR#: K0809344
PAGE 1 OF 2 COC #

PROJECT NAME: IP LONGVIEW
PROJECT NUMBER:
PROJECT MANAGER: PAUL KALINA
COMPANY/ADDRESS: 1501 4TH AVE
SUITE 1400
CITY/STATE/ZIP: SEATTLE WA 98101
E-MAIL ADDRESS: PAUL_KALINA@URSCORP.COM
PHONE #: 206 438 2700
FAX#:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☒	Hydrocarbons (*see below) Gas☐ 8021☐ BTEX☐ Diesel☒ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ 8082	Pesticides/Herbicides 608☐ 8081A☒ 8141A☐ 8151A☐ Congeners☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒ 8270C	Metals, Total or Dissolved (See list below)	Cyanide☐	pH, Cond., Cl, [✓ SO4], PO4, F, NO2, NO3, BOD, TSS, TDS (circle) Hex-Chrom☐	NH3-N, COD, [✓ Total P], TKN, [✓ TOC], DOC (circle) [✓ NO2+NO3]	TOX 9020 ☐ AOX 1650☐ 506☐	PAH's (PCP)	HDB/HPC			REMARKS
TMW-02	9/24/8	0900	1	GW	4			X	X	A						X									RCRA 8 TOTAL METALS
99EA-2A		1100	2		10			X	X			X	X		X	X					X				Arsenic & Chromium Total & Diss
99EA-1A		1200	3		10			X	X			X	X		X	X					X				
99EA-3A		1230	4		7			X	X			X	X			X									
TMW-07		1415	5		4				X						X										
AV-13		1445	6		8				X						X			X	X		X	X			
AV-14		1500	7		8				X						X			X	X		X	X			
TMW-08		1530	8		4				X						X										
TMW-09		1600	9		4				X						X										
TMW-10		1630	10	GW	4				X						X						X				

10

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ____
Bill To: ____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
___ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al [✓ As] Sb Ba Be B Ca Cd Co [✓ Cr] Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al [✓ As] Sb Ba Be B Ca Cd Co [✓ Cr] Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

A No sample see K080928 007

[redacted]

ON TMW-02 & 99EA3A
NWTPH Dx ALREADY SUBMITTED
YESTERDAY (9/23/08) TODAY
EXTRA VOLUME ONLY

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature: Rosa Ma Romero	Signature: Rosa Ma Romero	Signature:
Date/Time: 9/24/08 1740	Date/Time: 9/24/08 17:40	Date/Time: 9/24/08 17:45	Date/Time: 9/25/08 0800
Printed Name: IAN V	Printed Name: ROSA ROMERO	Printed Name: ROSA ROMERO	Printed Name: [illegible]
Firm: URS	Firm: CAS	Firm: CAS	Firm: CAS

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An Employee - Owned Company
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CHAIN OF CUSTODY

SR#: K0809344
PAGE 2 OF 2 COC #

PROJECT NAME IP LONGVIEW
PROJECT NUMBER
PROJECT MANAGER PAUL-KALINA
COMPANY/ADDRESS 1501 4TH AVE
SUITE 1400
CITY/STATE/ZIP SEATTLE WA
E-MAIL ADDRESS PAUL_KALINA@URSCORP.COM
PHONE # 206 438 2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☐ BTEX☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒ 8270c	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020☐ AOX 1650☐ 506☐	PAHs' (PCP)				REMARKS
TMW-11	9/24/8	1644	11	GW	4				X						X						X				
*			12																						

11

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ____
Bill To: ____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
____
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
*Recieved 2 trip blanks
DT 9/25/08 9:00am

[redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature	Signature Rosa Ma Romero	Signature Rosa Ma Romero	Signature
Date/Time 9/24/08 1740	Date/Time 9/24/08	Date/Time 9/24/08 17:45	Date/Time 9/25/08 0800
Printed Name	Printed Name Rosa Romero	Printed Name Rosa Romero	Printed Name
Firm URS	Firm CAS 17:40	Firm CAS	Firm CAS

RCOC #1 06/03

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC ED

lient / Project: URS
Service Request K08 09344

eceived: 9/24/08 Opened: 9/25/08 By: BT

SHORT HOLD TIME

. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]

. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ______ NA

. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where? ______

If present, were custody seals intact? Y N If present, were they signed and dated? Y N

. Is shipper's air-bill filed? If not, record air-bill number: ______ [✓ NA] Y N

. Temperature of cooler(s) upon receipt (°C): 3.3 -0.2 1.4 1.2

Temperature Blank (°C): 3.1 3.1 0.2 2.4

. If applicable, list Chain of Custody Numbers: ______

. Packing material used. [✓ Inserts] Baggies Bubble Wrap Gel Packs [✓ Wet Ice] [✓ Sleeves] Other ______

. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N

. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N

0. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N

1. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N

2. Were appropriate bottles/containers and volumes received for the tests indicated? NA ~~[✓ Y]~~ [✓ N]

3. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N

4. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* NA [✓ Y] N

5. Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection? [✓ NA] Y N

6. Was C12/Res negative? NA [✓ Y] N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

oes not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

dditional Notes, Discrepancies, & Resolutions: Did not rec a Btl for DX for TMW-02

Page 1 of: 1 2

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SR#: K0809344

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PAGE 1 OF 1 COC #

PROJECT NAME IP LONGVIEW
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS 1501 4TH AVE
SUITE 1400 ~~SEATTLE WA~~
CITY/STATE/ZIP SEATTLE, WA, 98101
E-MAIL ADDRESS PAUL_KALINA@URSCORP
PHONE # 206 438 2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ BTEX☐ Diesel☒ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒ 8270C	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, [✓ SO4], PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, [✓ TOC], DOC (circle) [✓ NO2+NO3]	TOX 9020☐	AOX 1650☐ 506☐	PAH's PCP	HDB-HPC		REMARKS
AV-01	9/25/08	0845	13	GW	8				X						X			X	X		X	X			
AV-12	↓	0950	14	GW	8				X						X			X	X		X	X			

13

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ____________
Bill To: ____________

TURNAROUND REQUIREMENTS

_____ 24 hr. _____ 48 hr.
_____ 5 Day
X Standard (10-15 working days)
_____ Provide FAX Results
____
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:________ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 9/25/08 1020	Signature	Date/Time 9/25/08 1025	Signature	Date/Time	Signature	Date/Time
Printed Name	Firm URS	Printed Name	Firm CAS	Printed Name	Firm	Printed Name	Firm

RCOC #1 06/03

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SR#: K0809314

PAGE 1 OF 1 COC #

PROJECT NAME IP LONGVIEW
PROJECT NUMBER
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS 1501 4TH AVE
SUITE 1400
CITY/STATE/ZIP SEATTLE WA 98101
E-MAIL ADDRESS PAUL_KALINA@URSCORP.COM
PHONE # 206 438 2700
FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☒ 8270	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, [✓ SO_4], PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, [✓ Total-P], TKN, [✓ TOC], DOC (circle) [✓ NO_2+NO_3]	TOX 9020☐ AOX 1650☐ 506☐	PAHS PCP	H2OS + HPC			REMARKS
AV-10	9/25/08	1030	15		8				X						X			X	X		X	X			
TMW-06		1120	16		4				X						X										
TMW-03		1300	17		4				X						X						X				
TMW-13		1230	18		4				X						X						X				
TMW-01		1400	19		4				X						X										
TMW-12		1440	20		4				X						X						X				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ____
Bill To: ____

TURNAROUND REQUIREMENTS

____ 24 hr. ____ 48 hr.
____ 5 Day
X Standard (10-15 working days)
____ Provide FAX Results
____ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: ____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 9/25/08	Signature	Date/Time 9/25/08 1530	Signature	Date/Time	Signature	Date/Time
Printed Name IAN V	Firm URS	Printed Name	Firm CAS	Printed Name	Firm	Printed Name	Firm

RCOC #1 06/03

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC

lient / Project: 11 / URS Service Request K08 09314

eceived: 9-25-8 Opened: 9-25-8 By:

Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX [✓ Courier] Hand Delivered

Samples were received in: (circle) [✓ Cooler] Box Envelope Other NA

Were custody seals on coolers? NA Y N If yes, how many and where?

If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Is shipper's air-bill filed? If not, record air-bill number: NA Y N

Temperature of cooler(s) upon receipt (°C): 17.8

Temperature Blank (°C): 9.9

If applicable, list Chain of Custody Numbers:

Packing material used. [✓ Inserts] Baggies Bubble Wrap Gel Packs [✓ Wet Ice] Sleeves Other

Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N

Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N

Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N

Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N

Were appropriate bottles/containers and volumes received for the tests indicated? NA [✓ Y] N

Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N

Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N

Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection? ~~NA~~ [✓ Y] N

Was Cl2/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials
all			X							

es not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

litional Notes, Discrepancies, & Resolutions: Sampled & recd same day Not enough time to cool Emm 9/29/08

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC ED

lient / Project: URS Service Request K08 69344

eceived: 9/25/08 Opened: 9/25/08 By: KB

. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]

. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ________ NA

. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where? ________

If present, were custody seals intact? Y [✓ N] If present, were they signed and dated? Y [✓ N]

. Is shipper's air-bill filed? If not, record air-bill number: ________ [✓ NA] Y N

. Temperature of cooler(s) upon receipt (°C): 9C* 11.6C

Temperature Blank (°C): 13.2C 11.2C

. If applicable, list Chain of Custody Numbers:

. Packing material used. [✓ Inserts] Baggies Bubble Wrap Gel Packs [✓ Wet Ice] [✓ Sleeves] Other ________

. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N

. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA [✓ Y] N

0. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N

1. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA Y [✓ N]

2. Were appropriate bottles/containers and volumes received for the tests indicated? [✓ Y] N

3. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N

4. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N

5. Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection? NA [✓ Y] N

6. Was Cl2/Res negative? NA [✓ Y] N

SHORT HOLD TIME

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC
TMW-02 *	TMW-06		

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

dditional Notes, Discrepancies, & Resolutions: * ~~tem~~ KB probe was next to the ice

* placed by time and process of elimination. OK to test - Sampled & recd same day 9/29/08

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
99EA-2A	K0809344-002	84	95
99EA-1A	K0809344-003	72	80
TMW-07	K0809344-005	76	82
AV-13	K0809344-006	79	85
AV-14	K0809344-007	76	82
TMW-08	K0809344-008	72	81
TMW-09	K0809344-009	77	88
TMW-10	K0809344-010	81	88
TMW-11	K0809344-011	79	86
AV-01	K0809344-013	76	78
AV-12	K0809344-014	80	81
AV-10	K0809344-015	84	79
TMW-06	K0809344-016	76	82
TMW-03	K0809344-017	83	86
TMW-13	K0809344-018	78	82
TMW-01	K0809344-019	107	111
TMW-12	K0809344-020	93	97
99EA-2ADUP	KWG0810644-1	74	84
TMW-09DUP	KWG0810644-2	71	81
TMW-06DUP	KWG0810718-1	75	76
TMW-12DUP	KWG0810718-2	76	80
Method Blank	KWG0810644-7	83	90
Method Blank	KWG0810718-4	79	82
Lab Control Sample	KWG0810644-5	91	98
Duplicate Lab Control Sample	KWG0810644-6	90	96
Lab Control Sample	KWG0810718-3	78	75

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810644-7	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	500	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	83	50-150	10/10/08	Acceptable
n-Triacontane	90	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810718-4	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	10/09/08	10/11/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	500	1	10/09/08	10/11/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	10/11/08	Acceptable
n-Triacontane	82	50-150	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	260	1	10/08/08	10/09/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	520	1	10/08/08	10/09/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	84	50-150	10/09/08	Acceptable
n-Triacontane	95	50-150	10/09/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	99EA-1A	**Units:**	ug/L
Lab Code:	K0809344-003	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	260	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	520	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	10/10/08	Acceptable
n-Triacontane	80	50-150	10/10/08	Acceptable

Comments:

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-07	**Units:**	ug/L
Lab Code:	K0809344-005	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	270	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	530	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	10/10/08	Acceptable
n-Triacontane	82	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	AV-13	**Units:**	ug/L
Lab Code:	K0809344-006	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**360**	Y	280	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	560	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	10/10/08	Acceptable
n-Triacontane	85	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	AV-14	**Units:**	ug/L
Lab Code:	K0809344-007	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**370**	Y	280	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	560	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	10/10/08	Acceptable
n-Triacontane	82	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-08	**Units:**	ug/L
Lab Code:	K0809344-008	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	280	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	560	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	72	50-150	10/10/08	Acceptable
n-Triacontane	81	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-09	**Units:**	ug/L
Lab Code:	K0809344-009	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	280	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	560	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	77	50-150	10/10/08	Acceptable
n-Triacontane	88	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-10	**Units:**	ug/L
Lab Code:	K0809344-010	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	300	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	590	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	81	50-150	10/10/08	Acceptable
n-Triacontane	88	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-11	**Units:**	ug/L
Lab Code:	K0809344-011	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	300	1	10/08/08	10/10/08	KWG0810644	
Residual Range Organics (RRO)	ND	U	590	1	10/08/08	10/10/08	KWG0810644	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	10/10/08	Acceptable
n-Triacontane	86	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	AV-01	**Units:**	ug/L
Lab Code:	K0809344-013	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	260	1	10/09/08	10/10/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	520	1	10/09/08	10/10/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	10/10/08	Acceptable
n-Triacontane	78	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	AV-12	**Units:**	ug/L
Lab Code:	K0809344-014	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**580**	Y	270	1	10/09/08	10/10/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	530	1	10/09/08	10/10/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	80	50-150	10/10/08	Acceptable
n-Triacontane	81	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	AV-10	**Units:**	ug/L
Lab Code:	K0809344-015	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**5000**	Y	280	1	10/09/08	10/10/08	KWG0810718	
Residual Range Organics (RRO)	**1100**	L	560	1	10/09/08	10/10/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	84	50-150	10/10/08	Acceptable
n-Triacontane	79	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-06	**Units:**	ug/L
Lab Code:	K0809344-016	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	300	1	10/09/08	10/10/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	590	1	10/09/08	10/10/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	10/10/08	Acceptable
n-Triacontane	82	50-150	10/10/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-03	**Units:**	ug/L
Lab Code:	K0809344-017	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	10/09/08	10/11/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	500	1	10/09/08	10/11/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	83	50-150	10/11/08	Acceptable
n-Triacontane	86	50-150	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-13	**Units:**	ug/L
Lab Code:	K0809344-018	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	270	1	10/09/08	10/11/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	530	1	10/09/08	10/11/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	78	50-150	10/11/08	Acceptable
n-Triacontane	82	50-150	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-01	**Units:**	ug/L
Lab Code:	K0809344-019	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	10/09/08	10/11/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	500	1	10/09/08	10/11/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	107	50-150	10/11/08	Acceptable
n-Triacontane	111	50-150	10/11/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Diesel and Residual Range Organics

Sample Name:	TMW-12	**Units:**	ug/L
Lab Code:	K0809344-020	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	280	1	10/09/08	10/11/08	KWG0810718	
Residual Range Organics (RRO)	ND	U	560	1	10/09/08	10/11/08	KWG0810718	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	93	50-150	10/11/08	Acceptable
n-Triacontane	97	50-150	10/11/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/08/2008
Sample Matrix:	Water	**Date Analyzed:**	10/10/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0810644

			99EA-2ADUP KWG0810644-1 Duplicate Sample			
Analyte Name	**MRL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	270	ND	ND	ND	-	30
Residual Range Organics (RRO)	530	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/08/2008
Sample Matrix:	Water	**Date Analyzed:**	10/10/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TMW-09	**Units:**	ug/L
Lab Code:	K0809344-009	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0810644

Analyte Name	MRL	Sample Result	TMW-09DUP KWG0810644-2 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	300	ND	ND	ND	-	30
Residual Range Organics (RRO)	590	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Extracted:**	10/09/2008
Sample Matrix:	Water		**Date Analyzed:**	10/11/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TMW-06		**Units:**	ug/L
Lab Code:	K0809344-016		**Basis:**	NA
Extraction Method:	EPA 3510C		**Level:**	Low
Analysis Method:	NWTPH-Dx		**Extraction Lot:**	KWG0810718

Analyte Name	**MRL**	**Sample Result**	TMW-06DUP KWG0810718-1 **Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	300	ND	ND	ND	-	30
Residual Range Organics (RRO)	590	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/09/2008
Sample Matrix:	Water	**Date Analyzed:**	10/11/2008

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TMW-12	**Units:**	ug/L
Lab Code:	K0809344-020	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0810718

			TMW-12DUP KWG0810718-2 **Duplicate Sample**			
Analyte Name	**MRL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	280	ND	ND	ND	-	30
Residual Range Organics (RRO)	560	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/08/2008
Sample Matrix:	Water	**Date Analyzed:**	10/10/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810644

	Lab Control Sample KWG0810644-5 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810644-6 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1370	1600	86	1360	1600	85	55-132	1	30
Residual Range Organics (RRO)	760	800	95	746	800	93	54-141	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/09/2008
Sample Matrix:	Water	**Date Analyzed:**	10/11/2008

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810718

	Lab Control Sample KWG0810718-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	1070	1600	67	55-132
Residual Range Organics (RRO)	657	800	82	54-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Organochlorine Pesticides

Extraction Method:	EPA 3535	**Units:**	PERCENT
Analysis Method:	8081A	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
99EA-2A	K0809344-002	60	83
99EA-2A	K0809344-002RE	66	69
99EA-1A	K0809344-003	62	80
99EA-1A	K0809344-003RE	69	77
99EA-3A	K0809344-004	66	84
Method Blank	KWG0810148-11	50	74
Method Blank	KWG0811349-3	56	82
Batch QC	K0809380-003	59	80
Batch QCMS	KWG0810148-1	61	88
Batch QCDMS	KWG0810148-2	65	86
Duplicate Lab Control Sample	KWG0810148-10	57	85
Lab Control Sample	KWG0810148-3	63	82
Lab Control Sample	KWG0810148-9	55	83
Lab Control Sample	KWG0811349-1	41	75
Duplicate Lab Control Sample	KWG0811349-2	41	82

Surrogate Recovery Control Limits (%)

Sur1 = Tetrachloro-m-xylene	10-121
Sur2 = Decachlorobiphenyl	17-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Organochlorine Pesticides

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG0810148-11	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.49	0.21	1	09/29/08	10/18/08	KWG0810148	
beta-BHC	ND	U	0.49	0.41	1	09/29/08	10/18/08	KWG0810148	
gamma-BHC (Lindane)	ND	U	0.49	0.47	1	09/29/08	10/18/08	KWG0810148	
delta-BHC	ND	U	0.49	0.14	1	09/29/08	10/18/08	KWG0810148	
Heptachlor	ND	U	0.49	0.18	1	09/29/08	10/18/08	KWG0810148	
Aldrin	ND	U	0.49	0.11	1	09/29/08	10/18/08	KWG0810148	
Heptachlor Epoxide	ND	U	0.49	0.21	1	09/29/08	10/18/08	KWG0810148	
gamma-Chlordane†	ND	U	0.49	0.31	1	09/29/08	10/18/08	KWG0810148	
Endosulfan I	ND	U	0.49	0.25	1	09/29/08	10/18/08	KWG0810148	
alpha-Chlordane	ND	U	0.49	0.27	1	09/29/08	10/18/08	KWG0810148	
Dieldrin	ND	U	0.49	0.37	1	09/29/08	10/18/08	KWG0810148	
4,4'-DDE	ND	U	0.49	0.19	1	09/29/08	10/18/08	KWG0810148	
Endrin	ND	U	0.49	0.49	1	09/29/08	10/18/08	KWG0810148	
Endosulfan II	ND	U	0.49	0.35	1	09/29/08	10/18/08	KWG0810148	*
4,4'-DDD	ND	U	0.49	0.21	1	09/29/08	10/18/08	KWG0810148	
Endrin Aldehyde	ND	U	0.49	0.21	1	09/29/08	10/18/08	KWG0810148	*
Endosulfan Sulfate	ND	U	0.49	0.28	1	09/29/08	10/18/08	KWG0810148	*
4,4'-DDT	ND	U	0.49	0.17	1	09/29/08	10/18/08	KWG0810148	
Endrin Ketone	ND	U	0.49	0.32	1	09/29/08	10/18/08	KWG0810148	*
Methoxychlor	ND	U	0.49	0.28	1	09/29/08	10/18/08	KWG0810148	
Toxaphene	ND	U	25	9.0	1	09/29/08	10/18/08	KWG0810148	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	50	10-121	10/18/08	Acceptable
Decachlorobiphenyl	74	17-150	10/18/08	Acceptable

† Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments: ____________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Organochlorine Pesticides

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG0811349-3	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.49	0.21	1	10/23/08	10/31/08	KWG0811349	
beta-BHC	ND	U	0.49	0.41	1	10/23/08	10/31/08	KWG0811349	
gamma-BHC (Lindane)	ND	U	0.49	0.47	1	10/23/08	10/31/08	KWG0811349	
delta-BHC	ND	U	0.49	0.14	1	10/23/08	10/31/08	KWG0811349	
Heptachlor	ND	U	0.49	0.18	1	10/23/08	10/31/08	KWG0811349	
Aldrin	ND	U	0.49	0.11	1	10/23/08	10/31/08	KWG0811349	
Heptachlor Epoxide	ND	U	0.49	0.21	1	10/23/08	10/31/08	KWG0811349	
gamma-Chlordane†	ND	U	0.49	0.31	1	10/23/08	10/31/08	KWG0811349	
Endosulfan I	ND	U	0.49	0.25	1	10/23/08	10/31/08	KWG0811349	
alpha-Chlordane	ND	U	0.49	0.27	1	10/23/08	10/31/08	KWG0811349	
Dieldrin	ND	U	0.49	0.37	1	10/23/08	10/31/08	KWG0811349	
4,4'-DDE	ND	U	0.49	0.19	1	10/23/08	10/31/08	KWG0811349	
Endrin	ND	U	0.49	0.49	1	10/23/08	10/31/08	KWG0811349	
Endosulfan II	ND	U	0.49	0.35	1	10/23/08	10/31/08	KWG0811349	
4,4'-DDD	ND	Ui	0.49	0.48	1	10/23/08	10/31/08	KWG0811349	
Endrin Aldehyde	ND	U	0.49	0.21	1	10/23/08	10/31/08	KWG0811349	
Endosulfan Sulfate	ND	U	0.49	0.28	1	10/23/08	10/31/08	KWG0811349	
4,4'-DDT	ND	Ui	0.49	0.49	1	10/23/08	10/31/08	KWG0811349	
Endrin Ketone	ND	U	0.49	0.32	1	10/23/08	10/31/08	KWG0811349	
Methoxychlor	ND	U	0.49	0.28	1	10/23/08	10/31/08	KWG0811349	
Toxaphene	ND	U	25	9.0	1	10/23/08	10/31/08	KWG0811349	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	56	10-121	10/31/08	Acceptable
Decachlorobiphenyl	82	17-150	10/31/08	Acceptable

† Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Organochlorine Pesticides

Sample Name:	99EA-2A	**Units:**	ng/L
Lab Code:	K0809344-002	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.50	0.21	1	09/29/08	10/17/08	KWG0810148	
beta-BHC	ND	U	0.50	0.41	1	09/29/08	10/17/08	KWG0810148	
gamma-BHC (Lindane)	ND	U	0.50	0.47	1	09/29/08	10/17/08	KWG0810148	
delta-BHC	ND	U	0.50	0.14	1	09/29/08	10/17/08	KWG0810148	
Heptachlor	ND	U	0.50	0.18	1	09/29/08	10/17/08	KWG0810148	
Aldrin	ND	U	0.50	0.11	1	09/29/08	10/17/08	KWG0810148	
Heptachlor Epoxide	ND	U	0.50	0.21	1	09/29/08	10/17/08	KWG0810148	
gamma-Chlordane†	ND	U	0.50	0.31	1	09/29/08	10/17/08	KWG0810148	
Endosulfan I	ND	U	0.50	0.25	1	09/29/08	10/17/08	KWG0810148	
alpha-Chlordane	ND	U	0.50	0.27	1	09/29/08	10/17/08	KWG0810148	
Dieldrin	ND	U	0.50	0.37	1	09/29/08	10/17/08	KWG0810148	
4,4'-DDE	ND	U	0.50	0.19	1	09/29/08	10/17/08	KWG0810148	
Endrin	ND	U	0.50	0.49	1	09/29/08	10/17/08	KWG0810148	
Endosulfan II	ND	U	0.50	0.35	1	09/29/08	10/17/08	KWG0810148	*
4,4'-DDD	ND	U	0.50	0.21	1	09/29/08	10/17/08	KWG0810148	
Endrin Aldehyde	ND	U	0.50	0.21	1	09/29/08	10/17/08	KWG0810148	*
Endosulfan Sulfate	ND	U	0.50	0.28	1	09/29/08	10/17/08	KWG0810148	*
4,4'-DDT	ND	U	0.50	0.17	1	09/29/08	10/17/08	KWG0810148	
Endrin Ketone	ND	U	0.50	0.32	1	09/29/08	10/17/08	KWG0810148	*
Methoxychlor	ND	U	0.50	0.28	1	09/29/08	10/17/08	KWG0810148	
Toxaphene	ND	Ui	25	25	1	09/29/08	10/17/08	KWG0810148	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	60	10-121	10/17/08	Acceptable
Decachlorobiphenyl	83	17-150	10/17/08	Acceptable

† Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Organochlorine Pesticides

Sample Name:	99EA-2A	**Units:**	ng/L
Lab Code:	K0809344-002RE	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.77	0.33	1	10/23/08	10/31/08	KWG0811349	*
beta-BHC	ND	U	0.77	0.64	1	10/23/08	10/31/08	KWG0811349	*
gamma-BHC (Lindane)	ND	U	0.77	0.73	1	10/23/08	10/31/08	KWG0811349	*
delta-BHC	ND	Ui	0.77	0.47	1	10/23/08	10/31/08	KWG0811349	*
Heptachlor	ND	U	0.77	0.28	1	10/23/08	10/31/08	KWG0811349	*
Aldrin	ND	U	0.77	0.17	1	10/23/08	10/31/08	KWG0811349	*
Heptachlor Epoxide	ND	U	0.77	0.33	1	10/23/08	10/31/08	KWG0811349	*
gamma-Chlordane†	ND	U	0.77	0.48	1	10/23/08	10/31/08	KWG0811349	*
Endosulfan I	ND	U	0.77	0.39	1	10/23/08	10/31/08	KWG0811349	*
alpha-Chlordane	ND	U	0.77	0.42	1	10/23/08	10/31/08	KWG0811349	*
Dieldrin	ND	U	0.77	0.57	1	10/23/08	10/31/08	KWG0811349	*
4,4'-DDE	ND	U	0.77	0.30	1	10/23/08	10/31/08	KWG0811349	*
Endrin	ND	U	0.77	0.76	1	10/23/08	10/31/08	KWG0811349	*
Endosulfan II	ND	U	0.77	0.54	1	10/23/08	10/31/08	KWG0811349	*
4,4'-DDD	ND	Ui	0.77	0.69	1	10/23/08	10/31/08	KWG0811349	*
Endrin Aldehyde	ND	U	0.77	0.33	1	10/23/08	10/31/08	KWG0811349	*
Endosulfan Sulfate	ND	U	0.77	0.44	1	10/23/08	10/31/08	KWG0811349	*
4,4'-DDT	ND	U	0.77	0.27	1	10/23/08	10/31/08	KWG0811349	*
Endrin Ketone	ND	U	0.77	0.50	1	10/23/08	10/31/08	KWG0811349	*
Methoxychlor	ND	U	0.77	0.44	1	10/23/08	10/31/08	KWG0811349	*
Toxaphene	ND	U	39	14	1	10/23/08	10/31/08	KWG0811349	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	66	10-121	10/31/08	Acceptable
Decachlorobiphenyl	69	17-150	10/31/08	Acceptable

† Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Organochlorine Pesticides

Sample Name:	99EA-1A	**Units:**	ng/L
Lab Code:	K0809344-003	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	
beta-BHC	ND	U	0.49	0.41	1	09/29/08	10/17/08	KWG0810148	
gamma-BHC (Lindane)	ND	U	0.49	0.47	1	09/29/08	10/17/08	KWG0810148	
delta-BHC	ND	U	0.49	0.14	1	09/29/08	10/17/08	KWG0810148	
Heptachlor	ND	U	0.49	0.18	1	09/29/08	10/17/08	KWG0810148	
Aldrin	ND	U	0.49	0.11	1	09/29/08	10/17/08	KWG0810148	
Heptachlor Epoxide	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	
gamma-Chlordane†	ND	U	0.49	0.31	1	09/29/08	10/17/08	KWG0810148	
Endosulfan I	ND	U	0.49	0.25	1	09/29/08	10/17/08	KWG0810148	
alpha-Chlordane	ND	U	0.49	0.27	1	09/29/08	10/17/08	KWG0810148	
Dieldrin	ND	U	0.49	0.37	1	09/29/08	10/17/08	KWG0810148	
4,4'-DDE	ND	U	0.49	0.19	1	09/29/08	10/17/08	KWG0810148	
Endrin	ND	U	0.49	0.49	1	09/29/08	10/17/08	KWG0810148	
Endosulfan II	ND	U	0.49	0.35	1	09/29/08	10/17/08	KWG0810148	
4,4'-DDD	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	
Endrin Aldehyde	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	
Endosulfan Sulfate	ND	U	0.49	0.28	1	09/29/08	10/17/08	KWG0810148	
4,4'-DDT	ND	U	0.49	0.17	1	09/29/08	10/17/08	KWG0810148	
Endrin Ketone	ND	U	0.49	0.32	1	09/29/08	10/17/08	KWG0810148	
Methoxychlor	ND	U	0.49	0.28	1	09/29/08	10/17/08	KWG0810148	
Toxaphene	ND	Ui	25	25	1	09/29/08	10/17/08	KWG0810148	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	62	10-121	10/17/08	Acceptable
Decachlorobiphenyl	80	17-150	10/17/08	Acceptable

† Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Organochlorine Pesticides

Sample Name:	99EA-1A	**Units:**	ng/L
Lab Code:	K0809344-003RE	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.72	0.30	1	10/23/08	10/31/08	KWG0811349	*
beta-BHC	ND	U	0.72	0.59	1	10/23/08	10/31/08	KWG0811349	*
gamma-BHC (Lindane)	ND	U	0.72	0.68	1	10/23/08	10/31/08	KWG0811349	*
delta-BHC	ND	U	0.72	0.20	1	10/23/08	10/31/08	KWG0811349	*
Heptachlor	ND	U	0.72	0.26	1	10/23/08	10/31/08	KWG0811349	*
Aldrin	ND	U	0.72	0.16	1	10/23/08	10/31/08	KWG0811349	*
Heptachlor Epoxide	ND	U	0.72	0.30	1	10/23/08	10/31/08	KWG0811349	*
gamma-Chlordane†	ND	U	0.72	0.45	1	10/23/08	10/31/08	KWG0811349	*
Endosulfan I	ND	U	0.72	0.36	1	10/23/08	10/31/08	KWG0811349	*
alpha-Chlordane	ND	U	0.72	0.39	1	10/23/08	10/31/08	KWG0811349	*
Dieldrin	ND	U	0.72	0.53	1	10/23/08	10/31/08	KWG0811349	*
4,4'-DDE	ND	U	0.72	0.28	1	10/23/08	10/31/08	KWG0811349	*
Endrin	ND	U	0.72	0.70	1	10/23/08	10/31/08	KWG0811349	*
Endosulfan II	ND	U	0.72	0.50	1	10/23/08	10/31/08	KWG0811349	*
4,4'-DDD	ND	U	0.72	0.30	1	10/23/08	10/31/08	KWG0811349	*
Endrin Aldehyde	ND	U	0.72	0.30	1	10/23/08	10/31/08	KWG0811349	*
Endosulfan Sulfate	ND	U	0.72	0.40	1	10/23/08	10/31/08	KWG0811349	*
4,4'-DDT	ND	Ui	0.72	0.72	1	10/23/08	10/31/08	KWG0811349	*
Endrin Ketone	ND	U	0.72	0.46	1	10/23/08	10/31/08	KWG0811349	*
Methoxychlor	ND	U	0.72	0.40	1	10/23/08	10/31/08	KWG0811349	*
Toxaphene	ND	Ui	36	20	1	10/23/08	10/31/08	KWG0811349	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	69	10-121	10/31/08	Acceptable
Decachlorobiphenyl	77	17-150	10/31/08	Acceptable

† Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Organochlorine Pesticides

Sample Name:	99EA-3A	**Units:**	ng/L
Lab Code:	K0809344-004	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	
beta-BHC	ND	U	0.49	0.41	1	09/29/08	10/17/08	KWG0810148	
gamma-BHC (Lindane)	ND	U	0.49	0.47	1	09/29/08	10/17/08	KWG0810148	
delta-BHC	ND	U	0.49	0.14	1	09/29/08	10/17/08	KWG0810148	
Heptachlor	ND	U	0.49	0.18	1	09/29/08	10/17/08	KWG0810148	
Aldrin	ND	U	0.49	0.11	1	09/29/08	10/17/08	KWG0810148	
Heptachlor Epoxide	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	
gamma-Chlordane†	ND	U	0.49	0.31	1	09/29/08	10/17/08	KWG0810148	
Endosulfan I	ND	U	0.49	0.25	1	09/29/08	10/17/08	KWG0810148	
alpha-Chlordane	ND	U	0.49	0.27	1	09/29/08	10/17/08	KWG0810148	
Dieldrin	ND	U	0.49	0.37	1	09/29/08	10/17/08	KWG0810148	
4,4'-DDE	ND	U	0.49	0.19	1	09/29/08	10/17/08	KWG0810148	
Endrin	ND	U	0.49	0.49	1	09/29/08	10/17/08	KWG0810148	
Endosulfan II	ND	U	0.49	0.35	1	09/29/08	10/17/08	KWG0810148	*
4,4'-DDD	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	
Endrin Aldehyde	ND	U	0.49	0.21	1	09/29/08	10/17/08	KWG0810148	*
Endosulfan Sulfate	ND	U	0.49	0.28	1	09/29/08	10/17/08	KWG0810148	*
4,4'-DDT	ND	U	0.49	0.17	1	09/29/08	10/17/08	KWG0810148	
Endrin Ketone	ND	U	0.49	0.32	1	09/29/08	10/17/08	KWG0810148	*
Methoxychlor	ND	U	0.49	0.28	1	09/29/08	10/17/08	KWG0810148	
Toxaphene	ND	Ui	40	40	1	09/29/08	10/17/08	KWG0810148	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	66	10-121	10/17/08	Acceptable
Decachlorobiphenyl	84	17-150	10/17/08	Acceptable

† Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	09/29/2008
Sample Matrix:	Water	**Date Analyzed:**	10/17/2008

Lab Control Spike Summary
Organochlorine Pesticides

Extraction Method:	EPA 3535	**Units:**	ng/L
Analysis Method:	8081A	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810148

	Lab Control Sample KWG0810148-3 **Lab Control Spike**				
Analyte Name	**Result**	**Expected**	**%Rec**		**%Rec Limits**
alpha-BHC	7.76	10.0	78		43-127
beta-BHC	7.98	10.0	80		41-129
gamma-BHC (Lindane)	7.58	10.0	76		42-128
delta-BHC	6.77	10.0	68		47-141
Heptachlor	7.01	10.0	70		34-126
Aldrin	5.24	10.0	52		10-125
Heptachlor Epoxide	7.88	10.0	79		45-124
gamma-Chlordane	7.84	10.0	78		48-119
Endosulfan I	7.20	10.0	72		30-115
alpha-Chlordane	7.89	10.0	79		48-119
Dieldrin	8.22	10.0	82		50-120
4,4'-DDE	7.83	10.0	78		36-137
Endrin	8.02	10.0	80		53-132
Endosulfan II	1.38	10.0	14	*	32-123
4,4'-DDD	7.29	10.0	73		38-140
Endrin Aldehyde	0.0500	10.0	1	*	30-114
Endosulfan Sulfate	0.0460	10.0	0	*	46-120
4,4'-DDT	7.84	10.0	78		45-146
Endrin Ketone	2.12	10.0	21	*	45-127
Methoxychlor	7.54	10.0	75		48-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	09/29/2008
Sample Matrix:	Water	**Date Analyzed:**	10/18/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Organochlorine Pesticides

Extraction Method:	EPA 3535	**Units:**	ng/L
Analysis Method:	8081A	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810148

	Lab Control Sample KWG0810148-9 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810148-10 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Toxaphene	153	200	77	163	200	82	37-142	6	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/23/2008
Sample Matrix:	Water	**Date Analyzed:**	10/30/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Organochlorine Pesticides

Extraction Method:	EPA 3535	**Units:**	ng/L
Analysis Method:	8081A	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0811349

	Lab Control Sample KWG0811349-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0811349-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
alpha-BHC	5.60	10.0	56	5.85	10.0	58	43-127	4	30
beta-BHC	6.15	10.0	62	6.31	10.0	63	41-129	3	30
gamma-BHC (Lindane)	6.13	10.0	61	6.21	10.0	62	42-128	1	30
delta-BHC	6.88	10.0	69	6.86	10.0	69	47-141	0	30
Heptachlor	6.05	10.0	61	6.32	10.0	63	34-126	4	30
Aldrin	6.55	10.0	66	4.83	10.0	48	10-125	30	30
Heptachlor Epoxide	6.81	10.0	68	7.03	10.0	70	45-124	3	30
gamma-Chlordane	7.08	10.0	71	7.39	10.0	74	48-119	4	30
Endosulfan I	6.91	10.0	69	7.04	10.0	70	30-115	2	30
alpha-Chlordane	7.28	10.0	73	7.54	10.0	75	48-119	4	30
Dieldrin	7.42	10.0	74	7.74	10.0	77	50-120	4	30
4,4'-DDE	6.87	10.0	69	7.10	10.0	71	36-137	3	30
Endrin	7.28	10.0	73	7.46	10.0	75	53-132	2	30
Endosulfan II	8.04	10.0	80	8.10	10.0	81	32-123	1	30
4,4'-DDD	7.82	10.0	78	7.65	10.0	77	38-140	2	30
Endrin Aldehyde	5.19	10.0	52	5.56	10.0	56	30-114	7	30
Endosulfan Sulfate	6.51	10.0	65	6.68	10.0	67	46-120	3	30
4,4'-DDT	7.48	10.0	75	8.41	10.0	84	45-146	12	30
Endrin Ketone	6.82	10.0	68	6.91	10.0	69	45-127	1	30
Methoxychlor	7.61	10.0	76	7.94	10.0	79	48-140	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	09/29/2008
Sample Matrix:	Ground water	**Date Analyzed:**	10/18/2008

Matrix Spike/Duplicate Matrix Spike Summary
Organochlorine Pesticides

Sample Name:	Batch QC	**Units:**	ng/L
Lab Code:	K0809380-003	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8081A	**Extraction Lot:**	KWG0810148

		Batch QCMS KWG0810148-1 **Matrix Spike**			Batch QCDMS KWG0810148-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
alpha-BHC	ND	6.94	10.0	69	7.77	9.80	79	30-126	11	30
beta-BHC	ND	5.20	10.0	52	5.11	9.80	52	28-121	2	30
gamma-BHC (Lindane)	ND	8.54	10.0	85	8.08	9.80	82	30-126	6	30
delta-BHC	ND	7.75	10.0	78	7.84	9.80	80	35-138	1	30
Heptachlor	ND	6.29	10.0	63	5.98	9.80	61	21-127	5	30
Aldrin	ND	6.72	10.0	67	6.70	9.80	68	11-124	0	30
Heptachlor Epoxide	ND	7.25	10.0	72	7.32	9.80	75	24-132	1	30
gamma-Chlordane	ND	7.39	10.0	74	7.82	9.80	80	35-121	6	30
Endosulfan I	ND	6.41	10.0	64	6.55	9.80	67	23-109	2	30
alpha-Chlordane	ND	6.75	10.0	67	6.79	9.80	69	25-134	1	30
Dieldrin	ND	8.55	10.0	86	8.47	9.80	86	25-134	1	30
4,4'-DDE	ND	7.98	10.0	80	8.02	9.80	82	21-139	1	30
Endrin	ND	7.42	10.0	74	7.58	9.80	77	35-137	2	30
Endosulfan II	0.47	7.81	10.0	73	7.91	9.80	76	23-119	1	30
4,4'-DDD	0.32	7.15	10.0	68	7.26	9.80	71	22-141	2	30
Endrin Aldehyde	ND	5.61	10.0	56	5.71	9.80	58	10-126	2	30
Endosulfan Sulfate	ND	6.79	10.0	68	6.91	9.80	70	25-130	2	30
4,4'-DDT	ND	13.5	10.0	135	12.2	9.80	124	30-143	10	30
Endrin Ketone	ND	6.70	10.0	67	7.14	9.80	73	38-117	6	30
Methoxychlor	ND	7.92	10.0	79	8.06	9.80	82	38-134	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)

Extraction Method:	EPA 3535	**Units:**	PERCENT
Analysis Method:	8082	**Level:**	Low

Sample Name	Lab Code	Sur1
99EA-2A	K0809344-002	84
99EA-1A	K0809344-003	80
99EA-3A	K0809344-004	85
Method Blank	KWG0810150-4	90
Batch QC	K0809380-001	85
Batch QCMS	KWG0810150-1	85
Batch QCDMS	KWG0810150-2	84
Lab Control Sample	KWG0810150-3	82

Surrogate Recovery Control Limits (%)

Sur1 = Decachlorobiphenyl	17-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Ground water	**Date Received:**	NA

Polychlorinated Biphenyls (PCBs)

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810150-4	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8082		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Aroclor 1016	ND	U	0.0049	0.0010	1	09/29/08	10/20/08	KWG0810150	
Aroclor 1221	ND	U	0.0098	0.0010	1	09/29/08	10/20/08	KWG0810150	
Aroclor 1232	ND	U	0.0049	0.0010	1	09/29/08	10/20/08	KWG0810150	
Aroclor 1242	ND	U	0.0049	0.0010	1	09/29/08	10/20/08	KWG0810150	
Aroclor 1248	ND	U	0.0049	0.0010	1	09/29/08	10/20/08	KWG0810150	
Aroclor 1254	ND	U	0.0049	0.0010	1	09/29/08	10/20/08	KWG0810150	
Aroclor 1260	ND	U	0.0049	0.0010	1	09/29/08	10/20/08	KWG0810150	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	90	17-140	10/20/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polychlorinated Biphenyls (PCBs)

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8082		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Aroclor 1016	ND	U	0.0050	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1221	ND	U	0.0099	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1232	ND	U	0.0050	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1242	ND	U	0.0050	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1248	ND	U	0.0050	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1254	ND	U	0.0050	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1260	ND	U	0.0050	0.0010	1	09/29/08	10/16/08	KWG0810150	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	84	17-140	10/16/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polychlorinated Biphenyls (PCBs)

Sample Name:	99EA-1A	**Units:**	ug/L
Lab Code:	K0809344-003	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8082		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Aroclor 1016	ND	U	0.0049	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1221	ND	U	0.0098	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1232	ND	U	0.0049	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1242	ND	U	0.0049	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1248	ND	U	0.0049	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1254	ND	U	0.0049	0.0010	1	09/29/08	10/16/08	KWG0810150	
Aroclor 1260	ND	U	0.0049	0.0010	1	09/29/08	10/16/08	KWG0810150	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	80	17-140	10/16/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polychlorinated Biphenyls (PCBs)

Sample Name:	99EA-3A	**Units:**	ug/L
Lab Code:	K0809344-004	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8082		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Aroclor 1016	ND	U	0.0049	0.0010	1	09/29/08	10/17/08	KWG0810150	
Aroclor 1221	ND	U	0.0098	0.0010	1	09/29/08	10/17/08	KWG0810150	
Aroclor 1232	ND	U	0.0049	0.0010	1	09/29/08	10/17/08	KWG0810150	
Aroclor 1242	ND	U	0.0049	0.0010	1	09/29/08	10/17/08	KWG0810150	
Aroclor 1248	ND	U	0.0049	0.0010	1	09/29/08	10/17/08	KWG0810150	
Aroclor 1254	ND	U	0.0049	0.0010	1	09/29/08	10/17/08	KWG0810150	
Aroclor 1260	ND	U	0.0049	0.0010	1	09/29/08	10/17/08	KWG0810150	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	85	17-140	10/17/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	09/29/2008
Sample Matrix:	Ground water	**Date Analyzed:**	10/20/2008

Lab Control Spike Summary
Polychlorinated Biphenyls (PCBs)

Extraction Method:	EPA 3535	**Units:**	ug/L
Analysis Method:	8082	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810150

	Lab Control Sample KWG0810150-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Aroclor 1016	0.145	0.200	73	32-115
Aroclor 1260	0.145	0.200	72	36-115

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	09/29/2008
Sample Matrix:	Ground water	**Date Analyzed:**	10/20/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809380-001	**Basis:**	NA
Extraction Method:	EPA 3535	**Level:**	Low
Analysis Method:	8082	**Extraction Lot:**	KWG0810150

		Batch QCMS KWG0810150-1 **Matrix Spike**			Batch QCDMS KWG0810150-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Aroclor 1016	ND	0.151	0.196	77	0.150	0.200	75	10-161	1	30
Aroclor 1260	ND	0.146	0.196	75	0.154	0.200	77	29-123	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Volatile Organic Compounds

Extraction Method:	EPA 5030B	**Units:**	PERCENT
Analysis Method:	8260B	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TMW-02	K0809344-001	89	101	87
99EA-2A	K0809344-002	90	102	87
99EA-1A	K0809344-003	89	102	86
99EA-3A	K0809344-004	89	101	87
Trip Blank	K0809344-012	89	102	88
Method Blank	KWG0810573-2	88	101	88
Batch QC	K0809362-026	90	101	88
Batch QCMS	KWG0810573-3	93	104	88
Batch QCDMS	KWG0810573-4	92	103	90
Lab Control Sample	KWG0810573-1	92	103	89

Surrogate Recovery Control Limits (%)

Sur1 = Dibromofluoromethane	75-120
Sur2 = Toluene-d8	80-128
Sur3 = 4-Bromofluorobenzene	75-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Analytical Results

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344
Date Collected: NA
Date Received: NA

Volatile Organic Compounds

Sample Name: Method Blank
Lab Code: KWG0810573-2

Extraction Method: EPA 5030B
Analysis Method: 8260B

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	0.083	1	10/06/08	10/06/08	KWG0810573	
Chloromethane	ND	U	0.50	0.053	1	10/06/08	10/06/08	KWG0810573	
Vinyl Chloride	ND	U	0.50	0.071	1	10/06/08	10/06/08	KWG0810573	
Bromomethane	ND	U	0.50	0.072	1	10/06/08	10/06/08	KWG0810573	
Chloroethane	ND	U	0.50	0.13	1	10/06/08	10/06/08	KWG0810573	
Trichlorofluoromethane	ND	U	0.50	0.086	1	10/06/08	10/06/08	KWG0810573	
Acetone	ND	U	20	2.5	1	10/06/08	10/06/08	KWG0810573	
1,1-Dichloroethene	ND	U	0.50	0.10	1	10/06/08	10/06/08	KWG0810573	
Carbon Disulfide	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	*
Methylene Chloride	ND	U	2.0	0.23	1	10/06/08	10/06/08	KWG0810573	
trans-1,2-Dichloroethene	ND	U	0.50	0.048	1	10/06/08	10/06/08	KWG0810573	
1,1-Dichloroethane	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
2-Butanone (MEK)	ND	U	20	3.8	1	10/06/08	10/06/08	KWG0810573	
2,2-Dichloropropane	ND	U	0.50	0.050	1	10/06/08	10/06/08	KWG0810573	
cis-1,2-Dichloroethene	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	
Chloroform	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
Bromochloromethane	ND	U	0.50	0.091	1	10/06/08	10/06/08	KWG0810573	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.050	1	10/06/08	10/06/08	KWG0810573	
1,1-Dichloropropene	ND	U	0.50	0.051	1	10/06/08	10/06/08	KWG0810573	
Carbon Tetrachloride	ND	U	0.50	0.068	1	10/06/08	10/06/08	KWG0810573	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.073	1	10/06/08	10/06/08	KWG0810573	
Benzene	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	
Trichloroethene (TCE)	ND	U	0.50	0.061	1	10/06/08	10/06/08	KWG0810573	
1,2-Dichloropropane	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
Bromodichloromethane	ND	U	0.50	0.036	1	10/06/08	10/06/08	KWG0810573	
Dibromomethane	ND	U	0.50	0.089	1	10/06/08	10/06/08	KWG0810573	
2-Hexanone	ND	U	20	2.9	1	10/06/08	10/06/08	KWG0810573	
cis-1,3-Dichloropropene	ND	U	0.50	0.038	1	10/06/08	10/06/08	KWG0810573	
Toluene	ND	U	0.50	0.048	1	10/06/08	10/06/08	KWG0810573	
trans-1,3-Dichloropropene	ND	U	0.50	0.041	1	10/06/08	10/06/08	KWG0810573	
1,1,2-Trichloroethane	ND	U	0.50	0.061	1	10/06/08	10/06/08	KWG0810573	
4-Methyl-2-pentanone (MIBK)	ND	U	20	3.0	1	10/06/08	10/06/08	KWG0810573	
1,3-Dichloropropane	ND	U	0.50	0.032	1	10/06/08	10/06/08	KWG0810573	

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Volatile Organic Compounds

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810573-2	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	0.50	0.077	1	10/06/08	10/06/08	KWG0810573	
Dibromochloromethane	ND	U	0.50	0.057	1	10/06/08	10/06/08	KWG0810573	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.084	1	10/06/08	10/06/08	KWG0810573	
Chlorobenzene	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.047	1	10/06/08	10/06/08	KWG0810573	
Ethylbenzene	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
m,p-Xylenes	ND	U	0.50	0.078	1	10/06/08	10/06/08	KWG0810573	
o-Xylene	ND	U	0.50	0.037	1	10/06/08	10/06/08	KWG0810573	
Styrene	ND	U	0.50	0.039	1	10/06/08	10/06/08	KWG0810573	
Bromoform	ND	U	0.50	0.080	1	10/06/08	10/06/08	KWG0810573	
Isopropylbenzene	ND	U	2.0	0.031	1	10/06/08	10/06/08	KWG0810573	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.064	1	10/06/08	10/06/08	KWG0810573	
1,2,3-Trichloropropane	ND	U	0.50	0.14	1	10/06/08	10/06/08	KWG0810573	
Bromobenzene	ND	U	2.0	0.027	1	10/06/08	10/06/08	KWG0810573	
n-Propylbenzene	ND	U	2.0	0.037	1	10/06/08	10/06/08	KWG0810573	
2-Chlorotoluene	ND	U	2.0	0.035	1	10/06/08	10/06/08	KWG0810573	
4-Chlorotoluene	ND	U	2.0	0.025	1	10/06/08	10/06/08	KWG0810573	
1,3,5-Trimethylbenzene	ND	U	2.0	0.042	1	10/06/08	10/06/08	KWG0810573	
tert-Butylbenzene	ND	U	2.0	0.038	1	10/06/08	10/06/08	KWG0810573	
1,2,4-Trimethylbenzene	**0.040**	J	2.0	0.037	1	10/06/08	10/06/08	KWG0810573	
sec-Butylbenzene	ND	U	2.0	0.036	1	10/06/08	10/06/08	KWG0810573	
1,3-Dichlorobenzene	ND	U	0.50	0.041	1	10/06/08	10/06/08	KWG0810573	
4-Isopropyltoluene	ND	U	2.0	0.044	1	10/06/08	10/06/08	KWG0810573	
1,4-Dichlorobenzene	ND	U	0.50	0.054	1	10/06/08	10/06/08	KWG0810573	
n-Butylbenzene	ND	U	2.0	0.056	1	10/06/08	10/06/08	KWG0810573	
1,2-Dichlorobenzene	ND	U	0.50	0.044	1	10/06/08	10/06/08	KWG0810573	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	10/06/08	10/06/08	KWG0810573	
1,2,4-Trichlorobenzene	ND	U	2.0	0.13	1	10/06/08	10/06/08	KWG0810573	
1,2,3-Trichlorobenzene	ND	U	2.0	0.10	1	10/06/08	10/06/08	KWG0810573	
Naphthalene	ND	U	2.0	0.10	1	10/06/08	10/06/08	KWG0810573	
Hexachlorobutadiene	ND	U	2.0	0.19	1	10/06/08	10/06/08	KWG0810573	

* See Case Narrative

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Volatile Organic Compounds

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810573-2	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	88	75-120	10/06/08	Acceptable
Toluene-d8	101	80-128	10/06/08	Acceptable
4-Bromofluorobenzene	88	75-117	10/06/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	TMW-02	**Units:**	ug/L
Lab Code:	K0809344-001	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	0.083	1	10/07/08	10/07/08	KWG0810573	
Chloromethane	ND	U	0.50	0.053	1	10/07/08	10/07/08	KWG0810573	
Vinyl Chloride	ND	U	0.50	0.071	1	10/07/08	10/07/08	KWG0810573	
Bromomethane	ND	U	0.50	0.072	1	10/07/08	10/07/08	KWG0810573	
Chloroethane	ND	U	0.50	0.13	1	10/07/08	10/07/08	KWG0810573	
Trichlorofluoromethane	ND	U	0.50	0.086	1	10/07/08	10/07/08	KWG0810573	
Acetone	ND	U	20	2.5	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethene	ND	U	0.50	0.10	1	10/07/08	10/07/08	KWG0810573	
Carbon Disulfide	**0.19**	J	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	*
Methylene Chloride	ND	U	2.0	0.23	1	10/07/08	10/07/08	KWG0810573	
trans-1,2-Dichloroethene	ND	U	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
2-Butanone (MEK)	ND	U	20	3.8	1	10/07/08	10/07/08	KWG0810573	
2,2-Dichloropropane	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
cis-1,2-Dichloroethene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Chloroform	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromochloromethane	ND	U	0.50	0.091	1	10/07/08	10/07/08	KWG0810573	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloropropene	ND	U	0.50	0.051	1	10/07/08	10/07/08	KWG0810573	
Carbon Tetrachloride	ND	U	0.50	0.068	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.073	1	10/07/08	10/07/08	KWG0810573	
Benzene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Trichloroethene (TCE)	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloropropane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromodichloromethane	ND	U	0.50	0.036	1	10/07/08	10/07/08	KWG0810573	
Dibromomethane	ND	U	0.50	0.089	1	10/07/08	10/07/08	KWG0810573	
2-Hexanone	ND	U	20	2.9	1	10/07/08	10/07/08	KWG0810573	
cis-1,3-Dichloropropene	ND	U	0.50	0.038	1	10/07/08	10/07/08	KWG0810573	
Toluene	**0.050**	J	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
trans-1,3-Dichloropropene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
1,1,2-Trichloroethane	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
4-Methyl-2-pentanone (MIBK)	ND	U	20	3.0	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichloropropane	ND	U	0.50	0.032	1	10/07/08	10/07/08	KWG0810573	

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	TMW-02	**Units:**	ug/L
Lab Code:	K0809344-001	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	0.50	0.077	1	10/07/08	10/07/08	KWG0810573	
Dibromochloromethane	ND	U	0.50	0.057	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.084	1	10/07/08	10/07/08	KWG0810573	
Chlorobenzene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.047	1	10/07/08	10/07/08	KWG0810573	
Ethylbenzene	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
m,p-Xylenes	ND	U	0.50	0.078	1	10/07/08	10/07/08	KWG0810573	
o-Xylene	ND	U	0.50	0.037	1	10/07/08	10/07/08	KWG0810573	
Styrene	ND	U	0.50	0.039	1	10/07/08	10/07/08	KWG0810573	
Bromoform	ND	U	0.50	0.080	1	10/07/08	10/07/08	KWG0810573	
Isopropylbenzene	**0.060**	J	2.0	0.031	1	10/07/08	10/07/08	KWG0810573	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.064	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichloropropane	ND	U	0.50	0.14	1	10/07/08	10/07/08	KWG0810573	
Bromobenzene	ND	U	2.0	0.027	1	10/07/08	10/07/08	KWG0810573	
n-Propylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
2-Chlorotoluene	ND	U	2.0	0.035	1	10/07/08	10/07/08	KWG0810573	
4-Chlorotoluene	ND	U	2.0	0.025	1	10/07/08	10/07/08	KWG0810573	
1,3,5-Trimethylbenzene	ND	U	2.0	0.042	1	10/07/08	10/07/08	KWG0810573	
tert-Butylbenzene	ND	U	2.0	0.038	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trimethylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
sec-Butylbenzene	ND	U	2.0	0.036	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichlorobenzene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
4-Isopropyltoluene	ND	U	2.0	0.044	1	10/07/08	10/07/08	KWG0810573	
1,4-Dichlorobenzene	ND	U	0.50	0.054	1	10/07/08	10/07/08	KWG0810573	
n-Butylbenzene	ND	U	2.0	0.056	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichlorobenzene	ND	U	0.50	0.044	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trichlorobenzene	ND	U	2.0	0.13	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichlorobenzene	ND	U	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Naphthalene	**0.37**	J	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Hexachlorobutadiene	ND	U	2.0	0.19	1	10/07/08	10/07/08	KWG0810573	

* See Case Narrative

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	TMW-02	**Units:**	ug/L
Lab Code:	K0809344-001	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	89	75-120	10/07/08	Acceptable
Toluene-d8	101	80-128	10/07/08	Acceptable
4-Bromofluorobenzene	87	75-117	10/07/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	0.083	1	10/07/08	10/07/08	KWG0810573	
Chloromethane	**0.090**	J	0.50	0.053	1	10/07/08	10/07/08	KWG0810573	
Vinyl Chloride	ND	U	0.50	0.071	1	10/07/08	10/07/08	KWG0810573	
Bromomethane	ND	U	0.50	0.072	1	10/07/08	10/07/08	KWG0810573	
Chloroethane	ND	U	0.50	0.13	1	10/07/08	10/07/08	KWG0810573	
Trichlorofluoromethane	ND	U	0.50	0.086	1	10/07/08	10/07/08	KWG0810573	
Acetone	ND	U	20	2.5	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethene	ND	U	0.50	0.10	1	10/07/08	10/07/08	KWG0810573	
Carbon Disulfide	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	*
Methylene Chloride	ND	U	2.0	0.23	1	10/07/08	10/07/08	KWG0810573	
trans-1,2-Dichloroethene	ND	U	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
2-Butanone (MEK)	ND	U	20	3.8	1	10/07/08	10/07/08	KWG0810573	
2,2-Dichloropropane	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
cis-1,2-Dichloroethene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Chloroform	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromochloromethane	ND	U	0.50	0.091	1	10/07/08	10/07/08	KWG0810573	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloropropene	ND	U	0.50	0.051	1	10/07/08	10/07/08	KWG0810573	
Carbon Tetrachloride	ND	U	0.50	0.068	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.073	1	10/07/08	10/07/08	KWG0810573	
Benzene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Trichloroethene (TCE)	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloropropane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromodichloromethane	ND	U	0.50	0.036	1	10/07/08	10/07/08	KWG0810573	
Dibromomethane	ND	U	0.50	0.089	1	10/07/08	10/07/08	KWG0810573	
2-Hexanone	ND	U	20	2.9	1	10/07/08	10/07/08	KWG0810573	
cis-1,3-Dichloropropene	ND	U	0.50	0.038	1	10/07/08	10/07/08	KWG0810573	
Toluene	ND	U	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
trans-1,3-Dichloropropene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
1,1,2-Trichloroethane	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
4-Methyl-2-pentanone (MIBK)	ND	U	20	3.0	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichloropropane	ND	U	0.50	0.032	1	10/07/08	10/07/08	KWG0810573	

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	0.50	0.077	1	10/07/08	10/07/08	KWG0810573	
Dibromochloromethane	ND	U	0.50	0.057	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.084	1	10/07/08	10/07/08	KWG0810573	
Chlorobenzene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.047	1	10/07/08	10/07/08	KWG0810573	
Ethylbenzene	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
m,p-Xylenes	ND	U	0.50	0.078	1	10/07/08	10/07/08	KWG0810573	
o-Xylene	ND	U	0.50	0.037	1	10/07/08	10/07/08	KWG0810573	
Styrene	ND	U	0.50	0.039	1	10/07/08	10/07/08	KWG0810573	
Bromoform	ND	U	0.50	0.080	1	10/07/08	10/07/08	KWG0810573	
Isopropylbenzene	ND	U	2.0	0.031	1	10/07/08	10/07/08	KWG0810573	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.064	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichloropropane	ND	U	0.50	0.14	1	10/07/08	10/07/08	KWG0810573	
Bromobenzene	ND	U	2.0	0.027	1	10/07/08	10/07/08	KWG0810573	
n-Propylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
2-Chlorotoluene	ND	U	2.0	0.035	1	10/07/08	10/07/08	KWG0810573	
4-Chlorotoluene	ND	U	2.0	0.025	1	10/07/08	10/07/08	KWG0810573	
1,3,5-Trimethylbenzene	ND	U	2.0	0.042	1	10/07/08	10/07/08	KWG0810573	
tert-Butylbenzene	ND	U	2.0	0.038	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trimethylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
sec-Butylbenzene	ND	U	2.0	0.036	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichlorobenzene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
4-Isopropyltoluene	ND	U	2.0	0.044	1	10/07/08	10/07/08	KWG0810573	
1,4-Dichlorobenzene	ND	U	0.50	0.054	1	10/07/08	10/07/08	KWG0810573	
n-Butylbenzene	ND	U	2.0	0.056	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichlorobenzene	ND	U	0.50	0.044	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trichlorobenzene	ND	U	2.0	0.13	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichlorobenzene	ND	U	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Naphthalene	ND	U	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Hexachlorobutadiene	ND	U	2.0	0.19	1	10/07/08	10/07/08	KWG0810573	

* See Case Narrative

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	90	75-120	10/07/08	Acceptable
Toluene-d8	102	80-128	10/07/08	Acceptable
4-Bromofluorobenzene	87	75-117	10/07/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-1A	**Units:**	ug/L
Lab Code:	K0809344-003	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	0.083	1	10/07/08	10/07/08	KWG0810573	
Chloromethane	ND	U	0.50	0.053	1	10/07/08	10/07/08	KWG0810573	
Vinyl Chloride	ND	U	0.50	0.071	1	10/07/08	10/07/08	KWG0810573	
Bromomethane	ND	U	0.50	0.072	1	10/07/08	10/07/08	KWG0810573	
Chloroethane	ND	U	0.50	0.13	1	10/07/08	10/07/08	KWG0810573	
Trichlorofluoromethane	ND	U	0.50	0.086	1	10/07/08	10/07/08	KWG0810573	
Acetone	ND	U	20	2.5	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethene	ND	U	0.50	0.10	1	10/07/08	10/07/08	KWG0810573	
Carbon Disulfide	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	*
Methylene Chloride	ND	U	2.0	0.23	1	10/07/08	10/07/08	KWG0810573	
trans-1,2-Dichloroethene	ND	U	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
2-Butanone (MEK)	ND	U	20	3.8	1	10/07/08	10/07/08	KWG0810573	
2,2-Dichloropropane	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
cis-1,2-Dichloroethene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Chloroform	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromochloromethane	ND	U	0.50	0.091	1	10/07/08	10/07/08	KWG0810573	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloropropene	ND	U	0.50	0.051	1	10/07/08	10/07/08	KWG0810573	
Carbon Tetrachloride	ND	U	0.50	0.068	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.073	1	10/07/08	10/07/08	KWG0810573	
Benzene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Trichloroethene (TCE)	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloropropane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromodichloromethane	ND	U	0.50	0.036	1	10/07/08	10/07/08	KWG0810573	
Dibromomethane	ND	U	0.50	0.089	1	10/07/08	10/07/08	KWG0810573	
2-Hexanone	ND	U	20	2.9	1	10/07/08	10/07/08	KWG0810573	
cis-1,3-Dichloropropene	ND	U	0.50	0.038	1	10/07/08	10/07/08	KWG0810573	
Toluene	ND	U	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
trans-1,3-Dichloropropene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
1,1,2-Trichloroethane	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
4-Methyl-2-pentanone (MIBK)	ND	U	20	3.0	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichloropropane	ND	U	0.50	0.032	1	10/07/08	10/07/08	KWG0810573	

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	09/24/2008
Sample Matrix:	Water		**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-1A		**Units:**	ug/L
Lab Code:	K0809344-003		**Basis:**	NA
Extraction Method:	EPA 5030B		**Level:**	Low
Analysis Method:	8260B			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	0.50	0.077	1	10/07/08	10/07/08	KWG0810573	
Dibromochloromethane	ND	U	0.50	0.057	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.084	1	10/07/08	10/07/08	KWG0810573	
Chlorobenzene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.047	1	10/07/08	10/07/08	KWG0810573	
Ethylbenzene	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
m,p-Xylenes	ND	U	0.50	0.078	1	10/07/08	10/07/08	KWG0810573	
o-Xylene	ND	U	0.50	0.037	1	10/07/08	10/07/08	KWG0810573	
Styrene	ND	U	0.50	0.039	1	10/07/08	10/07/08	KWG0810573	
Bromoform	ND	U	0.50	0.080	1	10/07/08	10/07/08	KWG0810573	
Isopropylbenzene	ND	U	2.0	0.031	1	10/07/08	10/07/08	KWG0810573	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.064	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichloropropane	ND	U	0.50	0.14	1	10/07/08	10/07/08	KWG0810573	
Bromobenzene	ND	U	2.0	0.027	1	10/07/08	10/07/08	KWG0810573	
n-Propylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
2-Chlorotoluene	ND	U	2.0	0.035	1	10/07/08	10/07/08	KWG0810573	
4-Chlorotoluene	ND	U	2.0	0.025	1	10/07/08	10/07/08	KWG0810573	
1,3,5-Trimethylbenzene	ND	U	2.0	0.042	1	10/07/08	10/07/08	KWG0810573	
tert-Butylbenzene	ND	U	2.0	0.038	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trimethylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
sec-Butylbenzene	ND	U	2.0	0.036	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichlorobenzene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
4-Isopropyltoluene	ND	U	2.0	0.044	1	10/07/08	10/07/08	KWG0810573	
1,4-Dichlorobenzene	ND	U	0.50	0.054	1	10/07/08	10/07/08	KWG0810573	
n-Butylbenzene	ND	U	2.0	0.056	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichlorobenzene	ND	U	0.50	0.044	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trichlorobenzene	ND	U	2.0	0.13	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichlorobenzene	ND	U	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Naphthalene	ND	U	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Hexachlorobutadiene	ND	U	2.0	0.19	1	10/07/08	10/07/08	KWG0810573	

* See Case Narrative

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	09/24/2008
Sample Matrix:	Water		**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-1A		**Units:**	ug/L
Lab Code:	K0809344-003		**Basis:**	NA

Surrogate Name	**%Rec**	**Control Limits**	**Date Analyzed**	**Note**
Dibromofluoromethane	89	75-120	10/07/08	Acceptable
Toluene-d8	102	80-128	10/07/08	Acceptable
4-Bromofluorobenzene	86	75-117	10/07/08	Acceptable

Comments:

Analytical Results

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344
Date Collected: 09/24/2008
Date Received: 09/25/2008

Volatile Organic Compounds

Sample Name: 99EA-3A
Lab Code: K0809344-004

Extraction Method: EPA 5030B
Analysis Method: 8260B

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	0.083	1	10/07/08	10/07/08	KWG0810573	
Chloromethane	**0.10**	J	0.50	0.053	1	10/07/08	10/07/08	KWG0810573	
Vinyl Chloride	ND	U	0.50	0.071	1	10/07/08	10/07/08	KWG0810573	
Bromomethane	ND	U	0.50	0.072	1	10/07/08	10/07/08	KWG0810573	
Chloroethane	ND	U	0.50	0.13	1	10/07/08	10/07/08	KWG0810573	
Trichlorofluoromethane	ND	U	0.50	0.086	1	10/07/08	10/07/08	KWG0810573	
Acetone	ND	U	20	2.5	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethene	ND	U	0.50	0.10	1	10/07/08	10/07/08	KWG0810573	
Carbon Disulfide	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	*
Methylene Chloride	ND	U	2.0	0.23	1	10/07/08	10/07/08	KWG0810573	
trans-1,2-Dichloroethene	ND	U	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloroethane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
2-Butanone (MEK)	ND	U	20	3.8	1	10/07/08	10/07/08	KWG0810573	
2,2-Dichloropropane	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
cis-1,2-Dichloroethene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Chloroform	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromochloromethane	ND	U	0.50	0.091	1	10/07/08	10/07/08	KWG0810573	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.050	1	10/07/08	10/07/08	KWG0810573	
1,1-Dichloropropene	ND	U	0.50	0.051	1	10/07/08	10/07/08	KWG0810573	
Carbon Tetrachloride	ND	U	0.50	0.068	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.073	1	10/07/08	10/07/08	KWG0810573	
Benzene	**0.12**	J	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
Trichloroethene (TCE)	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichloropropane	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
Bromodichloromethane	ND	U	0.50	0.036	1	10/07/08	10/07/08	KWG0810573	
Dibromomethane	ND	U	0.50	0.089	1	10/07/08	10/07/08	KWG0810573	
2-Hexanone	ND	U	20	2.9	1	10/07/08	10/07/08	KWG0810573	
cis-1,3-Dichloropropene	ND	U	0.50	0.038	1	10/07/08	10/07/08	KWG0810573	
Toluene	**0.050**	J	0.50	0.048	1	10/07/08	10/07/08	KWG0810573	
trans-1,3-Dichloropropene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
1,1,2-Trichloroethane	ND	U	0.50	0.061	1	10/07/08	10/07/08	KWG0810573	
4-Methyl-2-pentanone (MIBK)	ND	U	20	3.0	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichloropropane	ND	U	0.50	0.032	1	10/07/08	10/07/08	KWG0810573	

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-3A	**Units:**	ug/L
Lab Code:	K0809344-004	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	0.50	0.077	1	10/07/08	10/07/08	KWG0810573	
Dibromochloromethane	ND	U	0.50	0.057	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.084	1	10/07/08	10/07/08	KWG0810573	
Chlorobenzene	ND	U	0.50	0.045	1	10/07/08	10/07/08	KWG0810573	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.047	1	10/07/08	10/07/08	KWG0810573	
Ethylbenzene	ND	U	0.50	0.042	1	10/07/08	10/07/08	KWG0810573	
m,p-Xylenes	ND	U	0.50	0.078	1	10/07/08	10/07/08	KWG0810573	
o-Xylene	ND	U	0.50	0.037	1	10/07/08	10/07/08	KWG0810573	
Styrene	ND	U	0.50	0.039	1	10/07/08	10/07/08	KWG0810573	
Bromoform	ND	U	0.50	0.080	1	10/07/08	10/07/08	KWG0810573	
Isopropylbenzene	ND	U	2.0	0.031	1	10/07/08	10/07/08	KWG0810573	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.064	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichloropropane	ND	U	0.50	0.14	1	10/07/08	10/07/08	KWG0810573	
Bromobenzene	ND	U	2.0	0.027	1	10/07/08	10/07/08	KWG0810573	
n-Propylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
2-Chlorotoluene	ND	U	2.0	0.035	1	10/07/08	10/07/08	KWG0810573	
4-Chlorotoluene	ND	U	2.0	0.025	1	10/07/08	10/07/08	KWG0810573	
1,3,5-Trimethylbenzene	ND	U	2.0	0.042	1	10/07/08	10/07/08	KWG0810573	
tert-Butylbenzene	ND	U	2.0	0.038	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trimethylbenzene	ND	U	2.0	0.037	1	10/07/08	10/07/08	KWG0810573	
sec-Butylbenzene	ND	U	2.0	0.036	1	10/07/08	10/07/08	KWG0810573	
1,3-Dichlorobenzene	ND	U	0.50	0.041	1	10/07/08	10/07/08	KWG0810573	
4-Isopropyltoluene	ND	U	2.0	0.044	1	10/07/08	10/07/08	KWG0810573	
1,4-Dichlorobenzene	ND	U	0.50	0.054	1	10/07/08	10/07/08	KWG0810573	
n-Butylbenzene	ND	U	2.0	0.056	1	10/07/08	10/07/08	KWG0810573	
1,2-Dichlorobenzene	ND	U	0.50	0.044	1	10/07/08	10/07/08	KWG0810573	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	10/07/08	10/07/08	KWG0810573	
1,2,4-Trichlorobenzene	ND	U	2.0	0.13	1	10/07/08	10/07/08	KWG0810573	
1,2,3-Trichlorobenzene	ND	U	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Naphthalene	ND	U	2.0	0.10	1	10/07/08	10/07/08	KWG0810573	
Hexachlorobutadiene	ND	U	2.0	0.19	1	10/07/08	10/07/08	KWG0810573	

* See Case Narrative

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	09/24/2008
Sample Matrix:	Water		**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	99EA-3A		**Units:**	ug/L
Lab Code:	K0809344-004		**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	89	75-120	10/07/08	Acceptable
Toluene-d8	101	80-128	10/07/08	Acceptable
4-Bromofluorobenzene	87	75-117	10/07/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	09/24/2008
Sample Matrix:	Water		**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	Trip Blank		**Units:**	ug/L
Lab Code:	K0809344-012		**Basis:**	NA
Extraction Method:	EPA 5030B		**Level:**	Low
Analysis Method:	8260B			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Dichlorodifluoromethane	ND	U	0.50	0.083	1	10/06/08	10/06/08	KWG0810573	
Chloromethane	**0.10**	J	0.50	0.053	1	10/06/08	10/06/08	KWG0810573	
Vinyl Chloride	ND	U	0.50	0.071	1	10/06/08	10/06/08	KWG0810573	
Bromomethane	ND	U	0.50	0.072	1	10/06/08	10/06/08	KWG0810573	
Chloroethane	ND	U	0.50	0.13	1	10/06/08	10/06/08	KWG0810573	
Trichlorofluoromethane	ND	U	0.50	0.086	1	10/06/08	10/06/08	KWG0810573	
Acetone	ND	U	20	2.5	1	10/06/08	10/06/08	KWG0810573	
1,1-Dichloroethene	ND	U	0.50	0.10	1	10/06/08	10/06/08	KWG0810573	
Carbon Disulfide	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	*
Methylene Chloride	ND	U	2.0	0.23	1	10/06/08	10/06/08	KWG0810573	
trans-1,2-Dichloroethene	ND	U	0.50	0.048	1	10/06/08	10/06/08	KWG0810573	
1,1-Dichloroethane	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
2-Butanone (MEK)	ND	U	20	3.8	1	10/06/08	10/06/08	KWG0810573	
2,2-Dichloropropane	ND	U	0.50	0.050	1	10/06/08	10/06/08	KWG0810573	
cis-1,2-Dichloroethene	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	
Chloroform	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
Bromochloromethane	ND	U	0.50	0.091	1	10/06/08	10/06/08	KWG0810573	
1,1,1-Trichloroethane (TCA)	ND	U	0.50	0.050	1	10/06/08	10/06/08	KWG0810573	
1,1-Dichloropropene	ND	U	0.50	0.051	1	10/06/08	10/06/08	KWG0810573	
Carbon Tetrachloride	ND	U	0.50	0.068	1	10/06/08	10/06/08	KWG0810573	
1,2-Dichloroethane (EDC)	ND	U	0.50	0.073	1	10/06/08	10/06/08	KWG0810573	
Benzene	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	
Trichloroethene (TCE)	ND	U	0.50	0.061	1	10/06/08	10/06/08	KWG0810573	
1,2-Dichloropropane	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
Bromodichloromethane	ND	U	0.50	0.036	1	10/06/08	10/06/08	KWG0810573	
Dibromomethane	ND	U	0.50	0.089	1	10/06/08	10/06/08	KWG0810573	
2-Hexanone	ND	U	20	2.9	1	10/06/08	10/06/08	KWG0810573	
cis-1,3-Dichloropropene	ND	U	0.50	0.038	1	10/06/08	10/06/08	KWG0810573	
Toluene	ND	U	0.50	0.048	1	10/06/08	10/06/08	KWG0810573	
trans-1,3-Dichloropropene	ND	U	0.50	0.041	1	10/06/08	10/06/08	KWG0810573	
1,1,2-Trichloroethane	ND	U	0.50	0.061	1	10/06/08	10/06/08	KWG0810573	
4-Methyl-2-pentanone (MIBK)	ND	U	20	3.0	1	10/06/08	10/06/08	KWG0810573	
1,3-Dichloropropane	ND	U	0.50	0.032	1	10/06/08	10/06/08	KWG0810573	

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Volatile Organic Compounds

Sample Name:	Trip Blank	**Units:**	ug/L
Lab Code:	K0809344-012	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetrachloroethene (PCE)	ND	U	0.50	0.077	1	10/06/08	10/06/08	KWG0810573	
Dibromochloromethane	ND	U	0.50	0.057	1	10/06/08	10/06/08	KWG0810573	
1,2-Dibromoethane (EDB)	ND	U	2.0	0.084	1	10/06/08	10/06/08	KWG0810573	
Chlorobenzene	ND	U	0.50	0.045	1	10/06/08	10/06/08	KWG0810573	
1,1,1,2-Tetrachloroethane	ND	U	0.50	0.047	1	10/06/08	10/06/08	KWG0810573	
Ethylbenzene	ND	U	0.50	0.042	1	10/06/08	10/06/08	KWG0810573	
m,p-Xylenes	ND	U	0.50	0.078	1	10/06/08	10/06/08	KWG0810573	
o-Xylene	ND	U	0.50	0.037	1	10/06/08	10/06/08	KWG0810573	
Styrene	ND	U	0.50	0.039	1	10/06/08	10/06/08	KWG0810573	
Bromoform	ND	U	0.50	0.080	1	10/06/08	10/06/08	KWG0810573	
Isopropylbenzene	ND	U	2.0	0.031	1	10/06/08	10/06/08	KWG0810573	
1,1,2,2-Tetrachloroethane	ND	U	0.50	0.064	1	10/06/08	10/06/08	KWG0810573	
1,2,3-Trichloropropane	ND	U	0.50	0.14	1	10/06/08	10/06/08	KWG0810573	
Bromobenzene	ND	U	2.0	0.027	1	10/06/08	10/06/08	KWG0810573	
n-Propylbenzene	ND	U	2.0	0.037	1	10/06/08	10/06/08	KWG0810573	
2-Chlorotoluene	ND	U	2.0	0.035	1	10/06/08	10/06/08	KWG0810573	
4-Chlorotoluene	ND	U	2.0	0.025	1	10/06/08	10/06/08	KWG0810573	
1,3,5-Trimethylbenzene	ND	U	2.0	0.042	1	10/06/08	10/06/08	KWG0810573	
tert-Butylbenzene	ND	U	2.0	0.038	1	10/06/08	10/06/08	KWG0810573	
1,2,4-Trimethylbenzene	ND	U	2.0	0.037	1	10/06/08	10/06/08	KWG0810573	
sec-Butylbenzene	ND	U	2.0	0.036	1	10/06/08	10/06/08	KWG0810573	
1,3-Dichlorobenzene	ND	U	0.50	0.041	1	10/06/08	10/06/08	KWG0810573	
4-Isopropyltoluene	ND	U	2.0	0.044	1	10/06/08	10/06/08	KWG0810573	
1,4-Dichlorobenzene	ND	U	0.50	0.054	1	10/06/08	10/06/08	KWG0810573	
n-Butylbenzene	ND	U	2.0	0.056	1	10/06/08	10/06/08	KWG0810573	
1,2-Dichlorobenzene	ND	U	0.50	0.044	1	10/06/08	10/06/08	KWG0810573	
1,2-Dibromo-3-chloropropane	ND	U	2.0	0.22	1	10/06/08	10/06/08	KWG0810573	
1,2,4-Trichlorobenzene	ND	U	2.0	0.13	1	10/06/08	10/06/08	KWG0810573	
1,2,3-Trichlorobenzene	ND	U	2.0	0.10	1	10/06/08	10/06/08	KWG0810573	
Naphthalene	ND	U	2.0	0.10	1	10/06/08	10/06/08	KWG0810573	
Hexachlorobutadiene	ND	U	2.0	0.19	1	10/06/08	10/06/08	KWG0810573	

* See Case Narrative

Comments:

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344
Date Collected: 09/24/2008
Date Received: 09/25/2008

Volatile Organic Compounds

Sample Name: Trip Blank
Lab Code: K0809344-012

Units: ug/L
Basis: NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Dibromofluoromethane	89	75-120	10/06/08	Acceptable
Toluene-d8	102	80-128	10/06/08	Acceptable
4-Bromofluorobenzene	88	75-117	10/06/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/06/2008
Sample Matrix:	Water	**Date Analyzed:**	10/06/2008

Lab Control Spike Summary
Volatile Organic Compounds

Extraction Method:	EPA 5030B	**Units:**	ug/L
Analysis Method:	8260B	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810573

	Lab Control Sample KWG0810573-1 **Lab Control Spike**				
Analyte Name	**Result**	**Expected**	**%Rec**		**%Rec Limits**
Dichlorodifluoromethane	5.85	10.0	59		21-156
Chloromethane	8.37	10.0	84		45-135
Vinyl Chloride	8.42	10.0	84		59-135
Bromomethane	5.42	10.0	54		24-144
Chloroethane	7.46	10.0	75		60-128
Trichlorofluoromethane	7.89	10.0	79		54-129
Acetone	37.9	50.0	76		53-129
1,1-Dichloroethene	8.50	10.0	85		70-136
Carbon Disulfide	12.7	20.0	63	*	64-129
Methylene Chloride	9.03	10.0	90		64-137
trans-1,2-Dichloroethene	8.66	10.0	87		70-121
1,1-Dichloroethane	7.77	10.0	78		72-122
2-Butanone (MEK)	37.3	50.0	75		56-137
2,2-Dichloropropane	6.18	10.0	62		48-133
cis-1,2-Dichloroethene	8.49	10.0	85		76-125
Chloroform	8.26	10.0	83		71-118
Bromochloromethane	8.12	10.0	81		72-123
1,1,1-Trichloroethane (TCA)	7.34	10.0	73		65-126
1,1-Dichloropropene	7.84	10.0	78		71-119
Carbon Tetrachloride	6.93	10.0	69		58-133
1,2-Dichloroethane (EDC)	8.38	10.0	84		69-125
Benzene	8.39	10.0	84		74-118
Trichloroethene (TCE)	8.02	10.0	80		71-122
1,2-Dichloropropane	8.13	10.0	81		73-123
Bromodichloromethane	7.92	10.0	79		72-127
Dibromomethane	7.61	10.0	76		71-124
2-Hexanone	35.8	50.0	72		44-135
cis-1,3-Dichloropropene	7.16	10.0	72		71-125
Toluene	8.22	10.0	82		74-117
trans-1,3-Dichloropropene	6.45	10.0	65		56-121
1,1,2-Trichloroethane	8.60	10.0	86		73-122
4-Methyl-2-pentanone (MIBK)	36.5	50.0	73		57-129
1,3-Dichloropropane	8.85	10.0	89		74-120
Tetrachloroethene (PCE)	8.91	10.0	89		65-121
Dibromochloromethane	8.00	10.0	80		67-124

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Extracted:**	10/06/2008
Sample Matrix:	Water		**Date Analyzed:**	10/06/2008

Lab Control Spike Summary
Volatile Organic Compounds

Extraction Method:	EPA 5030B		**Units:**	ug/L
Analysis Method:	8260B		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0810573

	Lab Control Sample KWG0810573-1 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
1,2-Dibromoethane (EDB)	8.60	10.0	86	71-120
Chlorobenzene	9.05	10.0	91	74-115
1,1,1,2-Tetrachloroethane	8.29	10.0	83	71-118
Ethylbenzene	9.09	10.0	91	71-118
m,p-Xylenes	18.3	20.0	91	73-119
o-Xylene	8.93	10.0	89	74-120
Styrene	9.02	10.0	90	75-123
Bromoform	6.66	10.0	67	57-135
Isopropylbenzene	8.07	10.0	81	65-110
1,1,2,2-Tetrachloroethane	8.07	10.0	81	63-126
1,2,3-Trichloropropane	8.20	10.0	82	67-123
Bromobenzene	8.79	10.0	88	76-111
n-Propylbenzene	8.28	10.0	83	69-122
2-Chlorotoluene	8.31	10.0	83	72-120
4-Chlorotoluene	8.18	10.0	82	70-118
1,3,5-Trimethylbenzene	8.22	10.0	82	70-120
tert-Butylbenzene	8.21	10.0	82	72-118
1,2,4-Trimethylbenzene	8.28	10.0	83	72-121
sec-Butylbenzene	8.03	10.0	80	73-130
1,3-Dichlorobenzene	8.55	10.0	86	76-110
4-Isopropyltoluene	7.85	10.0	79	67-115
1,4-Dichlorobenzene	8.50	10.0	85	74-112
n-Butylbenzene	7.57	10.0	76	62-123
1,2-Dichlorobenzene	8.60	10.0	86	75-110
1,2-Dibromo-3-chloropropane	6.55	10.0	66	49-124
1,2,4-Trichlorobenzene	7.97	10.0	80	66-115
1,2,3-Trichlorobenzene	8.26	10.0	83	64-120
Naphthalene	7.65	10.0	77	58-132
Hexachlorobutadiene	8.01	10.0	80	61-124

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/06/2008
Sample Matrix:	Water	**Date Analyzed:**	10/06/2008

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809362-026	**Basis:**	NA
Extraction Method:	EPA 5030B	**Level:**	Low
Analysis Method:	8260B	**Extraction Lot:**	KWG0810573

		Batch QCMS KWG0810573-3 **Matrix Spike**			Batch QCDMS KWG0810573-4 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
1,1-Dichloroethene	4.2	918	1000	91	947	1000	94	67-147	3	30
Benzene	ND	886	1000	89	883	1000	88	69-126	0	30
Trichloroethene (TCE)	570	1430	1000	85	1420	1000	85	56-137	0	30
Toluene	ND	875	1000	88	882	1000	88	66-128	1	30
Chlorobenzene	ND	945	1000	95	929	1000	93	68-120	2	30
1,2-Dichlorobenzene	ND	908	1000	91	854	1000	85	67-116	6	30
Naphthalene	ND	809	1000	81	797	1000	80	61-137	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method:	EPA 3520C	**Units:**	PERCENT
Analysis Method:	8270C	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4	Sur5	Sur6
99EA-2A	K0809344-002	77	77	79	71	101	97
99EA-1A	K0809344-003	61	63	67	64	83	82
99EA-3A	K0809344-004	73	77	77	85	100	96
Method Blank	KWG0810224-5	80	79	84	85	100	93
Method Blank	KWG0810662-3	91	92	92	96	98	117
Batch QC	K0809408-004	80	81	86	80	96	101
Batch QCMS	KWG0810224-1	59	69	76	76	89	84
Batch QCDMS	KWG0810224-2	61	74	79	77	88	85
Lab Control Sample	KWG0810224-3	65	71	76	78	90	85
Duplicate Lab Control Sample	KWG0810224-4	64	72	75	76	85	88
Lab Control Sample	KWG0810662-1	80	81	84	83	95	100
Duplicate Lab Control Sample	KWG0810662-2	75	75	78	76	96	94

Surrogate Recovery Control Limits (%)

Surrogate	Limits	Surrogate	Limits
Sur1 = 2-Fluorophenol	21-119	Sur5 = 2,4,6-Tribromophenol	30-131
Sur2 = Phenol-d6	31-121	Sur6 = Terphenyl-d14	20-140
Sur3 = Nitrobenzene-d5	29-121		
Sur4 = 2-Fluorobiphenyl	25-109		

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344
Date Collected: NA
Date Received: NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name: Method Blank
Lab Code: KWG0810224-5

Extraction Method: EPA 3520C
Analysis Method: 8270C

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Bis(2-chloroethyl) Ether	ND	U	0.19	0.035	1	09/30/08	10/13/08	KWG0810224	
Phenol	ND	U	0.48	0.063	1	09/30/08	10/13/08	KWG0810224	
2-Chlorophenol	ND	U	0.48	0.054	1	09/30/08	10/13/08	KWG0810224	
1,3-Dichlorobenzene	**0.028**	J	0.19	0.021	1	09/30/08	10/13/08	KWG0810224	
1,4-Dichlorobenzene	**0.037**	J	0.19	0.029	1	09/30/08	10/13/08	KWG0810224	
1,2-Dichlorobenzene	**0.028**	J	0.19	0.022	1	09/30/08	10/13/08	KWG0810224	
Benzyl Alcohol	ND	U	0.48	0.073	1	09/30/08	10/13/08	KWG0810224	
Bis(2-chloroisopropyl) Ether	ND	U	0.19	0.026	1	09/30/08	10/13/08	KWG0810224	
2-Methylphenol	ND	U	0.48	0.11	1	09/30/08	10/13/08	KWG0810224	
Hexachloroethane	ND	U	0.19	0.024	1	09/30/08	10/13/08	KWG0810224	
N-Nitrosodi-n-propylamine	ND	U	0.19	0.037	1	09/30/08	10/13/08	KWG0810224	
4-Methylphenol†	ND	U	0.48	0.12	1	09/30/08	10/13/08	KWG0810224	
Nitrobenzene	ND	U	0.19	0.028	1	09/30/08	10/13/08	KWG0810224	
Isophorone	ND	U	0.19	0.016	1	09/30/08	10/13/08	KWG0810224	
2-Nitrophenol	ND	U	0.48	0.063	1	09/30/08	10/13/08	KWG0810224	
2,4-Dimethylphenol	ND	U	3.8	2.2	1	09/30/08	10/13/08	KWG0810224	*
Bis(2-chloroethoxy)methane	ND	U	0.19	0.024	1	09/30/08	10/13/08	KWG0810224	
2,4-Dichlorophenol	ND	U	0.48	0.047	1	09/30/08	10/13/08	KWG0810224	
Benzoic Acid	ND	U	4.8	1.1	1	09/30/08	10/13/08	KWG0810224	
1,2,4-Trichlorobenzene	ND	U	0.19	0.016	1	09/30/08	10/13/08	KWG0810224	
Naphthalene	ND	U	0.19	0.022	1	09/30/08	10/13/08	KWG0810224	
4-Chloroaniline	ND	U	0.19	0.025	1	09/30/08	10/13/08	KWG0810224	
Hexachlorobutadiene	ND	U	0.19	0.027	1	09/30/08	10/13/08	KWG0810224	
4-Chloro-3-methylphenol	ND	U	0.48	0.037	1	09/30/08	10/13/08	KWG0810224	
2-Methylnaphthalene	**0.028**	J	0.19	0.026	1	09/30/08	10/13/08	KWG0810224	
Hexachlorocyclopentadiene	ND	U	0.95	0.19	1	09/30/08	10/13/08	KWG0810224	
2,4,6-Trichlorophenol	ND	U	0.48	0.058	1	09/30/08	10/13/08	KWG0810224	
2,4,5-Trichlorophenol	ND	U	0.48	0.031	1	09/30/08	10/13/08	KWG0810224	
2-Chloronaphthalene	ND	U	0.19	0.041	1	09/30/08	10/13/08	KWG0810224	
2-Nitroaniline	ND	U	0.19	0.024	1	09/30/08	10/13/08	KWG0810224	
Acenaphthylene	**0.026**	J	0.19	0.015	1	09/30/08	10/13/08	KWG0810224	
Dimethyl Phthalate	**0.032**	J	0.19	0.021	1	09/30/08	10/13/08	KWG0810224	
2,6-Dinitrotoluene	ND	U	0.19	0.033	1	09/30/08	10/13/08	KWG0810224	

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	NA
Sample Matrix:	Water		**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank		**Units:**	ug/L
Lab Code:	KWG0810224-5		**Basis:**	NA
Extraction Method:	EPA 3520C		**Level:**	Low
Analysis Method:	8270C			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Acenaphthene	ND	U	0.19	0.026	1	09/30/08	10/13/08	KWG0810224	
3-Nitroaniline	ND	U	0.95	0.029	1	09/30/08	10/13/08	KWG0810224	
2,4-Dinitrophenol	ND	U	3.8	0.17	1	09/30/08	10/13/08	KWG0810224	
Dibenzofuran	**0.029**	J	0.19	0.018	1	09/30/08	10/13/08	KWG0810224	
4-Nitrophenol	ND	U	1.9	0.28	1	09/30/08	10/13/08	KWG0810224	
2,4-Dinitrotoluene	ND	U	0.19	0.018	1	09/30/08	10/13/08	KWG0810224	
Fluorene	**0.027**	J	0.19	0.027	1	09/30/08	10/13/08	KWG0810224	
4-Chlorophenyl Phenyl Ether	ND	U	0.19	0.027	1	09/30/08	10/13/08	KWG0810224	
Diethyl Phthalate	**0.045**	J	0.19	0.012	1	09/30/08	10/13/08	KWG0810224	
4-Nitroaniline	ND	U	0.95	0.019	1	09/30/08	10/13/08	KWG0810224	
2-Methyl-4,6-dinitrophenol	ND	U	1.9	0.025	1	09/30/08	10/13/08	KWG0810224	
N-Nitrosodiphenylamine	ND	U	0.19	0.048	1	09/30/08	10/13/08	KWG0810224	
4-Bromophenyl Phenyl Ether	ND	U	0.19	0.026	1	09/30/08	10/13/08	KWG0810224	
Hexachlorobenzene	ND	U	0.19	0.022	1	09/30/08	10/13/08	KWG0810224	
Pentachlorophenol	ND	U	0.95	0.34	1	09/30/08	10/13/08	KWG0810224	
Phenanthrene	**0.036**	J	0.19	0.022	1	09/30/08	10/13/08	KWG0810224	
Anthracene	**0.027**	J	0.19	0.024	1	09/30/08	10/13/08	KWG0810224	
Di-n-butyl Phthalate	**0.062**	J	0.19	0.023	1	09/30/08	10/13/08	KWG0810224	
Fluoranthene	**0.038**	J	0.19	0.020	1	09/30/08	10/13/08	KWG0810224	
Pyrene	**0.033**	J	0.19	0.019	1	09/30/08	10/13/08	KWG0810224	
Butyl Benzyl Phthalate	**0.045**	J	0.19	0.018	1	09/30/08	10/13/08	KWG0810224	
3,3'-Dichlorobenzidine	ND	U	1.9	0.43	1	09/30/08	10/13/08	KWG0810224	
Benz(a)anthracene	**0.037**	J	0.19	0.018	1	09/30/08	10/13/08	KWG0810224	
Chrysene	ND	U	0.19	0.028	1	09/30/08	10/13/08	KWG0810224	
Bis(2-ethylhexyl) Phthalate	ND	U	0.95	0.13	1	09/30/08	10/13/08	KWG0810224	
Di-n-octyl Phthalate	ND	U	0.19	0.018	1	09/30/08	10/13/08	KWG0810224	
Benzo(b)fluoranthene	**0.028**	J	0.19	0.017	1	09/30/08	10/13/08	KWG0810224	*
Benzo(k)fluoranthene	**0.027**	J	0.19	0.024	1	09/30/08	10/13/08	KWG0810224	
Benzo(a)pyrene	ND	U	0.19	0.031	1	09/30/08	10/13/08	KWG0810224	
Indeno(1,2,3-cd)pyrene	**0.030**	J	0.19	0.021	1	09/30/08	10/13/08	KWG0810224	*
Dibenz(a,h)anthracene	**0.022**	J	0.19	0.017	1	09/30/08	10/13/08	KWG0810224	
Benzo(g,h,i)perylene	**0.026**	J	0.19	0.019	1	09/30/08	10/13/08	KWG0810224	

* See Case Narrative

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810224-5	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	80	21-119	10/13/08	Acceptable
Phenol-d6	79	31-121	10/13/08	Acceptable
Nitrobenzene-d5	84	29-121	10/13/08	Acceptable
2-Fluorobiphenyl	85	25-109	10/13/08	Acceptable
2,4,6-Tribromophenol	100	30-131	10/13/08	Acceptable
Terphenyl-d14	93	20-140	10/13/08	Acceptable

† Analyte Comments

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Aqueous equip b	**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810662-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Bis(2-chloroethyl) Ether	ND	U	0.19	0.035	1	10/08/08	10/20/08	KWG0810662	
Phenol	ND	U	0.48	0.063	1	10/08/08	10/20/08	KWG0810662	
2-Chlorophenol	ND	U	0.48	0.054	1	10/08/08	10/20/08	KWG0810662	
1,3-Dichlorobenzene	ND	U	0.19	0.021	1	10/08/08	10/20/08	KWG0810662	
1,4-Dichlorobenzene	ND	U	0.19	0.029	1	10/08/08	10/20/08	KWG0810662	
1,2-Dichlorobenzene	ND	U	0.19	0.022	1	10/08/08	10/20/08	KWG0810662	
Benzyl Alcohol	ND	U	0.48	0.073	1	10/08/08	10/20/08	KWG0810662	
Bis(2-chloroisopropyl) Ether	ND	U	0.19	0.026	1	10/08/08	10/20/08	KWG0810662	
2-Methylphenol	ND	U	0.48	0.11	1	10/08/08	10/20/08	KWG0810662	
Hexachloroethane	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	
N-Nitrosodi-n-propylamine	ND	U	0.19	0.037	1	10/08/08	10/20/08	KWG0810662	
4-Methylphenol†	ND	U	0.48	0.12	1	10/08/08	10/20/08	KWG0810662	
Nitrobenzene	ND	U	0.19	0.028	1	10/08/08	10/20/08	KWG0810662	
Isophorone	ND	U	0.19	0.016	1	10/08/08	10/20/08	KWG0810662	
2-Nitrophenol	ND	U	0.48	0.063	1	10/08/08	10/20/08	KWG0810662	
2,4-Dimethylphenol	ND	U	3.8	2.2	1	10/08/08	10/20/08	KWG0810662	
Bis(2-chloroethoxy)methane	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	
2,4-Dichlorophenol	ND	U	0.48	0.047	1	10/08/08	10/20/08	KWG0810662	
Benzoic Acid	ND	U	4.8	1.1	1	10/08/08	10/20/08	KWG0810662	*
1,2,4-Trichlorobenzene	ND	U	0.19	0.016	1	10/08/08	10/20/08	KWG0810662	
Naphthalene	ND	U	0.19	0.022	1	10/08/08	10/20/08	KWG0810662	
4-Chloroaniline	ND	U	0.19	0.025	1	10/08/08	10/20/08	KWG0810662	
Hexachlorobutadiene	ND	U	0.19	0.027	1	10/08/08	10/20/08	KWG0810662	
4-Chloro-3-methylphenol	ND	U	0.48	0.037	1	10/08/08	10/20/08	KWG0810662	
2-Methylnaphthalene	ND	U	0.19	0.026	1	10/08/08	10/20/08	KWG0810662	
Hexachlorocyclopentadiene	ND	U	0.95	0.19	1	10/08/08	10/20/08	KWG0810662	*
2,4,6-Trichlorophenol	ND	U	0.48	0.058	1	10/08/08	10/20/08	KWG0810662	
2,4,5-Trichlorophenol	ND	U	0.48	0.031	1	10/08/08	10/20/08	KWG0810662	
2-Chloronaphthalene	ND	U	0.19	0.041	1	10/08/08	10/20/08	KWG0810662	
2-Nitroaniline	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	
Acenaphthylene	ND	U	0.19	0.015	1	10/08/08	10/20/08	KWG0810662	
Dimethyl Phthalate	ND	U	0.19	0.021	1	10/08/08	10/20/08	KWG0810662	
2,6-Dinitrotoluene	ND	U	0.19	0.033	1	10/08/08	10/20/08	KWG0810662	

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Aqueous equip b	**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810662-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Acenaphthene	ND	U	0.19	0.026	1	10/08/08	10/20/08	KWG0810662	
3-Nitroaniline	ND	U	0.95	0.029	1	10/08/08	10/20/08	KWG0810662	
2,4-Dinitrophenol	ND	U	3.8	0.17	1	10/08/08	10/20/08	KWG0810662	*
Dibenzofuran	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	
4-Nitrophenol	ND	U	1.9	0.28	1	10/08/08	10/20/08	KWG0810662	
2,4-Dinitrotoluene	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	
Fluorene	ND	U	0.19	0.027	1	10/08/08	10/20/08	KWG0810662	
4-Chlorophenyl Phenyl Ether	ND	U	0.19	0.027	1	10/08/08	10/20/08	KWG0810662	
Diethyl Phthalate	**0.016**	J	0.19	0.012	1	10/08/08	10/20/08	KWG0810662	
4-Nitroaniline	ND	U	0.95	0.019	1	10/08/08	10/20/08	KWG0810662	
2-Methyl-4,6-dinitrophenol	ND	U	1.9	0.025	1	10/08/08	10/20/08	KWG0810662	
N-Nitrosodiphenylamine	ND	U	0.19	0.048	1	10/08/08	10/20/08	KWG0810662	
4-Bromophenyl Phenyl Ether	ND	U	0.19	0.026	1	10/08/08	10/20/08	KWG0810662	
Hexachlorobenzene	ND	U	0.19	0.022	1	10/08/08	10/20/08	KWG0810662	
Pentachlorophenol	ND	U	0.95	0.34	1	10/08/08	10/20/08	KWG0810662	
Phenanthrene	ND	U	0.19	0.022	1	10/08/08	10/20/08	KWG0810662	
Anthracene	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	
Di-n-butyl Phthalate	**0.042**	J	0.19	0.023	1	10/08/08	10/20/08	KWG0810662	
Fluoranthene	ND	U	0.19	0.020	1	10/08/08	10/20/08	KWG0810662	
Pyrene	ND	U	0.19	0.019	1	10/08/08	10/20/08	KWG0810662	
Butyl Benzyl Phthalate	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	
3,3'-Dichlorobenzidine	ND	U	1.9	0.43	1	10/08/08	10/20/08	KWG0810662	
Benz(a)anthracene	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	
Chrysene	ND	U	0.19	0.028	1	10/08/08	10/20/08	KWG0810662	
Bis(2-ethylhexyl) Phthalate	ND	U	0.95	0.13	1	10/08/08	10/20/08	KWG0810662	
Di-n-octyl Phthalate	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	
Benzo(b)fluoranthene	ND	U	0.19	0.017	1	10/08/08	10/20/08	KWG0810662	
Benzo(k)fluoranthene	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	
Benzo(a)pyrene	ND	U	0.19	0.031	1	10/08/08	10/20/08	KWG0810662	
Indeno(1,2,3-cd)pyrene	ND	U	0.19	0.021	1	10/08/08	10/20/08	KWG0810662	
Dibenz(a,h)anthracene	ND	U	0.19	0.017	1	10/08/08	10/20/08	KWG0810662	
Benzo(g,h,i)perylene	ND	U	0.19	0.019	1	10/08/08	10/20/08	KWG0810662	

* See Case Narrative

Comments: ____________________

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Aqueous equip b	**Date Received:**	NA

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810662-3	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	91	21-119	10/20/08	Acceptable
Phenol-d6	92	31-121	10/20/08	Acceptable
Nitrobenzene-d5	92	29-121	10/20/08	Acceptable
2-Fluorobiphenyl	96	25-109	10/20/08	Acceptable
2,4,6-Tribromophenol	98	30-131	10/20/08	Acceptable
Terphenyl-d14	117	20-140	10/20/08	Acceptable

† Analyte Comments

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Bis(2-chloroethyl) Ether	ND	U	0.20	0.035	1	09/30/08	10/13/08	KWG0810224	
Phenol	ND	U	0.49	0.063	1	09/30/08	10/13/08	KWG0810224	
2-Chlorophenol	ND	U	0.49	0.054	1	09/30/08	10/13/08	KWG0810224	
1,3-Dichlorobenzene	ND	U	0.20	0.021	1	09/30/08	10/13/08	KWG0810224	
1,4-Dichlorobenzene	ND	U	0.20	0.029	1	09/30/08	10/13/08	KWG0810224	
1,2-Dichlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
Benzyl Alcohol	ND	U	0.49	0.073	1	09/30/08	10/13/08	KWG0810224	
Bis(2-chloroisopropyl) Ether	ND	U	0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
2-Methylphenol	ND	U	0.49	0.11	1	09/30/08	10/13/08	KWG0810224	
Hexachloroethane	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
N-Nitrosodi-n-propylamine	ND	U	0.20	0.037	1	09/30/08	10/13/08	KWG0810224	
4-Methylphenol†	ND	U	0.49	0.12	1	09/30/08	10/13/08	KWG0810224	
Nitrobenzene	ND	U	0.20	0.028	1	09/30/08	10/13/08	KWG0810224	
Isophorone	ND	U	0.20	0.016	1	09/30/08	10/13/08	KWG0810224	
2-Nitrophenol	ND	U	0.49	0.063	1	09/30/08	10/13/08	KWG0810224	
2,4-Dimethylphenol	ND	U	3.9	2.2	1	09/30/08	10/13/08	KWG0810224	*
Bis(2-chloroethoxy)methane	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
2,4-Dichlorophenol	ND	U	0.49	0.047	1	09/30/08	10/13/08	KWG0810224	
Benzoic Acid	**2.0**	J	4.9	1.1	1	09/30/08	10/13/08	KWG0810224	
1,2,4-Trichlorobenzene	ND	U	0.20	0.016	1	09/30/08	10/13/08	KWG0810224	
Naphthalene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
4-Chloroaniline	ND	U	0.20	0.025	1	09/30/08	10/13/08	KWG0810224	
Hexachlorobutadiene	ND	U	0.20	0.027	1	09/30/08	10/13/08	KWG0810224	
4-Chloro-3-methylphenol	ND	U	0.49	0.037	1	09/30/08	10/13/08	KWG0810224	
2-Methylnaphthalene	ND	U	0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
Hexachlorocyclopentadiene	ND	U	0.98	0.19	1	09/30/08	10/13/08	KWG0810224	
2,4,6-Trichlorophenol	ND	U	0.49	0.058	1	09/30/08	10/13/08	KWG0810224	
2,4,5-Trichlorophenol	ND	U	0.49	0.031	1	09/30/08	10/13/08	KWG0810224	
2-Chloronaphthalene	ND	U	0.20	0.041	1	09/30/08	10/13/08	KWG0810224	
2-Nitroaniline	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
Acenaphthylene	ND	U	0.20	0.015	1	09/30/08	10/13/08	KWG0810224	
Dimethyl Phthalate	ND	U	0.20	0.021	1	09/30/08	10/13/08	KWG0810224	
2,6-Dinitrotoluene	ND	U	0.20	0.033	1	09/30/08	10/13/08	KWG0810224	

Comments:

Analytical Results

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	09/24/2008
Sample Matrix:	Water		**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-2A		**Units:**	ug/L
Lab Code:	K0809344-002		**Basis:**	NA
Extraction Method:	EPA 3520C		**Level:**	Low
Analysis Method:	8270C			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Acenaphthene	**1.1**		0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
3-Nitroaniline	ND	U	0.98	0.029	1	09/30/08	10/13/08	KWG0810224	
2,4-Dinitrophenol	ND	U	3.9	0.17	1	09/30/08	10/13/08	KWG0810224	
Dibenzofuran	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
4-Nitrophenol	ND	U	2.0	0.28	1	09/30/08	10/13/08	KWG0810224	
2,4-Dinitrotoluene	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
Fluorene	ND	U	0.20	0.027	1	09/30/08	10/13/08	KWG0810224	
4-Chlorophenyl Phenyl Ether	ND	U	0.20	0.027	1	09/30/08	10/13/08	KWG0810224	
Diethyl Phthalate	ND	U	0.20	0.012	1	09/30/08	10/13/08	KWG0810224	
4-Nitroaniline	ND	U	0.98	0.019	1	09/30/08	10/13/08	KWG0810224	
2-Methyl-4,6-dinitrophenol	ND	U	2.0	0.025	1	09/30/08	10/13/08	KWG0810224	
N-Nitrosodiphenylamine	ND	U	0.20	0.048	1	09/30/08	10/13/08	KWG0810224	
4-Bromophenyl Phenyl Ether	ND	U	0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
Hexachlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
Pentachlorophenol	ND	U	0.98	0.34	1	09/30/08	10/13/08	KWG0810224	
Phenanthrene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
Anthracene	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
Di-n-butyl Phthalate	**0.042**	J	0.20	0.023	1	09/30/08	10/13/08	KWG0810224	
Fluoranthene	ND	U	0.20	0.020	1	09/30/08	10/13/08	KWG0810224	
Pyrene	ND	U	0.20	0.019	1	09/30/08	10/13/08	KWG0810224	
Butyl Benzyl Phthalate	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
3,3'-Dichlorobenzidine	ND	U	2.0	0.43	1	09/30/08	10/13/08	KWG0810224	
Benz(a)anthracene	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
Chrysene	ND	U	0.20	0.028	1	09/30/08	10/13/08	KWG0810224	
Bis(2-ethylhexyl) Phthalate	ND	U	0.98	0.13	1	09/30/08	10/13/08	KWG0810224	
Di-n-octyl Phthalate	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
Benzo(b)fluoranthene	ND	U	0.20	0.017	1	09/30/08	10/13/08	KWG0810224	*
Benzo(k)fluoranthene	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
Benzo(a)pyrene	ND	U	0.20	0.031	1	09/30/08	10/13/08	KWG0810224	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.021	1	09/30/08	10/13/08	KWG0810224	*
Dibenz(a,h)anthracene	ND	U	0.20	0.017	1	09/30/08	10/13/08	KWG0810224	
Benzo(g,h,i)perylene	ND	U	0.20	0.019	1	09/30/08	10/13/08	KWG0810224	

* See Case Narrative

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-2A	**Units:**	ug/L
Lab Code:	K0809344-002	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	77	21-119	10/13/08	Acceptable
Phenol-d6	77	31-121	10/13/08	Acceptable
Nitrobenzene-d5	79	29-121	10/13/08	Acceptable
2-Fluorobiphenyl	71	25-109	10/13/08	Acceptable
2,4,6-Tribromophenol	101	30-131	10/13/08	Acceptable
Terphenyl-d14	97	20-140	10/13/08	Acceptable

† Analyte Comments

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-1A	**Units:**	ug/L
Lab Code:	K0809344-003	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Bis(2-chloroethyl) Ether	ND	U	0.20	0.035	1	09/30/08	10/13/08	KWG0810224	
Phenol	ND	U	0.49	0.063	1	09/30/08	10/13/08	KWG0810224	
2-Chlorophenol	ND	U	0.49	0.054	1	09/30/08	10/13/08	KWG0810224	
1,3-Dichlorobenzene	ND	U	0.20	0.021	1	09/30/08	10/13/08	KWG0810224	
1,4-Dichlorobenzene	ND	U	0.20	0.029	1	09/30/08	10/13/08	KWG0810224	
1,2-Dichlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
Benzyl Alcohol	ND	U	0.49	0.073	1	09/30/08	10/13/08	KWG0810224	
Bis(2-chloroisopropyl) Ether	ND	U	0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
2-Methylphenol	ND	U	0.49	0.11	1	09/30/08	10/13/08	KWG0810224	
Hexachloroethane	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
N-Nitrosodi-n-propylamine	ND	U	0.20	0.037	1	09/30/08	10/13/08	KWG0810224	
4-Methylphenol†	ND	U	0.49	0.12	1	09/30/08	10/13/08	KWG0810224	
Nitrobenzene	ND	U	0.20	0.028	1	09/30/08	10/13/08	KWG0810224	
Isophorone	ND	U	0.20	0.016	1	09/30/08	10/13/08	KWG0810224	
2-Nitrophenol	ND	U	0.49	0.063	1	09/30/08	10/13/08	KWG0810224	
2,4-Dimethylphenol	ND	U	3.9	2.2	1	09/30/08	10/13/08	KWG0810224	*
Bis(2-chloroethoxy)methane	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
2,4-Dichlorophenol	ND	U	0.49	0.047	1	09/30/08	10/13/08	KWG0810224	
Benzoic Acid	**1.7**	J	4.9	1.1	1	09/30/08	10/13/08	KWG0810224	
1,2,4-Trichlorobenzene	ND	U	0.20	0.016	1	09/30/08	10/13/08	KWG0810224	
Naphthalene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
4-Chloroaniline	ND	U	0.20	0.025	1	09/30/08	10/13/08	KWG0810224	
Hexachlorobutadiene	ND	U	0.20	0.027	1	09/30/08	10/13/08	KWG0810224	
4-Chloro-3-methylphenol	ND	U	0.49	0.037	1	09/30/08	10/13/08	KWG0810224	
2-Methylnaphthalene	ND	U	0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
Hexachlorocyclopentadiene	ND	U	0.98	0.19	1	09/30/08	10/13/08	KWG0810224	
2,4,6-Trichlorophenol	ND	U	0.49	0.058	1	09/30/08	10/13/08	KWG0810224	
2,4,5-Trichlorophenol	ND	U	0.49	0.031	1	09/30/08	10/13/08	KWG0810224	
2-Chloronaphthalene	ND	U	0.20	0.041	1	09/30/08	10/13/08	KWG0810224	
2-Nitroaniline	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
Acenaphthylene	ND	U	0.20	0.015	1	09/30/08	10/13/08	KWG0810224	
Dimethyl Phthalate	ND	U	0.20	0.021	1	09/30/08	10/13/08	KWG0810224	
2,6-Dinitrotoluene	ND	U	0.20	0.033	1	09/30/08	10/13/08	KWG0810224	

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	09/24/2008
Sample Matrix:	Water		**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-1A		**Units:**	ug/L
Lab Code:	K0809344-003		**Basis:**	NA
Extraction Method:	EPA 3520C		**Level:**	Low
Analysis Method:	8270C			

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Acenaphthene	ND	U	0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
3-Nitroaniline	ND	U	0.98	0.029	1	09/30/08	10/13/08	KWG0810224	
2,4-Dinitrophenol	ND	U	3.9	0.17	1	09/30/08	10/13/08	KWG0810224	
Dibenzofuran	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
4-Nitrophenol	ND	U	2.0	0.28	1	09/30/08	10/13/08	KWG0810224	
2,4-Dinitrotoluene	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
Fluorene	ND	U	0.20	0.027	1	09/30/08	10/13/08	KWG0810224	
4-Chlorophenyl Phenyl Ether	ND	U	0.20	0.027	1	09/30/08	10/13/08	KWG0810224	
Diethyl Phthalate	**0.019**	J	0.20	0.012	1	09/30/08	10/13/08	KWG0810224	
4-Nitroaniline	ND	U	0.98	0.019	1	09/30/08	10/13/08	KWG0810224	
2-Methyl-4,6-dinitrophenol	ND	U	2.0	0.025	1	09/30/08	10/13/08	KWG0810224	
N-Nitrosodiphenylamine	ND	U	0.20	0.048	1	09/30/08	10/13/08	KWG0810224	
4-Bromophenyl Phenyl Ether	ND	U	0.20	0.026	1	09/30/08	10/13/08	KWG0810224	
Hexachlorobenzene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
Pentachlorophenol	ND	U	0.98	0.34	1	09/30/08	10/13/08	KWG0810224	
Phenanthrene	ND	U	0.20	0.022	1	09/30/08	10/13/08	KWG0810224	
Anthracene	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
Di-n-butyl Phthalate	**0.042**	J	0.20	0.023	1	09/30/08	10/13/08	KWG0810224	
Fluoranthene	ND	U	0.20	0.020	1	09/30/08	10/13/08	KWG0810224	
Pyrene	ND	U	0.20	0.019	1	09/30/08	10/13/08	KWG0810224	
Butyl Benzyl Phthalate	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
3,3'-Dichlorobenzidine	ND	U	2.0	0.43	1	09/30/08	10/13/08	KWG0810224	
Benz(a)anthracene	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
Chrysene	ND	U	0.20	0.028	1	09/30/08	10/13/08	KWG0810224	
Bis(2-ethylhexyl) Phthalate	ND	U	0.98	0.13	1	09/30/08	10/13/08	KWG0810224	
Di-n-octyl Phthalate	ND	U	0.20	0.018	1	09/30/08	10/13/08	KWG0810224	
Benzo(b)fluoranthene	ND	U	0.20	0.017	1	09/30/08	10/13/08	KWG0810224	*
Benzo(k)fluoranthene	ND	U	0.20	0.024	1	09/30/08	10/13/08	KWG0810224	
Benzo(a)pyrene	ND	U	0.20	0.031	1	09/30/08	10/13/08	KWG0810224	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.021	1	09/30/08	10/13/08	KWG0810224	*
Dibenz(a,h)anthracene	ND	U	0.20	0.017	1	09/30/08	10/13/08	KWG0810224	
Benzo(g,h,i)perylene	ND	U	0.20	0.019	1	09/30/08	10/13/08	KWG0810224	

* See Case Narrative

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-1A	**Units:**	ug/L
Lab Code:	K0809344-003	**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	61	21-119	10/13/08	Acceptable
Phenol-d6	63	31-121	10/13/08	Acceptable
Nitrobenzene-d5	67	29-121	10/13/08	Acceptable
2-Fluorobiphenyl	64	25-109	10/13/08	Acceptable
2,4,6-Tribromophenol	83	30-131	10/13/08	Acceptable
Terphenyl-d14	82	20-140	10/13/08	Acceptable

† Analyte Comments

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-3A	**Units:**	ug/L
Lab Code:	K0809344-004	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Bis(2-chloroethyl) Ether	ND	U	0.19	0.035	1	10/08/08	10/20/08	KWG0810662	*
Phenol	ND	U	0.48	0.063	1	10/08/08	10/20/08	KWG0810662	*
2-Chlorophenol	ND	U	0.48	0.054	1	10/08/08	10/20/08	KWG0810662	*
1,3-Dichlorobenzene	ND	U	0.19	0.021	1	10/08/08	10/20/08	KWG0810662	*
1,4-Dichlorobenzene	ND	U	0.19	0.029	1	10/08/08	10/20/08	KWG0810662	*
1,2-Dichlorobenzene	ND	U	0.19	0.022	1	10/08/08	10/20/08	KWG0810662	*
Benzyl Alcohol	ND	U	0.48	0.073	1	10/08/08	10/20/08	KWG0810662	*
Bis(2-chloroisopropyl) Ether	ND	U	0.19	0.026	1	10/08/08	10/20/08	KWG0810662	*
2-Methylphenol	ND	U	0.48	0.11	1	10/08/08	10/20/08	KWG0810662	*
Hexachloroethane	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	*
N-Nitrosodi-n-propylamine	ND	U	0.19	0.037	1	10/08/08	10/20/08	KWG0810662	*
4-Methylphenol†	ND	U	0.48	0.12	1	10/08/08	10/20/08	KWG0810662	*
Nitrobenzene	ND	U	0.19	0.028	1	10/08/08	10/20/08	KWG0810662	*
Isophorone	ND	U	0.19	0.016	1	10/08/08	10/20/08	KWG0810662	*
2-Nitrophenol	ND	U	0.48	0.063	1	10/08/08	10/20/08	KWG0810662	*
2,4-Dimethylphenol	ND	U	3.8	2.2	1	10/08/08	10/20/08	KWG0810662	*
Bis(2-chloroethoxy)methane	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	*
2,4-Dichlorophenol	ND	U	0.48	0.047	1	10/08/08	10/20/08	KWG0810662	*
Benzoic Acid	**1.8**	J	4.8	1.1	1	10/08/08	10/20/08	KWG0810662	*
1,2,4-Trichlorobenzene	ND	U	0.19	0.016	1	10/08/08	10/20/08	KWG0810662	*
Naphthalene	**0.051**	J	0.19	0.022	1	10/08/08	10/20/08	KWG0810662	*
4-Chloroaniline	ND	U	0.19	0.025	1	10/08/08	10/20/08	KWG0810662	*
Hexachlorobutadiene	ND	U	0.19	0.027	1	10/08/08	10/20/08	KWG0810662	*
4-Chloro-3-methylphenol	ND	U	0.48	0.037	1	10/08/08	10/20/08	KWG0810662	*
2-Methylnaphthalene	**0.078**	J	0.19	0.026	1	10/08/08	10/20/08	KWG0810662	*
Hexachlorocyclopentadiene	ND	U	0.95	0.19	1	10/08/08	10/20/08	KWG0810662	*
2,4,6-Trichlorophenol	ND	U	0.48	0.058	1	10/08/08	10/20/08	KWG0810662	*
2,4,5-Trichlorophenol	ND	U	0.48	0.031	1	10/08/08	10/20/08	KWG0810662	*
2-Chloronaphthalene	ND	U	0.19	0.041	1	10/08/08	10/20/08	KWG0810662	*
2-Nitroaniline	ND	U	0.19	0.024	1	10/08/08	10/20/08	KWG0810662	*
Acenaphthylene	ND	U	0.19	0.015	1	10/08/08	10/20/08	KWG0810662	*
Dimethyl Phthalate	ND	U	0.19	0.021	1	10/08/08	10/20/08	KWG0810662	*
2,6-Dinitrotoluene	ND	U	0.19	0.033	1	10/08/08	10/20/08	KWG0810662	*

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-3A	**Units:**	ug/L
Lab Code:	K0809344-004	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Acenaphthene	**3.6**		0.19	0.026	1	10/08/08	10/20/08	KWG0810662	*
3-Nitroaniline	ND	U	0.95	0.029	1	10/08/08	10/20/08	KWG0810662	*
2,4-Dinitrophenol	ND	U	3.8	0.17	1	10/08/08	10/20/08	KWG0810662	*
Dibenzofuran	**0.034**	J	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	*
4-Nitrophenol	ND	U	1.9	0.28	1	10/08/08	10/20/08	KWG0810662	*
2,4-Dinitrotoluene	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	*
Fluorene	**1.6**		0.19	0.027	1	10/08/08	10/20/08	KWG0810662	*
4-Chlorophenyl Phenyl Ether	ND	U	0.19	0.027	1	10/08/08	10/20/08	KWG0810662	*
Diethyl Phthalate	ND	U	0.19	0.012	1	10/08/08	10/20/08	KWG0810662	*
4-Nitroaniline	ND	U	0.95	0.019	1	10/08/08	10/20/08	KWG0810662	*
2-Methyl-4,6-dinitrophenol	ND	U	1.9	0.025	1	10/08/08	10/20/08	KWG0810662	*
N-Nitrosodiphenylamine	ND	U	0.19	0.048	1	10/08/08	10/20/08	KWG0810662	*
4-Bromophenyl Phenyl Ether	ND	U	0.19	0.026	1	10/08/08	10/20/08	KWG0810662	*
Hexachlorobenzene	ND	U	0.19	0.022	1	10/08/08	10/20/08	KWG0810662	*
Pentachlorophenol	ND	U	0.95	0.34	1	10/08/08	10/20/08	KWG0810662	*
Phenanthrene	**0.78**		0.19	0.022	1	10/08/08	10/20/08	KWG0810662	*
Anthracene	**0.24**		0.19	0.024	1	10/08/08	10/20/08	KWG0810662	*
Di-n-butyl Phthalate	**0.046**	J	0.19	0.023	1	10/08/08	10/20/08	KWG0810662	*
Fluoranthene	**2.0**		0.19	0.020	1	10/08/08	10/20/08	KWG0810662	*
Pyrene	**1.8**		0.19	0.019	1	10/08/08	10/20/08	KWG0810662	*
Butyl Benzyl Phthalate	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	*
3,3'-Dichlorobenzidine	ND	U	1.9	0.43	1	10/08/08	10/20/08	KWG0810662	*
Benz(a)anthracene	**1.5**		0.19	0.018	1	10/08/08	10/20/08	KWG0810662	*
Chrysene	**1.7**		0.19	0.028	1	10/08/08	10/20/08	KWG0810662	*
Bis(2-ethylhexyl) Phthalate	**0.14**	J	0.95	0.13	1	10/08/08	10/20/08	KWG0810662	*
Di-n-octyl Phthalate	ND	U	0.19	0.018	1	10/08/08	10/20/08	KWG0810662	*
Benzo(b)fluoranthene	**2.8**		0.19	0.017	1	10/08/08	10/20/08	KWG0810662	*
Benzo(k)fluoranthene	**0.84**		0.19	0.024	1	10/08/08	10/20/08	KWG0810662	*
Benzo(a)pyrene	**1.9**		0.19	0.031	1	10/08/08	10/20/08	KWG0810662	*
Indeno(1,2,3-cd)pyrene	**1.6**		0.19	0.021	1	10/08/08	10/20/08	KWG0810662	*
Dibenz(a,h)anthracene	**0.38**		0.19	0.017	1	10/08/08	10/20/08	KWG0810662	*
Benzo(g,h,i)perylene	**1.6**		0.19	0.019	1	10/08/08	10/20/08	KWG0810662	*

* See Case Narrative

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Collected:**	09/24/2008
Sample Matrix:	Water		**Date Received:**	09/25/2008

Semi-Volatile Organic Compounds by GC/MS

Sample Name:	99EA-3A		**Units:**	ug/L
Lab Code:	K0809344-004		**Basis:**	NA

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
2-Fluorophenol	73	21-119	10/20/08	Acceptable
Phenol-d6	77	31-121	10/20/08	Acceptable
Nitrobenzene-d5	77	29-121	10/20/08	Acceptable
2-Fluorobiphenyl	85	25-109	10/20/08	Acceptable
2,4,6-Tribromophenol	100	30-131	10/20/08	Acceptable
Terphenyl-d14	96	20-140	10/20/08	Acceptable

† Analyte Comments

4-Methylphenol	This analyte cannot be separated from 3-Methylphenol.

Comments:

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344
Date Extracted: 09/30/2008
Date Analyzed: 10/13/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method: EPA 3520C
Analysis Method: 8270C

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG0810224

	Lab Control Sample KWG0810224-3 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810224-4 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Bis(2-chloroethyl) Ether	4.62	5.00	92	4.69	5.00	94	39-115	1	30
Phenol	4.17	5.00	83	4.15	5.00	83	39-117	1	30
2-Chlorophenol	4.75	5.00	95	4.67	5.00	93	40-113	2	30
1,3-Dichlorobenzene	2.73	5.00	55	2.78	5.00	56	18-71	2	30
1,4-Dichlorobenzene	2.91	5.00	58	2.89	5.00	58	19-73	1	30
1,2-Dichlorobenzene	3.06	5.00	61	3.09	5.00	62	22-78	1	30
Benzyl Alcohol	4.98	5.00	100	4.96	5.00	99	37-119	0	30
Bis(2-chloroisopropyl) Ether	3.91	5.00	78	4.07	5.00	81	35-113	4	30
2-Methylphenol	3.36	5.00	67	2.79	5.00	56	26-113	19	30
Hexachloroethane	2.29	5.00	46	2.46	5.00	49	11-62	7	30
N-Nitrosodi-n-propylamine	4.66	5.00	93	4.62	5.00	92	32-117	1	30
4-Methylphenol	3.54	5.00	71	2.75	5.00	55	25-118	25	30
Nitrobenzene	4.64	5.00	93	4.56	5.00	91	37-116	2	30
Isophorone	4.37	5.00	87	4.36	5.00	87	39-112	0	30
2-Nitrophenol	4.98	5.00	100	5.17	5.00	103	42-116	4	30
2,4-Dimethylphenol	0.825	5.00	17	0.277	5.00	6 *	10-113	100 *	30
Bis(2-chloroethoxy)methane	4.83	5.00	97	4.99	5.00	100	40-113	3	30
2,4-Dichlorophenol	4.89	5.00	98	4.98	5.00	100	39-115	2	30
Benzoic Acid	2.25	15.0	15	2.86	15.0	19	10-102	24	30
1,2,4-Trichlorobenzene	3.26	5.00	65	3.39	5.00	68	21-78	4	30
Naphthalene	4.07	5.00	81	4.15	5.00	83	33-98	2	30
4-Chloroaniline	3.92	5.00	78	3.55	5.00	71	10-119	10	30
Hexachlorobutadiene	2.35	5.00	47	2.50	5.00	50	10-61	6	30
4-Chloro-3-methylphenol	4.45	5.00	89	4.03	5.00	81	37-119	10	30
2-Methylnaphthalene	4.13	5.00	83	4.19	5.00	84	32-95	2	30
Hexachlorocyclopentadiene	1.15	5.00	23	0.999	5.00	20	10-39	14	30
2,4,6-Trichlorophenol	5.18	5.00	104	4.91	5.00	98	40-117	5	30
2,4,5-Trichlorophenol	5.21	5.00	104	5.09	5.00	102	44-116	2	30
2-Chloronaphthalene	4.46	5.00	89	4.31	5.00	86	21-115	3	30
2-Nitroaniline	4.90	5.00	98	4.85	5.00	97	43-124	1	30
Acenaphthylene	4.54	5.00	91	4.47	5.00	89	41-114	1	30
Dimethyl Phthalate	5.08	5.00	102	5.18	5.00	104	47-117	2	30
2,6-Dinitrotoluene	5.46	5.00	109	5.53	5.00	111	45-120	1	30
Acenaphthene	4.54	5.00	91	4.51	5.00	90	38-106	1	30
3-Nitroaniline	5.36	5.00	107	5.41	5.00	108	31-125	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344
Date Extracted: 09/30/2008
Date Analyzed: 10/13/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method: EPA 3520C
Analysis Method: 8270C

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG0810224

	Lab Control Sample KWG0810224-3 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810224-4 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
2,4-Dinitrophenol	3.97	5.00	79	4.63	5.00	93	10-121	15	30
Dibenzofuran	4.75	5.00	95	4.74	5.00	95	40-107	0	30
4-Nitrophenol	6.24	5.00	125	6.66	5.00	133	43-133	7	30
2,4-Dinitrotoluene	5.94	5.00	119	6.01	5.00	120	47-125	1	30
Fluorene	4.93	5.00	99	4.89	5.00	98	40-112	1	30
4-Chlorophenyl Phenyl Ether	4.79	5.00	96	4.77	5.00	95	39-108	0	30
Diethyl Phthalate	5.35	5.00	107	5.50	5.00	110	47-120	3	30
4-Nitroaniline	5.35	5.00	107	5.58	5.00	112	36-128	4	30
2-Methyl-4,6-dinitrophenol	5.30	5.00	106	5.51	5.00	110	19-127	4	30
N-Nitrosodiphenylamine	5.05	5.00	101	5.15	5.00	103	36-114	2	30
4-Bromophenyl Phenyl Ether	4.95	5.00	99	5.25	5.00	105	43-110	6	30
Hexachlorobenzene	4.64	5.00	93	5.03	5.00	101	42-107	8	30
Pentachlorophenol	4.24	5.00	85	4.71	5.00	94	28-114	11	30
Phenanthrene	4.82	5.00	96	5.25	5.00	105	43-110	8	30
Anthracene	4.64	5.00	93	4.99	5.00	100	40-110	7	30
Di-n-butyl Phthalate	5.10	5.00	102	5.53	5.00	111	45-135	8	30
Fluoranthene	4.82	5.00	96	5.34	5.00	107	42-119	10	30
Pyrene	4.67	5.00	93	5.06	5.00	101	43-118	8	30
Butyl Benzyl Phthalate	5.05	5.00	101	5.47	5.00	109	48-124	8	30
3,3'-Dichlorobenzidine	3.97	5.00	79	3.81	5.00	76	15-108	4	30
Benz(a)anthracene	5.02	5.00	100	5.53	5.00	111	45-112	10	30
Chrysene	4.56	5.00	91	5.03	5.00	101	47-112	10	30
Bis(2-ethylhexyl) Phthalate	5.14	5.00	103	5.66	5.00	113	32-149	10	30
Di-n-octyl Phthalate	5.10	5.00	102	5.70	5.00	114	49-127	11	30
Benzo(b)fluoranthene	5.47	5.00	109	6.04	5.00	121 *	45-115	10	30
Benzo(k)fluoranthene	4.53	5.00	91	4.93	5.00	99	46-115	8	30
Benzo(a)pyrene	4.74	5.00	95	5.19	5.00	104	40-117	9	30
Indeno(1,2,3-cd)pyrene	5.52	5.00	110	6.13	5.00	123 *	44-119	10	30
Dibenz(a,h)anthracene	5.02	5.00	100	5.45	5.00	109	45-118	8	30
Benzo(g,h,i)perylene	5.18	5.00	104	5.73	5.00	115	45-116	10	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Extracted:**	10/08/2008
Sample Matrix:	Aqueous equip b		**Date Analyzed:**	10/20/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method:	EPA 3520C		**Units:**	ug/L
Analysis Method:	8270C		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0810662

	Lab Control Sample KWG0810662-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810662-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Bis(2-chloroethyl) Ether	3.24	4.90	66	3.20	4.90	65	39-115	1	30
Phenol	4.14	4.90	84	4.04	4.90	82	39-117	2	30
2-Chlorophenol	3.40	4.90	69	3.42	4.90	70	40-113	1	30
1,3-Dichlorobenzene	1.92	4.90	39	2.14	4.90	44	18-71	11	30
1,4-Dichlorobenzene	2.04	4.90	42	2.20	4.90	45	19-73	7	30
1,2-Dichlorobenzene	2.20	4.90	45	2.36	4.90	48	22-78	7	30
Benzyl Alcohol	3.49	4.90	71	3.58	4.90	73	37-119	2	30
Bis(2-chloroisopropyl) Ether	3.08	4.90	63	3.12	4.90	64	35-113	1	30
2-Methylphenol	3.19	4.90	65	3.18	4.90	65	26-113	1	30
Hexachloroethane	1.60	4.90	33	1.75	4.90	36	11-62	9	30
N-Nitrosodi-n-propylamine	3.27	4.90	67	3.23	4.90	66	32-117	1	30
4-Methylphenol	3.45	4.90	70	3.43	4.90	70	25-118	1	30
Nitrobenzene	3.35	4.90	68	3.36	4.90	69	37-116	0	30
Isophorone	3.15	4.90	64	3.11	4.90	63	39-112	1	30
2-Nitrophenol	3.46	4.90	71	3.42	4.90	70	42-116	1	30
2,4-Dimethylphenol	3.35	4.90	68	3.15	4.90	64	10-113	6	30
Bis(2-chloroethoxy)methane	3.49	4.90	71	3.42	4.90	70	40-113	2	30
2,4-Dichlorophenol	3.48	4.90	71	3.53	4.90	72	39-115	1	30
Benzoic Acid	ND	14.7	0 *	ND	14.7	0 *	10-102		30
1,2,4-Trichlorobenzene	2.25	4.90	46	2.29	4.90	47	21-78	2	30
Naphthalene	2.95	5.00	59	3.00	5.00	60	33-98	2	30
4-Chloroaniline	3.19	4.90	65	2.94	4.90	60	10-119	8	30
Hexachlorobutadiene	1.60	4.90	33	1.76	4.90	36	10-61	9	30
4-Chloro-3-methylphenol	3.58	4.90	73	3.91	4.90	80	37-119	9	30
2-Methylnaphthalene	2.91	5.00	58	3.00	5.00	60	32-95	3	30
Hexachlorocyclopentadiene	0.412	5.00	8 *	0.471	5.00	9 *	10-39	13	30
2,4,6-Trichlorophenol	3.39	4.90	69	3.79	4.90	77	40-117	11	30
2,4,5-Trichlorophenol	3.43	4.90	70	3.89	4.90	79	44-116	13	30
2-Chloronaphthalene	3.03	4.90	62	3.12	4.90	64	21-115	3	30
2-Nitroaniline	3.37	4.90	69	3.71	4.90	76	43-124	9	30
Acenaphthylene	3.19	5.00	64	3.32	5.00	66	41-114	4	30
Dimethyl Phthalate	3.69	4.90	75	3.86	4.90	79	47-117	5	30
2,6-Dinitrotoluene	3.68	4.90	75	3.82	4.90	78	45-120	4	30
Acenaphthene	3.24	5.00	65	3.33	5.00	67	38-106	3	30
3-Nitroaniline	3.77	4.90	77	4.03	4.90	82	31-125	7	30

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/08/2008
Sample Matrix:	Aqueous equip b	**Date Analyzed:**	10/20/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Extraction Method:	EPA 3520C	**Units:**	ug/L
Analysis Method:	8270C	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0810662

	Lab Control Sample KWG0810662-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810662-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
2,4-Dinitrophenol	ND	4.90	0 *	1.25	4.90	26	10-121		30
Dibenzofuran	3.30	4.90	67	3.49	4.90	71	40-107	6	30
4-Nitrophenol	3.23	4.90	66	3.26	4.90	67	43-133	1	30
2,4-Dinitrotoluene	4.04	4.90	82	4.22	4.90	86	47-125	4	30
Fluorene	3.48	5.00	70	3.65	5.00	73	40-112	5	30
4-Chlorophenyl Phenyl Ether	3.30	4.90	67	3.53	4.90	72	39-108	7	30
Diethyl Phthalate	3.88	4.90	79	3.99	4.90	81	47-120	3	30
4-Nitroaniline	3.68	4.90	75	3.81	4.90	78	36-128	3	30
2-Methyl-4,6-dinitrophenol	1.99	4.90	41	2.99	4.90	61	19-127	40 *	30
N-Nitrosodiphenylamine	3.71	4.90	76	3.96	4.90	81	36-114	6	30
4-Bromophenyl Phenyl Ether	3.43	4.90	70	3.59	4.90	73	43-110	5	30
Hexachlorobenzene	3.48	4.90	71	3.50	4.90	71	42-107	0	30
Pentachlorophenol	2.02	4.90	41	2.06	4.90	42	28-114	2	30
Phenanthrene	3.71	5.00	74	3.86	5.00	77	43-110	4	30
Anthracene	3.64	5.00	73	3.78	5.00	76	40-110	4	30
Di-n-butyl Phthalate	3.96	4.90	81	4.06	4.90	83	45-135	3	30
Fluoranthene	3.93	5.00	79	3.94	5.00	79	42-119	0	30
Pyrene	3.98	5.00	80	3.99	5.00	80	43-118	0	30
Butyl Benzyl Phthalate	3.77	4.90	77	3.86	4.90	79	48-124	2	30
3,3'-Dichlorobenzidine	3.49	4.90	71	3.50	4.90	71	15-108	0	30
Benz(a)anthracene	3.87	5.00	77	3.87	5.00	77	45-112	0	30
Chrysene	3.93	5.00	79	3.92	5.00	78	47-112	0	30
Bis(2-ethylhexyl) Phthalate	3.86	4.90	79	3.98	4.90	81	32-149	3	30
Di-n-octyl Phthalate	3.93	4.90	80	4.10	4.90	84	49-127	4	30
Benzo(b)fluoranthene	4.10	5.00	82	3.96	5.00	79	45-115	4	30
Benzo(k)fluoranthene	4.18	5.00	84	4.01	5.00	80	46-115	4	30
Benzo(a)pyrene	3.89	5.00	78	3.83	5.00	77	40-117	2	30
Indeno(1,2,3-cd)pyrene	4.03	5.00	81	3.96	5.00	79	44-119	2	30
Dibenz(a,h)anthracene	4.17	5.00	83	4.03	5.00	81	45-118	3	30
Benzo(g,h,i)perylene	4.08	5.00	82	3.91	5.00	78	45-116	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	09/30/2008
Sample Matrix:	Water	**Date Analyzed:**	10/13/2008

Matrix Spike/Duplicate Matrix Spike Summary
Semi-Volatile Organic Compounds by GC/MS

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809408-004	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C	**Extraction Lot:**	KWG0810224

		Batch QCMS KWG0810224-1 **Matrix Spike**			Batch QCDMS KWG0810224-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Phenol	ND	3.93	4.72	83	3.95	4.72	84	14-135	1	30
2-Chlorophenol	ND	4.53	4.72	96	4.39	4.72	93	28-111	3	30
1,4-Dichlorobenzene	ND	2.77	4.72	59	2.60	4.72	55	10-74	6	30
N-Nitrosodi-n-propylamine	ND	4.35	4.72	92	4.43	4.72	94	25-117	2	30
1,2,4-Trichlorobenzene	ND	3.13	4.72	66	2.89	4.72	61	15-79	8	30
4-Chloro-3-methylphenol	ND	4.04	4.72	86	4.06	4.72	86	10-138	0	30
Acenaphthene	ND	4.22	4.72	89	4.10	4.72	87	17-119	3	30
4-Nitrophenol	ND	5.94	4.72	126	5.74	4.72	122	31-148	3	30
2,4-Dinitrotoluene	ND	5.57	4.72	118	5.48	4.72	116	30-131	2	30
Pentachlorophenol	ND	5.22	4.72	111	4.81	4.72	102	27-146	8	30
Pyrene	ND	4.49	4.72	95	4.33	4.72	92	18-136	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TMW-07	K0809344-005	80	83	89
TMW-08	K0809344-008	71	74	84
TMW-09	K0809344-009	67	74	82
TMW-06	K0809344-016	80	82	92
TMW-01	K0809344-019	71	72	80
Method Blank	KWG0810290-3	57	56	66
Method Blank	KWG0810363-4	73	72	87
Method Blank	KWG0810663-3	82	86	89
Batch QC	K0809408-016	74	75	88
Batch QCMS	KWG0810363-1	109	117	126
Batch QCDMS	KWG0810363-2	116	124	130
Lab Control Sample	KWG0810290-1	62	62	65
Duplicate Lab Control Sample	KWG0810290-2	74	74	80
Lab Control Sample	KWG0810363-3	95	97	100
Lab Control Sample	KWG0810663-1	74	75	77
Duplicate Lab Control Sample	KWG0810663-2	97	96	97

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	39-122
Sur2 =	Fluoranthene-d10	36-132
Sur3 =	Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	PERCENT
Analysis Method:	8270C SIM	**Level:**	Low

Sample Name	**Lab Code**	**Sur1**	**Sur2**	**Sur3**	**Sur4**
AV-13	K0809344-006	66	80	66	76
AV-14	K0809344-007	63	74	65	67
TMW-10	K0809344-010	53	58	55	65
TMW-11	K0809344-011	76	27 *	87	91
AV-01	K0809344-013	70	76	72	81
AV-12	K0809344-014	75	35 *	74	88
AV-10	K0809344-015	79 D	77 D	82 D	76 D
TMW-03	K0809344-017	68	67	68	76
TMW-13	K0809344-018	66	68	67	75
TMW-12	K0809344-020	56	54	61	74
Method Blank	KWG0810286-3	74	65	78	91
Method Blank	KWG0810359-8	98	55	96	115 *
Batch QC	K0809393-005	82	86	84	85
Batch QCMS	KWG0810359-1	56	57	60	54
Batch QCDMS	KWG0810359-2	92	95	94	95
Lab Control Sample	KWG0810286-1	110	98	117 *	132 *
Duplicate Lab Control Sample	KWG0810286-2	87	53	95	107
Lab Control Sample	KWG0810359-7	50	16 *	52	52

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	35-110
Sur2 = 2,4,6-Tribromophenol	42-122
Sur3 = Fluoranthene-d10	35-110
Sur4 = Terphenyl-d14	35-110

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810286-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	10/01/08	10/11/08	KWG0810286	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	10/01/08	10/11/08	KWG0810286	
Acenaphthylene	ND	U	0.019	0.0034	1	10/01/08	10/11/08	KWG0810286	
Acenaphthene	ND	U	0.019	0.0044	1	10/01/08	10/11/08	KWG0810286	
Dibenzofuran	ND	U	0.019	0.0046	1	10/01/08	10/11/08	KWG0810286	
Fluorene	ND	U	0.019	0.0038	1	10/01/08	10/11/08	KWG0810286	
Pentachlorophenol	ND	U	0.95	0.017	1	10/01/08	10/11/08	KWG0810286	
Phenanthrene	ND	U	0.019	0.0050	1	10/01/08	10/11/08	KWG0810286	
Anthracene	ND	U	0.019	0.0036	1	10/01/08	10/11/08	KWG0810286	
Fluoranthene	ND	U	0.019	0.0044	1	10/01/08	10/11/08	KWG0810286	
Pyrene	ND	U	0.019	0.0035	1	10/01/08	10/11/08	KWG0810286	
Benz(a)anthracene	ND	U	0.019	0.0026	1	10/01/08	10/11/08	KWG0810286	
Chrysene	ND	U	0.019	0.0034	1	10/01/08	10/11/08	KWG0810286	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	10/01/08	10/11/08	KWG0810286	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	10/01/08	10/11/08	KWG0810286	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	10/01/08	10/11/08	KWG0810286	
Indeno(1,2,3-cd)pyrene	ND	U	0.019	0.0026	1	10/01/08	10/11/08	KWG0810286	
Dibenz(a,h)anthracene	**0.0025**	J	0.019	0.0025	1	10/01/08	10/11/08	KWG0810286	
Benzo(g,h,i)perylene	ND	U	0.019	0.0029	1	10/01/08	10/11/08	KWG0810286	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	65	10-177	10/11/08	Acceptable
Fluoranthene-d10	78	36-132	10/11/08	Acceptable
Terphenyl-d14	91	31-140	10/11/08	Acceptable

Comments:

3140

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810359-8	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	10/02/08	10/20/08	KWG0810359	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	10/02/08	10/20/08	KWG0810359	
Acenaphthylene	ND	U	0.019	0.0034	1	10/02/08	10/20/08	KWG0810359	
Acenaphthene	ND	U	0.019	0.0044	1	10/02/08	10/20/08	KWG0810359	
Dibenzofuran	ND	U	0.019	0.0046	1	10/02/08	10/20/08	KWG0810359	
Fluorene	ND	U	0.019	0.0038	1	10/02/08	10/20/08	KWG0810359	
Pentachlorophenol	ND	U	0.95	0.017	1	10/02/08	10/20/08	KWG0810359	*
Phenanthrene	ND	U	0.019	0.0050	1	10/02/08	10/20/08	KWG0810359	
Anthracene	ND	U	0.019	0.0036	1	10/02/08	10/20/08	KWG0810359	
Fluoranthene	ND	U	0.019	0.0044	1	10/02/08	10/20/08	KWG0810359	
Pyrene	ND	U	0.019	0.0035	1	10/02/08	10/20/08	KWG0810359	
Benz(a)anthracene	ND	U	0.019	0.0026	1	10/02/08	10/20/08	KWG0810359	
Chrysene	ND	U	0.019	0.0034	1	10/02/08	10/20/08	KWG0810359	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	10/02/08	10/20/08	KWG0810359	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	10/02/08	10/20/08	KWG0810359	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	10/02/08	10/20/08	KWG0810359	
Indeno(1,2,3-cd)pyrene	ND	U	0.019	0.0026	1	10/02/08	10/20/08	KWG0810359	
Dibenz(a,h)anthracene	ND	U	0.019	0.0025	1	10/02/08	10/20/08	KWG0810359	
Benzo(g,h,i)perylene	ND	U	0.019	0.0029	1	10/02/08	10/20/08	KWG0810359	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	98	39-122	10/20/08	Acceptable
2,4,6-Tribromophenol	55	10-177	10/20/08	Acceptable
Fluoranthene-d10	96	36-132	10/20/08	Acceptable
Terphenyl-d14	115	31-140	10/20/08	Acceptable

Comments:

3141

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810290-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	10/01/08	10/21/08	KWG0810290	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	10/01/08	10/21/08	KWG0810290	
Acenaphthylene	ND	U	0.019	0.0034	1	10/01/08	10/21/08	KWG0810290	
Acenaphthene	ND	U	0.019	0.0044	1	10/01/08	10/21/08	KWG0810290	
Dibenzofuran	ND	U	0.019	0.0046	1	10/01/08	10/21/08	KWG0810290	
Fluorene	ND	U	0.019	0.0038	1	10/01/08	10/21/08	KWG0810290	
Phenanthrene	ND	U	0.019	0.0050	1	10/01/08	10/21/08	KWG0810290	
Anthracene	ND	U	0.019	0.0036	1	10/01/08	10/21/08	KWG0810290	
Fluoranthene	ND	U	0.019	0.0044	1	10/01/08	10/21/08	KWG0810290	
Pyrene	ND	U	0.019	0.0035	1	10/01/08	10/21/08	KWG0810290	
Benz(a)anthracene	ND	U	0.019	0.0026	1	10/01/08	10/21/08	KWG0810290	
Chrysene	ND	U	0.019	0.0034	1	10/01/08	10/21/08	KWG0810290	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	10/01/08	10/21/08	KWG0810290	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	10/01/08	10/21/08	KWG0810290	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	10/01/08	10/21/08	KWG0810290	
Indeno(1,2,3-cd)pyrene	**0.0044**	J	0.019	0.0026	1	10/01/08	10/21/08	KWG0810290	
Dibenz(a,h)anthracene	**0.0036**	J	0.019	0.0025	1	10/01/08	10/21/08	KWG0810290	
Benzo(g,h,i)perylene	**0.0069**	J	0.019	0.0029	1	10/01/08	10/21/08	KWG0810290	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	57	39-122	10/21/08	Acceptable
Fluoranthene-d10	56	36-132	10/21/08	Acceptable
Terphenyl-d14	66	31-140	10/21/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810363-4	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	10/02/08	10/20/08	KWG0810363	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	10/02/08	10/20/08	KWG0810363	
Acenaphthylene	ND	U	0.019	0.0034	1	10/02/08	10/20/08	KWG0810363	
Acenaphthene	ND	U	0.019	0.0044	1	10/02/08	10/20/08	KWG0810363	
Dibenzofuran	ND	U	0.019	0.0046	1	10/02/08	10/20/08	KWG0810363	
Fluorene	ND	U	0.019	0.0038	1	10/02/08	10/20/08	KWG0810363	
Phenanthrene	ND	U	0.019	0.0050	1	10/02/08	10/20/08	KWG0810363	
Anthracene	ND	U	0.019	0.0036	1	10/02/08	10/20/08	KWG0810363	
Fluoranthene	ND	U	0.019	0.0044	1	10/02/08	10/20/08	KWG0810363	
Pyrene	ND	U	0.019	0.0035	1	10/02/08	10/20/08	KWG0810363	
Benz(a)anthracene	**0.0046**	J	0.019	0.0026	1	10/02/08	10/20/08	KWG0810363	
Chrysene	ND	U	0.019	0.0034	1	10/02/08	10/20/08	KWG0810363	
Benzo(b)fluoranthene	**0.0040**	J	0.019	0.0023	1	10/02/08	10/20/08	KWG0810363	
Benzo(k)fluoranthene	**0.0042**	J	0.019	0.0025	1	10/02/08	10/20/08	KWG0810363	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	10/02/08	10/20/08	KWG0810363	
Indeno(1,2,3-cd)pyrene	**0.0046**	J	0.019	0.0026	1	10/02/08	10/20/08	KWG0810363	
Dibenz(a,h)anthracene	**0.0036**	J	0.019	0.0025	1	10/02/08	10/20/08	KWG0810363	
Benzo(g,h,i)perylene	**0.0053**	J	0.019	0.0029	1	10/02/08	10/20/08	KWG0810363	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	39-122	10/20/08	Acceptable
Fluoranthene-d10	72	36-132	10/20/08	Acceptable
Terphenyl-d14	87	31-140	10/20/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0810663-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.019	0.0030	1	10/08/08	11/06/08	KWG0810663	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	10/08/08	11/06/08	KWG0810663	
Acenaphthylene	ND	U	0.019	0.0034	1	10/08/08	11/06/08	KWG0810663	
Acenaphthene	ND	U	0.019	0.0044	1	10/08/08	11/06/08	KWG0810663	
Dibenzofuran	ND	U	0.019	0.0046	1	10/08/08	11/06/08	KWG0810663	
Fluorene	ND	U	0.019	0.0038	1	10/08/08	11/06/08	KWG0810663	
Phenanthrene	ND	U	0.019	0.0050	1	10/08/08	11/06/08	KWG0810663	
Anthracene	ND	U	0.019	0.0036	1	10/08/08	11/06/08	KWG0810663	
Fluoranthene	ND	U	0.019	0.0044	1	10/08/08	11/06/08	KWG0810663	
Pyrene	ND	U	0.019	0.0035	1	10/08/08	11/06/08	KWG0810663	
Benz(a)anthracene	ND	U	0.019	0.0026	1	10/08/08	11/06/08	KWG0810663	
Chrysene	ND	U	0.019	0.0034	1	10/08/08	11/06/08	KWG0810663	
Benzo(b)fluoranthene	ND	U	0.019	0.0023	1	10/08/08	11/06/08	KWG0810663	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	10/08/08	11/06/08	KWG0810663	
Benzo(a)pyrene	ND	U	0.019	0.0043	1	10/08/08	11/06/08	KWG0810663	
Indeno(1,2,3-cd)pyrene	ND	U	0.019	0.0026	1	10/08/08	11/06/08	KWG0810663	
Dibenz(a,h)anthracene	ND	U	0.019	0.0025	1	10/08/08	11/06/08	KWG0810663	
Benzo(g,h,i)perylene	ND	U	0.019	0.0029	1	10/08/08	11/06/08	KWG0810663	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	82	39-122	11/06/08	Acceptable
Fluoranthene-d10	86	36-132	11/06/08	Acceptable
Terphenyl-d14	89	31-140	11/06/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-07	**Units:**	ug/L
Lab Code:	K0809344-005	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.057**		0.020	0.0030	1	10/08/08	11/06/08	KWG0810663	*
2-Methylnaphthalene	**0.027**		0.020	0.0023	1	10/08/08	11/06/08	KWG0810663	*
Acenaphthylene	ND	U	0.020	0.0034	1	10/08/08	11/06/08	KWG0810663	*
Acenaphthene	**0.066**		0.020	0.0044	1	10/08/08	11/06/08	KWG0810663	*
Dibenzofuran	**0.033**		0.020	0.0046	1	10/08/08	11/06/08	KWG0810663	*
Fluorene	**0.031**		0.020	0.0038	1	10/08/08	11/06/08	KWG0810663	*
Phenanthrene	**0.072**		0.020	0.0050	1	10/08/08	11/06/08	KWG0810663	*
Anthracene	**0.017**	J	0.020	0.0036	1	10/08/08	11/06/08	KWG0810663	*
Fluoranthene	**0.025**		0.020	0.0044	1	10/08/08	11/06/08	KWG0810663	*
Pyrene	**0.012**	J	0.020	0.0035	1	10/08/08	11/06/08	KWG0810663	*
Benz(a)anthracene	**0.0050**	J	0.020	0.0026	1	10/08/08	11/06/08	KWG0810663	*
Chrysene	**0.0049**	J	0.020	0.0034	1	10/08/08	11/06/08	KWG0810663	*
Benzo(b)fluoranthene	ND	U	0.020	0.0023	1	10/08/08	11/06/08	KWG0810663	*
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	10/08/08	11/06/08	KWG0810663	*
Benzo(a)pyrene	ND	U	0.020	0.0043	1	10/08/08	11/06/08	KWG0810663	*
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0026	1	10/08/08	11/06/08	KWG0810663	*
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	10/08/08	11/06/08	KWG0810663	*
Benzo(g,h,i)perylene	ND	U	0.020	0.0029	1	10/08/08	11/06/08	KWG0810663	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	39-122	11/06/08	Acceptable
Fluoranthene-d10	83	36-132	11/06/08	Acceptable
Terphenyl-d14	89	31-140	11/06/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-13	**Units:**	ug/L
Lab Code:	K0809344-006	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.015**	J	0.023	0.0034	1	10/01/08	10/11/08	KWG0810286	
2-Methylnaphthalene	**0.0056**	J	0.023	0.0026	1	10/01/08	10/11/08	KWG0810286	
Acenaphthylene	**0.021**	J	0.023	0.0038	1	10/01/08	10/11/08	KWG0810286	
Acenaphthene	**2.2**		0.023	0.0049	1	10/01/08	10/11/08	KWG0810286	
Dibenzofuran	ND	U	0.023	0.0052	1	10/01/08	10/11/08	KWG0810286	
Fluorene	**0.011**	J	0.023	0.0043	1	10/01/08	10/11/08	KWG0810286	
Pentachlorophenol	ND	U	1.2	0.019	1	10/01/08	10/11/08	KWG0810286	
Phenanthrene	**0.0077**	J	0.023	0.0056	1	10/01/08	10/11/08	KWG0810286	
Anthracene	**0.065**		0.023	0.0040	1	10/01/08	10/11/08	KWG0810286	
Fluoranthene	**0.025**		0.023	0.0049	1	10/01/08	10/11/08	KWG0810286	
Pyrene	**0.019**	J	0.023	0.0039	1	10/01/08	10/11/08	KWG0810286	
Benz(a)anthracene	ND	U	0.023	0.0029	1	10/01/08	10/11/08	KWG0810286	
Chrysene	ND	U	0.023	0.0038	1	10/01/08	10/11/08	KWG0810286	
Benzo(b)fluoranthene	ND	U	0.023	0.0026	1	10/01/08	10/11/08	KWG0810286	
Benzo(k)fluoranthene	ND	U	0.023	0.0028	1	10/01/08	10/11/08	KWG0810286	
Benzo(a)pyrene	ND	U	0.023	0.0048	1	10/01/08	10/11/08	KWG0810286	
Indeno(1,2,3-cd)pyrene	ND	U	0.023	0.0029	1	10/01/08	10/11/08	KWG0810286	
Dibenz(a,h)anthracene	ND	U	0.023	0.0028	1	10/01/08	10/11/08	KWG0810286	
Benzo(g,h,i)perylene	ND	U	0.023	0.0033	1	10/01/08	10/11/08	KWG0810286	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	66	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	80	10-177	10/11/08	Acceptable
Fluoranthene-d10	66	36-132	10/11/08	Acceptable
Terphenyl-d14	76	31-140	10/11/08	Acceptable

Comments:

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-14	**Units:**	ug/L
Lab Code:	K0809344-007	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.016**	J	0.020	0.0030	1	10/01/08	10/11/08	KWG0810286	
2-Methylnaphthalene	**0.0051**	J	0.020	0.0023	1	10/01/08	10/11/08	KWG0810286	
Acenaphthylene	**0.019**	J	0.020	0.0034	1	10/01/08	10/11/08	KWG0810286	
Acenaphthene	**2.2**		0.020	0.0044	1	10/01/08	10/11/08	KWG0810286	
Dibenzofuran	ND	U	0.020	0.0046	1	10/01/08	10/11/08	KWG0810286	
Fluorene	**0.0093**	J	0.020	0.0038	1	10/01/08	10/11/08	KWG0810286	
Pentachlorophenol	ND	U	1.0	0.017	1	10/01/08	10/11/08	KWG0810286	
Phenanthrene	**0.0081**	J	0.020	0.0050	1	10/01/08	10/11/08	KWG0810286	
Anthracene	**0.064**		0.020	0.0036	1	10/01/08	10/11/08	KWG0810286	
Fluoranthene	**0.017**	J	0.020	0.0044	1	10/01/08	10/11/08	KWG0810286	
Pyrene	**0.010**	J	0.020	0.0035	1	10/01/08	10/11/08	KWG0810286	
Benz(a)anthracene	ND	U	0.020	0.0026	1	10/01/08	10/11/08	KWG0810286	
Chrysene	ND	U	0.020	0.0034	1	10/01/08	10/11/08	KWG0810286	
Benzo(b)fluoranthene	ND	U	0.020	0.0023	1	10/01/08	10/11/08	KWG0810286	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	10/01/08	10/11/08	KWG0810286	
Benzo(a)pyrene	ND	U	0.020	0.0043	1	10/01/08	10/11/08	KWG0810286	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0026	1	10/01/08	10/11/08	KWG0810286	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	10/01/08	10/11/08	KWG0810286	
Benzo(g,h,i)perylene	ND	U	0.020	0.0029	1	10/01/08	10/11/08	KWG0810286	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	74	10-177	10/11/08	Acceptable
Fluoranthene-d10	65	36-132	10/11/08	Acceptable
Terphenyl-d14	67	31-140	10/11/08	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-08	**Units:**	ug/L
Lab Code:	K0809344-008	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.011**	J	0.022	0.0032	1	10/01/08	10/22/08	KWG0810290	
2-Methylnaphthalene	**0.0046**	J	0.022	0.0025	1	10/01/08	10/22/08	KWG0810290	
Acenaphthylene	**0.015**	J	0.022	0.0036	1	10/01/08	10/22/08	KWG0810290	
Acenaphthene	**5.1**		0.022	0.0047	1	10/01/08	10/22/08	KWG0810290	
Dibenzofuran	**0.095**		0.022	0.0049	1	10/01/08	10/22/08	KWG0810290	
Fluorene	**0.0041**	J	0.022	0.0040	1	10/01/08	10/22/08	KWG0810290	
Phenanthrene	**0.0064**	J	0.022	0.0053	1	10/01/08	10/22/08	KWG0810290	
Anthracene	**0.015**	J	0.022	0.0038	1	10/01/08	10/22/08	KWG0810290	
Fluoranthene	**0.012**	J	0.022	0.0047	1	10/01/08	10/22/08	KWG0810290	
Pyrene	**0.0087**	J	0.022	0.0037	1	10/01/08	10/22/08	KWG0810290	
Benz(a)anthracene	**0.0053**	J	0.022	0.0028	1	10/01/08	10/22/08	KWG0810290	
Chrysene	**0.0046**	J	0.022	0.0036	1	10/01/08	10/22/08	KWG0810290	
Benzo(b)fluoranthene	**0.0036**	J	0.022	0.0025	1	10/01/08	10/22/08	KWG0810290	
Benzo(k)fluoranthene	ND	U	0.022	0.0027	1	10/01/08	10/22/08	KWG0810290	
Benzo(a)pyrene	ND	U	0.022	0.0046	1	10/01/08	10/22/08	KWG0810290	
Indeno(1,2,3-cd)pyrene	ND	U	0.022	0.0028	1	10/01/08	10/22/08	KWG0810290	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	10/01/08	10/22/08	KWG0810290	
Benzo(g,h,i)perylene	ND	U	0.022	0.0031	1	10/01/08	10/22/08	KWG0810290	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	71	39-122	10/22/08	Acceptable
Fluoranthene-d10	74	36-132	10/22/08	Acceptable
Terphenyl-d14	84	31-140	10/22/08	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-09	**Units:**	ug/L
Lab Code:	K0809344-009	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.015**	J	0.022	0.0032	1	10/01/08	10/22/08	KWG0810290	
2-Methylnaphthalene	**0.0094**	J	0.022	0.0025	1	10/01/08	10/22/08	KWG0810290	
Acenaphthylene	ND	U	0.022	0.0036	1	10/01/08	10/22/08	KWG0810290	
Acenaphthene	**0.44**		0.022	0.0047	1	10/01/08	10/22/08	KWG0810290	
Dibenzofuran	ND	U	0.022	0.0049	1	10/01/08	10/22/08	KWG0810290	
Fluorene	ND	U	0.022	0.0040	1	10/01/08	10/22/08	KWG0810290	
Phenanthrene	**0.0067**	J	0.022	0.0053	1	10/01/08	10/22/08	KWG0810290	
Anthracene	ND	U	0.022	0.0038	1	10/01/08	10/22/08	KWG0810290	
Fluoranthene	**0.0057**	J	0.022	0.0047	1	10/01/08	10/22/08	KWG0810290	
Pyrene	**0.0042**	J	0.022	0.0037	1	10/01/08	10/22/08	KWG0810290	
Benz(a)anthracene	**0.0045**	J	0.022	0.0028	1	10/01/08	10/22/08	KWG0810290	
Chrysene	**0.0051**	J	0.022	0.0036	1	10/01/08	10/22/08	KWG0810290	
Benzo(b)fluoranthene	ND	U	0.022	0.0025	1	10/01/08	10/22/08	KWG0810290	
Benzo(k)fluoranthene	ND	U	0.022	0.0027	1	10/01/08	10/22/08	KWG0810290	
Benzo(a)pyrene	ND	U	0.022	0.0046	1	10/01/08	10/22/08	KWG0810290	
Indeno(1,2,3-cd)pyrene	ND	U	0.022	0.0028	1	10/01/08	10/22/08	KWG0810290	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	10/01/08	10/22/08	KWG0810290	
Benzo(g,h,i)perylene	ND	U	0.022	0.0031	1	10/01/08	10/22/08	KWG0810290	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	39-122	10/22/08	Acceptable
Fluoranthene-d10	74	36-132	10/22/08	Acceptable
Terphenyl-d14	82	31-140	10/22/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0809344
Date Collected: 09/24/2008
Date Received: 09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name: TMW-10
Lab Code: K0809344-010

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.018**	J	0.022	0.0032	1	10/01/08	10/11/08	KWG0810286	
2-Methylnaphthalene	**0.0095**	J	0.022	0.0025	1	10/01/08	10/11/08	KWG0810286	
Acenaphthylene	**0.0037**	J	0.022	0.0036	1	10/01/08	10/11/08	KWG0810286	
Acenaphthene	**0.15**		0.022	0.0047	1	10/01/08	10/11/08	KWG0810286	
Dibenzofuran	ND	U	0.022	0.0049	1	10/01/08	10/11/08	KWG0810286	
Fluorene	ND	U	0.022	0.0040	1	10/01/08	10/11/08	KWG0810286	
Pentachlorophenol	ND	U	1.1	0.018	1	10/01/08	10/11/08	KWG0810286	
Phenanthrene	**0.0088**	J	0.022	0.0053	1	10/01/08	10/11/08	KWG0810286	
Anthracene	**0.010**	J	0.022	0.0038	1	10/01/08	10/11/08	KWG0810286	
Fluoranthene	**0.013**	J	0.022	0.0047	1	10/01/08	10/11/08	KWG0810286	
Pyrene	**0.010**	J	0.022	0.0037	1	10/01/08	10/11/08	KWG0810286	
Benz(a)anthracene	ND	U	0.022	0.0028	1	10/01/08	10/11/08	KWG0810286	
Chrysene	ND	U	0.022	0.0036	1	10/01/08	10/11/08	KWG0810286	
Benzo(b)fluoranthene	ND	U	0.022	0.0025	1	10/01/08	10/11/08	KWG0810286	
Benzo(k)fluoranthene	ND	U	0.022	0.0027	1	10/01/08	10/11/08	KWG0810286	
Benzo(a)pyrene	ND	U	0.022	0.0046	1	10/01/08	10/11/08	KWG0810286	
Indeno(1,2,3-cd)pyrene	ND	U	0.022	0.0028	1	10/01/08	10/11/08	KWG0810286	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	10/01/08	10/11/08	KWG0810286	
Benzo(g,h,i)perylene	ND	U	0.022	0.0031	1	10/01/08	10/11/08	KWG0810286	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	58	10-177	10/11/08	Acceptable
Fluoranthene-d10	55	36-132	10/11/08	Acceptable
Terphenyl-d14	65	31-140	10/11/08	Acceptable

Comments: ____________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/24/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-11	**Units:**	ug/L
Lab Code:	K0809344-011	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.18**		0.020	0.0030	1	10/01/08	10/11/08	KWG0810286	
2-Methylnaphthalene	**0.022**		0.020	0.0023	1	10/01/08	10/11/08	KWG0810286	
Acenaphthylene	**0.20**		0.020	0.0034	1	10/01/08	10/11/08	KWG0810286	
Acenaphthene	**0.10**		0.020	0.0044	1	10/01/08	10/11/08	KWG0810286	
Dibenzofuran	**0.12**		0.020	0.0046	1	10/01/08	10/11/08	KWG0810286	
Fluorene	**0.21**		0.020	0.0038	1	10/01/08	10/11/08	KWG0810286	
Pentachlorophenol	ND	U	0.99	0.017	1	10/01/08	10/11/08	KWG0810286	
Phenanthrene	**3.2**		0.020	0.0050	1	10/01/08	10/11/08	KWG0810286	
Anthracene	**0.60**		0.020	0.0036	1	10/01/08	10/11/08	KWG0810286	
Fluoranthene	12	D	0.040	0.0088	2	10/01/08	10/15/08	KWG0810286	
Pyrene	**8.3**		0.020	0.0035	1	10/01/08	10/11/08	KWG0810286	
Benz(a)anthracene	**1.2**		0.020	0.0026	1	10/01/08	10/11/08	KWG0810286	
Chrysene	**3.5**		0.020	0.0034	1	10/01/08	10/11/08	KWG0810286	
Benzo(b)fluoranthene	**2.0**		0.020	0.0023	1	10/01/08	10/11/08	KWG0810286	
Benzo(k)fluoranthene	**0.68**		0.020	0.0025	1	10/01/08	10/11/08	KWG0810286	
Benzo(a)pyrene	**0.56**		0.020	0.0043	1	10/01/08	10/11/08	KWG0810286	
Indeno(1,2,3-cd)pyrene	**0.42**		0.020	0.0026	1	10/01/08	10/11/08	KWG0810286	
Dibenz(a,h)anthracene	**0.075**		0.020	0.0025	1	10/01/08	10/11/08	KWG0810286	
Benzo(g,h,i)perylene	**0.29**		0.020	0.0029	1	10/01/08	10/11/08	KWG0810286	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	39-122	10/11/08	Acceptable
2,4,6-Tribromophenol	27	10-177	10/11/08	Acceptable
Fluoranthene-d10	87	36-132	10/11/08	Acceptable
Terphenyl-d14	91	31-140	10/11/08	Acceptable

Comments:

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-01	**Units:**	ug/L
Lab Code:	K0809344-013	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.019**	J	0.020	0.0030	1	10/02/08	10/22/08	KWG0810359	
2-Methylnaphthalene	**0.0065**	J	0.020	0.0023	1	10/02/08	10/22/08	KWG0810359	
Acenaphthylene	**0.022**		0.020	0.0034	1	10/02/08	10/22/08	KWG0810359	
Acenaphthene	**0.18**		0.020	0.0044	1	10/02/08	10/22/08	KWG0810359	
Dibenzofuran	**0.024**		0.020	0.0046	1	10/02/08	10/22/08	KWG0810359	
Fluorene	**0.054**		0.020	0.0038	1	10/02/08	10/22/08	KWG0810359	
Pentachlorophenol	**0.23**	J	1.0	0.017	1	10/02/08	10/22/08	KWG0810359	*
Phenanthrene	**0.011**	J	0.020	0.0050	1	10/02/08	10/22/08	KWG0810359	
Anthracene	**0.24**		0.020	0.0036	1	10/02/08	10/22/08	KWG0810359	
Fluoranthene	**0.024**		0.020	0.0044	1	10/02/08	10/22/08	KWG0810359	
Pyrene	**0.077**		0.020	0.0035	1	10/02/08	10/22/08	KWG0810359	
Benz(a)anthracene	**0.015**	J	0.020	0.0026	1	10/02/08	10/22/08	KWG0810359	
Chrysene	**0.010**	J	0.020	0.0034	1	10/02/08	10/22/08	KWG0810359	
Benzo(b)fluoranthene	**0.018**	J	0.020	0.0023	1	10/02/08	10/22/08	KWG0810359	
Benzo(k)fluoranthene	**0.0075**	J	0.020	0.0025	1	10/02/08	10/22/08	KWG0810359	
Benzo(a)pyrene	**0.017**	J	0.020	0.0043	1	10/02/08	10/22/08	KWG0810359	
Indeno(1,2,3-cd)pyrene	**0.012**	J	0.020	0.0026	1	10/02/08	10/22/08	KWG0810359	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	10/02/08	10/22/08	KWG0810359	
Benzo(g,h,i)perylene	**0.012**	J	0.020	0.0029	1	10/02/08	10/22/08	KWG0810359	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	70	39-122	10/22/08	Acceptable
2,4,6-Tribromophenol	76	10-177	10/22/08	Acceptable
Fluoranthene-d10	72	36-132	10/22/08	Acceptable
Terphenyl-d14	81	31-140	10/22/08	Acceptable

Comments:

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-12	**Units:**	ug/L
Lab Code:	K0809344-014	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.0067**	J	0.019	0.0030	1	10/02/08	10/22/08	KWG0810359	
2-Methylnaphthalene	ND	U	0.019	0.0023	1	10/02/08	10/22/08	KWG0810359	
Acenaphthylene	ND	U	0.019	0.0034	1	10/02/08	10/22/08	KWG0810359	
Acenaphthene	ND	U	0.019	0.0044	1	10/02/08	10/22/08	KWG0810359	
Dibenzofuran	ND	U	0.019	0.0046	1	10/02/08	10/22/08	KWG0810359	
Fluorene	ND	U	0.019	0.0038	1	10/02/08	10/22/08	KWG0810359	
Pentachlorophenol	ND	U	0.95	0.017	1	10/02/08	10/22/08	KWG0810359	*
Phenanthrene	**0.0091**	J	0.019	0.0050	1	10/02/08	10/22/08	KWG0810359	
Anthracene	**0.063**		0.019	0.0036	1	10/02/08	10/22/08	KWG0810359	
Fluoranthene	**0.0096**	J	0.019	0.0044	1	10/02/08	10/22/08	KWG0810359	
Pyrene	**0.013**	J	0.019	0.0035	1	10/02/08	10/22/08	KWG0810359	
Benz(a)anthracene	**0.0077**	J	0.019	0.0026	1	10/02/08	10/22/08	KWG0810359	
Chrysene	**0.0068**	J	0.019	0.0034	1	10/02/08	10/22/08	KWG0810359	
Benzo(b)fluoranthene	**0.0095**	J	0.019	0.0023	1	10/02/08	10/22/08	KWG0810359	
Benzo(k)fluoranthene	ND	U	0.019	0.0025	1	10/02/08	10/22/08	KWG0810359	
Benzo(a)pyrene	**0.0081**	J	0.019	0.0043	1	10/02/08	10/22/08	KWG0810359	
Indeno(1,2,3-cd)pyrene	**0.0079**	J	0.019	0.0026	1	10/02/08	10/22/08	KWG0810359	
Dibenz(a,h)anthracene	ND	U	0.019	0.0025	1	10/02/08	10/22/08	KWG0810359	
Benzo(g,h,i)perylene	**0.0070**	J	0.019	0.0029	1	10/02/08	10/22/08	KWG0810359	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	39-122	10/22/08	Acceptable
2,4,6-Tribromophenol	35	10-177	10/22/08	Acceptable
Fluoranthene-d10	74	36-132	10/22/08	Acceptable
Terphenyl-d14	88	31-140	10/22/08	Acceptable

Comments:

3135

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-10	**Units:**	ug/L
Lab Code:	K0809344-015	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5.7**	D	0.13	0.019	5	10/02/08	10/27/08	KWG0810359	
2-Methylnaphthalene	**0.35**		0.025	0.0029	1	10/02/08	10/30/08	KWG0810359	
Acenaphthylene	**4.8**		0.025	0.0042	1	10/02/08	10/30/08	KWG0810359	
Acenaphthene	**140**	D	1.3	0.27	50	10/02/08	10/22/08	KWG0810359	
Dibenzofuran	**51**	D	0.13	0.029	5	10/02/08	10/27/08	KWG0810359	
Fluorene	**41**	D	0.13	0.024	5	10/02/08	10/27/08	KWG0810359	
Pentachlorophenol	**0.80**	J	1.3	0.021	1	10/02/08	10/30/08	KWG0810359	*
Phenanthrene	**18**	D	0.13	0.031	5	10/02/08	10/27/08	KWG0810359	
Anthracene	**3.5**		0.025	0.0044	1	10/02/08	10/30/08	KWG0810359	
Fluoranthene	**5.6**		0.025	0.0054	1	10/02/08	10/30/08	KWG0810359	
Pyrene	**4.0**		0.025	0.0043	1	10/02/08	10/30/08	KWG0810359	
Benz(a)anthracene	**0.39**		0.025	0.0032	1	10/02/08	10/30/08	KWG0810359	
Chrysene	**0.47**		0.025	0.0042	1	10/02/08	10/30/08	KWG0810359	
Benzo(b)fluoranthene	**0.19**		0.025	0.0029	1	10/02/08	10/30/08	KWG0810359	
Benzo(k)fluoranthene	**0.065**		0.025	0.0031	1	10/02/08	10/30/08	KWG0810359	
Benzo(a)pyrene	**0.12**		0.025	0.0053	1	10/02/08	10/30/08	KWG0810359	
Indeno(1,2,3-cd)pyrene	**0.087**		0.025	0.0032	1	10/02/08	10/30/08	KWG0810359	
Dibenz(a,h)anthracene	**0.020**	J	0.025	0.0031	1	10/02/08	10/30/08	KWG0810359	
Benzo(g,h,i)perylene	**0.082**		0.025	0.0036	1	10/02/08	10/30/08	KWG0810359	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	79	39-122	10/27/08	Acceptable
2,4,6-Tribromophenol	77	10-177	10/27/08	Acceptable
Fluoranthene-d10	82	36-132	10/27/08	Acceptable
Terphenyl-d14	76	31-140	10/27/08	Acceptable

Comments: ____________________

3136

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-06	**Units:**	ug/L
Lab Code:	K0809344-016	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.018**	J	0.021	0.0032	1	10/02/08	10/25/08	KWG0810363	
2-Methylnaphthalene	**0.0037**	J	0.021	0.0024	1	10/02/08	10/25/08	KWG0810363	
Acenaphthylene	ND	U	0.021	0.0036	1	10/02/08	10/25/08	KWG0810363	
Acenaphthene	**0.037**		0.021	0.0046	1	10/02/08	10/25/08	KWG0810363	
Dibenzofuran	ND	U	0.021	0.0048	1	10/02/08	10/25/08	KWG0810363	
Fluorene	**0.0092**	J	0.021	0.0040	1	10/02/08	10/25/08	KWG0810363	
Phenanthrene	**0.015**	J	0.021	0.0053	1	10/02/08	10/25/08	KWG0810363	
Anthracene	**0.0039**	J	0.021	0.0038	1	10/02/08	10/25/08	KWG0810363	
Fluoranthene	**0.013**	J	0.021	0.0046	1	10/02/08	10/25/08	KWG0810363	
Pyrene	**0.011**	J	0.021	0.0037	1	10/02/08	10/25/08	KWG0810363	
Benz(a)anthracene	**0.0063**	J	0.021	0.0028	1	10/02/08	10/25/08	KWG0810363	
Chrysene	**0.0062**	J	0.021	0.0036	1	10/02/08	10/25/08	KWG0810363	
Benzo(b)fluoranthene	**0.0055**	J	0.021	0.0024	1	10/02/08	10/25/08	KWG0810363	
Benzo(k)fluoranthene	ND	U	0.021	0.0027	1	10/02/08	10/25/08	KWG0810363	
Benzo(a)pyrene	ND	U	0.021	0.0045	1	10/02/08	10/25/08	KWG0810363	
Indeno(1,2,3-cd)pyrene	**0.0045**	J	0.021	0.0028	1	10/02/08	10/25/08	KWG0810363	
Dibenz(a,h)anthracene	ND	U	0.021	0.0027	1	10/02/08	10/25/08	KWG0810363	
Benzo(g,h,i)perylene	**0.0039**	J	0.021	0.0031	1	10/02/08	10/25/08	KWG0810363	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	39-122	10/25/08	Acceptable
Fluoranthene-d10	82	36-132	10/25/08	Acceptable
Terphenyl-d14	92	31-140	10/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-03	**Units:**	ug/L
Lab Code:	K0809344-017	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.069**		0.022	0.0032	1	10/02/08	10/22/08	KWG0810359	
2-Methylnaphthalene	**0.022**	J	0.022	0.0025	1	10/02/08	10/22/08	KWG0810359	
Acenaphthylene	**0.039**		0.022	0.0036	1	10/02/08	10/22/08	KWG0810359	
Acenaphthene	**5.7**		0.022	0.0047	1	10/02/08	10/22/08	KWG0810359	
Dibenzofuran	**0.0073**	J	0.022	0.0049	1	10/02/08	10/22/08	KWG0810359	
Fluorene	**0.066**		0.022	0.0040	1	10/02/08	10/22/08	KWG0810359	
Pentachlorophenol	**0.053**	J	1.1	0.018	1	10/02/08	10/22/08	KWG0810359	*
Phenanthrene	**0.017**	J	0.022	0.0053	1	10/02/08	10/22/08	KWG0810359	
Anthracene	**0.034**		0.022	0.0038	1	10/02/08	10/22/08	KWG0810359	
Fluoranthene	ND	U	0.022	0.0047	1	10/02/08	10/22/08	KWG0810359	
Pyrene	ND	U	0.022	0.0037	1	10/02/08	10/22/08	KWG0810359	
Benz(a)anthracene	ND	U	0.022	0.0028	1	10/02/08	10/22/08	KWG0810359	
Chrysene	ND	U	0.022	0.0036	1	10/02/08	10/22/08	KWG0810359	
Benzo(b)fluoranthene	ND	U	0.022	0.0025	1	10/02/08	10/22/08	KWG0810359	
Benzo(k)fluoranthene	ND	U	0.022	0.0027	1	10/02/08	10/22/08	KWG0810359	
Benzo(a)pyrene	ND	U	0.022	0.0046	1	10/02/08	10/22/08	KWG0810359	
Indeno(1,2,3-cd)pyrene	ND	U	0.022	0.0028	1	10/02/08	10/22/08	KWG0810359	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	10/02/08	10/22/08	KWG0810359	
Benzo(g,h,i)perylene	ND	U	0.022	0.0031	1	10/02/08	10/22/08	KWG0810359	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	39-122	10/22/08	Acceptable
2,4,6-Tribromophenol	67	10-177	10/22/08	Acceptable
Fluoranthene-d10	68	36-132	10/22/08	Acceptable
Terphenyl-d14	76	31-140	10/22/08	Acceptable

Comments:

3137

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-13	**Units:**	ug/L
Lab Code:	K0809344-018	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.072**		0.022	0.0032	1	10/02/08	10/22/08	KWG0810359	
2-Methylnaphthalene	**0.021**	J	0.022	0.0025	1	10/02/08	10/22/08	KWG0810359	
Acenaphthylene	**0.045**		0.022	0.0036	1	10/02/08	10/22/08	KWG0810359	
Acenaphthene	**5.7**		0.022	0.0047	1	10/02/08	10/22/08	KWG0810359	
Dibenzofuran	**0.0061**	J	0.022	0.0049	1	10/02/08	10/22/08	KWG0810359	
Fluorene	**0.063**		0.022	0.0040	1	10/02/08	10/22/08	KWG0810359	
Pentachlorophenol	**0.056**	J	1.1	0.018	1	10/02/08	10/22/08	KWG0810359	*
Phenanthrene	**0.015**	J	0.022	0.0053	1	10/02/08	10/22/08	KWG0810359	
Anthracene	**0.034**		0.022	0.0038	1	10/02/08	10/22/08	KWG0810359	
Fluoranthene	ND	U	0.022	0.0047	1	10/02/08	10/22/08	KWG0810359	
Pyrene	**0.0037**	J	0.022	0.0037	1	10/02/08	10/22/08	KWG0810359	
Benz(a)anthracene	ND	U	0.022	0.0028	1	10/02/08	10/22/08	KWG0810359	
Chrysene	ND	U	0.022	0.0036	1	10/02/08	10/22/08	KWG0810359	
Benzo(b)fluoranthene	ND	U	0.022	0.0025	1	10/02/08	10/22/08	KWG0810359	
Benzo(k)fluoranthene	ND	U	0.022	0.0027	1	10/02/08	10/22/08	KWG0810359	
Benzo(a)pyrene	ND	U	0.022	0.0046	1	10/02/08	10/22/08	KWG0810359	
Indeno(1,2,3-cd)pyrene	ND	U	0.022	0.0028	1	10/02/08	10/22/08	KWG0810359	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	10/02/08	10/22/08	KWG0810359	
Benzo(g,h,i)perylene	ND	U	0.022	0.0031	1	10/02/08	10/22/08	KWG0810359	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	66	39-122	10/22/08	Acceptable
2,4,6-Tribromophenol	68	10-177	10/22/08	Acceptable
Fluoranthene-d10	67	36-132	10/22/08	Acceptable
Terphenyl-d14	75	31-140	10/22/08	Acceptable

Comments:

3138

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-01	**Units:**	ug/L
Lab Code:	K0809344-019	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.078**		0.022	0.0032	1	10/02/08	10/25/08	KWG0810363	
2-Methylnaphthalene	**0.013**	J	0.022	0.0025	1	10/02/08	10/25/08	KWG0810363	
Acenaphthylene	**0.020**	J	0.022	0.0036	1	10/02/08	10/25/08	KWG0810363	
Acenaphthene	**7.8**		0.022	0.0047	1	10/02/08	10/25/08	KWG0810363	
Dibenzofuran	**0.012**	J	0.022	0.0049	1	10/02/08	10/25/08	KWG0810363	
Fluorene	**3.3**		0.022	0.0040	1	10/02/08	10/25/08	KWG0810363	
Phenanthrene	**0.043**		0.022	0.0053	1	10/02/08	10/25/08	KWG0810363	
Anthracene	**0.15**		0.022	0.0038	1	10/02/08	10/25/08	KWG0810363	
Fluoranthene	**0.036**		0.022	0.0047	1	10/02/08	10/25/08	KWG0810363	
Pyrene	**0.0070**	J	0.022	0.0037	1	10/02/08	10/25/08	KWG0810363	
Benz(a)anthracene	ND	U	0.022	0.0028	1	10/02/08	10/25/08	KWG0810363	
Chrysene	ND	U	0.022	0.0036	1	10/02/08	10/25/08	KWG0810363	
Benzo(b)fluoranthene	ND	U	0.022	0.0025	1	10/02/08	10/25/08	KWG0810363	
Benzo(k)fluoranthene	ND	U	0.022	0.0027	1	10/02/08	10/25/08	KWG0810363	
Benzo(a)pyrene	ND	U	0.022	0.0046	1	10/02/08	10/25/08	KWG0810363	
Indeno(1,2,3-cd)pyrene	ND	U	0.022	0.0028	1	10/02/08	10/25/08	KWG0810363	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	10/02/08	10/25/08	KWG0810363	
Benzo(g,h,i)perylene	ND	U	0.022	0.0031	1	10/02/08	10/25/08	KWG0810363	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	71	39-122	10/25/08	Acceptable
Fluoranthene-d10	72	36-132	10/25/08	Acceptable
Terphenyl-d14	80	31-140	10/25/08	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	09/25/2008
Sample Matrix:	Water	**Date Received:**	09/25/2008

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-12	**Units:**	ug/L
Lab Code:	K0809344-020	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.036**		0.022	0.0032	1	10/02/08	10/22/08	KWG0810359	
2-Methylnaphthalene	**0.011**	J	0.022	0.0025	1	10/02/08	10/22/08	KWG0810359	
Acenaphthylene	ND	U	0.022	0.0037	1	10/02/08	10/22/08	KWG0810359	
Acenaphthene	**0.36**		0.022	0.0047	1	10/02/08	10/22/08	KWG0810359	
Dibenzofuran	**0.0099**	J	0.022	0.0049	1	10/02/08	10/22/08	KWG0810359	
Fluorene	**0.013**	J	0.022	0.0041	1	10/02/08	10/22/08	KWG0810359	
Pentachlorophenol	**0.046**	J	1.1	0.019	1	10/02/08	10/22/08	KWG0810359	*
Phenanthrene	**0.041**		0.022	0.0054	1	10/02/08	10/22/08	KWG0810359	
Anthracene	**0.032**		0.022	0.0039	1	10/02/08	10/22/08	KWG0810359	
Fluoranthene	**0.032**		0.022	0.0047	1	10/02/08	10/22/08	KWG0810359	
Pyrene	**0.021**	J	0.022	0.0038	1	10/02/08	10/22/08	KWG0810359	
Benz(a)anthracene	**0.0054**	J	0.022	0.0028	1	10/02/08	10/22/08	KWG0810359	
Chrysene	ND	U	0.022	0.0037	1	10/02/08	10/22/08	KWG0810359	
Benzo(b)fluoranthene	ND	U	0.022	0.0025	1	10/02/08	10/22/08	KWG0810359	
Benzo(k)fluoranthene	ND	U	0.022	0.0027	1	10/02/08	10/22/08	KWG0810359	
Benzo(a)pyrene	ND	U	0.022	0.0046	1	10/02/08	10/22/08	KWG0810359	
Indeno(1,2,3-cd)pyrene	ND	U	0.022	0.0028	1	10/02/08	10/22/08	KWG0810359	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	10/02/08	10/22/08	KWG0810359	
Benzo(g,h,i)perylene	ND	U	0.022	0.0031	1	10/02/08	10/22/08	KWG0810359	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	56	39-122	10/22/08	Acceptable
2,4,6-Tribromophenol	54	10-177	10/22/08	Acceptable
Fluoranthene-d10	61	36-132	10/22/08	Acceptable
Terphenyl-d14	74	31-140	10/22/08	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Extracted:**	10/01/2008
Sample Matrix:	Water		**Date Analyzed:**	10/21/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG0810290

	Lab Control Sample KWG0810290-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810290-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	1.96	2.50	78	1.83	2.50	73	49-108	7	30
2-Methylnaphthalene	2.09	2.50	84	1.94	2.50	78	40-113	7	30
Acenaphthylene	2.26	2.50	90	2.17	2.50	87	56-113	4	30
Acenaphthene	2.14	2.50	86	2.07	2.50	83	56-111	3	30
Dibenzofuran	2.38	2.50	95	2.32	2.50	93	59-114	3	30
Fluorene	2.39	2.50	96	2.32	2.50	93	61-114	3	30
Phenanthrene	2.43	2.50	97	2.34	2.50	94	58-116	4	30
Anthracene	2.31	2.50	92	2.24	2.50	90	48-115	3	30
Fluoranthene	2.43	2.50	97	2.33	2.50	93	61-130	4	30
Pyrene	2.48	2.50	99	2.50	2.50	100	56-118	1	30
Benz(a)anthracene	2.42	2.50	97	2.38	2.50	95	55-118	2	30
Chrysene	2.46	2.50	98	2.39	2.50	96	61-119	3	30
Benzo(b)fluoranthene	2.31	2.50	92	2.19	2.50	88	57-124	5	30
Benzo(k)fluoranthene	2.43	2.50	97	2.41	2.50	96	65-121	1	30
Benzo(a)pyrene	2.44	2.50	97	2.39	2.50	96	44-122	2	30
Indeno(1,2,3-cd)pyrene	2.36	2.50	94	2.53	2.50	101	44-132	7	30
Dibenz(a,h)anthracene	2.86	2.50	115	2.88	2.50	115	51-131	0	30
Benzo(g,h,i)perylene	2.62	2.50	105	2.65	2.50	106	55-122	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Extracted:**	10/02/2008
Sample Matrix:	Water		**Date Analyzed:**	10/20/2008

Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG0810359

	Lab Control Sample KWG0810359-7 **Lab Control Spike**				
Analyte Name	**Result**	**Expected**	**%Rec**		**%Rec Limits**
Naphthalene	2.09	2.50	83		49-108
2-Methylnaphthalene	2.32	2.50	93		40-113
Acenaphthylene	2.26	2.50	90		56-113
Acenaphthene	2.19	2.50	88		56-111
Dibenzofuran	2.30	2.50	92		59-114
Fluorene	2.25	2.50	90		61-114
Pentachlorophenol	0.0778	10.0	1	*	10-130
Phenanthrene	2.20	2.50	88		58-116
Anthracene	2.12	2.50	85		48-115
Fluoranthene	2.25	2.50	90		61-130
Pyrene	2.22	2.50	89		56-118
Benz(a)anthracene	2.11	2.50	84		55-118
Chrysene	2.17	2.50	87		61-119
Benzo(b)fluoranthene	2.00	2.50	80		57-124
Benzo(k)fluoranthene	2.13	2.50	85		65-121
Benzo(a)pyrene	2.15	2.50	86		44-122
Indeno(1,2,3-cd)pyrene	2.02	2.50	81		44-132
Dibenz(a,h)anthracene	2.34	2.50	94		51-131
Benzo(g,h,i)perylene	2.12	2.50	85		55-122

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Extracted:**	10/02/2008
Sample Matrix:	Water		**Date Analyzed:**	10/20/2008

Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C		**Units:**	ug/L
Analysis Method:	8270C SIM		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0810363

	Lab Control Sample KWG0810363-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Naphthalene	1.97	2.50	79	49-108
2-Methylnaphthalene	2.14	2.50	85	40-113
Acenaphthylene	2.30	2.50	92	56-113
Acenaphthene	2.20	2.50	88	56-111
Dibenzofuran	2.41	2.50	96	59-114
Fluorene	2.38	2.50	95	61-114
Phenanthrene	2.40	2.50	96	58-116
Anthracene	2.42	2.50	97	48-115
Fluoranthene	2.46	2.50	98	61-130
Pyrene	2.47	2.50	99	56-118
Benz(a)anthracene	2.35	2.50	94	55-118
Chrysene	2.42	2.50	97	61-119
Benzo(b)fluoranthene	2.26	2.50	90	57-124
Benzo(k)fluoranthene	2.42	2.50	97	65-121
Benzo(a)pyrene	2.46	2.50	99	44-122
Indeno(1,2,3-cd)pyrene	2.33	2.50	93	44-132
Dibenz(a,h)anthracene	2.60	2.50	104	51-131
Benzo(g,h,i)perylene	2.30	2.50	92	55-122

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/02/2008
Sample Matrix:	Water	**Date Analyzed:**	10/22/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809393-005	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0810359

		Batch QCMS KWG0810359-1 **Matrix Spike**			Batch QCDMS KWG0810359-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.66	2.72	2.36	87	2.42	2.38	74	27-109	12	30
2-Methylnaphthalene	0.023	2.29	2.36	96	1.91	2.38	79	27-115	18	30
Acenaphthylene	2.5	4.51	2.36	86	4.31	2.38	77	30-118	4	30
Acenaphthene	36	38.5E	2.36	103 #	38.4E	2.38	96 #	28-115	0	30
Dibenzofuran	0.15	2.28	2.36	90	2.14	2.38	83	26-121	6	30
Fluorene	5.2	7.78	2.36	108	7.77	2.38	106	28-122	0	30
Pentachlorophenol	1.9	8.79	9.43	73	8.14	9.52	65	20-167	8	30
Phenanthrene	0.11	2.29	2.36	93	2.33	2.38	93	24-129	2	30
Anthracene	2.6	4.54	2.36	80	5.16	2.38	105	26-118	13	30
Fluoranthene	0.87	3.10	2.36	95	3.07	2.38	92	18-133	1	30
Pyrene	0.49	2.89	2.36	102	2.88	2.38	100	19-133	0	30
Benz(a)anthracene	0.042	2.18	2.36	91	2.24	2.38	92	19-136	2	30
Chrysene	ND	2.15	2.36	91	2.16	2.38	91	22-129	0	30
Benzo(b)fluoranthene	ND	2.06	2.36	87	2.10	2.38	88	19-141	2	30
Benzo(k)fluoranthene	ND	2.13	2.36	90	2.26	2.38	95	19-138	6	30
Benzo(a)pyrene	ND	2.14	2.36	91	2.23	2.38	94	10-142	4	30
Indeno(1,2,3-cd)pyrene	ND	2.49	2.36	106	2.51	2.38	106	19-151	1	30
Dibenz(a,h)anthracene	ND	2.60	2.36	110	2.70	2.38	113	16-146	4	30
Benzo(g,h,i)perylene	ND	2.27	2.36	96	2.38	2.38	100	22-134	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0809344
Project:	IP Longview		**Date Extracted:**	10/08/2008
Sample Matrix:	Water		**Date Analyzed:**	11/06/2008

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C		**Units:**	ug/L
Analysis Method:	8270C SIM		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0810663

	Lab Control Sample KWG0810663-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0810663-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	1.92	2.50	77	2.29	2.50	92	49-108	18	30
2-Methylnaphthalene	2.21	2.50	88	2.62	2.50	105	40-113	17	30
Acenaphthylene	2.24	2.50	89	2.61	2.50	104	56-113	15	30
Acenaphthene	2.18	2.50	87	2.55	2.50	102	56-111	16	30
Dibenzofuran	2.39	2.50	96	2.85	2.50	114	59-114	17	30
Fluorene	2.39	2.50	95	2.80	2.50	112	61-114	16	30
Phenanthrene	2.38	2.50	95	2.68	2.50	107	58-116	12	30
Anthracene	2.28	2.50	91	2.64	2.50	106	48-115	14	30
Fluoranthene	2.42	2.50	97	2.74	2.50	109	61-130	12	30
Pyrene	2.42	2.50	97	2.79	2.50	112	56-118	14	30
Benz(a)anthracene	2.37	2.50	95	2.75	2.50	110	55-118	15	30
Chrysene	2.45	2.50	98	2.81	2.50	112	61-119	14	30
Benzo(b)fluoranthene	2.31	2.50	92	2.66	2.50	106	57-124	14	30
Benzo(k)fluoranthene	2.42	2.50	97	2.84	2.50	113	65-121	16	30
Benzo(a)pyrene	2.50	2.50	100	2.93	2.50	117	44-122	16	30
Indeno(1,2,3-cd)pyrene	2.42	2.50	97	2.80	2.50	112	44-132	15	30
Dibenz(a,h)anthracene	2.54	2.50	102	2.98	2.50	119	51-131	16	30
Benzo(g,h,i)perylene	2.26	2.50	90	2.66	2.50	106	55-122	16	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Extracted:**	10/02/2008
Sample Matrix:	Water	**Date Analyzed:**	10/25/2008

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0809408-016	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM	**Extraction Lot:**	KWG0810363

		Batch QCMS KWG0810363-1 **Matrix Spike**			Batch QCDMS KWG0810363-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.0060	2.10	2.36	89	2.05	2.36	87	41-119	3	30
2-Methylnaphthalene	ND	2.37	2.36	101	2.29	2.36	97	34-118	4	30
Acenaphthylene	ND	2.33	2.36	99	2.25	2.36	95	43-126	3	30
Acenaphthene	ND	2.25	2.36	96	2.19	2.36	93	46-121	3	30
Dibenzofuran	0.0050	2.45	2.36	104	2.42	2.36	102	43-126	1	30
Fluorene	ND	2.40	2.36	102	2.37	2.36	100	51-124	1	30
Phenanthrene	0.014	2.45	2.36	103	2.40	2.36	101	52-124	2	30
Anthracene	ND	2.35	2.36	100	2.39	2.36	101	33-129	1	30
Fluoranthene	0.098	2.54	2.36	104	2.55	2.36	104	46-139	0	30
Pyrene	0.0056	2.52	2.36	107	2.46	2.36	104	45-131	2	30
Benz(a)anthracene	0.0075	2.45	2.36	103	2.40	2.36	101	37-131	2	30
Chrysene	0.0044	2.42	2.36	103	2.36	2.36	100	44-131	3	30
Benzo(b)fluoranthene	0.0047	2.22	2.36	94	2.23	2.36	94	29-145	0	30
Benzo(k)fluoranthene	0.0058	2.36	2.36	100	2.37	2.36	100	33-143	0	30
Benzo(a)pyrene	0.0048	2.45	2.36	104	2.47	2.36	105	23-137	1	30
Indeno(1,2,3-cd)pyrene	0.0076	2.58	2.36	109	2.61	2.36	110	25-144	1	30
Dibenz(a,h)anthracene	0.0066	2.76	2.36	117	2.74	2.36	116	27-145	0	30
Benzo(g,h,i)perylene	0.0069	2.51	2.36	106	2.49	2.36	105	29-137	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	09/24/08
Project Name:	IP Longview	**Date Received:**	09/25/08
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 99EA-2A **Lab Code:** K0809344-002 DISS

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/18/08	10/23/08	5.0	U	
Chromium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	09/24/08
Project Name:	IP Longview	**Date Received:**	09/25/08
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 99EA-1A **Lab Code:** K0809344-003 DISS

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/24/08	11/10/08	5.0	U	
Chromium	6010B	5.0	1.0	10/24/08	10/28/08	5.0	U	

% Solids: 0.0

Comments:

Metals

- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	09/24/08
Project Name:	IP Longview	**Date Received:**	09/25/08
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 99EA-3A **Lab Code:** K0809344-004 DISS

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/31/08	11/05/08	5.0	U	
Chromium	6010B	5.0	1.0	10/31/08	11/03/08	5.0	U	

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	09/24/08
Project Name:	IP Longview	**Date Received:**	09/25/08
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: TMW-02 **Lab Code:** K0809344-001

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/18/08	10/23/08	5.0	U	
Barium	6010B	5.0	1.0	10/24/08	10/24/08	35		
Cadmium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	
Chromium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	
Lead	7421	2.0	1.0	10/18/08	10/22/08	2.0	U	
Mercury	7470A	0.2	1.0	10/15/08	10/16/08	0.2	U	
Selenium	7740	5.0	1.0	10/18/08	10/22/08	5.0	U	
Silver	6010B	10	1.0	10/24/08	10/24/08	10	U	

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	09/24/08
Project Name:	IP Longview	**Date Received:**	09/25/08
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 99EA-2A **Lab Code:** K0809344-002

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/18/08	10/23/08	5.0	U	
Chromium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	09/24/08
Project Name:	IP Longview	**Date Received:**	09/25/08
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 99EA-1A **Lab Code:** K0809344-003

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/18/08	10/23/08	5.2		
Chromium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	

% Solids: 0.0

Comments:

Metals

- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	09/24/08
Project Name:	IP Longview	**Date Received:**	09/25/08
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: 99EA-3A **Lab Code:** K0809344-004

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/18/08	10/23/08	5.0	U	
Chromium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	
Project Name:	IP Longview	**Date Received:**	
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: Method Blank **Lab Code:** K0809344-MB1

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/18/08	10/23/08	5.0	U	
Barium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	
Cadmium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	
Chromium	6010B	5.0	1.0	10/24/08	10/24/08	5.0	U	
Lead	7421	2.0	1.0	10/18/08	10/22/08	2.0	U	
Mercury	7470A	0.2	1.0	10/15/08	10/16/08	0.2	U	
Selenium	7740	5.0	1.0	10/18/08	10/22/08	5.0	U	
Silver	6010B	10	1.0	10/24/08	10/24/08	10	U	

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	
Project Name:	IP Longview	**Date Received:**	
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: Method Blank **Lab Code:** K0809344-MB2

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/24/08	11/10/08	5.0	U	
Chromium	6010B	5.0	1.0	10/24/08	10/28/08	5.0	U	

% Solids: 0.0

Comments:

Metals

- 1 -

INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Date Collected:**	
Project Name:	IP Longview	**Date Received:**	
Matrix:	WATER	**Units:**	ug/L
		Basis:	N/A

Sample Name: Method Blank **Lab Code:** K0809344-MB3

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	7060A	5.0	1.0	10/31/08	11/05/08	5.0	U	
Chromium	6010B	5.0	1.0	10/31/08	11/03/08	5.0	U	

% Solids: 0.0

Comments:

Metals

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SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: TMW-02S **Lab Code:** K0809344-001S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	58 - 131	40.5		5.0	U	40.00	101.2		7060A
Barium	80 - 125	2080		35		2000.00	102.2		6010B
Cadmium	71 - 143	50		5.0	U	50.00	100.0		6010B
Chromium	89 - 117	203		5.0	U	200.00	101.5		6010B
Lead	64 - 122	37.4		2.0	U	40.00	93.5		7421
Selenium	43 - 133	28.5		5.0	U	40.00	71.2		7740
Silver	79 - 119	55		10	U	50.00	110.0		6010B

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: 99EA-1AS **Lab Code:** K0809344-003S DISS

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Chromium	89 - 117	205		5.0	U	200.00	102.5		6010B

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: 99EA-3AS **Lab Code:** K0809344-004S DISS

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	58 - 131	38.9		5.0	U	40.00	97.2		7060A
Chromium	89 - 117	205		5.0	U	200.00	102.5		6010B

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

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SPIKE SAMPLE RECOVERY

Client: URS Corporation

Service Request: K0809344

Project No.: NA

Units: UG/L

Project Name: IP Longview

Basis: N/A

Matrix: WATER

% Solids: 0.0

Sample Name: Batch QC1S

Lab Code: K0809434-003S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Mercury	78 - 122	0.9		0.2	U	1.00	90.0		7470A

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: Batch QC2S **Lab Code:** K0809583-004S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	58 - 131	38.3		5.0	U	40.00	95.8		7060A

An empty field in the Control Limit column indicates the control limit is not applicable

Metals

- 5B -

POST SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER		

Sample Name: TMW-02A **Lab Code:** K0809344-001A

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	85 - 115	20.7		5.0		20.0	104		7060A
Lead	85 - 115	19.4		2.0		20.0	97		7421

Metals

- 5B -

POST SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER		

Sample Name: 99EA-1AA **Lab Code:** K0809344-003A DISS

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	85 - 115	19.4		5.0		20.0	97		7060A

Metals

- 5B -

POST SPIKE SAMPLE RECOVERY

Client: URS Corporation

Service Request: K0809344

Project No.: NA

Units: UG/L

Project Name: IP Longview

Basis: N/A

Matrix: WATER

Sample Name: Batch QC1A

Lab Code: K0809434-001A

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Mercury	85 - 115	0.98		0.20		1.0	98		7470A

Metals

- 6 -

DUPLICATES

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: TMW-02D **Lab Code:** K0809344-001D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Arsenic		5.0	U	5.0	U			7060A
Barium	20	35		35		0.0		6010B
Cadmium		5.0	U	5.0	U			6010B
Chromium		5.0	U	5.0	U			6010B
Lead		2.0	U	2.0	U			7421
Selenium		5.0	U	5.0	U			7740
Silver		10	U	10	U			6010B

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

-6-

DUPLICATES

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: 99EA-1AD **Lab Code:** K0809344-003D DISS

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Chromium		5.0	U	5.0	U			6010B

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

- 6 -

DUPLICATES

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: 99EA-3AD **Lab Code:** K0809344-004D DISS

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Arsenic		5.0	U	5.0	U			7060A
Chromium		5.0	U	5.0	U			6010B

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

- 6 -

DUPLICATES

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: Batch QC1D **Lab Code:** K0809434-003D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Mercury		0.2	U	0.2	U			7470A

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

-6-

DUPLICATES

Client:	URS Corporation	**Service Request:**	K0809344
Project No.:	NA	**Units:**	UG/L
Project Name:	IP Longview	**Basis:**	N/A
Matrix:	WATER	**% Solids:**	0.0

Sample Name: Batch QC2D **Lab Code:** K0809583-004D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Arsenic		5.0	U	5.0	U			7060A

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals

-7-

LABORATORY CONTROL SAMPLE

Client: URS Corporation

Service Request: K0809344

Project No.: NA

Project Name: IP Longview

Aqueous LCS Source: CAS MIXED

Solid LCS Source:

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Arsenic	25	23.4	93.6					
Barium	5000	5060	101.2					
Cadmium	1250	1250	100.0					
Chromium	500	508	101.6					
Lead	25	23.5	94.0					
Mercury	5	5.10	102.0					
Selenium	25	22.6	90.4					
Silver	625	628	100.5					

Metals

- 7 -

LABORATORY CONTROL SAMPLE

Client: URS Corporation

Service Request: K0809344

Project No.: NA

Project Name: IP Longview

Aqueous LCS Source: CAS MIXED

Solid LCS Source:

Analyte	Aqueous (ug/L) True	Aqueous (ug/L) Found	Aqueous (ug/L) %R	Solid (mg/kg) True	Solid (mg/kg) Found	C	Limits	%R
Arsenic	25	22.8	91.2					
Chromium	500	512	102.4					

Form VII - IN

Metals

-7-

LABORATORY CONTROL SAMPLE

Client: URS Corporation

Service Request: K0809344

Project No.: NA

Project Name: IP Longview

Aqueous LCS Source: CAS MIXED

Solid LCS Source:

Analyte	Aqueous (ug/L) True	Aqueous (ug/L) Found	Aqueous (ug/L) %R	Solid (mg/kg) True	Solid (mg/kg) Found	C	Limits	%R
Arsenic	25	24.0	96.0					
Chromium	500	500	100.0					

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	09/24,25/08
Project Number :	NA	**Date Received :**	09/25/08
Sample Matrix :	WATER		

Heterotrophic Plate Count

Analysis Method : SM 9215 B
Test Notes :

Units : CFU/mL
Basis : NA

Sample Name	Lab Code	MRL	Dilution Factor	Date/Time Analyzed	Result	Result Notes
AV-13	K0809344-006	0.5	1	09/25/08 12:15	15.0	
AV-14	K0809344-007	0.5	1	09/25/08 12:15	17.5	
AV-01	K0809344-013	0.5	1	09/25/08 12:15	117	
AV-12	K0809344-014	0.5	1	09/25/08 12:15	58.5	
AV-10	K0809344-015	0.5	1	09/25/08 17:00	135	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	9/25/2008
Project Number :	NA	**Date Received :**	9/25/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/25/08

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-12	Units :	CFU/mL
Lab Code :	K0809344-014DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Heterotrophic Plate Count	SM 9215 B	0.5	58.5	43.5	51.0	29	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	09/24,25/08
Project Number :	NA	**Date Received :**	09/25/08
Sample Matrix :	WATER		

Nitrate+Nitrite as Nitrogen

Analysis Method : 353.2
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
AV-13	K0809344-006	0.05	1	09/29/08	0.19	
AV-14	K0809344-007	0.05	1	09/29/08	0.19	
AV-01	K0809344-013	0.05	1	09/29/08	0.10	
AV-12	K0809344-014	0.05	1	09/29/08	0.37	
AV-10	K0809344-015	0.05	1	09/29/08	0.19	
Method Blank	K0809344-MB	0.05	1	09/29/08	ND	
Method Blank	K0809344-MB	0.05	1	09/29/08	ND	
Method Blank	K0809344-MB	0.05	1	09/29/08	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/29/08

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0809270-017DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	0.13	0.14	0.14	7	

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0809344
Date Collected : NA
Date Received : NA
Date Prepared : NA
Date Analyzed : 09/29/08

Matrix Spike Summary
Inorganic Parameters

Sample Name : Batch QC
Lab Code : K0809270-017MS
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	2.00	0.13	2.17	102	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0809344
Date Collected : NA
Date Received : NA
Date Prepared : NA
Date Analyzed : 09/29/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name : Lab Control Sample
Lab Code : K0809344-LCS
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	NONE	353.2	1.70	1.62	95	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0809344
Date Collected : 09/24,25/08
Date Received : 09/25/08

Phosphorus, Total

Prep Method : Method
Analysis Method : 365.3
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-13	K0809344-006	0.01	0.004	1	9/30/2008	10/01/08	0.58	
AV-14	K0809344-007	0.01	0.004	1	9/30/2008	10/01/08	0.63	
AV-01	K0809344-013	0.01	0.004	1	9/30/2008	10/01/08	0.29	
AV-12	K0809344-014	0.01	0.004	1	9/30/2008	10/01/08	0.02	
AV-10	K0809344-015	0.01	0.004	1	9/30/2008	10/01/08	0.69	
Method Blank	K0809344-MB	0.01	0.004	1	9/30/2008	10/01/08	ND	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	09/30/08
		Date Analyzed :	10/01/08

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0809270-001DUP	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Phosphorus, Total	NONE	365.3	0.01	0.40	0.44	0.43	9	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	09/30/08
		Date Analyzed :	10/01/08

Matrix Spike Summary
Inorganic Parameters

Sample Name : Batch QC
Lab Code : K0809270-001MS
Test Notes :

Units : mg/L
Basis : NA

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Phosphorus, Total	NONE	365.3	0.02	0.50	0.40	0.91	102	75-115	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	09/30/08
		Date Analyzed :	10/01/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0809344-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Phosphorus, Total	NONE	365.3	4.68	4.86	104	85-115	

Analytical Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	9/24/2008
Sample Matrix:	Water	**Date Received:**	9/25/2008

Hydrocarbon Degrading Bacteria

Prep Method:	NONE	Units:	MPN/100mL
Analysis Method:	Brown and Braddock	Basis:	NA
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
AV-13	K0809344-006	0.5	1	9/25/2008	45000	
AV-14	K0809344-007	0.5	1	9/25/2008	25000	
AV-01	K0809344-013	0.5	1	9/25/2008	5500	
AV-12	K0809344-014	0.5	1	9/25/2008	9740	
AV-10	K0809344-015	0.5	1	9/25/2008	≥800000	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0809344
Project:	IP Longview	**Date Collected:**	9/24/2008
Sample Matrix:	Water	**Date Received:**	9/25/2008
		Date Extracted:	NA
		Date Analyzed:	9/25/2008

Duplicate Summary
Inorganic Parameters

Sample Name:	AV-10	Units:	MPN/100mL
Lab Code:	K0809344-015DUP	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Hydrocarbon Degrading Bacteria	NONE	own and Bradd	0.5	9740	175000	92400	179	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	09/24,25/08
Project Number :	NA	**Date Received :**	09/25/08
Sample Matrix :	WATER		

Sulfate

Analysis Method :	300.0	Units :	mg/L
Test Notes :		Basis :	NA

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
AV-13	K0809344-006	10	50	09/27/08	230	
AV-14	K0809344-007	10	50	09/27/08	232	
AV-01	K0809344-013	10	50	09/27/08	267	
AV-12	K0809344-014	1.0	5	09/27/08	13.7	
AV-10	K0809344-015	10	50	09/27/08	75	
Method Blank	K0809344-MB	0.2	1	09/26/08	ND	

Report By:MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/26/08

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC		
Lab Code :	K0809386-004DUP	Units :	mg/L
Test Notes :		Basis :	NA

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Sulfate	300.0	0.2	3.4	3.4	3.4	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	09/26/08

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0809386-004MS	Basis :	NA
Test Notes :			

Analyte	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Sulfate	300.0	0.2	4.0	3.4	7.5	103	80-120	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation		**Service Request :**	K0809344
Project Name :	IP Longview		**Date Collected :**	NA
Project Number :	NA		**Date Received :**	NA
Sample Matrix :	WATER		**Date Prepared :**	NA
			Date Analyzed :	09/26/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample		Units :	mg/L
Lab Code :	K0809344-LCS		Basis :	NA
Test Notes :				

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Sulfate	NONE	300.0	5.0	4.8	96	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0809344
Date Collected : 09/24,25/08
Date Received : 09/25/08

Carbon, Total Organic

Analysis Method : 415.1
Test Notes :

Units : mg/L
Basis : NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
AV-13	K0809344-006	0.5	0.7	1	10/14/08	10.0	
AV-14	K0809344-007	0.5	0.7	1	10/14/08	10.5	
AV-01	K0809344-013	0.5	0.7	1	10/14/08	8.5	
AV-12	K0809344-014	0.5	0.7	1	10/14/08	1.2	
AV-10	K0809344-015	1.0	0.14	2	10/14/08	31.6	
Method Blank	K0809344-MB	0.5	0.07	1	10/14/08	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0809344
Project Name :	IP Longview	**Date Collected :**	9/24/2008
Project Number :	NA	**Date Received :**	9/25/2008
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	10/14/08

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-13	Units :	mg/L
Lab Code :	K0809344-006DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Carbon, Total Organic	415.1	0.5	10.0	10.6	10.3	6	

Client :	URS Corporation
Project Name :	IP Longview
Project Number :	NA
Sample Matrix :	WATER

Service Request :	K0809344
Date Collected :	9/24/2008
Date Received :	9/25/2008
Date Prepared :	NA
Date Analyzed :	10/14/08

Matrix Spike Summary
Inorganic Parameters

Sample Name : AV-13
Lab Code : K0809344-006MS
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	415.1	0.5	25.0	10.0	34.2	97	68-132	

Report By:MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0809344
Date Collected : NA
Date Received : NA
Date Prepared : NA
Date Analyzed : 10/14/08

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name : Lab Control Sample
Lab Code : K0809344-LCS
Test Notes :

Units : mg/L
Basis : NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	NONE	415.1	24.0	24.0	100	90-109	

Appendix G

March 2009 Laboratory Analytical Reports

Memo

URS

1501 4th Avenue, Suite 1400
Seattle, WA 98101-1616
206-438-2700 Telephone
406-438-2699 Fax

To: Paul Kalina, Project Manager **Info:** **FINAL**

From: Alison M. Rohde, Chemist
Jennifer Garner, Chemist **Date:** May 1, 2009

RE: **Quality Assurance Review**
IP Longview – March 2009 Groundwater Monitoring
CAS SDGs K0902314, K0902357, K0902359, K0902371, K0902372, K0902398, K0902399

The summary data quality review of 22 groundwater samples collected between March 17 and March 19, 2009 has been completed. The samples were submitted to Columbia Analytical Services (CAS), a Washington State Department of Ecology (Ecology) accredited laboratory, located in Kelso, Washington. Samples were analyzed for total petroleum hydrocarbons (TPH- diesel and residual range) by Ecology Method NWTPH-Dx, polynuclear aromatic hydrocarbons (PAHs) by Environmental Protection Agency (EPA) Method 8270C ultra low-level modified by select ion monitoring (SIM), pentachlorophenol (PCP) by EPA Method 8151M, nitrate-nitrite (NO_3+NO_2) by EPA Method 353.2, total phosphorus by EPA Method 365.3, sulfate by EPA Method 300.0, total organic carbon (TOC) by EPA Method 415.1, hydrocarbon degrading bacteria (HDB) by Standard Method (SM) 9221C, and/or heterotrophic plate count (HPC) by SM 9215B as described in the cross reference below. The analyses were performed in general accordance with methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846) Update IIIB*, June 2005, *Methods for Chemical Analysis of Water and Wastes*, March 1983, Ecology's *Analytical Methods for Petroleum Hydrocarbons*, June 1997, and Standard Methods for the Examination of Water and Wastewater, 20th edition, 1998. The following samples are associated with CAS sample delivery groups (SDGs) K0902314, K0902357, K0902359, K0902371, K0902372, K0902398, and K0902399:

Sample ID	CAS ID	Parameters
TMW-07	K0902314-001	PAH
TMW-08	K0902314-002	PAH
TMW-09	K0902314-003	PAH
TMW-10	K0902314-004	PAH, PCP
TMW-12	K0902314-005	PAH, PCP
TMW-03	K0902357-001	PAH, PCP
TMW-02	K0902357-002	PAH, PCP
TMW-02-F (filtered)	K0902357-003	PAH
TMW-04	K0902357-004	PAH, PCP
TMW-01	K0902357-005	PAH
TMW-05	K0902357-006	PAH
TMW-06	K0902357-007	PAH
97-5A	K0902357-008	PAH
97-5A-F (filtered)	K0902357-009	PAH
04-6A	K0902357-010	PAH
97-6C (duplicate of 04-6A)	K0902357-011	PAH
AV-09	K0902357-012	TPH, PAH, PCP, Sulfate, Nitrate+Nitrite, Phosphorus, TOC, HPC
AV-09	K0902359-001	HDB

Sample ID (continued)	CAS ID	Parameters
AV-13	K0902371-001	TPH, PAH, PCP, Sulfate, Nitrate+Nitrite, Phosphorus, TOC, HPC
AV-14 (duplicate of AV-13)	K0902371-002	TPH, PAH, PCP, Sulfate, Nitrate+Nitrite, Phosphorus, TOC, HPC
AV-13	K0902372-001	HDB
AV-14 (duplicate of AV-13)	K0902372-002	HDB
99EA-3A	K0902398-001	TPH, PAH, PCP, Sulfate, Nitrate+Nitrite, Phosphorus, TOC, HPC
99EA-3A-F (filtered)	K0902398-002	PAH
TMW-11	K0902398-003	PAH, PCP
TMW-11-F (filtered)	K0902398-004	PAH
AV-12	K0902398-005	TPH, PAH, PCP, Sulfate, Nitrate+Nitrite, Phosphorus, TOC, HPC
AV-11	K0902398-006	TPH, PAH, PCP, Sulfate, Nitrate+Nitrite, Phosphorus, TOC, HPC
AV-10	K0902398-007	TPH, PAH, PCP, Sulfate, Nitrate+Nitrite, Phosphorus, TOC, HPC
99EA-3A	K0902399-001	HDB
AV-12	K0902399-002	HDB
AV-11	K0902399-003	HDB
AV-10	K0902399-004	HDB

Upon receipt by CAS, the sample jar information was compared to the associated chain-of-custody (COC). The cooler and cooler blank temperatures were recorded as part of the check-in procedure. Several cooler (0.3°C and 1.4°C) and/or cooler blanks (0.3°C and 1.3°C) temperatures were outside the EPA-recommended limits of 4ºC±2ºC. Data were not qualified based on the cooler and cooler blank temperatures.

Sample aliquots for locations TMW-02, 97-5A, 99EA-3A, and TMW-11 were filtered by field personnel and submitted to the laboratory for PAH analysis. The field personnel did not assign new sample identifications (IDs) to the field-filtered samples, but indicated the requested analyses on the COC. Due to laboratory information management system (LIMS) limitations, the laboratory designated the field-filtered aliquots of samples TMW-02, 97-5A, 99EA-3A, and TMW-11 as TMW-02-F, 97-5A-F, 99EA-3A-F, and TMW-11-F, respectively. The results for these aliquots are presented in the data tables.

Due to time constraints, the laboratory chose to place the HDB analyses for samples 99EA-3A, AV-09, AV-10, AV-11, AV-12, AV-13, and AV-14 into separate SDGs.

Data validation is based on method performance criteria and QC criteria as documented in the *Draft Quality Assurance Project Plan (QAPP), Maintenance Faciliy Area, Former International Paper Facility, Longview, Washington, June 2008* (URS Corporation, 2008) and current CAS control limits. The laboratory provided EPA Contract Laboratory Program-equivalent validatable data packages. The data review conducted on this sample delivery group (SDG) included a review of summarized results and QA/QC data, per the requirements set forth in Section A.10 of the QAPP. Hold times, initial and continuing calibrations, method blanks, surrogate recoveries, laboratory control sample (LCS) results, matrix duplicate results, matrix spike/matrix spike duplicate (MS/MSD) results, field duplicates, and reporting limits were reviewed to assess compliance with applicable methods. Calculation checks and review of the raw data were not included in the data review. If data qualification was required, data were qualified in accordance with *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, October 1999 and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004.

Organic Analyses

Samples were analyzed for TPH (diesel and residual range), PAHs, and/or PCP by the methods identified in the introduction to this report.

1. Holding Times – Acceptable

2. Instrument Performance (Tunes – applicable to PAHs only) – Acceptable

3. Initial Calibrations – Acceptable except as noted below:

   PAHs by Method 8270C-SIM – Chrysene (15.6%) and benzo(k)fluoranthene (15.6%) exceeded the relative standard deviation (RSD) method control limit of 15% for the initial calibration analyzed on December 29, 2008. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard allowing analysis to proceed. The results for chrysene and benzo(k)fluoranthene are qualified as estimated and flagged 'J' or 'UJ' in the associated samples based on the initial calibration.

4. Continuing Calibrations – Acceptable

5. Blanks – Acceptable except as noted below:

   PAHs by Method 8270C-SIM – Several analytes were detected in method blanks associated with these samples as shown below:

Preparation Date	Analyte	MB Concentration (ug/L)
3/20/2009	Naphthalene	35
	2-Methylnaphthalene	5.7
	Dibenzofuran	0.69 J
	Benz(a)anthracene	0.54 J
	Dibenz(a,h)anthracene	0.30 J
3/24/2009	Naphthalene	1.4
	Fluoranthene	0.67 J
	Pyrene	0. 71 J
3/25/2009	Naphthalene	5.0
	2-Methylnaphthalene	1.0 J
	Acenaphthene	0.30 J
	Fluorene	0.23 J
	Phenanthrene	1.8 J
	Fluoranthene	0.85 J
	Pyrene	1.1 J
	Benz(a)anthracene	0.63 J
	Chrysene	0.33 J
3/26/2009	Naphthalene	14
	2-Methylnaphthalene	1.7 J
	Acenaphthene	0.50 J
	Phenanthrene	2.1 J
	Anthracene	0.24 J
	Fluoranthene	2.0 J
	Pyrene	1.3 J
	Benz(a)anthracene	0.77 J
	Chrysene	0.61 J
	Benzo(b)fluoranthene	0.56 J
	Benzo(a)pyrene	0.32 J
	Benzo(g,h,i)perylene	0.37 J

J – Indicates result was between the laboratory reporting limit and the method detection limit.

Per CLP guidelines, results reported at concentrations less than five times (5x) the method blank concentration are qualified as not detected and flagged with a 'U' at the reported result. When the associated sample results are reported between the MDL and the reporting limit, and are less than 5x the method blank concentration, the results are qualified as not detected at the reporting limit. Results reported at concentrations greater than 5x the concentration found in the method blank do not require qualification. Qualifiers assigned to samples associated with these method blanks are shown in Table 1 at the end of this report.

<u>Diesel-range and residual-range by NWTPH-Dx</u> – Diesel-range (18 ug/L) and residual-range (80 ug/L) hydrocarbons were detected in the method blank extracted on March 23, 2009 at concentrations between the MDLs and the reporting limits. Diesel-range (19 ug/L) and residual-range (200 ug/L) hydrocarbons were detected in the method blank extracted on March 24, 2009 at concentrations between the MDLs and the reporting limits. Qualifiers assigned to samples associated with these method blanks are shown in Table 1 at the end of this report.

6. Surrogates – Acceptable except as noted below:

<u>PAHs by Method 8270C-SIM</u> – Fluorene-d10 and fluoranthene-d10 were not recovered from the initial analysis of sample AV-10. The surrogate recoveries in the dilution of sample AV-10 were acceptable; therefore, the results for all PAHs in the initial analysis of sample AV-10 are qualified as Do Not Report and flagged 'DNR'.

7. Internal Standards (applicable to PAHs only) – Acceptable except as noted below:

<u>PAHs by Method 8270C-SIM</u> – The area counts for the internal standards acenaphthene-d10 and phenanthrene-d10 were outside the control limits of -50%±100% in the initial analysis of sample AV-10. The acenaphthene-d10 and phenanthrene-d10 internal standard area counts were acceptable in the dilution of sample AV-10. The results for PAHs in the initial analysis of sample AV-10 were previously qualified based on surrogates and further qualification is not necessary.

8. Laboratory Control/ Laboratory Control Duplicate Samples (LCS/LCSD) – Acceptable where applicable

9. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable where applicable

<u>PAHs by Method 8270C-SIM</u> – An MS/MSD was not performed in association with this analysis. Precision and accuracy were assessed using the LCS/LCSD results.

<u>PCP by Method 8151M</u> – An MS/MSD was performed on sample TMW-12. Results were acceptable.

<u>Diesel-range and residual-range TPH by NWTPH-Dx</u> – An MS/MSD was not performed in association with this analysis. Precision and accuracy were assessed using the LCS and laboratory duplicate results.

10. Laboratory Duplicate – Acceptable where applicable except as noted below:

<u>Diesel-range and residual-range TPH by NWTPH-Dx</u> – A laboratory duplicate was performed on sample AV-13. Results were acceptable.

An additional laboratory duplicate was performed on sample AV-11. The relative percent difference (RPD) for residual-range hydrocarbons (116%) exceeded the control limit of 30%; therefore, the result for residual-range hydrocarbons in sample AV-11 is qualified as estimated and flagged with a 'J' based on the laboratory duplicate RPD.

11. Field Duplicate – Acceptable except as noted below:

    General – Field duplicates were submitted for samples AV-13 (PAH, PCP, and TPH) and 04-6A (PAH) and identified as AV-14 and 97-6C, respectively. Results were comparable for all organic analyses except as noted below.

    PAHs by Method 8270C-SIM – The RPD for indeno(1,2,3-cd)pyrene (128%) in the parent sample / field duplicate pair AV-13 / AV-14 was more than 50%. The results for indeno(1,2,3-cd)pyrene in samples AV-13 and AV-14 are qualified as estimated and flagged 'J' based on the field duplicate RPD.

    The RPD for indeno(1,2,3-cd)pyrene (57%) in the parent sample / field duplicate pair 04-6A / 97-6C was more than 50%. The results for indeno(1,2,3-cd)pyrene in samples 04-6A and 97-6C are qualified as estimated and flagged 'J' based on the field duplicate RPD.

12. Reporting Limits – Acceptable except as noted below:

    PAHs by Method 8270C-SIM – The results for one or more PAHs in several samples were assigned a 'D' qualifier by the laboratory to indicate the result was reported from a dilution of the sample. No additional qualifiers were necessary based on the 'D' qualifiers assigned by the laboratory.

    The results for one or more PAHs in all samples were assigned a 'J' qualifier by the laboratory to indicate that the reported concentration is above the MDL, but below the MRL. All J-flagged results are considered estimated unless previously qualified based on quality control issues as described within this report.

    Samples AV-13, TMW-08, and the dilution of sample AV-10 required dilution to quantitate acenaphthene within the linear range of the instrument. The sample results for acenaphthene which exceeded the calibration range of the instrument were flagged 'E' by the laboratory and have been qualified with the flag 'DNR.' As the reporting limits were lower for the undiluted analyses, results for compounds other than acenaphthene that were not flagged 'E' by the laboratory in the undiluted analyses of samples AV-13 and TMW-08 and the dilution of sample AV-10 are qualified with the flag 'DNR' for the diluted analyses.

    Diesel-range and residual-range TPH by NWTPH-Dx – The results for one or more TPHs in several samples were assigned a 'J' qualifier by the laboratory to indicate that the reported concentration is above the MDL, but below the MRL. All J-flagged results are considered estimated unless previously qualified based on quality control issues as described within this report.

    The results for diesel-range and/or residual-range hydrocarbons in several samples were assigned an 'Y' or 'Z' qualifier by the laboratory to indicate that the chromatographic fingerprint does not resemble a petroleum product. No additional qualifiers were necessary based on the 'Y' or 'Z' qualifiers assigned by the laboratory.

Conventional Analyses

Samples were analyzed for NO_3+NO_2, total phosphorus, sulfate, TOC, HDB, and HPC by the methods specified in the introduction to this report.

1. Holding Times – Acceptable

2. Initial Calibrations – Acceptable where applicable

3. Continuing Calibrations – Acceptable where applicable

4. Blanks – Acceptable except as noted below:

Total Phosphorous by Method 365.3 – Total phosphorous was detected at 0.005 mg/L and 0.006 mg/L in the second continuing calibration blanks prepared on March 20 and March 21, 2009, respectively. Per CLP guidelines, results reported at concentrations above the reporting limit and less than five times (5x) the blank concentration are qualified as estimated (high bias) and flagged with a 'J+.' Results reported as not detected or at concentrations greater than 5x the concentration found in the blank do not require qualification. Results reported at concentrations less than 5x the blank concentration and reported between the MDL and the reporting limits are qualified as not detected at the reporting limit. The result for total phosphorus in sample AV-09 was less than 5x the blank concentration; therefore, the result for total phosphorus in this sample is qualified as estimated and flagged 'J+.' The concentrations for total phosphorous in all other samples were reported as not detected or reported at concentrations greater than 5x the method blank and no qualification is necessary.

5. Laboratory Control Samples (LCS) – Acceptable where applicable

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable where applicable

NO_3+NO_2 by Method 353.2 – Matrix spikes were performed on samples 99EA-3A and AV-13. Results were acceptable.

Total Phosphorus by Method 365.3 – Matrix spikes were performed on samples AV-13 and AV-09. An MS/MSD was performed on sample 99EA-3A. Results were acceptable.

Sulfate by Method 300.0 – A matrix spike was performed on a sample from an unrelated project. Results were acceptable.

TOC by Method 415.1 – A matrix spike was performed on sample AV-09. Results were acceptable.

7. Laboratory Duplicates – Acceptable except as noted below:

NO_3+NO_2 by Method 353.2 – Laboratory duplicates were performed on samples 99EA-3A and AV-13. Results were acceptable.

Total Phosphorus by Method 365.3 – Laboratory duplicates were performed on samples 99EA-3A, AV-13, and AV-09. Results were acceptable.

Sulfate by Method 300.0 – A laboratory duplicate was performed on a sample from an unrelated project. Results were acceptable.

TOC by Method 415.1 – A laboratory duplicate was performed on sample AV-09. Results were acceptable.

HDB by SM9221C – Laboratory duplicates were performed on samples AV-09 and 99EA-3A. The RPD for the sample/duplicate pair for 99EA-3A (51%) did not meet the acceptance criterion of 40%. All associated sample results are qualified as estimated and flagged 'J'.

HPC by SM9215B – Laboratory duplicates were performed on samples AV-09 and AV-12. Results were acceptable.

8. Field Duplicate – Acceptable

General – A field duplicate was submitted for sample AV-13 and identified as AV-14. Results were comparable except as noted below.

HPC by SM9215B – The RPD for HPC (133%) was more than 50%. The results for HPC in samples AV-13 and AV-14 are qualified as estimated and flagged 'J' based on the field duplicate RPD.

9. Reporting Limits – Acceptable

General – Detection limit goals were not specified in the QAPP. The reporting limits provided by the laboratory are common levels reported by environmental laboratories and acceptable for project objectives.

Overall Assessment

The data reported in these SDGs, as qualified, are considered to be usable for meeting project objectives. The completeness for SDGs K0902314, K0902357, K0902359, K0902371, K0902372, K0902398, and K0902399 is 100%.

Data Qualifier Definitions:

U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
DNR	Do Not Report. Another result is available that is more reliable.

Table 1. Summary of Qualified Data.

Sample ID	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-07	K0902314-001	Naphthalene	0.0028 J	ug/L	0.0034 U
		2-Methylnaphthalene	0.0011 J	ug/L	0.0011 J
		Acenaphthene	0.0033 J	ug/L	0.0033 J
		Fluorene	0.00067 J	ug/L	0.00067 J
		Fluoranthene	0.0013 J	ug/L	0.0034 U
		Pyrene	0.0011 J	ug/L	0.0034 U
		Benz(a)anthracene	0.0011 J	ug/L	0.0011 J
		Chrysene	0.00045 J	ug/L	0.00045 J
		Benzo(b)fluoranthene	0.00099 J	ug/L	0.00099 J
		Benzo(k)fluoranthene	0.00036 J	ug/L	0.00036 J
		Benzo(a)pyrene	0.00067 J	ug/L	0.00067 J
		Indeno(1,2,3-cd)pyrene	0.00049 J	ug/L	0.00049 J
		Dibenz(a,h)anthracene	0.0003 J	ug/L	0.0003 J
		Benzo(g,h,i)perylene	0.00074 J	ug/L	0.00074 J
TMW-08	K0902314-002	2-Methylnaphthalene	0.0026 J	ug/L	0.0026 J
		Acenaphthene	3.3 E	ug/L	3.3 E DNR
		Phenanthrene	0.0025 J	ug/L	0.0025 J
		Pyrene	0.0013 J	ug/L	0.0036 U
		Chrysene	0.0036 U	ug/L	0.0036 UJ
		Benzo(k)fluoranthene	0.0036 U	ug/L	0.0036 UJ
	K0902314-002DL	All PAHs except acenaphthene	Varies	ug/L	DNR
TMW-09	K0902314-003	2-Methylnaphthalene	0.0022 J	ug/L	0.0022 J
		Dibenzofuran	0.00088 J	ug/L	0.00088 J
		Fluorene	0.0009 J	ug/L	0.0009 J
		Phenanthrene	0.003 J	ug/L	0.003 J
		Pyrene	0.0033 J	ug/L	0.0036 U
		Benz(a)anthracene	0.0017 J	ug/L	0.0017 J
		Chrysene	0.0022 J	ug/L	0.0022 J
		Benzo(b)fluoranthene	0.0016 J	ug/L	0.0016 J
		Benzo(k)fluoranthene	0.00054 J	ug/L	0.00054 J
		Benzo(a)pyrene	0.00059 J	ug/L	0.00059 J
		Indeno(1,2,3-cd)pyrene	0.00056 J	ug/L	0.00056 J
		Benzo(g,h,i)perylene	0.00056 J	ug/L	0.00056 J

Table 1. Summary of Qualified Data (continued)

Sample ID (continued)	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-10	K0902314-004	Naphthalene	0.0031 J	ug/L	0.0033 U
		2-Methylnaphthalene	0.0014 J	ug/L	0.0014 J
		Acenaphthylene	0.00092 J	ug/L	0.00092 J
		Fluorene	0.0011 J	ug/L	0.0011 J
		Phenanthrene	0.0021 J	ug/L	0.0021 J
		Pyrene	0.0029 J	ug/L	0.0033 U
		Benz(a)anthracene	0.0014 J	ug/L	0.0014 J
		Chrysene	0.001 J	ug/L	0.001 J
		Benzo(b)fluoranthene	0.0011 J	ug/L	0.0011 J
		Benzo(k)fluoranthene	0.0033 U	ug/L	0.0033 UJ
		Benzo(a)pyrene	0.00061 J	ug/L	0.00061 J
		Indeno(1,2,3-cd)pyrene	0.00031 J	ug/L	0.00031 J
		Benzo(g,h,i)perylene	0.00047 J	ug/L	0.00047 J
TMW-12	K0902314-005	Naphthalene	0.0033 J	ug/L	0.0036 U
		2-Methylnaphthalene	0.0014 J	ug/L	0.0014 J
		Acenaphthylene	0.00084 J	ug/L	0.00084 J
		Fluorene	0.0008 J	ug/L	0.0008 J
		Phenanthrene	0.0035 J	ug/L	0.0035 J
		Benz(a)anthracene	0.0017 J	ug/L	0.0017 J
		Chrysene	0.0015 J	ug/L	0.0015 J
		Benzo(b)fluoranthene	0.0014 J	ug/L	0.0014 J
		Benzo(k)fluoranthene	0.00046 J	ug/L	0.00046 J
		Benzo(a)pyrene	0.00083 J	ug/L	0.00083 J
		Indeno(1,2,3-cd)pyrene	0.00063 J	ug/L	0.00063 J
		Benzo(g,h,i)perylene	0.0006 J	ug/L	0.0006 J
TMW-03	K0902357-001	Naphthalene	0.0086	ug/L	0.0086 U
		2-Methylnaphthalene	0.0027 J	ug/L	0.0034 U
		Phenanthrene	0.0049	ug/L	0.0049 U
		Fluoranthene	0.0016 J	ug/L	0.0034 U
		Pyrene	0.0011 J	ug/L	0.0034 U
		Chrysene	0.0034 U	ug/L	0.0034 UJ
		Benzo(k)fluoranthene	0.0034 U	ug/L	0.0034 UJ

Table 1. Summary of Qualified Data (continued)

Sample ID (continued)	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-02	K0902357-002	Naphthalene	0.01	ug/L	0.01 U
		2-Methylnaphthalene	0.0044	ug/L	0.0044 U
		Dibenzofuran	0.0019 J	ug/L	0.0019 J
		Phenanthrene	0.0071	ug/L	0.0071 U
		Chrysene	0.0067	ug/L	0.0067 UJ
		Benzo(k)fluoranthene	0.003 J	ug/L	0.003 J
		Dibenz(a,h)anthracene	0.0011 J	ug/L	0.0011 J
TMW-02-F (filtered)	K0902357-003	Naphthalene	0.011	ug/L	0.011 U
		2-Methylnaphthalene	0.0023 J	ug/L	0.0034 U
		Dibenzofuran	0.0012 J	ug/L	0.0012 J
		Phenanthrene	0.0027 J	ug/L	0.0034 U
		Pyrene	0.0013 J	ug/L	0.0034 U
		Chrysene	0.0034 U	ug/L	0.0034 UJ
		Benzo(k)fluoranthene	0.0034 U	ug/L	0.0034 UJ
		Indeno(1,2,3-cd)pyrene	0.0003 J	ug/L	0.0003 J
		Benzo(g,h,i)perylene	0.00033 J	ug/L	0.00033 J
TMW-04	K0902357-004	Naphthalene	0.017	ug/L	0.017 U
		2-Methylnaphthalene	0.0037	ug/L	0.0037 U
		Dibenzofuran	0.0022 J	ug/L	0.0022 J
		Phenanthrene	0.0059	ug/L	0.0059 U
		Pyrene	0.0031 J	ug/L	0.0034 U
		Benz(a)anthracene	0.0028 J	ug/L	0.0034 U
		Chrysene	0.0027 J	ug/L	0.0027 J
		Benzo(b)fluoranthene	0.0033 J	ug/L	0.0033 J
		Benzo(k)fluoranthene	0.0011 J	ug/L	0.0011 J
		Benzo(a)pyrene	0.0022 J	ug/L	0.0022 J
		Indeno(1,2,3-cd)pyrene	0.0014 J	ug/L	0.0014 J
		Dibenz(a,h)anthracene	0.00048 J	ug/L	0.00048 J
		Benzo(g,h,i)perylene	0.0015 J	ug/L	0.0015 J
TMW-01	K0902357-005	Naphthalene	0.013	ug/L	0.013 U
		2-Methylnaphthalene	0.0036	ug/L	0.0036 U
		Benz(a)anthracene	0.0016 J	ug/L	0.0034 U
		Chrysene	0.0011 J	ug/L	0.0034 UJ
		Benzo(b)fluoranthene	0.0018 J	ug/L	0.0018 J
		Benzo(k)fluoranthene	0.00062 J	ug/L	0.00062 J
		Benzo(a)pyrene	0.001 J	ug/L	0.001 J
		Indeno(1,2,3-cd)pyrene	0.00093 J	ug/L	0.00093 J
		Benzo(g,h,i)perylene	0.00094 J	ug/L	0.00094 J

Table 1. Summary of Qualified Data (continued)

Sample ID (continued)	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-05	K0902357-006	Naphthalene	0.005	ug/L	0.005 U
		2-Methylnaphthalene	0.0019 J	ug/L	0.0034 U
		Acenaphthene	0.0022 J	ug/L	0.0022 J
		Dibenzofuran	0.00072 J	ug/L	0.00072 J
		Fluorene	0.00075 J	ug/L	0.0034 U
		Fluoranthene	0.00082 J	ug/L	0.0034 U
		Pyrene	0.0014 J	ug/L	0.0034 U
		Benz(a)anthracene	0.00085 J	ug/L	0.0034 U
		Chrysene	0.00062 J	ug/L	0.0034 UJ
		Benzo(b)fluoranthene	0.00064 J	ug/L	0.00064 J
		Benzo(k)fluoranthene	0.0003 J	ug/L	0.0003 J
		Benzo(g,h,i)perylene	0.0004 J	ug/L	0.0004 J
TMW-06	K0902357-007	Naphthalene	0.0042	ug/L	0.0042 U
		2-Methylnaphthalene	0.002 J	ug/L	0.0034 U
		Acenaphthene	0.0017 J	ug/L	0.0017 J
		Fluorene	0.0008 J	ug/L	0.0034 U
		Fluoranthene	0.00069 J	ug/L	0.0034 U
		Pyrene	0.00082 J	ug/L	0.0034 U
		Chrysene	0.0034 U	ug/L	0.0034 UJ
		Benzo(k)fluoranthene	0.0034 U	ug/L	0.0034 UJ
97-5A	K0902357-008	Naphthalene	0.0066	ug/L	0.0066 U
		Chrysene	0.0046	ug/L	0.0046 J
		Benzo(k)fluoranthene	0.0023 J	ug/L	0.0023 J
		Dibenz(a,h)anthracene	0.00075 J	ug/L	0.00075 J
97-5A-F (filtered)	K0902357-009	Naphthalene	0.01	ug/L	0.01 U
		Benz(a)anthracene	0.00086 J	ug/L	0.0038 U
		Chrysene	0.00037 J	ug/L	0.0038 UJ
		Benzo(b)fluoranthene	0.00065 J	ug/L	0.00065 J
		Benzo(k)fluoranthene	0.00032 J	ug/L	0.00032 J
		Indeno(1,2,3-cd)pyrene	0.00034 J	ug/L	0.00034 J
04-6A	K0902357-010	Chrysene	0.13	ug/L	0.13 J
		Benzo(k)fluoranthene	0.014	ug/L	0.014 J
		Indeno(1,2,3-cd)pyrene	0.0067	ug/L	0.0067 J
		Dibenz(a,h)anthracene	0.0019 J	ug/L	0.0019 J
97-6C (Duplicate of 04-6A)	K0902357-011	Chrysene	0.14	ug/L	0.14 J
		Benzo(k)fluoranthene	0.016	ug/L	0.016 J
		Indeno(1,2,3-cd)pyrene	0.012	ug/L	0.012 J
		Dibenz(a,h)anthracene	0.0025 J	ug/L	0.0025 J
AV-09	K0902357-012	Phosphorus, Total	0.03	mg/L	0.03 J+
		Diesel Range Organics (DRO)	58 J	ug/L	270 U
		Residual Range Organics (RRO)	130 J	ug/L	530 U
		Naphthalene	0.016	ug/L	0.016 U
		2-Methylnaphthalene	0.0025 J	ug/L	0.0037 U

Table 1. Summary of Qualified Data (continued)

Sample ID (continued)	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
AV-09 (continued)	K0902357-012	Acenaphthylene	0.0011 J	ug/L	0.0011 J
		Acenaphthene	0.0023 J	ug/L	0.0023 J
		Dibenzofuran	0.0017 J	ug/L	0.0017 J
		Fluorene	0.0018 J	ug/L	0.0018 J
		Chrysene	0.018	ug/L	0.018 J
		Benzo(k)fluoranthene	0.01	ug/L	0.01 J
		Dibenz(a,h)anthracene	0.0037 J	ug/L	0.0037 J
AV-13	K0902371-001	Heterotrophic Plate Count	1	CFU/mL	1 J
		Residual Range Organics (RRO)	320 J	ug/L	560 U
		Acenaphthene	1.9 E	ug/L	1.9 E DNR
		Chrysene	0.0066	ug/L	0.0066 J
		Benzo(k)fluoranthene	0.0017 J	ug/L	0.0017 J
		Benzo(a)pyrene	0.003 J	ug/L	0.003 J
		Indeno(1,2,3-cd)pyrene	0.0027 J	ug/L	0.0027 J
		Dibenz(a,h)anthracene	0.0007 J	ug/L	0.0007 J
		Benzo(g,h,i)perylene	0.0026 J	ug/L	0.0026 J
	K0902371-001DL	All PAHs except acenaphthene	Varies	ug/L	DNR
AV-14 (Duplicate of AV-13)	K0902371-002	Heterotrophic Plate Count	5	CFU/mL	5 J
		Residual Range Organics (RRO)	350 J	ug/L	560 U
		Fluoranthene	0.01	ug/L	0.01 U
		Benz(a)anthracene	0.0018 J	ug/L	0.0034 U
		Chrysene	0.0028 J	ug/L	0.0034 UJ
		Benzo(b)fluoranthene	0.0018 J	ug/L	0.0034 U
		Benzo(k)fluoranthene	0.0034 U	ug/L	0.0034 UJ
		Benzo(a)pyrene	0.0008 J	ug/L	0.0034 U
		Indeno(1,2,3-cd)pyrene	0.00059 J	ug/L	0.00059 J
		Benzo(g,h,i)perylene	0.0007 J	ug/L	0.0034 U
99EA 3A	K0902398-001	Residual Range Organics (RRO)	310 J	ug/L	530 U
		Naphthalene	0.022	ug/L	0.022 U
		2-Methylnaphthalene	0.004	ug/L	0.004 U
		Chrysene	0.7	ug/L	0.7 J
		Benzo(k)fluoranthene	0.29	ug/L	0.29 J
99EA 3A-F (filtered)	K0902398-002	Naphthalene	0.04	ug/L	0.04 U
		Chrysene	0.0038	ug/L	0.0038 J
		Benzo(k)fluoranthene	0.0014 J	ug/L	0.0014 J
		Benzo(a)pyrene	0.0021 J	ug/L	0.0021 J
		Indeno(1,2,3-cd)pyrene	0.0016 J	ug/L	0.0016 J
		Dibenz(a,h)anthracene	0.0005 J	ug/L	0.0005 J
		Benzo(g,h,i)perylene	0.0017 J	ug/L	0.0036 U

Table 1. Summary of Qualified Data (continued)

Sample ID (continued)	Laboratory ID	Analyte	Laboratory Result	Units	Final Result
TMW-11	K0902398-003	Naphthalene	0.07	ug/L	0.07 U
		Acenaphthylene	0.00096 J	ug/L	0.00096 J
		Phenanthrene	0.011	ug/L	0.011 U
		Anthracene	0.0025 J	ug/L	0.0025 J
		Benz(a)anthracene	0.0029 J	ug/L	0.0035 U
		Chrysene	0.0056	ug/L	0.0056 J
		Benzo(k)fluoranthene	0.0016 J	ug/L	0.0016 J
		Benzo(a)pyrene	0.0017 J	ug/L	0.0017 J
		Indeno(1,2,3-cd)pyrene	0.0016 J	ug/L	0.0016 J
		Benzo(g,h,i)perylene	0.0014 J	ug/L	0.0035 U
TMW-11-F (filtered)	K0902398-004	Naphthalene	0.043	ug/L	0.043 U
		Fluorene	0.0027 J	ug/L	0.0027 J
		Phenanthrene	0.0035 J	ug/L	0.0036 U
		Anthracene	0.0022 J	ug/L	0.0022 J
		Fluoranthene	0.00082 J	ug/L	0.0036 U
		Chrysene	0.0036 U	ug/L	0.0036 UJ
		Benzo(k)fluoranthene	0.0036 U	ug/L	0.0036 UJ
AV-12	K0902398-005	Diesel Range Organics (DRO)	69 J	ug/L	270 U
		Residual Range Organics (RRO)	200 J	ug/L	530 U
		Acenaphthylene	0.0026 J	ug/L	0.0026 J
		Fluoranthene	0.0068	ug/L	0.0068 U
		Benz(a)anthracene	0.0021 J	ug/L	0.0036 U
		Chrysene	0.0016 J	ug/L	0.0036 UJ
		Benzo(b)fluoranthene	0.0029 J	ug/L	0.0029 J
		Benzo(k)fluoranthene	0.00094 J	ug/L	0.00094 J
		Benzo(a)pyrene	0.0017 J	ug/L	0.0017 J
		Indeno(1,2,3-cd)pyrene	0.0017 J	ug/L	0.0017 J
		Dibenz(a,h)anthracene	0.00046 J	ug/L	0.00046 J
		Benzo(g,h,i)perylene	0.0016 J	ug/L	0.0036 U
AV-11	K0902398-006	Diesel Range Organics (DRO)	59 J	ug/L	270 U
		Residual Range Organics (RRO)	560	ug/L	560 UJ
		Acenaphthylene	0.0019 J	ug/L	0.0019 J
		Chrysene	0.031	ug/L	0.031 J
		Benzo(k)fluoranthene	0.013	ug/L	0.013 J
AV-10	K0902398-007	All PAHs	Varies	ug/L	DNR
	K0902398-007DL	Acenaphthene	37 E	ug/L	37 E DNR
		Chrysene	0.074	ug/L	0.074 J
		Benzo(k)fluoranthene	0.035	ug/L	0.035 J
		Indeno(1,2,3-cd)pyrene	0.033 J	ug/L	0.033 J
		Dibenz(a,h)anthracene	0.01 J	ug/L	0.01 J
	K0902398-007DL2	All PAHs except acenaphthene	Varies	ug/L	DNR
99EA 3A	K0902399-001	HDB	65000	MPN/100mL	65,000 J
AV-12	K0902399-002	HDB	1000	MPN/100mL	1,000 J
AV-11	K0902399-003	HDB	7000	MPN/100mL	7,000 J
AV-10	K0902399-004	HDB	1000	MPN/100mL	1,000 J

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
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March 26, 2009 Analytical Report for Service Request No: K0902314

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on March 18, 2009. For your reference, these analyses have been assigned our service request number K0902314.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/ln

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0902314
Project:	IP Longview	**Date Received:**	3/18/2009
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Five water samples were received for analysis at Columbia Analytical Services on 3/18/2009. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Pentachlorophenol by EPA Method 8151M

No anomalies associated with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL8092: Chrysene, Benzo(k)fluoranthene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.2%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Elevated Method Reporting Limits:
The reporting limit is elevated for Fluorene in sample TMW-08. The chromatogram indicated the presence of non-target background components. The matrix interference prevented adequate resolution of the target compound at the reporting limit. The result is flagged to indicate the matrix interference.

Approved by LAH **Date** 3/24/09

Columbia Analytical ServicesINC.
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CHAIN OF CUSTODY

SR#: K0902314

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PAGE 1 OF 1 COC # ______

PROJECT NAME IP Longview
PROJECT NUMBER
PROJECT MANAGER Paul Kalina
COMPANY/ADDRESS 1501 4th Avenue
Suite 1400
CITY/STATE/ZIP Seattle, WA 98101
E-MAIL ADDRESS
PHONE # (206) 438-2700 FAX#
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☑	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020☐ AOX 1650☐ 506☐	8270-C SIM ULL				REMARKS
TMW-07	3/17/09	1200		GW	2																A				A: indicates the PAH list A analyte list attached.
TMW-08	↓	1315		↓	2																A				
TMW-09	↓	1425		↓	2																A				
TMW-10	↓	1715		↓	4									X							A				
TMW-12	↓	1815		↓	4									X							A				

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REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.

___ 5 Day

X Standard (10-15 working days)

___ Provide FAX Results

______
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: ______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS: Please make sure the analyte list for 8270 analysis match requested analyte list and that "ultra low levels" are achieved with cPAH reporting limits so that MTCA B levels are not exceeding the reporting limits.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature	Signature Rosa Ma Romero	Signature Rosa Ma Romero	Signature
Date/Time 3/17/09 1500	Date/Time 3/17/09 19:05	Date/Time 3/17/09 19:30	Date/Time 3/18/09 0800
Printed Name Jesse McCullough	Printed Name ROSA ROMERO	Printed Name Rosa Romero	Printed Name [illegible]
Firm URS	Firm CAS.	Firm CAS	Firm [illegible]

RCOC #1 06/03

PAH LIST A	PAH LIST B	PAH LIST C
2-Methylnaphthalene	Benzo(a)anthracene	2-Methylnaphthalene
Acenaphthene	Benzo(a)pyrene	Benzo(a)anthracene
Acenaphthylene	Benzo(b)fluoranthene	Benzo(a)pyrene
Anthracene	Benzo(k)fluoranthene	Benzo(b)fluoranthene
Benzo(a)anthracene	Chrysene	Benzo(k)fluoranthene
Benzo(a)pyrene	Dibenzo(a,h)anthracene	Chrysene
Benzo(b)fluoranthene	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene
Benzo(g,h,i)perylene	Naphthalene	Indeno(1,2,3-cd)pyrene
Benzo(k)fluoranthene		Naphthalene
Chrysene		Dibenzofuran
Dibenzo(a,h)anthracene		
Dibenzofuran		
Fluoranthene		
Fluorene		
Indeno(1,2,3-cd)pyrene		
Naphthalene		
Phenanthrene		
Pyrene		
(All AV and TMW Wells)	*(97-5A only)*	*(04-6A, 97-6C only)*

IP Longview March 2008 Field Effort
rev 3/16/09

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC [illegible]

Client / Project: IP longview Service Request K09 02314

Received: 3/17/09 Opened: 3/18/09 By: BT

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ______ NA

SHORT HOLD TIME

3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: ______ [✓ NA] Y N
5. **Temperature of cooler(s) upon receipt (°C):** 0.3
   Temperature Blank (°C): 1.3
   Thermometer ID: 262
6. If applicable, list Chain of Custody Numbers: ______
7. Packing material used. *Inserts Baggies Bubble Wrap Gel Packs* [✓ *Wet Ice*] *Sleeves Other* ______
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* [✓ NA] Y N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* NA [✓ Y] N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** [✓ NA] Y N
16. Was Cl2/Res negative? NA [✓ Y] N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions: ______

Page 1 of: 1 2

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0902314

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TMW-07	K0902314-001	56	79	77
TMW-08	K0902314-002	63	72	74
TMW-08DL	K0902314-002	60 D	74 D	74 D
TMW-09	K0902314-003	53	75	74
TMW-10	K0902314-004	56	74	75
TMW-12	K0902314-005	64	75	74
Method Blank	KWG0902460-3	62	69	71
Lab Control Sample	KWG0902460-1	69	73	81
Duplicate Lab Control Sample	KWG0902460-2	64	73	77

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	39-122
Sur2 = Fluoranthene-d10	36-132
Sur3 = Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	03/24/2009
		Date Analyzed:	03/26/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG0902460-3	**Basis:**	NA
File ID:	J:\MS11\DATA\032609\0326F003.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902460
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092
Sample Amount:	1040 ml		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**1.4**	J	3.3	0.76	
91-57-6	2-Methylnaphthalene	3.3	U	3.3	0.65	
208-96-8	Acenaphthylene	3.3	U	3.3	0.24	
83-32-9	Acenaphthene	3.3	U	3.3	0.27	
132-64-9	Dibenzofuran	3.3	U	3.3	0.67	
86-73-7	Fluorene	3.3	U	3.3	0.21	
85-01-8	Phenanthrene	3.3	U	3.3	1.8	
120-12-7	Anthracene	3.3	U	3.3	0.20	
206-44-0	**Fluoranthene**	**0.67**	J	3.3	0.24	
129-00-0	**Pyrene**	**0.71**	J	3.3	0.27	
56-55-3	Benz(a)anthracene	3.3	U	3.3	0.25	
218-01-9	Chrysene	3.3	U	3.3	0.29	
205-99-2	Benzo(b)fluoranthene	3.3	U	3.3	0.24	
207-08-9	Benzo(k)fluoranthene	3.3	U	3.3	0.19	
50-32-8	Benzo(a)pyrene	3.3	U	3.3	0.27	
193-39-5	Indeno(1,2,3-cd)pyrene	3.3	U	3.3	0.28	
53-70-3	Dibenz(a,h)anthracene	3.3	U	3.3	0.25	
191-24-2	Benzo(g,h,i)perylene	3.3	U	3.3	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	39-122	03/26/09	Acceptable
Fluoranthene-d10	69	36-132	03/26/09	Acceptable
Terphenyl-d14	71	31-140	03/26/09	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/24/2009
		Date Analyzed:	03/25/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-07	**Units:**	ng/L
Lab Code:	K0902314-001	**Basis:**	NA
File ID:	J:\MS11\DATA\032509A\0325F020.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902460
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092
Sample Amount:	1030 ml		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**2.8**	J	3.4	0.76	
91-57-6	**2-Methylnaphthalene**	**1.1**	J	3.4	0.65	
208-96-8	Acenaphthylene	3.4	U	3.4	0.24	
83-32-9	**Acenaphthene**	**3.3**	J	3.4	0.27	
132-64-9	Dibenzofuran	3.4	U	3.4	0.67	
86-73-7	**Fluorene**	**0.67**	J	3.4	0.21	
85-01-8	Phenanthrene	3.4	U	3.4	1.8	
120-12-7	**Anthracene**	**12**		3.4	0.20	
206-44-0	**Fluoranthene**	**1.3**	J	3.4	0.24	
129-00-0	**Pyrene**	**1.1**	J	3.4	0.27	
56-55-3	**Benz(a)anthracene**	**1.1**	J	3.4	0.25	
218-01-9	**Chrysene**	**0.45**	J	3.4	0.29	
205-99-2	**Benzo(b)fluoranthene**	**0.99**	J	3.4	0.24	
207-08-9	**Benzo(k)fluoranthene**	**0.36**	J	3.4	0.19	
50-32-8	**Benzo(a)pyrene**	**0.67**	J	3.4	0.27	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**0.49**	J	3.4	0.28	
53-70-3	**Dibenz(a,h)anthracene**	**0.30**	J	3.4	0.25	
191-24-2	**Benzo(g,h,i)perylene**	**0.74**	J	3.4	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	56	39-122	03/25/09	Acceptable
Fluoranthene-d10	79	36-132	03/25/09	Acceptable
Terphenyl-d14	77	31-140	03/25/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/24/2009
		Date Analyzed:	03/25/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-08	**Units:**	ng/L
Lab Code:	K0902314-002	**Basis:**	NA
File ID:	J:\MS11\DATA\032509A\0325F021.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902460
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 970 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**10**		3.6	0.79	
91-57-6	**2-Methylnaphthalene**	**2.6**	J	3.6	0.68	
208-96-8	**Acenaphthylene**	**9.9**		3.6	0.25	
83-32-9	**Acenaphthene**	**3300**	E	3.6	0.28	
132-64-9	**Dibenzofuran**	**73**		3.6	0.70	
86-73-7	Fluorene	5.4	Ui	5.4	5.4	
85-01-8	**Phenanthrene**	**2.5**	J	3.6	1.9	
120-12-7	**Anthracene**	**18**		3.6	0.21	
206-44-0	Fluoranthene	3.6	U	3.6	0.25	
129-00-0	**Pyrene**	**1.3**	J	3.6	0.28	
56-55-3	Benz(a)anthracene	3.6	U	3.6	0.26	
218-01-9	Chrysene	3.6	U	3.6	0.30	
205-99-2	Benzo(b)fluoranthene	3.6	U	3.6	0.25	
207-08-9	Benzo(k)fluoranthene	3.6	U	3.6	0.20	
50-32-8	Benzo(a)pyrene	3.6	U	3.6	0.28	
193-39-5	Indeno(1,2,3-cd)pyrene	3.6	U	3.6	0.29	
53-70-3	Dibenz(a,h)anthracene	3.6	U	3.6	0.26	
191-24-2	Benzo(g,h,i)perylene	3.6	U	3.6	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	39-122	03/25/09	Acceptable
Fluoranthene-d10	72	36-132	03/25/09	Acceptable
Terphenyl-d14	74	31-140	03/25/09	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/24/2009
		Date Analyzed:	03/26/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-08DL	**Units:**	ng/L
Lab Code:	K0902314-002	**Basis:**	NA
File ID:	J:\MS11\DATA\032609\0326F004.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902460
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 970 ml
% Solids: NA
Dilution Factor: 5

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**16**	JD	18	4.0	
91-57-6	2-Methylnaphthalene	18	U	18	3.4	
208-96-8	**Acenaphthylene**	**9.9**	JD	18	1.3	
83-32-9	**Acenaphthene**	**3400**	D	18	1.4	
132-64-9	Dibenzofuran	18	U	18	3.5	
86-73-7	Fluorene	18	U	18	1.1	
85-01-8	Phenanthrene	18	U	18	9.3	
120-12-7	**Anthracene**	**18**	D	18	1.1	
206-44-0	Fluoranthene	18	U	18	1.3	
129-00-0	Pyrene	18	U	18	1.4	
56-55-3	Benz(a)anthracene	18	U	18	1.3	
218-01-9	Chrysene	18	U	18	1.5	
205-99-2	Benzo(b)fluoranthene	18	U	18	1.3	
207-08-9	Benzo(k)fluoranthene	18	U	18	0.98	
50-32-8	Benzo(a)pyrene	18	U	18	1.4	
193-39-5	Indeno(1,2,3-cd)pyrene	18	U	18	1.5	
53-70-3	Dibenz(a,h)anthracene	18	U	18	1.3	
191-24-2	Benzo(g,h,i)perylene	18	U	18	0.78	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	39-122	03/26/09	Acceptable
Fluoranthene-d10	74	36-132	03/26/09	Acceptable
Terphenyl-d14	74	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/24/2009
		Date Analyzed:	03/25/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-09	**Units:**	ng/L
Lab Code:	K0902314-003	**Basis:**	NA
File ID:	J:\MS11\DATA\032509A\0325F022.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902460
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 970 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**9.1**		3.6	0.79	
91-57-6	**2-Methylnaphthalene**	**2.2**	J	3.6	0.68	
208-96-8	Acenaphthylene	3.6	U	3.6	0.25	
83-32-9	**Acenaphthene**	**16**		3.6	0.28	
132-64-9	**Dibenzofuran**	**0.88**	J	3.6	0.70	
86-73-7	**Fluorene**	**0.90**	J	3.6	0.22	
85-01-8	**Phenanthrene**	**3.0**	J	3.6	1.9	
120-12-7	**Anthracene**	**4.9**		3.6	0.21	
206-44-0	**Fluoranthene**	**5.3**		3.6	0.25	
129-00-0	**Pyrene**	**3.3**	J	3.6	0.28	
56-55-3	**Benz(a)anthracene**	**1.7**	J	3.6	0.26	
218-01-9	**Chrysene**	**2.2**	J	3.6	0.30	
205-99-2	**Benzo(b)fluoranthene**	**1.6**	J	3.6	0.25	
207-08-9	**Benzo(k)fluoranthene**	**0.54**	J	3.6	0.20	
50-32-8	**Benzo(a)pyrene**	**0.59**	J	3.6	0.28	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**0.56**	J	3.6	0.29	
53-70-3	Dibenz(a,h)anthracene	3.6	U	3.6	0.26	
191-24-2	**Benzo(g,h,i)perylene**	**0.56**	J	3.6	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	39-122	03/25/09	Acceptable
Fluoranthene-d10	75	36-132	03/25/09	Acceptable
Terphenyl-d14	74	31-140	03/25/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/24/2009
		Date Analyzed:	03/25/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-10	**Units:**	ng/L
Lab Code:	K0902314-004	**Basis:**	NA
File ID:	J:\MS11\DATA\032509A\0325F023.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902460
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092
Sample Amount:	1040 ml		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**3.1**	J	3.3	0.76	
91-57-6	**2-Methylnaphthalene**	**1.4**	J	3.3	0.65	
208-96-8	**Acenaphthylene**	**0.92**	J	3.3	0.24	
83-32-9	**Acenaphthene**	**100**		3.3	0.27	
132-64-9	Dibenzofuran	3.3	U	3.3	0.67	
86-73-7	**Fluorene**	**1.1**	J	3.3	0.21	
85-01-8	**Phenanthrene**	**2.1**	J	3.3	1.8	
120-12-7	**Anthracene**	**4.5**		3.3	0.20	
206-44-0	**Fluoranthene**	**4.4**		3.3	0.24	
129-00-0	**Pyrene**	**2.9**	J	3.3	0.27	
56-55-3	**Benz(a)anthracene**	**1.4**	J	3.3	0.25	
218-01-9	**Chrysene**	**1.0**	J	3.3	0.29	
205-99-2	**Benzo(b)fluoranthene**	**1.1**	J	3.3	0.24	
207-08-9	Benzo(k)fluoranthene	3.3	U	3.3	0.19	
50-32-8	**Benzo(a)pyrene**	**0.61**	J	3.3	0.27	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**0.31**	J	3.3	0.28	
53-70-3	Dibenz(a,h)anthracene	3.3	U	3.3	0.25	
191-24-2	**Benzo(g,h,i)perylene**	**0.47**	J	3.3	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	56	39-122	03/25/09	Acceptable
Fluoranthene-d10	74	36-132	03/25/09	Acceptable
Terphenyl-d14	75	31-140	03/25/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/24/2009
		Date Analyzed:	03/25/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-12	**Units:**	ng/L
Lab Code:	K0902314-005	**Basis:**	NA
File ID:	J:\MS11\DATA\032509A\0325F024.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902460
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 950 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**3.3**	J	3.6	0.80	
91-57-6	**2-Methylnaphthalene**	**1.4**	J	3.6	0.69	
208-96-8	**Acenaphthylene**	**0.84**	J	3.6	0.26	
83-32-9	**Acenaphthene**	**46**		3.6	0.29	
132-64-9	Dibenzofuran	3.6	U	3.6	0.71	
86-73-7	**Fluorene**	**0.80**	J	3.6	0.23	
85-01-8	**Phenanthrene**	**3.5**	J	3.6	1.9	
120-12-7	**Anthracene**	**15**		3.6	0.22	
206-44-0	**Fluoranthene**	**6.0**		3.6	0.26	
129-00-0	**Pyrene**	**5.2**		3.6	0.29	
56-55-3	**Benz(a)anthracene**	**1.7**	J	3.6	0.27	
218-01-9	**Chrysene**	**1.5**	J	3.6	0.31	
205-99-2	**Benzo(b)fluoranthene**	**1.4**	J	3.6	0.26	
207-08-9	**Benzo(k)fluoranthene**	**0.46**	J	3.6	0.20	
50-32-8	**Benzo(a)pyrene**	**0.83**	J	3.6	0.29	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**0.63**	J	3.6	0.30	
53-70-3	Dibenz(a,h)anthracene	3.6	U	3.6	0.27	
191-24-2	**Benzo(g,h,i)perylene**	**0.60**	J	3.6	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	39-122	03/25/09	Acceptable
Fluoranthene-d10	75	36-132	03/25/09	Acceptable
Terphenyl-d14	74	31-140	03/25/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Extracted:**	03/24/2009
Sample Matrix:	Water	**Date Analyzed:**	03/25/2009

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	ng/L
Analysis Method:	8270C SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902460

	Lab Control Sample KWG0902460-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0902460-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	367	500	73	361	500	72	49-108	1	30
2-Methylnaphthalene	377	500	75	353	500	71	40-113	6	30
Acenaphthylene	404	500	81	379	500	76	56-113	6	30
Acenaphthene	395	500	79	368	500	74	56-111	7	30
Dibenzofuran	404	500	81	382	500	76	59-114	6	30
Fluorene	395	500	79	374	500	75	61-114	5	30
Phenanthrene	382	500	76	386	500	77	58-116	1	30
Anthracene	380	500	76	378	500	76	48-115	0	30
Fluoranthene	398	500	80	390	500	78	61-130	2	30
Pyrene	460	500	92	431	500	86	56-118	7	30
Benz(a)anthracene	445	500	89	413	500	83	55-118	7	30
Chrysene	427	500	85	397	500	79	61-119	7	30
Benzo(b)fluoranthene	473	500	95	448	500	90	57-124	5	30
Benzo(k)fluoranthene	473	500	95	449	500	90	65-121	5	30
Benzo(a)pyrene	480	500	96	447	500	89	44-122	7	30
Indeno(1,2,3-cd)pyrene	451	500	90	418	500	84	44-132	8	30
Dibenz(a,h)anthracene	441	500	88	408	500	82	51-131	8	30
Benzo(g,h,i)perylene	455	500	91	427	500	85	55-122	6	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Pentachlorophenol

Extraction Method:	METHOD	**Units:**	PERCENT
Analysis Method:	8151M	**Level:**	Low

Sample Name	Lab Code	Sur1
TMW-10	K0902314-004	74
TMW-12	K0902314-005	77
Method Blank	KWG0902359-4	63
TMW-12MS	KWG0902359-1	83
TMW-12DMS	KWG0902359-2	74
Lab Control Sample	KWG0902359-3	71

Surrogate Recovery Control Limits (%)

Sur1 = 4-Bromo-2,6-dichlorophenol 22-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0902359-4	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F004.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	63	22-117	03/20/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	TMW-10	**Units:**	ug/L
Lab Code:	K0902314-004	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F006.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	74	22-117	03/20/09	Acceptable

Comments: ______________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Collected:**	03/17/2009
Sample Matrix:	Water	**Date Received:**	03/18/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	TMW-12	**Units:**	ug/L
Lab Code:	K0902314-005	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F007.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	77	22-117	03/20/09	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0902314
Project:	IP Longview		**Date Extracted:**	03/20/2009
Sample Matrix:	Water		**Date Analyzed:**	03/20/2009

Matrix Spike/Duplicate Matrix Spike Summary
Pentachlorophenol

Sample Name:	TMW-12		**Units:**	ug/L
Lab Code:	K0902314-005		**Basis:**	NA
Extraction Method:	METHOD		**Level:**	Low
Analysis Method:	8151M		**Extraction Lot:**	KWG0902359

		TMW-12MS KWG0902359-1 **Matrix Spike**			TMW-12DMS KWG0902359-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Pentachlorophenol	ND	7.09	10.0	71	6.91	10.0	69	32-123	3	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902314
Project:	IP Longview	**Date Extracted:**	03/20/2009
Sample Matrix:	Water	**Date Analyzed:**	03/20/2009

Lab Control Spike Summary
Pentachlorophenol

Extraction Method:	METHOD	**Units:**	ug/L
Analysis Method:	8151M	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902359

	Lab Control Sample KWG0902359-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Pentachlorophenol	7.42	10.0	74	42-119

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

March 27, 2009 Analytical Report for Service Request No: K0902357

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview/33761076.00020

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on March 19, 2009. For your reference, these analyses have been assigned our service request number K0902357.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynde ln for
Ed Wallace
Project Chemist

EW/ln

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	**Number**
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0902357
Project:	IP Longview	**Date Received:**	3/19/2009
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Twelve water samples were received for analysis at Columbia Analytical Services on 3/19/2009. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

Diesel and Residual Range Hydrocarbons by NWTPH-Dx

No anomalies associated with the analysis of these samples were observed.

Pentachlorophenol by EPA Method 8151M

No anomalies associated with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL8092: Chrysene, Benzo(k)fluoranthene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.2%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Method Blank Exceptions:
The Method Blank KWG0902345-3 associated with the initial analysis of these samples contained low levels of Naphthalene (35 ng/L) and 2-Methylnaphthalene (5.7 ng/L), which were above the Method Reporting Limit (MRL). The samples that contained less than 20x the level in the blank were re-extracted and re-analyzed. Note that samples 04-6A and 97-6C contained levels of Naphthalene and 2-Methylnaphthalene significantly above the levels in the method blank, so no further corrective action was necessary for them.

Approved by________________ **Date** 3/27/09

The Method Blank KWG0902481-3 associated with the re-extraction also contained low level Naphthalene, but at a level relatively common for the ultra-trace procedure used. Note that Naphthalene is a laboratory artifact typically present in the low part per trillion range when analyzing aqueous samples. Since the concentration of Naphthalene in both the method blank and the associated samples was significantly below the MTCA Method B Cleanup Level of 160 ug/L specified for the project, the impact on the results was insignificant. In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Samples TMW-02-F and 97-5A-F were filtered in the field. The results reported were reported as dissolved concentrations.

Approved by______________________ **Date** 3/27/09

Columbia Analytical Services INC

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K0902357

PAGE 1 OF 1 COC #

PROJECT NAME IP LONGVIEW
PROJECT NUMBER 33761076.00020
PROJECT MANAGER PAUL KALINA
COMPANY/ADDRESS 1501 4TH AVE SUITE 1900
CITY/STATE/ZIP SEATTLE WA 98101
E-MAIL ADDRESS PAUL-KALINA@URSCORP.COM
PHONE # 206 438 2700
FAX #
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ BTEX☐ Diesel☒ Oil☐ 8015	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☑	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, [✓ SO4], PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, [✓ Total-P], TKN, [✓ TOC], DOC (circle) [✓ NO2+NO3]	TOX 9020☐ AOX 1650☐ 506☐	HDG + HPC	8270C SIM ULL PAH		REMARKS
TMW-03	3/18/09	1415		GW	4									X								X	A		
JMW-02		1230			6									X								X	A		FIELD FILTERED INCLD.
JMW-04		1100			4									X								X	A		
JMW-01		1500			2																	X	A		
JMW-05		1005			2																	X	A		
TMW-06		0910			2																	X	A		
97-5A		1815			4																	X	B		FIELD FILTERED INCLUDED
04-6A		1555			2																	X	C		
97-6C		1615			2																	X	C		
AV-09	↓	1715		↓	10				X					X				X	X		X	X	A		

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. # ____

Bill To: ____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.

___ 5 Day

X Standard (10-15 working days)

___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

PAH's BY 8270C SIM ULL - MTCA B limits must be < reporting limits. Also make sure correct PAH analyte list is reported (as indicated by letters above)

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 3/18/09	Signature Debi Wood	Date/Time 3-18-09	Signature	Date/Time	Signature	Date/Time 3/19/09 0800
Printed Name IAN VERM	Firm URS	Printed Name Debi Wood	Firm CAS-Kelso	Printed Name	Firm	Printed Name	Firm CAS

RCOC #1 06/08

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed

Client / Project: URS
Service Request K09 02357

Received: 3/18/09 Opened: 3/19/09 By: BT

SHORT HOLD TIME

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other ______ NA
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: ______ NA Y N
5. **Temperature of cooler(s) upon receipt (°C):** 5.4 4.3
   Temperature Blank (°C): 4.7 2.7
   Thermometer ID: 237 246
6. If applicable, list Chain of Custody Numbers: ______
7. Packing material used. *Inserts Baggies Bubble Wrap Gel Packs* [✓ *Wet Ice*] *Sleeves Other* ______
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* NA [✓ Y] N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA [✓ Y] N
16. Was C12/Res negative? NA [✓ Y] N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions: ______

Page 1 of: 1 2

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	03/18/09
Project Number :	33761076.00020	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Sulfate

Prep Method :	NONE	Units :	mg/L
Analysis Method	300.0	Basis :	NA
Test Notes :			

Sample Name	**Lab Code**	**MRL**	**Dilution Factor**	**Date Prepared**	**Date Analyzed**	**Result**	**Result Notes**
AV-09	K0902357-012	10	50	NA	03/23/09	222	
Method Blank	K0902357-MB	0.2	1	NA	03/23/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	33761076.00020	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/23/09

Duplicate Summary
Inorganic Parameters

Sample Name : Batch QC
Lab Code : K0902466-004DUP
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Sulfate	300.0	0.2	15.7	15.6	15.7	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	33761076.00020	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/23/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902466-004MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Sulfate	300.0	1.0	10.0	15.7	24.5	88	80-120	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	33761076.00020	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/23/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902357-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Sulfate	NONE	300.0	5.0	4.6	92	90-110	

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Sulfate
300.0
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/23/2009	5.0	4.8	96
CCV2 Result	3/23/2009	5.0	4.7	94
CCV3 Result	3/23/2009	5.0	4.7	94
CCV4 Result	3/23/2009	5.0	4.8	96
CCV5 Result	3/23/2009	5.0	4.7	94
CCV6 Result	3/23/2009	5.0	4.7	94
CCV7 Result	3/23/2009	5.0	4.7	94
CCV8 Result	3/24/2009	5.0	4.7	94
CCV9 Result	3/24/2009	5.0	4.8	96

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Sulfate
300.0
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/23/2009	0.2	ND
CCB2 Result	3/23/2009	0.2	ND
CCB3 Result	3/23/2009	0.2	ND
CCB5 Result	3/23/2009	0.2	ND
CCB6 Result	3/23/2009	0.2	ND
CCB7 Result	3/23/2009	0.2	ND
CCB8 Result	3/23/2009	0.2	ND
CCB4 Result	3/24/2009	0.2	ND
CCB9 Result	3/24/2009	0.2	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	03/18/09
Project Number :	33761076.00020	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Nitrate+Nitrite as Nitrogen

Prep Method :	NONE	Units :	mg/L
Analysis Method	353.2	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-09	K0902357-012	0.05	1	NA	03/20/09	ND	
Method Blank	K0902357-MB	0.05	1	NA	03/20/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: HJACKY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	33761076.00020	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/20/09

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902371-001DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	0.05	0.06	0.06	17	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	33761076.00020	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/20/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902371-001MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	2.00	0.05	2.11	103	90-110	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	33761076.00020	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/20/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902357-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	NONE	353.2	1.70	1.73	102	90-110	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Nitrate+Nitrite as Nitrogen
353.2
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/20/2009	2.00	2.00	100
CCV2 Result	3/20/2009	2.00	2.00	100
CCV3 Result	3/20/2009	2.00	2.01	101
CCV4 Result	3/20/2009	2.00	2.01	101

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Nitrate+Nitrite as Nitrogen
353.2
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/20/2009	0.05	ND
CCB2 Result	3/20/2009	0.05	ND
CCB3 Result	3/20/2009	0.05	ND
CCB4 Result	3/20/2009	0.05	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	03/18/09
Project Number :	33761076.00020	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Phosphorus, Total

Prep Method :	Method	Units :	mg/L
Analysis Method	365.3	Basis :	NA
Test Notes :			

Sample Name	**Lab Code**	**MRL**	**Dilution Factor**	**Date Prepared**	**Date Analyzed**	**Result**	**Result Notes**
AV-09	K0902357-012	0.01	1	3/20/2009	03/25/09	0.03	
Method Blank	K0902357-MB	0.01	1	3/20/2009	03/25/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Client : URS Corporation
Project Name : IP Longview
Project Number : 33761076.00020
Sample Matrix : WATER

Service Request : K0902357
Date Collected : 3/18/2009
Date Received : 3/19/2009
Date Prepared : 03/20/09
Date Analyzed : 03/25/09

Duplicate Summary
Inorganic Parameters

Sample Name : AV-09
Lab Code : K0902357-012DUP
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Phosphorus, Total	Method	365.3	0.01	0.03	0.03	0.03	<1	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : 33761076.00020
Sample Matrix : WATER

Service Request : K0902357
Date Collected : 3/18/2009
Date Received : 3/19/2009
Date Prepared : 03/20/09
Date Analyzed : 03/25/09

Matrix Spike Summary
Inorganic Parameters

Sample Name : AV-09
Lab Code : K0902357-012MS
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Phosphorus, Total	Method	365.3	0.01	0.50	0.03	0.51	96	75-115	

Report By: MKANALY

QA/QC Report

Client :	URS Corporation		**Service Request :**	K0902357
Project Name :	IP Longview		**Date Collected :**	NA
Project Number :	33761076.00020		**Date Received :**	NA
Sample Matrix :	WATER		**Date Prepared :**	03/20/09
			Date Analyzed :	03/25/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample		Units :	mg/L
Lab Code :	K0902357-LCS		Basis :	NA
Test Notes :				

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Phosphorus, Total	Method	365.3	4.68	4.63	99	85-115	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Phosphorus, Total
365.3
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/25/2009	0.50	0.49	98
CCV2 Result	3/25/2009	0.50	0.50	100
CCV3 Result	3/25/2009	0.50	0.50	100
CCV4 Result	3/25/2009	0.50	0.50	100

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Phosphorus, Total
365.3
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/25/2009	0.01	ND
CCB2 Result	3/25/2009	0.01	0.005 J
CCB3 Result	3/25/2009	0.01	0.006 J
CCB4 Result	3/25/2009	0.01	0.005 J

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	03/18/09
Project Number :	33761076.00020	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Carbon, Total Organic

Prep Method :	NONE	Units :	mg/L
Analysis Method	415.1	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-09	K0902357-012	0.5	1	NA	03/25/09	1.5	
Method Blank	K0902357-MB	0.5	1	NA	03/25/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: HJACKY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	3/18/2009
Project Number :	33761076.00020	**Date Received :**	3/19/2009
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/25/09

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-09	Units :	mg/L
Lab Code :	K0902357-012DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Carbon, Total Organic	415.1	0.5	1.5	1.4	1.5	7	

Report By: MKANALY

Client :	URS Corporation		**Service Request :**	K0902357
Project Name :	IP Longview		**Date Collected :**	3/18/2009
Project Number :	33761076.00020		**Date Received :**	3/19/2009
Sample Matrix :	WATER		**Date Prepared :**	NA
			Date Analyzed :	03/25/09

Matrix Spike Summary
Inorganic Parameters

Sample Name : AV-09
Lab Code : K0902357-012MS
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	415.1	0.5	25.0	1.5	26.0	98	49-156	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	33761076.00020	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/25/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902357-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	NONE	415.1	24.0	22.4	93	69-136	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Carbon, Total Organic
415.1
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/25/2009	25.0	23.8	95
CCV2 Result	3/25/2009	25.0	24.8	99
CCV3 Result	3/25/2009	25.0	24.3	97
CCV4 Result	3/25/2009	25.0	24.0	96
CCV5 Result	3/25/2009	25.0	24.0	96
CCV6 Result	3/25/2009	25.0	24.2	97
CCV7 Result	3/25/2009	25.0	24.9	100
CCV8 Result	3/25/2009	25.0	24.8	99

Client : URS Corporation
Project : IP Longview

Service Request : K0902357
Date Collected : NA
Date Received : NA

Carbon, Total Organic
415.1
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/25/2009	0.5	ND
CCB2 Result	3/25/2009	0.5	ND
CCB3 Result	3/25/2009	0.5	ND
CCB4 Result	3/25/2009	0.5	ND
CCB5 Result	3/25/2009	0.5	ND
CCB6 Result	3/25/2009	0.5	ND
CCB7 Result	3/25/2009	0.5	ND
CCB8 Result	3/25/2009	0.5	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902357
Project Name :	IP Longview	**Date Collected :**	03/18/09
Project Number :	33761076.00020	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Heterotrophic Plate Count

Prep Method :	NONE	Units :	CFU/mL
Analysis Method	SM 9215 B	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-09	K0902357-012	0.5	1	NA	03/19/09	255	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: HJACKY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview/33761076.00020
Sample Matrix: Water

Service Request: K0902357

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
AV-09	K0902357-012	82	55
Batch QCDUP	KWG0902394-3	82	69
Method Blank	KWG0902394-5	91	51
Batch QC	K0902371-001	94	64
Lab Control Sample	KWG0902394-4	99	52

Surrogate Recovery Control Limits (%)

Sur1 =	o-Terphenyl	50-150
Sur2 =	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0902394-5	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**18**	J	250	11	1	03/23/09	03/24/09	KWG0902394	
Residual Range Organics (RRO)	**80**	J	500	19	1	03/23/09	03/24/09	KWG0902394	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	91	50-150	03/24/09	Acceptable
n-Triacontane	51	50-150	03/24/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Diesel and Residual Range Organics

Sample Name:	AV-09	**Units:**	ug/L
Lab Code:	K0902357-012	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**58**	J	270	12	1	03/23/09	03/24/09	KWG0902394	
Residual Range Organics (RRO)	**130**	J	530	21	1	03/23/09	03/24/09	KWG0902394	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	82	50-150	03/24/09	Acceptable
n-Triacontane	55	50-150	03/24/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Extracted:**	03/23/2009
Sample Matrix:	Water	**Date Analyzed:**	03/24/2009

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0902371-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0902394

				Batch QCDUP KWG0902394-3 **Duplicate Sample**			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	300	13	330	270	300	18 #	30
Residual Range Organics (RRO)	590	23	320	360	340	12 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0902357
Project:	IP Longview/33761076.00020		**Date Extracted:**	03/23/2009
Sample Matrix:	Water		**Date Analyzed:**	03/24/2009

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C		**Units:**	ug/L
Analysis Method:	NWTPH-Dx		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0902394

	Lab Control Sample KWG0902394-4 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	1600	1600	100	55-132
Residual Range Organics (RRO)	872	800	109	54-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020		
Sample Matrix:	Water		

Surrogate Recovery Summary
Pentachlorophenol

Extraction Method:	METHOD	**Units:**	PERCENT
Analysis Method:	8151M	**Level:**	Low

Sample Name	Lab Code	Sur1
TMW-03	K0902357-001	70
TMW-02	K0902357-002	75
TMW-04	K0902357-004	75
AV-09	K0902357-012	80
Method Blank	KWG0902359-4	63
Batch QC	K0902314-005	77
Batch QCMS	KWG0902359-1	83
Batch QCDMS	KWG0902359-2	74
Lab Control Sample	KWG0902359-3	71

Surrogate Recovery Control Limits (%)

Sur1 = 4-Bromo-2,6-dichlorophenol 22-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0902359-4	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F004.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
		Column2:	Rtx-35
Sample Amount:	5 ml		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	63	22-117	03/20/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	TMW-03	**Units:**	ug/L
Lab Code:	K0902357-001	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F010.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	70	22-117	03/20/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	TMW-02	**Units:**	ug/L
Lab Code:	K0902357-002	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F011.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	75	22-117	03/20/09	Acceptable

Comments: ____________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	TMW-04	**Units:**	ug/L
Lab Code:	K0902357-004	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F012.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	75	22-117	03/20/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	AV-09	**Units:**	ug/L
Lab Code:	K0902357-012	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F013.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	80	22-117	03/20/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Extracted:**	03/20/2009
Sample Matrix:	Water	**Date Analyzed:**	03/20/2009

Matrix Spike/Duplicate Matrix Spike Summary
Pentachlorophenol

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0902314-005	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151M	**Extraction Lot:**	KWG0902359

		Batch QCMS KWG0902359-1 **Matrix Spike**			Batch QCDMS KWG0902359-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Pentachlorophenol	ND	7.09	10.0	71	6.91	10.0	69	32-123	3	30

Results flagged with an asterisk (*) indicate values outside control criteria.

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Extracted:**	03/20/2009
Sample Matrix:	Water	**Date Analyzed:**	03/20/2009

Lab Control Spike Summary
Pentachlorophenol

Extraction Method:	METHOD	**Units:**	ug/L
Analysis Method:	8151M	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902359

	Lab Control Sample KWG0902359-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Pentachlorophenol	7.42	10.0	74	42-119

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview/33761076.00020
Sample Matrix: Water

Service Request: K0902357

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TMW-03	K0902357-001	68	80	82
TMW-02	K0902357-002	51	66	72
TMW-02-F	K0902357-003	72	73	78
TMW-04	K0902357-004	56	69	71
TMW-01	K0902357-005	52	63	62
TMW-05	K0902357-006	57	71	72
TMW-06	K0902357-007	58	68	70
97-5A	K0902357-008	60	70	72
97-5A-F	K0902357-009	56	65	68
04-6A	K0902357-010	78	83	68
97-6C	K0902357-011	72	76	64
AV-09	K0902357-012	53	70	70
Method Blank	KWG0902345-3	62	69	70
Method Blank	KWG0902481-3	54	57	62
Lab Control Sample	KWG0902345-1	63	69	69
Duplicate Lab Control Sample	KWG0902345-2	62	68	69
Lab Control Sample	KWG0902481-1	64	70	73
Duplicate Lab Control Sample	KWG0902481-2	58	64	69

Surrogate Recovery Control Limits (%)

Sur1	= Fluorene-d10	39-122
Sur2	= Fluoranthene-d10	36-132
Sur3	= Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG0902345-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**35**		3.3	0.76	1	03/20/09	03/23/09	KWG0902345	
2-Methylnaphthalene	**5.7**		3.3	0.65	1	03/20/09	03/23/09	KWG0902345	
Dibenzofuran	**0.69**	J	3.3	0.67	1	03/20/09	03/23/09	KWG0902345	
Benz(a)anthracene	**0.54**	J	3.3	0.25	1	03/20/09	03/23/09	KWG0902345	
Chrysene	ND	U	3.3	0.29	1	03/20/09	03/23/09	KWG0902345	
Benzo(b)fluoranthene	ND	U	3.3	0.24	1	03/20/09	03/23/09	KWG0902345	
Benzo(k)fluoranthene	ND	U	3.3	0.19	1	03/20/09	03/23/09	KWG0902345	
Benzo(a)pyrene	ND	U	3.3	0.27	1	03/20/09	03/23/09	KWG0902345	
Indeno(1,2,3-cd)pyrene	ND	U	3.3	0.28	1	03/20/09	03/23/09	KWG0902345	
Dibenz(a,h)anthracene	**0.30**	J	3.3	0.25	1	03/20/09	03/23/09	KWG0902345	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	39-122	03/23/09	Acceptable
Fluoranthene-d10	69	36-132	03/23/09	Acceptable
Terphenyl-d14	70	31-140	03/23/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG0902481-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5.0**		3.3	0.76	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**1.0**	J	3.3	0.65	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	ND	U	3.3	0.24	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**0.30**	J	3.3	0.27	1	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	ND	U	3.3	0.67	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**0.23**	J	3.3	0.21	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	**1.8**	J	3.3	1.8	1	03/25/09	03/26/09	KWG0902481	
Anthracene	ND	U	3.3	0.20	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**0.85**	J	3.3	0.24	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**1.1**	J	3.3	0.27	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**0.63**	J	3.3	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**0.33**	J	3.3	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	ND	U	3.3	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	ND	U	3.3	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	ND	U	3.3	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	ND	U	3.3	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	ND	U	3.3	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	ND	U	3.3	0.15	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	54	39-122	03/26/09	Acceptable
Fluoranthene-d10	57	36-132	03/26/09	Acceptable
Terphenyl-d14	62	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-03	**Units:**	ng/L
Lab Code:	K0902357-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**8.6**	B	3.4	0.76	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**2.7**	J	3.4	0.65	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	**17**		3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**3700**	D	17	1.4	5	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	ND	U	3.4	0.67	1	03/25/09	03/26/09	KWG0902481	
Fluorene	ND	U	3.4	0.21	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	**4.9**		3.4	1.8	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**12**		3.4	0.20	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**1.6**	J	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**1.1**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	ND	U	3.4	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	ND	U	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	ND	U	3.4	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	ND	U	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	ND	U	3.4	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	ND	U	3.4	0.15	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	39-122	03/26/09	Acceptable
Fluoranthene-d10	80	36-132	03/26/09	Acceptable
Terphenyl-d14	82	31-140	03/26/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-02	**Units:**	ng/L
Lab Code:	K0902357-002	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**10**	B	3.5	0.77	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**4.4**		3.5	0.66	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	**20**		3.5	0.25	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**7900**	D	35	2.8	10	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	**1.9**	J	3.5	0.68	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**110**		3.5	0.22	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	**7.1**		3.5	1.9	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**17**		3.5	0.21	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**8.0**		3.5	0.25	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**8.9**		3.5	0.28	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**5.1**		3.5	0.26	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**6.7**		3.5	0.30	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	**10**		3.5	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	**3.0**	J	3.5	0.20	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	**4.4**		3.5	0.28	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	**4.8**		3.5	0.29	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	**1.1**	J	3.5	0.26	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	**5.2**		3.5	0.16	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	51	39-122	03/26/09	Acceptable
Fluoranthene-d10	66	36-132	03/26/09	Acceptable
Terphenyl-d14	72	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-02-F	**Units:**	ng/L
Lab Code:	K0902357-003	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**11**	B	3.4	0.76	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**2.3**	J	3.4	0.65	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	**9.9**		3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**6400**	D	34	2.7	10	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	**1.2**	J	3.4	0.67	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**72**		3.4	0.21	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	**2.7**	J	3.4	1.8	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**13**		3.4	0.20	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	ND	U	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**1.3**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	ND	U	3.4	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	ND	U	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	ND	U	3.4	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	ND	U	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	**0.30**	J	3.4	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	**0.33**	J	3.4	0.15	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	39-122	03/26/09	Acceptable
Fluoranthene-d10	73	36-132	03/26/09	Acceptable
Terphenyl-d14	78	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-04	**Units:**	ng/L
Lab Code:	K0902357-004	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**17**	B	3.4	0.76	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**3.7**		3.4	0.65	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	**17**		3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**4700**	D	34	2.7	10	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	**2.2**	J	3.4	0.67	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**930**		3.4	0.21	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	**5.9**		3.4	1.8	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**13**		3.4	0.20	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**4.5**		3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**3.1**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**2.8**	J	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**2.7**	J	3.4	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	**3.3**	J	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	**1.1**	J	3.4	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	**2.2**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	**1.4**	J	3.4	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	**0.48**	J	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	**1.5**	J	3.4	0.15	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	56	39-122	03/26/09	Acceptable
Fluoranthene-d10	69	36-132	03/26/09	Acceptable
Terphenyl-d14	71	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-01	**Units:**	ng/L
Lab Code:	K0902357-005	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**13**	B	3.4	0.76	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**3.6**		3.4	0.65	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	**15**		3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**5400**	D	34	2.7	10	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	**3.8**		3.4	0.67	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**1600**		3.4	0.21	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	**10**		3.4	1.8	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**110**		3.4	0.20	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**29**		3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Pyrene	7.7		3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**1.6**	J	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**1.1**	J	3.4	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	**1.8**	J	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	**0.62**	J	3.4	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	**1.0**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	**0.93**	J	3.4	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	**0.94**	J	3.4	0.15	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	52	39-122	03/26/09	Acceptable
Fluoranthene-d10	63	36-132	03/26/09	Acceptable
Terphenyl-d14	62	31-140	03/26/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-05	**Units:**	ng/L
Lab Code:	K0902357-006	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5.0**	B	3.4	0.76	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**1.9**	J	3.4	0.65	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	ND	U	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**2.2**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	**0.72**	J	3.4	0.67	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**0.75**	J	3.4	0.21	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	ND	U	3.4	1.8	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**4.0**		3.4	0.20	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**0.82**	J	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**1.4**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**0.85**	J	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**0.62**	J	3.4	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	**0.64**	J	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	**0.30**	J	3.4	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	ND	U	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	ND	U	3.4	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	**0.40**	J	3.4	0.15	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	57	39-122	03/26/09	Acceptable
Fluoranthene-d10	71	36-132	03/26/09	Acceptable
Terphenyl-d14	72	31-140	03/26/09	Acceptable

Comments: ____________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-06	**Units:**	ng/L
Lab Code:	K0902357-007	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4.2**	B	3.4	0.76	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**2.0**	J	3.4	0.65	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	ND	U	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**1.7**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	ND	U	3.4	0.67	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**0.80**	J	3.4	0.21	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	ND	U	3.4	1.8	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**4.6**		3.4	0.20	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**0.69**	J	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**0.82**	J	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	ND	U	3.4	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	ND	U	3.4	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	ND	U	3.4	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	ND	U	3.4	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	ND	U	3.4	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	ND	U	3.4	0.25	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	ND	U	3.4	0.15	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	58	39-122	03/26/09	Acceptable
Fluoranthene-d10	68	36-132	03/26/09	Acceptable
Terphenyl-d14	70	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	97-5A	**Units:**	ng/L
Lab Code:	K0902357-008	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**6.6**	B	3.3	0.76	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**4.4**		3.3	0.25	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**4.6**		3.3	0.29	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	**6.8**		3.3	0.24	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	**2.3**	J	3.3	0.19	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	**4.6**		3.3	0.27	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	**4.1**		3.3	0.28	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	**0.75**	J	3.3	0.25	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	39-122	03/26/09	Acceptable
Fluoranthene-d10	70	36-132	03/26/09	Acceptable
Terphenyl-d14	72	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview/33761076.00020
Sample Matrix: Water

Service Request: K0902357
Date Collected: 03/18/2009
Date Received: 03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name: 97-5A-F
Lab Code: K0902357-009

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**10**	B	3.8	0.84	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**0.86**	J	3.8	0.28	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**0.37**	J	3.8	0.32	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	**0.65**	J	3.8	0.27	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	**0.32**	J	3.8	0.21	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	ND	U	3.8	0.30	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	**0.34**	J	3.8	0.31	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	ND	U	3.8	0.28	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	56	39-122	03/26/09	Acceptable
Fluoranthene-d10	65	36-132	03/26/09	Acceptable
Terphenyl-d14	68	31-140	03/26/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	04-6A	**Units:**	ng/L
Lab Code:	K0902357-010	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**50000**	D	350	77	100	03/20/09	03/24/09	KWG0902345	
2-Methylnaphthalene	**1400**		3.5	0.66	1	03/20/09	03/23/09	KWG0902345	
Dibenzofuran	**49000**	D	350	68	100	03/20/09	03/24/09	KWG0902345	
Benz(a)anthracene	**180**		3.5	0.26	1	03/20/09	03/23/09	KWG0902345	
Chrysene	**130**		3.5	0.30	1	03/20/09	03/23/09	KWG0902345	
Benzo(b)fluoranthene	**41**		3.5	0.25	1	03/20/09	03/23/09	KWG0902345	
Benzo(k)fluoranthene	**14**		3.5	0.20	1	03/20/09	03/23/09	KWG0902345	
Benzo(a)pyrene	**24**		3.5	0.28	1	03/20/09	03/23/09	KWG0902345	
Indeno(1,2,3-cd)pyrene	**6.7**		3.5	0.29	1	03/20/09	03/23/09	KWG0902345	
Dibenz(a,h)anthracene	**1.9**	J	3.5	0.26	1	03/20/09	03/23/09	KWG0902345	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	78	39-122	03/23/09	Acceptable
Fluoranthene-d10	83	36-132	03/23/09	Acceptable
Terphenyl-d14	68	31-140	03/23/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	97-6C	**Units:**	ng/L
Lab Code:	K0902357-011	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**44000**	D	340	76	100	03/20/09	03/25/09	KWG0902345	
2-Methylnaphthalene	**1300**		3.4	0.65	1	03/20/09	03/23/09	KWG0902345	
Dibenzofuran	**45000**	D	340	67	100	03/20/09	03/25/09	KWG0902345	
Benz(a)anthracene	**180**		3.4	0.25	1	03/20/09	03/23/09	KWG0902345	
Chrysene	**140**		3.4	0.29	1	03/20/09	03/23/09	KWG0902345	
Benzo(b)fluoranthene	**47**		3.4	0.24	1	03/20/09	03/23/09	KWG0902345	
Benzo(k)fluoranthene	**16**		3.4	0.19	1	03/20/09	03/23/09	KWG0902345	
Benzo(a)pyrene	**29**		3.4	0.27	1	03/20/09	03/23/09	KWG0902345	
Indeno(1,2,3-cd)pyrene	**12**		3.4	0.28	1	03/20/09	03/23/09	KWG0902345	
Dibenz(a,h)anthracene	**2.5**	J	3.4	0.25	1	03/20/09	03/23/09	KWG0902345	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	39-122	03/23/09	Acceptable
Fluoranthene-d10	76	36-132	03/23/09	Acceptable
Terphenyl-d14	64	31-140	03/23/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Collected:**	03/18/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-09	**Units:**	ng/L
Lab Code:	K0902357-012	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**16**	B	3.7	0.82	1	03/25/09	03/26/09	KWG0902481	
2-Methylnaphthalene	**2.5**	J	3.7	0.70	1	03/25/09	03/26/09	KWG0902481	
Acenaphthylene	**1.1**	J	3.7	0.26	1	03/25/09	03/26/09	KWG0902481	
Acenaphthene	**2.3**	J	3.7	0.30	1	03/25/09	03/26/09	KWG0902481	
Dibenzofuran	**1.7**	J	3.7	0.73	1	03/25/09	03/26/09	KWG0902481	
Fluorene	**1.8**	J	3.7	0.23	1	03/25/09	03/26/09	KWG0902481	
Phenanthrene	**12**		3.7	2.0	1	03/25/09	03/26/09	KWG0902481	
Anthracene	**7.2**		3.7	0.22	1	03/25/09	03/26/09	KWG0902481	
Fluoranthene	**21**		3.7	0.26	1	03/25/09	03/26/09	KWG0902481	
Pyrene	**19**		3.7	0.30	1	03/25/09	03/26/09	KWG0902481	
Benz(a)anthracene	**17**		3.7	0.27	1	03/25/09	03/26/09	KWG0902481	
Chrysene	**18**		3.7	0.32	1	03/25/09	03/26/09	KWG0902481	
Benzo(b)fluoranthene	**32**		3.7	0.26	1	03/25/09	03/26/09	KWG0902481	
Benzo(k)fluoranthene	**10**		3.7	0.21	1	03/25/09	03/26/09	KWG0902481	
Benzo(a)pyrene	**23**		3.7	0.30	1	03/25/09	03/26/09	KWG0902481	
Indeno(1,2,3-cd)pyrene	**21**		3.7	0.31	1	03/25/09	03/26/09	KWG0902481	
Dibenz(a,h)anthracene	**3.7**	J	3.7	0.27	1	03/25/09	03/26/09	KWG0902481	
Benzo(g,h,i)perylene	**20**		3.7	0.17	1	03/25/09	03/26/09	KWG0902481	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	39-122	03/26/09	Acceptable
Fluoranthene-d10	70	36-132	03/26/09	Acceptable
Terphenyl-d14	70	31-140	03/26/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Analyzed:**	03/23/2009
		Time Analyzed:	10:41

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\032309\0323F002.D	**Lab Code:**	KWG0902442-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902442
Analysis Method:	8270C SIM		

		Naphthalene-d8		Acenaphthene-d10		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Results ==>	226,622	4.74	119,101	6.15	198,810	7.37
	Upper Limit ==>	453,244	5.24	238,202	6.65	397,620	7.87
	Lower Limit ==>	113,311	4.24	59,551	5.65	99,405	6.87
	ICAL Result ==>	239,255	4.81	140,641	6.21	226,448	7.44
Associated Analyses							
Lab Control Sample	KWG0902345-1	224,697	4.74	122,882	6.15	200,497	7.37
Duplicate Lab Control Sample	KWG0902345-2	209,011	4.74	119,140	6.15	194,915	7.37
Method Blank	KWG0902345-3	213,727	4.74	120,895	6.15	201,377	7.37
04-6A	K0902357-010	267,591	4.76	149,371	6.18	258,942	7.39
97-6C	K0902357-011	257,775	4.76	142,510	6.18	252,123	7.39

Results flagged with an asterisk (*) indicate values outside control criteria.

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Analyzed:**	03/23/2009
		Time Analyzed:	10:41

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\032309\0323F002.D	**Lab Code:**	KWG0902442-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902442
Analysis Method:	8270C SIM		

		Chrysene-d12		Perylene-d12	
		Area	**RT**	**Area**	**RT**
	Results ==>	218,334	9.96	237,973	13.23
	Upper Limit ==>	436,668	10.46	475,946	13.73
	Lower Limit ==>	109,167	9.46	118,987	12.73
	ICAL Result ==>	275,883	10.08	311,249	13.44
Associated Analyses					
Lab Control Sample	KWG0902345-1	224,371	9.96	248,415	13.24
Duplicate Lab Control Sample	KWG0902345-2	212,787	9.96	231,881	13.24
Method Blank	KWG0902345-3	224,146	9.96	238,512	13.23
04-6A	K0902357-010	229,725	10.00	223,463	13.33
97-6C	K0902357-011	216,201	10.00	215,801	13.33

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Analyzed:**	03/24/2009
		Time Analyzed:	07:19

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\032409A\0324F002.D	**Lab Code:**	KWG0902483-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902483
Analysis Method:	8270C SIM		

		Naphthalene-d8		Acenaphthene-d10		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Results ==>	234,184	4.73	128,692	6.14	215,267	7.37
	Upper Limit ==>	468,368	5.23	257,384	6.64	430,534	7.87
	Lower Limit ==>	117,092	4.23	64,346	5.64	107,634	6.87
	ICAL Result ==>	239,255	4.81	140,641	6.21	226,448	7.44
Associated Analyses							
04-6ADL	K0902357-010	167,917	4.73	88,782	6.14	147,740	7.37

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: URS Corporation
Project: IP Longview/33761076.00020

Service Request: K0902357
Date Analyzed: 03/24/2009
Time Analyzed: 07:19

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID: J:\MS11\DATA\032409A\0324F002.D
Instrument ID: MS11
Analysis Method: 8270C SIM

Lab Code: KWG0902483-2
Analysis Lot: KWG0902483

		Chrysene-d12		Perylene-d12	
		Area	**RT**	**Area**	**RT**
	Results ==>	241,886	9.96	257,669	13.26
	Upper Limit ==>	483,772	10.46	515,338	13.76
	Lower Limit ==>	120,943	9.46	128,835	12.76
	ICAL Result ==>	275,883	10.08	311,249	13.44
Associated Analyses					
04-6ADL	K0902357-010	152,449	9.96	138,901	13.25

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: URS Corporation
Project: IP Longview/33761076.00020

Service Request: K0902357
Date Analyzed: 03/25/2009
Time Analyzed: 08:00

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID: J:\MS11\DATA\032509A\0325F002.D
Instrument ID: MS11
Analysis Method: 8270C SIM

Lab Code: KWG0902530-2
Analysis Lot: KWG0902530

		Naphthalene-d8		Acenaphthene-d10		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Results ==>	250,873	4.73	134,817	6.14	218,249	7.37
	Upper Limit ==>	501,746	5.23	269,634	6.64	436,498	7.87
	Lower Limit ==>	125,437	4.23	67,409	5.64	109,125	6.87
	ICAL Result ==>	239,255	4.81	140,641	6.21	226,448	7.44
Associated Analyses							
97-6CDL	K0902357-011	223,878	4.73	112,182	6.14	182,414	7.36

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview/33761076.00020

Service Request: K0902357
Date Analyzed: 03/25/2009
Time Analyzed: 08:00

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID: J:\MS11\DATA\032509A\0325F002.D
Instrument ID: MS11
Analysis Method: 8270C SIM

Lab Code: KWG0902530-2
Analysis Lot: KWG0902530

		Chrysene-d12		Perylene-d12	
		Area	**RT**	**Area**	**RT**
	Results ==>	251,315	9.96	273,888	13.25
	Upper Limit ==>	502,630	10.46	547,776	13.75
	Lower Limit ==>	125,658	9.46	136,944	12.75
	ICAL Result ==>	275,883	10.08	311,249	13.44
Associated Analyses					
97-6CDL	K0902357-011	190,205	9.94	186,299	13.20

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Analyzed:**	03/26/2009
		Time Analyzed:	09:29

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\032609\0326F002.D	**Lab Code:**	KWG0902543-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902543
Analysis Method:	8270C SIM		

		Naphthalene-d8		Acenaphthene-d10		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Results ==>	227,981	4.72	125,039	6.14	205,496	7.36
	Upper Limit ==>	455,962	5.22	250,078	6.64	410,992	7.86
	Lower Limit ==>	113,991	4.22	62,520	5.64	102,748	6.86
	ICAL Result ==>	239,255	4.81	140,641	6.21	226,448	7.44
Associated Analyses							
Method Blank	KWG0902481-3	216,359	4.72	120,250	6.14	201,992	7.36
Lab Control Sample	KWG0902481-1	212,161	4.72	114,200	6.14	190,250	7.36
Duplicate Lab Control Sample	KWG0902481-2	221,428	4.72	116,860	6.14	196,023	7.36
TMW-03RX	K0902357-001	215,788	4.72	129,521	6.14	202,178	7.36
TMW-02RX	K0902357-002	223,797	4.72	127,414	6.14	211,182	7.36
TMW-02-FRX	K0902357-003	241,014	4.73	134,490	6.14	215,331	7.36
TMW-04RX	K0902357-004	223,501	4.72	134,863	6.14	203,933	7.37
TMW-01RX	K0902357-005	226,728	4.72	135,959	6.14	211,654	7.36
TMW-05RX	K0902357-006	231,226	4.72	122,696	6.14	196,634	7.36
TMW-06RX	K0902357-007	211,744	4.72	117,660	6.14	189,266	7.36
97-5ARX	K0902357-008	209,463	4.72	112,066	6.14	184,949	7.36
97-5A-FRX	K0902357-009	216,846	4.72	115,976	6.14	187,013	7.36
AV-09RX	K0902357-012	215,461	4.72	113,980	6.14	184,711	7.36
TMW-03RX	K0902357-001	201,310	4.72	105,407	6.14	167,483	7.36
TMW-02RX	K0902357-002	199,556	4.72	102,758	6.14	166,183	7.36
TMW-02-FRX	K0902357-003	198,237	4.72	101,537	6.14	169,884	7.36
TMW-04RX	K0902357-004	177,429	4.72	99,403	6.14	168,181	7.36
TMW-01RX	K0902357-005	175,627	4.72	96,327	6.14	164,058	7.36

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Analyzed:**	03/26/2009
		Time Analyzed:	09:29

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\032609\0326F002.D	**Lab Code:**	KWG0902543-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902543
Analysis Method:	8270C SIM		

		Chrysene-d12		Perylene-d12	
		Area	**RT**	**Area**	**RT**
	Results ==>	234,040	9.96	248,989	13.24
	Upper Limit ==>	468,080	10.46	497,978	13.74
	Lower Limit ==>	117,020	9.46	124,495	12.74
	ICAL Result ==>	275,883	10.08	311,249	13.44
Associated Analyses					
Method Blank	KWG0902481-3	214,174	9.96	226,427	13.24
Lab Control Sample	KWG0902481-1	208,634	9.96	224,093	13.24
Duplicate Lab Control Sample	KWG0902481-2	211,479	9.96	224,062	13.23
TMW-03RX	K0902357-001	227,694	9.96	252,502	13.26
TMW-02RX	K0902357-002	223,965	9.96	242,379	13.26
TMW-02-FRX	K0902357-003	229,970	9.96	245,835	13.24
TMW-04RX	K0902357-004	227,437	9.97	239,811	13.26
TMW-01RX	K0902357-005	235,037	9.96	247,498	13.26
TMW-05RX	K0902357-006	222,669	9.96	235,693	13.24
TMW-06RX	K0902357-007	214,326	9.96	222,207	13.24
97-5ARX	K0902357-008	202,538	9.96	213,742	13.24
97-5A-FRX	K0902357-009	208,357	9.96	214,190	13.24
AV-09RX	K0902357-012	215,058	9.96	230,789	13.24
TMW-03RX	K0902357-001	195,478	9.96	203,794	13.23
TMW-02RX	K0902357-002	192,739	9.96	191,218	13.23
TMW-02-FRX	K0902357-003	178,852	9.95	171,668	13.23
TMW-04RX	K0902357-004	177,770	9.96	168,196	13.23
TMW-01RX	K0902357-005	177,218	9.95	173,136	13.23

Results flagged with an asterisk (*) indicate values outside control criteria.

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Extracted:**	03/20/2009
Sample Matrix:	Water	**Date Analyzed:**	03/23/2009

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	ng/L
Analysis Method:	8270C SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902345

	Lab Control Sample KWG0902345-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0902345-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	358	500	72	349	500	70	49-108	3	30
2-Methylnaphthalene	386	500	77	374	500	75	40-113	3	30
Dibenzofuran	385	500	77	359	500	72	59-114	7	30
Benz(a)anthracene	416	500	83	389	500	78	55-118	7	30
Chrysene	397	500	79	372	500	74	61-119	7	30
Benzo(b)fluoranthene	408	500	82	382	500	76	57-124	6	30
Benzo(k)fluoranthene	413	500	83	386	500	77	65-121	7	30
Benzo(a)pyrene	433	500	87	407	500	81	44-122	6	30
Indeno(1,2,3-cd)pyrene	422	500	84	388	500	78	44-132	8	30
Dibenz(a,h)anthracene	414	500	83	381	500	76	51-131	8	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902357
Project:	IP Longview/33761076.00020	**Date Extracted:**	03/25/2009
Sample Matrix:	Water	**Date Analyzed:**	03/26/2009

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	ng/L
Analysis Method:	8270C SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902481

	Lab Control Sample KWG0902481-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0902481-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	394	500	79	334	500	67	49-108	16	30
2-Methylnaphthalene	409	500	82	351	500	70	40-113	15	30
Acenaphthylene	399	500	80	353	500	71	56-113	12	30
Acenaphthene	393	500	79	345	500	69	56-111	13	30
Dibenzofuran	401	500	80	355	500	71	59-114	12	30
Fluorene	393	500	79	350	500	70	61-114	12	30
Phenanthrene	399	500	80	360	500	72	58-116	10	30
Anthracene	396	500	79	347	500	69	48-115	13	30
Fluoranthene	396	500	79	362	500	72	61-130	9	30
Pyrene	437	500	87	408	500	82	56-118	7	30
Benz(a)anthracene	434	500	87	402	500	80	55-118	8	30
Chrysene	417	500	83	387	500	77	61-119	7	30
Benzo(b)fluoranthene	441	500	88	415	500	83	57-124	6	30
Benzo(k)fluoranthene	435	500	87	408	500	82	65-121	6	30
Benzo(a)pyrene	462	500	92	432	500	86	44-122	7	30
Indeno(1,2,3-cd)pyrene	440	500	88	410	500	82	44-132	7	30
Dibenz(a,h)anthracene	429	500	86	399	500	80	51-131	7	30
Benzo(g,h,i)perylene	420	500	84	392	500	78	55-122	7	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

April 14, 2009 Analytical Report for Service Request No: K0902359

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview HDB/33761076.00020

Dear Paul:

Enclosed are the results of the sample submitted to our laboratory on March 19, 2009. For your reference, these analyses have been assigned our service request number K0902359.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0902359
Project:	IP Longview	**Date Received:**	3/19/09
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

One water sample was received for analysis at Columbia Analytical Services on 3/19/09. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Hydrocarbon Degrading Bacteria
No anomalies associated with the analysis of these samples were observed

Approved by EMW **Date** 4/13/09

Columbia Analytical ServicesINC
1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

CHAIN OF CUSTODY

SR#: K0902307
PAGE 1 OF 1 COC #

PROJECT NAME: IP LONGVIEW
PROJECT NUMBER: 33761076.00020
PROJECT MANAGER: PAUL KALINA
COMPANY/ADDRESS: 1501 4TH AVE SUITE 1400
CITY/STATE/ZIP: SEATTLE WA 98101
E-MAIL ADDRESS: PAUL-KALINA@URSCORP.COM
PHONE #: 206 438 2700
FAX #:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ BTEX☐ Diesel☒ Oil☐ 8015	Fuel Fingerprint (FIQ) ☐ NW-HCID Screen ☐	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☑	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, [✓ SO4], PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, [✓ Total-P], TKN, [✓ TOC], DOC (circle) [✓ NO2+NO3]	TOX 9020☐ AOX 1650☐ 506☐	HDG + HPC	8270C SIM ULL PAH			REMARKS
JMW-03	3/18/09	1415		GW	4									X								X	A		
JMW-02		1230			6									X								X	A		FIELD FILTERED INC
JMW-04		1100			4									X								X	A		
JMW-01		1500			2																	X	A		
JMW-05		1005			2																	X	A		
JMW-06		0910			2																	X	A		
97-5A		1815			4																	X		B	FIELD FILTERED INCLUDED
04-6A		1555			2																	X	C		
97-6C		1615			2																	X	C		
AV-09	↓	1715		↓	10				X					X				X	X		X	X	A		

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ____
Bill To: ____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
___ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:___ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

PAHs BY 8270C SIM ULL - MTCA B limits must be < reporting limits. Also make sure correct PAH analyte list is reported (as indicated by letters above).

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time: 3/18/09	Signature: Debi Wood	Date/Time: 3-18-09	Signature	Date/Time	Signature	Date/Time: [illegible]
Printed Name: LON VERM	Firm: URS	Printed Name: Debi Wood	Firm: CAS Kelso	Printed Name	Firm	Printed Name	Firm

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC ______

Client / Project: URS

Service Request K09 02359

Received: 3/18/09 Opened: 3/19/09 By: BT

SHORT HOLD TIME

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* *Courier* [✓ *Hand Delivered*]
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: ______ [✓ NA] Y N

5. **Temperature of cooler(s) upon receipt (°C):**	5.4	4.3		
Temperature Blank (°C):	4.7	2.7		
Thermometer ID:	237	246		
6. If applicable, list Chain of Custody Numbers:				

7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* [✓ *Wet Ice*] *Sleeves* *Other* ______

8. Were custody papers properly filled out (ink, signed, etc.)?	NA	[✓ Y]	N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.*	NA	[✓ Y]	N
10. Were all sample labels complete (i.e analysis, preservation, etc.)?	NA	[✓ Y]	N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below*	NA	[✓ Y]	N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?**	NA	[✓ Y]	N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below*	NA	[✓ Y]	N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.*	NA	[✓ Y]	N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?**	NA	[✓ Y]	N
16. Was C12/Res negative?	NA	[✓ Y]	N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

**Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).*

Additional Notes, Discrepancies, & Resolutions: ______

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902359
Project Name :	IP Longview HDB	**Date Collected :**	03/18/09
Project Number :	33761076.00020	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Hydrocarbon Degrading Bacteria

Prep Method :	Brown and Braddock	Units :	MPN/100mL
Analysis Method	SM 9221C	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-09	K0902359-001	1000	1000	1	3/19/2009	04/09/09	5500	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: MKANALY

Client :	URS Corporation	**Service Request :**	K0902359
Project Name :	IP Longview HDB	**Date Collected :**	3/18/2009
Project Number :	33761076.00020	**Date Received :**	3/19/2009
Sample Matrix :	WATER	**Date Prepared :**	03/19/09
		Date Analyzed :	04/09/09

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-09	Units :	MPN/100mL
Lab Code :	K0902359-001DUP	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Hydrocarbon Degrading Bacteria	Brown and Braddock	SM 9221C	1000	5500	ND	NC	NC	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

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Columbia Analytical Services INC.
An Employee - Owned Company

March 27, 2009 Analytical Report for Service Request No: K0902371

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on March 19, 2009. For your reference, these analyses have been assigned our service request number K0902371.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/lb

Page 1 of 091

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water
Service Request No.: K0902371
Date Received: 3/19/2009

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Two water samples were received for analysis at Columbia Analytical Services on 3/19/2009. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

Diesel and Residual Range Hydrocarbons by NWTPH-Dx

No anomalies associated with the analysis of these samples were observed.

Pentachlorophenol by EPA Method 8151M

Continuing Calibration Verification Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Continuing Calibration Verification (CCV) 0320F026: Pentachlorophenol. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL8092: Chrysene, Benzo(k)fluoranthene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.2%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Approved by________________ **Date** 3/30/09

Method Blank Exceptions:

The Method Blank KWG0902345-3 associated with the initial analysis of these samples contained low levels of Naphthalene (14 ng/L) but at a level relatively common for the ultra-trace procedure used. Note that Naphthalene is a laboratory artifact typically present in the low part per trillion range when analyzing aqueous samples. Since the concentration of Naphthalene in both the method blank and the associated samples was significantly below the MTCA Method B Cleanup Level of 160 ug/L specified for the project, the impact on the results was insignificant. In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated.

Sample Notes and Discussion:

Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by____________________ **Date** 7/20/09

Columbia Analytical Services™
1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

CHAIN OF CUSTODY

SR#: K0902371

PAGE 1 OF 1 COC #

PROJECT NAME: IP Longview
PROJECT NUMBER:
PROJECT MANAGER: Paul Kalina
COMPANY/ADDRESS: 1501 4th Avenue
Suite 1400
CITY/STATE/ZIP: Seattle, WA 98101
E-MAIL ADDRESS:
PHONE #: (206) 438-2700
FAX #:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☒	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, [✓ SO4], PO4, F, [✓ NO2], [✓ NO3], BOD, TSS, TDS (circle)	NH3-N, COD, [✓ Total-P], TKN, [✓ TOC], DOC (circle) NO2+NO3	TOX 9020☐ AOX 1650☐ 506☐	8270C SIM ULL	SM 7215B (HR)	HDB		REMARKS
AV-13	3/19/09	0940		GW	10				X					X				X	X		A	X	X		
AV-14	↓	1000		GW	10				X					X				X	X		A	X	X		

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ________
Bill To: ________

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
☒ Standard (10-15 working days)
___ Provide FAX Results
____
Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:________ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS: Please make sure that RLs are less than MTCA B limits and that the PAH analyte list "A" is reported.
A copy of this COC needs to be faxed to Paul Kalina upon receipt. Also, please confirm which analyses are to be billed to URS.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature:	Signature	Signature
Date/Time: 3/19/08 1130	Date/Time: 3/19/09 11:30	Date/Time	Date/Time
Printed Name: Jesse McCullough	Printed Name: Brad Tobin	Printed Name	Printed Name
Firm: URS	Firm: CAS	Firm	Firm

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC A

SHORT HOLD TIME

Client / Project: I.P Longview Service Request K09 0257

Received: 3-19-09 Opened: 3-19-09 By: bw

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier [✓ Hand Delivered]
2. Samples were received in: (circle) [✓ Cooler] Box Envelope Other NA
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where?

   If present, were custody seals intact? Y [✓ N] If present, were they signed and dated? Y [✓ N]
4. Is shipper's air-bill filed? If not, record air-bill number: [✓ NA] Y N
5. **Temperature of cooler(s) upon receipt (°C):** 4.8

   Temperature Blank (°C): 5.6

   Thermometer ID: smo 235
6. If applicable, list Chain of Custody Numbers:
7. Packing material used. Inserts Baggies Bubble Wrap Gel Packs [✓ Wet Ice] Sleeves Other
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA [✓ Y] N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions:

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0902371

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
AV-13	K0902371-001	58	68	64
AV-13DL	K0902371-001	63 D	75 D	68 D
AV-14	K0902371-002	53	70	67
Method Blank	KWG0902559-3	60	71	74
Lab Control Sample	KWG0902559-1	64	76	75
Duplicate Lab Control Sample	KWG0902559-2	62	72	73

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	39-122
Sur2 = Fluoranthene-d10	36-132
Sur3 = Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG0902559-3	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F010.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1050 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**14**		3.3	0.76	
91-57-6	**2-Methylnaphthalene**	**1.7**	J	3.3	0.65	
208-96-8	Acenaphthylene	3.3	U	3.3	0.24	
83-32-9	**Acenaphthene**	**0.50**	J	3.3	0.27	
132-64-9	Dibenzofuran	3.3	U	3.3	0.67	
86-73-7	Fluorene	3.3	U	3.3	0.21	
85-01-8	**Phenanthrene**	**2.1**	J	3.3	1.8	
120-12-7	**Anthracene**	**0.24**	J	3.3	0.20	
206-44-0	**Fluoranthene**	**2.0**	J	3.3	0.24	
129-00-0	**Pyrene**	**1.3**	J	3.3	0.27	
56-55-3	**Benz(a)anthracene**	**0.77**	J	3.3	0.25	
218-01-9	**Chrysene**	**0.61**	J	3.3	0.29	
205-99-2	**Benzo(b)fluoranthene**	**0.56**	J	3.3	0.24	
207-08-9	Benzo(k)fluoranthene	3.3	U	3.3	0.19	
50-32-8	**Benzo(a)pyrene**	**0.32**	J	3.3	0.27	
193-39-5	Indeno(1,2,3-cd)pyrene	3.3	U	3.3	0.28	
53-70-3	Dibenz(a,h)anthracene	3.3	U	3.3	0.25	
191-24-2	**Benzo(g,h,i)perylene**	**0.37**	J	3.3	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	39-122	03/27/09	Acceptable
Fluoranthene-d10	71	36-132	03/27/09	Acceptable
Terphenyl-d14	74	31-140	03/27/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-13	**Units:**	ng/L
Lab Code:	K0902371-001	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F013.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1050 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	Naphthalene	270	B	3.3	0.76	
91-57-6	2-Methylnaphthalene	100		3.3	0.65	
208-96-8	Acenaphthylene	7.6		3.3	0.24	
83-32-9	Acenaphthene	1900	E	3.3	0.27	
132-64-9	Dibenzofuran	65		3.3	0.67	
86-73-7	Fluorene	60		3.3	0.21	
85-01-8	Phenanthrene	52		3.3	1.8	
120-12-7	Anthracene	44		3.3	0.20	
206-44-0	Fluoranthene	23		3.3	0.24	
129-00-0	Pyrene	19		3.3	0.27	
56-55-3	Benz(a)anthracene	4.6		3.3	0.25	
218-01-9	Chrysene	6.6		3.3	0.29	
205-99-2	Benzo(b)fluoranthene	5.8		3.3	0.24	
207-08-9	Benzo(k)fluoranthene	1.7	J	3.3	0.19	
50-32-8	Benzo(a)pyrene	3.0	J	3.3	0.27	
193-39-5	Indeno(1,2,3-cd)pyrene	2.7	J	3.3	0.28	
53-70-3	Dibenz(a,h)anthracene	0.70	J	3.3	0.25	
191-24-2	Benzo(g,h,i)perylene	2.6	J	3.3	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	58	39-122	03/27/09	Acceptable
Fluoranthene-d10	68	36-132	03/27/09	Acceptable
Terphenyl-d14	64	31-140	03/27/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/30/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-13DL	**Units:**	ng/L
Lab Code:	K0902371-001	**Basis:**	NA
File ID:	J:\MS11\DATA\033009\0330F004.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1050 ml
% Solids: NA
Dilution Factor: 2

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**290**	D	6.5	1.6	
91-57-6	**2-Methylnaphthalene**	**100**	D	6.5	1.3	
208-96-8	**Acenaphthylene**	**8.4**	D	6.5	0.48	
83-32-9	**Acenaphthene**	**2200**	D	6.5	0.54	
132-64-9	**Dibenzofuran**	**73**	D	6.5	1.4	
86-73-7	**Fluorene**	**67**	D	6.5	0.42	
85-01-8	**Phenanthrene**	**57**	D	6.5	3.6	
120-12-7	**Anthracene**	**48**	D	6.5	0.40	
206-44-0	**Fluoranthene**	**26**	D	6.5	0.48	
129-00-0	**Pyrene**	**19**	D	6.5	0.54	
56-55-3	Benz(a)anthracene	6.5	U	6.5	0.50	
218-01-9	Chrysene	6.5	U	6.5	0.58	
205-99-2	Benzo(b)fluoranthene	6.5	U	6.5	0.48	
207-08-9	Benzo(k)fluoranthene	6.5	U	6.5	0.38	
50-32-8	Benzo(a)pyrene	6.5	U	6.5	0.54	
193-39-5	Indeno(1,2,3-cd)pyrene	6.5	U	6.5	0.56	
53-70-3	Dibenz(a,h)anthracene	6.5	U	6.5	0.50	
191-24-2	Benzo(g,h,i)perylene	6.5	U	6.5	0.30	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	39-122	03/30/09	Acceptable
Fluoranthene-d10	75	36-132	03/30/09	Acceptable
Terphenyl-d14	68	31-140	03/30/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-14	**Units:**	ng/L
Lab Code:	K0902371-002	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F014.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1000 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**170**	B	3.4	0.76	
91-57-6	**2-Methylnaphthalene**	**65**		3.4	0.65	
208-96-8	**Acenaphthylene**	**7.4**		3.4	0.24	
83-32-9	**Acenaphthene**	**1700**		3.4	0.27	
132-64-9	**Dibenzofuran**	**46**		3.4	0.67	
86-73-7	**Fluorene**	**43**		3.4	0.21	
85-01-8	**Phenanthrene**	**36**		3.4	1.8	
120-12-7	**Anthracene**	**39**		3.4	0.20	
206-44-0	**Fluoranthene**	**10**		3.4	0.24	
129-00-0	**Pyrene**	**8.4**		3.4	0.27	
56-55-3	**Benz(a)anthracene**	**1.8**	J	3.4	0.25	
218-01-9	**Chrysene**	**2.8**	J	3.4	0.29	
205-99-2	**Benzo(b)fluoranthene**	**1.8**	J	3.4	0.24	
207-08-9	Benzo(k)fluoranthene	3.4	U	3.4	0.19	
50-32-8	**Benzo(a)pyrene**	**0.80**	J	3.4	0.27	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**0.59**	J	3.4	0.28	
53-70-3	Dibenz(a,h)anthracene	3.4	U	3.4	0.25	
191-24-2	**Benzo(g,h,i)perylene**	**0.70**	J	3.4	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	39-122	03/27/09	Acceptable
Fluoranthene-d10	70	36-132	03/27/09	Acceptable
Terphenyl-d14	67	31-140	03/27/09	Acceptable

Comments:

Client:	URS Corporation		**Service Request:**	K0902371
Project:	IP Longview		**Date Extracted:**	03/26/2009
Sample Matrix:	Water		**Date Analyzed:**	03/27/2009

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C		**Units:**	ng/L
Analysis Method:	8270C SIM		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0902559

	Lab Control Sample KWG0902559-1 **Lab Control Spike**			Duplicate Lab Control Sample KWG0902559-2 **Duplicate Lab Control Spike**					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	355	500	71	358	500	72	49-108	1	30
2-Methylnaphthalene	375	500	75	374	500	75	40-113	0	30
Acenaphthylene	374	500	75	372	500	74	56-113	0	30
Acenaphthene	370	500	74	371	500	74	56-111	0	30
Dibenzofuran	376	500	75	374	500	75	59-114	1	30
Fluorene	376	500	75	373	500	75	61-114	1	30
Phenanthrene	396	500	79	392	500	78	58-116	1	30
Anthracene	379	500	76	375	500	75	48-115	1	30
Fluoranthene	396	500	79	393	500	79	61-130	1	30
Pyrene	434	500	87	429	500	86	56-118	1	30
Benz(a)anthracene	438	500	88	428	500	86	55-118	2	30
Chrysene	409	500	82	403	500	81	61-119	1	30
Benzo(b)fluoranthene	413	500	83	413	500	83	57-124	0	30
Benzo(k)fluoranthene	418	500	84	415	500	83	65-121	1	30
Benzo(a)pyrene	446	500	89	446	500	89	44-122	0	30
Indeno(1,2,3-cd)pyrene	429	500	86	428	500	86	44-132	0	30
Dibenz(a,h)anthracene	420	500	84	413	500	83	51-131	2	30
Benzo(g,h,i)perylene	407	500	81	405	500	81	55-122	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Pentachlorophenol

Extraction Method:	METHOD	**Units:**	PERCENT
Analysis Method:	8151M	**Level:**	Low

Sample Name	Lab Code	Sur1
AV-13	K0902371-001	82
AV-14	K0902371-002	70
Method Blank	KWG0902359-4	63
Batch QC	K0902314-005	77
Batch QCMS	KWG0902359-1	83
Batch QCDMS	KWG0902359-2	74
Lab Control Sample	KWG0902359-3	71

Surrogate Recovery Control Limits (%)

Sur1 = 4-Bromo-2,6-dichlorophenol 22-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0902359-4	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F004.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	63	22-117	03/20/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	AV-13	**Units:**	ug/L
Lab Code:	K0902371-001	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F017.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	82	22-117	03/20/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/21/2009

Pentachlorophenol

Sample Name:	AV-14	**Units:**	ug/L
Lab Code:	K0902371-002	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F018.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	70	22-117	03/21/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Extracted:**	03/20/2009
Sample Matrix:	Water	**Date Analyzed:**	03/20/2009

Matrix Spike/Duplicate Matrix Spike Summary
Pentachlorophenol

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0902314-005	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151M	**Extraction Lot:**	KWG0902359

		Batch QCMS KWG0902359-1 **Matrix Spike**			Batch QCDMS KWG0902359-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Pentachlorophenol	ND	7.09	10.0	71	6.91	10.0	69	32-123	3	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Extracted:**	03/20/2009
Sample Matrix:	Water	**Date Analyzed:**	03/20/2009

Lab Control Spike Summary
Pentachlorophenol

Extraction Method:	METHOD	**Units:**	ug/L
Analysis Method:	8151M	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902359

	Lab Control Sample KWG0902359-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Pentachlorophenol	7.42	10.0	74	42-119

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	PERCENT
Analysis Method:	NWTPH-Dx	**Level:**	Low

Sample Name	Lab Code	Sur1	Sur2
AV-13	K0902371-001	94	64
AV-14	K0902371-002	75	54
AV-13DUP	KWG0902394-3	82	69
Method Blank	KWG0902394-5	91	51
Lab Control Sample	KWG0902394-4	99	52

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0902394-5	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**18**	J	250	11	1	03/23/09	03/24/09	KWG0902394	
Residual Range Organics (RRO)	**80**	J	500	19	1	03/23/09	03/24/09	KWG0902394	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	91	50-150	03/24/09	Acceptable
n-Triacontane	51	50-150	03/24/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Diesel and Residual Range Organics

Sample Name:	AV-13	**Units:**	ug/L
Lab Code:	K0902371-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**330**	Y	280	13	1	03/23/09	03/24/09	KWG0902394	
Residual Range Organics (RRO)	**320**	J	560	22	1	03/23/09	03/24/09	KWG0902394	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	94	50-150	03/24/09	Acceptable
n-Triacontane	64	50-150	03/24/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/19/2009

Diesel and Residual Range Organics

Sample Name:	AV-14	**Units:**	ug/L
Lab Code:	K0902371-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**310**	Y	280	13	1	03/23/09	03/24/09	KWG0902394	
Residual Range Organics (RRO)	**350**	J	560	22	1	03/23/09	03/24/09	KWG0902394	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	75	50-150	03/24/09	Acceptable
n-Triacontane	54	50-150	03/24/09	Acceptable

Comments:

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Merged

SuperSet Reference: RR100170

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Extracted:**	03/23/2009
Sample Matrix:	Water	**Date Analyzed:**	03/24/2009

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	AV-13	**Units:**	ug/L
Lab Code:	K0902371-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0902394

				AV-13DUP KWG0902394-3 **Duplicate Sample**			
Analyte Name	**MRL**	**MDL**	**Sample Result**	**Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	300	13	330	273	300	18 #	30
Residual Range Organics (RRO)	590	23	320	362	340	12 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902371
Project:	IP Longview	**Date Extracted:**	03/23/2009
Sample Matrix:	Water	**Date Analyzed:**	03/24/2009

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902394

	Lab Control Sample KWG0902394-4 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	1600	1600	100	55-132
Residual Range Organics (RRO)	872	800	109	54-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Sulfate

Prep Method :	NONE	Units :	mg/L
Analysis Method	300.0	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-13	K0902371-001	10	50	NA	03/23/09	160	
AV-14	K0902371-002	10	50	NA	03/23/09	149	
Method Blank	K0902371-MB	0.2	1	NA	03/23/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: HJACKY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/23/09

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902466-004DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Sulfate	300.0	0.2	15.7	15.6	15.7	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0902371
Date Collected : NA
Date Received : NA
Date Prepared : NA
Date Analyzed : 03/23/09

Matrix Spike Summary
Inorganic Parameters

Sample Name : Batch QC
Lab Code : K0902466-004MS
Test Notes :

Units : mg/L
Basis : NA

Analyte	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Sulfate	300.0	1.0	10.0	15.7	24.5	88	80-120	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation		**Service Request :**	K0902371
Project Name :	IP Longview		**Date Collected :**	NA
Project Number :	NA		**Date Received :**	NA
Sample Matrix :	WATER		**Date Prepared :**	NA
			Date Analyzed :	03/23/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample		Units :	mg/L
Lab Code :	K0902371-LCS		Basis :	NA
Test Notes :				

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Sulfate	NONE	300.0	5.0	4.6	92	90-110	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Nitrate+Nitrite as Nitrogen

Prep Method :	NONE	Units :	mg/L
Analysis Method	353.2	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-13	K0902371-001	0.05	1	NA	03/20/09	0.05	
AV-14	K0902371-002	0.05	1	NA	03/20/09	0.07	
Method Blank	K0902371-MB	0.05	1	NA	03/20/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: HJACKY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/19/2009
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/20/09

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-13	Units :	mg/L
Lab Code :	K0902371-001DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	0.05	0.06	0.06	17	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/19/2009
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/20/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	AV-13	Units :	mg/L
Lab Code :	K0902371-001MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	2.00	0.05	2.11	103	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/20/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902371-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	NONE	353.2	1.70	1.73	102	90-110	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Phosphorus, Total

Prep Method :	Method	Units :	mg/L
Analysis Method	365.3	Basis :	NA
Test Notes :			

Sample Name	**Lab Code**	**MRL**	**Dilution Factor**	**Date Prepared**	**Date Analyzed**	**Result**	**Result Notes**
AV-13	K0902371-001	0.01	1	3/21/2009	03/26/09	0.67	
AV-14	K0902371-002	0.01	1	3/21/2009	03/26/09	0.65	
Method Blank	K0902371-MB	0.01	1	3/21/2009	03/26/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: HJACKY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0902371
Date Collected : 3/19/2009
Date Received : 3/19/2009
Date Prepared : 03/21/09
Date Analyzed : 03/26/09

Duplicate Summary
Inorganic Parameters

Sample Name : AV-13
Lab Code : K0902371-001DUP
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Phosphorus, Total	Method	365.3	0.01	0.67	0.67	0.67	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation		**Service Request :**	K0902371
Project Name :	IP Longview		**Date Collected :**	3/19/2009
Project Number :	NA		**Date Received :**	3/19/2009
Sample Matrix :	WATER		**Date Prepared :**	03/21/09
			Date Analyzed :	03/26/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	AV-13		Units :	mg/L
Lab Code :	K0902371-001MS		Basis :	NA
Test Notes :				

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Phosphorus, Total	Method	365.3	0.02	0.50	0.67	1.18	102	75-115	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0902371
Date Collected : NA
Date Received : NA
Date Prepared : 03/21/09
Date Analyzed : 03/26/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name : Lab Control Sample
Lab Code : K0902371-LCS
Test Notes :

Units : mg/L
Basis : NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Phosphorus, Total	Method	365.3	4.68	4.68	100	85-115	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0902371
Date Collected : 03/19/09
Date Received : 03/19/09

Carbon, Total Organic

Prep Method : NONE
Analysis Method 415.1
Test Notes :

Units : mg/L
Basis : NA

Sample Name	**Lab Code**	**MRL**	**Dilution Factor**	**Date Prepared**	**Date Analyzed**	**Result**	**Result Notes**
AV-13	K0902371-001	1.0	2	NA	03/25/09	13.4	
AV-14	K0902371-002	1.0	2	NA	03/25/09	13.5	
Method Blank	K0902371-MB	0.5	1	NA	03/25/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Client :	URS Corporation		**Service Request :**	K0902371
Project Name :	IP Longview		**Date Collected :**	NA
Project Number :	NA		**Date Received :**	NA
Sample Matrix :	WATER		**Date Prepared :**	NA
			Date Analyzed :	03/25/09

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC		Units :	mg/L
Lab Code :	K0902357-012DUP		Basis :	NA
Test Notes :				

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Carbon, Total Organic	415.1	0.5	1.5	1.4	1.5	7	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/25/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902357-012MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	415.1	0.5	25.0	1.5	26.0	98	49-156	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/25/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902371-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	NONE	415.1	21.0	22.4	107	69-136	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Heterotrophic Plate Count

Prep Method :	NONE	Units :	CFU/mL
Analysis Method	SM 9215 B	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-13	K0902371-001	0.5	1	NA	03/19/09	1.0	
AV-14	K0902371-002	0.5	1	NA	03/19/09	5.0	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Report By: HJACKY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902371
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/19/09

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	CFU/mL
Lab Code :	K0902357-012DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Heterotrophic Plate Count	SM 9215 B	0.5	255	237	246	7	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

April 13, 2009 Analytical Report for Service Request No: K0902372

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview HDB

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on March 19, 2009. For your reference, these analyses have been assigned our service request number K0902372.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/lb

Page 1 of 14

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0902372
Project:	IP Longview	**Date Received:**	3/19/09
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Two water samples were received for analysis at Columbia Analytical Services on 3/19/09. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Hydrocarbon Degrading Bacteria
No anomalies associated with the analysis of these samples were observed

Approved by EMW **Date** 4/13/09

Columbia Analytical Services

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K0902378

PAGE 1 OF 1 COC #

PROJECT NAME: IP Longview
PROJECT NUMBER:
PROJECT MANAGER: Paul Kalina
COMPANY/ADDRESS: 1501 4th Avenue
Suite 1400
CITY/STATE/ZIP: Seattle, WA 98101
E-MAIL ADDRESS:
PHONE #: (206) 438-2700
FAX #:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625 ☐ 8270 ☐ 8270LL ☐	Volatile Organics 624 ☐ 8260 ☐	Hydrocarbons (*see below) Gas ☐ 8021 ☐ BTEX ☐ Diesel ☒ Oil ☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM ☐ 1664 SGT ☐	PCB's Aroclors ☐ Congeners ☐	Pesticides/Herbicides 608 ☐ 8081A ☐ 8141A ☐ 8151A ☐	Chlorophenolics - 8151M Tri ☐ Tetra ☐ PCP ☒	PAHS 8310 ☐ SIM ☐	Metals, Total or Dissolved (See list below)	Cyanide ☐ Hex-Chrom ☐	pH, Cond., [✓ Cl, SO4], PO4, F, [✓ NO2], [✓ NO3], BOD, TSS, TDS (circle)	NH3-N, COD, [✓ Total-P], TKN, [✓ TOC], DOC (circle) NO2+NO3	TOX 9020 ☐ AOX 1650 ☐ 506 ☐	8270-C SIM ULL	SW 7215B (HR)	HDB		REMARKS
AV-13	3/19/09	0940		GW	10				X					X				X	X		A	X	X		
AV-14	↓	1000		GW	10				X					X				X	X		A	X	X		

8

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
✓ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results
______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS: Please make sure that RLs are less than MTCA B limits and that the PAH analyte list "A" is reported.

A copy of this COC needs to be faxed to Paul Kalina upon receipt. Also, please confirm which analyses are to be billed to URS.

RELINQUISHED BY:
Signature:
Date/Time: 3/19/08 1130
Printed Name: Jesse McCullough
Firm: URS

RECEIVED BY:
Signature:
Date/Time: 3/19/09 11:30
Printed Name: Brad Tobin
Firm: CAS

RELINQUISHED BY:
Signature ______ Date/Time ______
Printed Name ______ Firm ______

RECEIVED BY:
Signature ______ Date/Time ______
Printed Name ______ Firm ______

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC

SHORT HOLD TIME

Client / Project: I.P Longview

Service Request K09 2872

Received: 3-19-09 Opened: 3-19-09 By: bw

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* *Courier* [✓ *Hand Delivered*]
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other*______ *NA*
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where?______
   If present, were custody seals intact? Y [✓ N] If present, were they signed and dated? Y [✓ N]
4. Is shipper's air-bill filed? If not, record air-bill number:______ [✓ NA] Y N
5. **Temperature of cooler(s) upon receipt (°C):** 4.8
   Temperature Blank (°C): 5.6
   Thermometer ID: smo 235
6. If applicable, list Chain of Custody Numbers:______
7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* [✓ *Wet Ice*] *Sleeves* *Other*______
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* [✓ NA] Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA [✓ Y] N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

**Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).*

Additional Notes, Discrepancies, & Resolutions:______

Page 1 of: 1 2

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902372
Project Name :	IP Longview HDB	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/19/09
Sample Matrix :	WATER		

Hydrocarbon Degrading Bacteria

Prep Method :	Brown and Braddock	Units :	MPN/100mL
Analysis Method	SM 9221C	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
AV-13	K0902372-001	1000	1	3/19/2009	04/09/09	ND	
AV-14	K0902372-002	1000	1	3/19/2009	04/09/09	ND	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Client :	URS Corporation	**Service Request :**	K0902372
Project Name :	IP Longview HDB	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	03/19/09
		Date Analyzed :	04/09/09

Duplicate Summary
Inorganic Parameters

Sample Name :	BatchQC	Units :	MPN/100mL
Lab Code :	K0902359-001DUP	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Hydrocarbon Degrading Bacteria	Brown and Braddock	SM 9221C	1000	5500	ND	NC	NC	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

March 30, 2009 Analytical Report for Service Request No: K0902398

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on March 20, 2009. For your reference, these analyses have been assigned our service request number K0902398.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/ln

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K0902398
Project:	IP Longview	**Date Received:**	3/20/2009
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Seven water samples were received for analysis at Columbia Analytical Services on 3/20/2009. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

Diesel and Residual Range Hydrocarbons by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel and Residual Range Organics in sample AV-11 is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Pentachlorophenol by EPA Method 8151M

Continuing Calibration Verification Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Continuing Calibration Verification (CCV) 0320F026: Pentachlorophenol. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL8092: Chrysene, Benzo(k)fluoranthene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 9.2%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Approved by________________ **Date** 3/30/09

Method Blank Exceptions:
The Method Blank KWG0902559-3 associated with the initial analysis of these samples contained low levels of Naphthalene (14 ng/L) but at a level relatively common for the ultra-trace procedure used. Note that Naphthalene is a laboratory artifact typically present in the low part per trillion range when analyzing aqueous samples. Since the concentration of Naphthalene in both the method blank and the associated samples was significantly below the MTCA Method B Cleanup Level of 160 ug/L specified for the project, the impact on the results was insignificant. In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated.

Surrogate Exceptions:
The control criteria were exceeded for the following surrogates in sample AV-10 due to matrix interferences: Fluorene-d10, Fluoranthene-d10. Due to the presence of non-target background components that prevented adequate resolution of the surrogate, accurate quantitation was not possible. No further corrective action was appropriate.

Internal Standard Exceptions:
The internal standard recovery of Acenaphthene-d10 and Phenanthrene-d10 in sample AV-10 was outside control criteria because of matrix interference. The sample was reanalyzed at a dilution. The internal standards in question were within control criteria in the diluted analysis. All affected analytes are reported from the diluted analysis. The MRL for those analytes has been elevated to reflect the dilution.

Sample Notes and Discussion
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by____________________ **Date** 3/30/09

Columbia Analytical Services

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K0902398

PAGE ______ OF ______ COC # ______

PROJECT NAME: IP Longview
PROJECT NUMBER:
PROJECT MANAGER: Paul Kalina
COMPANY/ADDRESS: URS Corporation
1501 4th Ave, Suite 1400
CITY/STATE/ZIP: Seattle, WA
E-MAIL ADDRESS:
PHONE #: (206) 438-2700 FAX #:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐	Hydrocarbons (*see below) Gas☐ ☒ Diesel Oil☐ BTEX☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ ☒ PCP	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, [✓ SO4], PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, [✓ Total-P], TKN, [✓ TOC], DOC (circle) [✓ NO2+NO3]	TOX 9020☐ AOX 1650☐ 506☐	8270C-SIM LL	HDB	HPC		REMARKS
99EA 3A	3/19/09	1240		GW	12				X					X				X	X		A	X	X		
TMW-11		1345			6									X							A				
AV-12		1445			10				X					X				X	X		A	X	X		
AV-11		1540			10				X					X				X	X		A	X	X		
AV-10		1635			10				X					X				X	X		A	X	X		

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # ______
Bill To: ______

TURNAROUND REQUIREMENTS

____ 24 hr. ____ 48 hr.
____ 5 Day
X Standard (10-15 working days)
____ Provide FAX Results
______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI [✓ NORTHWEST] OTHER: ______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS: Reporting limits must be below MTCA B levels for PAHs. Please make sure PAHs reported match analyte list as indicated by the letter above. Please verify which analysis will be billed to URS with Paul Kalina a Tressa Pearson Fritts.

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Date/Time: 3/19/09	Signature: Date/Time: 5:41pm 3/19/09	Signature: Date/Time:	Signature: Date/Time: 3/20/09 0800
Printed Name: Jesse McWilliams Firm: URS	Printed Name: CKNox Firm:	Printed Name: Firm:	Printed Name: [illegible] Firm: CAS

RCOC #1 06/08

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC BD

Client / Project: URS Service Request K09 02398

Received: 3/19/09 Opened: 3/20/09 By: BT

1. Samples were received via? US Mail Fed Ex UPS DHL GH GS PDX Courier ~~Hand Delivered~~
2. Samples were received in: (circle) ~~Cooler~~ Box Envelope Other NA
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where?

SHORT HOLD TIME

If present, were custody seals intact? Y N If present, were they signed and dated? Y N

4. Is shipper's air-bill filed? If not, record air-bill number: [✓ NA] Y N

5. **Temperature of cooler(s) upon receipt (°C):**	3.2	1.4	3.3	
Temperature Blank (°C):	N/A	0.4	2.6	
Thermometer ID:	262	263	261	
6. If applicable, list Chain of Custody Numbers:				

7. Packing material used. [✓ Inserts] Baggies Bubble Wrap Gel Packs [✓ Wet Ice] Sleeves Other
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* NA [✓ Y] N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA [✓ Y] N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions: Rec'd 4 empty 1L amber's, 2 500mL HCL's, and 2 40mL amber voas not used in coolers.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/20/09
Sample Matrix :	WATER		

Sulfate

Units : mg/L
Basis : NA

Analysis Method 300.0
Test Notes :

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
99EA 3A	K0902398-001	0.2	2	03/23/09	4.5	
AV-12	K0902398-005	0.2	2	03/23/09	11.7	
AV-11	K0902398-006	1.0	5	03/23/09	32.6	
AV-10	K0902398-007	4.0	20	03/23/09	91.1	
Method Blank	K0902398-MB	0.2	1	03/23/09	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/23/09

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902466-004DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Sulfate	300.0	0.2	15.7	15.6	15.7	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/23/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902466-004MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Sulfate	300.0	1.0	10.0	15.7	24.5	88	80-120	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/23/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902398-LCS	Basis :	NA
Test Notes :			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Sulfate	NONE	300.0	5.0	4.6	92	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Sulfate
300.0
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/23/2009	5.0	4.8	96
CCV2 Result	3/23/2009	5.0	4.7	94
CCV3 Result	3/23/2009	5.0	4.7	94
CCV4 Result	3/23/2009	5.0	4.8	96
CCV5 Result	3/23/2009	5.0	4.7	94
CCV6 Result	3/23/2009	5.0	4.7	94
CCV7 Result	3/23/2009	5.0	4.7	94
CCV8 Result	3/24/2009	5.0	4.7	94
CCV9 Result	3/24/2009	5.0	4.8	96

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Sulfate
300.0
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/23/2009	0.2	ND
CCB2 Result	3/23/2009	0.2	ND
CCB3 Result	3/23/2009	0.2	ND
CCB5 Result	3/23/2009	0.2	ND
CCB6 Result	3/23/2009	0.2	ND
CCB7 Result	3/23/2009	0.2	ND
CCB8 Result	3/23/2009	0.2	ND
CCB4 Result	3/24/2009	0.2	ND
CCB9 Result	3/24/2009	0.2	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/20/09
Sample Matrix :	WATER		

Nitrate+Nitrite as Nitrogen

Units : mg/L
Basis : NA

Analysis Method 353.2
Test Notes :

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
99EA 3A	K0902398-001	0.05	1	03/24/09	0.16	
AV-12	K0902398-005	0.05	1	03/24/09	ND	
AV-11	K0902398-006	0.05	1	03/24/09	ND	
AV-10	K0902398-007	0.05	1	03/24/09	0.74	
Method Blank	K0902398-MB	0.05	1	03/24/09	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/20/2009
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/24/09

Duplicate Summary
Inorganic Parameters

Sample Name :	99EA 3A	Units :	mg/L
Lab Code :	K0902398-001DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	0.16	0.16	0.16	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/20/2009
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/24/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	99EA 3A	Units :	mg/L
Lab Code :	K0902398-001MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	353.2	0.05	2.00	0.16	2.20	102	90-110	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/24/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902398-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Nitrate+Nitrite as Nitrogen	NONE	353.2	1.70	1.70	100	90-110	

Report By: MKANALY

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Nitrate+Nitrite as Nitrogen
353.2
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/24/2009	2.00	1.96	98
CCV2 Result	3/24/2009	2.00	1.98	99
CCV3 Result	3/24/2009	2.00	1.97	99
CCV4 Result	3/24/2009	2.00	1.97	99
CCV5 Result	3/24/2009	2.00	1.97	99

QA/QC Report

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Nitrate+Nitrite as Nitrogen
353.2
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/24/2009	0.05	ND
CCB2 Result	3/24/2009	0.05	ND
CCB3 Result	3/24/2009	0.05	ND
CCB4 Result	3/24/2009	0.05	ND
CCB5 Result	3/24/2009	0.05	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/20/09
Sample Matrix :	WATER		

Phosphorus, Total

Prep Method :	Method	Units :	mg/L
Analysis Method	365.3	Basis :	NA
Test Notes :			

Sample Name	Lab Code	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
99EA 3A	K0902398-001	0.01	1	3/27/2009	03/27/09	0.06	
AV-12	K0902398-005	0.01	1	3/27/2009	03/27/09	0.02	
AV-11	K0902398-006	0.01	1	3/27/2009	03/27/09	0.24	
AV-10	K0902398-007	0.01	1	3/27/2009	03/27/09	0.26	
Method Blank	K0902398-MB	0.01	1	3/27/2009	03/27/09	ND	

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0902398
Date Collected : 3/19/2009
Date Received : 3/20/2009
Date Prepared : 03/27/09
Date Analyzed : 03/27/09

Duplicate Summary
Inorganic Parameters

Sample Name : 99EA 3A
Lab Code : K0902398-001DUP
Test Notes :

Units : mg/L
Basis : NA

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Phosphorus, Total	Method	365.3	0.01	0.06	0.06	0.06	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/20/2009
Sample Matrix :	WATER	**Date Prepared :**	03/27/09
		Date Analyzed :	03/27/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	99EA 3A	Units :	mg/L
Lab Code :	K0902398-001MS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Phosphorus, Total	Method	365.3	0.01	0.50	0.06	0.60	108	75-115	

COLUMBIA ANALYTICAL SERVICES, INC.
QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/20/2009
Sample Matrix :	WATER	**Date Prepared :**	03/27/09
		Date Analyzed :	03/27/09

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name :	99EA 3A		Units :	mg/L
Lab Code :	K0902398-001MS	K0902398-001DMS	Basis :	NA
Test Notes :				

Analyte	Prep Method	Analysis Method	MRL	Spike Level		Sample Result	Spike Result		Spike Recovery		CAS Acceptance Limits	Relative Percent Difference	Result Notes
				MS	DMS		MS	DMS	MS	DMS			
Phosphorus, Total	Method	365.3	0.02	0.50	1.00	0.06	0.60	1.11	108	105	75-125	3	

Report By: CMIHAI-LAZAR

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	03/27/09
		Date Analyzed :	03/27/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902398-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Phosphorus, Total	Method	365.3	4.68	4.90	105	85-115	

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Phosphorus, Total
365.3
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/27/2009	0.50	0.50	100
CCV2 Result	3/27/2009	0.50	0.50	100
CCV3 Result	3/27/2009	0.50	0.49	98
CCV4 Result	3/27/2009	0.50	0.50	100

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Phosphorus, Total
365.3
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/27/2009	0.01	ND
CCB2 Result	3/27/2009	0.01	ND
CCB3 Result	3/27/2009	0.01	ND
CCB4 Result	3/27/2009	0.01	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/20/09
Sample Matrix :	WATER		

Carbon, Total Organic

Units : mg/L
Basis : NA

Analysis Method 415.1
Test Notes :

Sample Name	**Lab Code**	**MRL**	**Dilution Factor**	**Date Analyzed**	**Result**	**Result Notes**
99EA 3A	K0902398-001	0.5	1	03/25/09	3.9	
AV-12	K0902398-005	0.5	1	03/25/09	1.4	
AV-11	K0902398-006	0.5	1	03/25/09	2.4	
AV-10	K0902398-007	0.5	1	03/25/09	13.5	
Method Blank	K0902398-MB	0.5	1	03/25/09	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/25/09

Duplicate Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902357-012DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Carbon, Total Organic	415.1	0.5	1.5	1.4	1.5	7	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/25/09

Matrix Spike Summary
Inorganic Parameters

Sample Name :	Batch QC	Units :	mg/L
Lab Code :	K0902357-012MS	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	415.1	0.5	25.0	1.5	26.0	98	49-156	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/25/09

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Lab Control Sample	Units :	mg/L
Lab Code :	K0902398-LCS	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**True Value**	**Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**	**Result Notes**
Carbon, Total Organic	NONE	415.1	21.0	22.4	107	69-136	

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Carbon, Total Organic
415.1
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	3/25/2009	25.0	23.8	95
CCV2 Result	3/25/2009	25.0	24.8	99
CCV3 Result	3/25/2009	25.0	24.3	97
CCV4 Result	3/25/2009	25.0	24.0	96
CCV5 Result	3/25/2009	25.0	24.0	96
CCV6 Result	3/25/2009	25.0	24.2	97
CCV7 Result	3/25/2009	25.0	24.9	100
CCV8 Result	3/25/2009	25.0	24.8	99

Client : URS Corporation
Project : IP Longview

Service Request : K0902398
Date Collected : NA
Date Received : NA

Carbon, Total Organic
415.1
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	3/25/2009	0.5	ND
CCB2 Result	3/25/2009	0.5	ND
CCB3 Result	3/25/2009	0.5	ND
CCB4 Result	3/25/2009	0.5	ND
CCB5 Result	3/25/2009	0.5	ND
CCB6 Result	3/25/2009	0.5	ND
CCB7 Result	3/25/2009	0.5	ND
CCB8 Result	3/25/2009	0.5	ND

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : URS Corporation
Project Name : IP Longview
Project Number : NA
Sample Matrix : WATER

Service Request : K0902398
Date Collected : 03/19/09
Date Received : 03/20/09

Heterotrophic Plate Count

Units : CFU/mL
Basis : NA

Analysis Method SM 9215 B
Test Notes :

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
99EA 3A	K0902398-001	0.5	1	03/20/09	4300	
AV-12	K0902398-005	0.5	1	03/20/09	47.0	
AV-11	K0902398-006	0.5	1	03/20/09	250	
AV-10	K0902398-007	0.5	1	03/20/09	230	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902398
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/20/2009
Sample Matrix :	WATER	**Date Prepared :**	NA
		Date Analyzed :	03/20/09

Duplicate Summary
Inorganic Parameters

Sample Name :	AV-12	Units :	CFU/mL
Lab Code :	K0902398-005DUP	Basis :	NA
Test Notes :			

Analyte	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Heterotrophic Plate Count	SM 9215 B	0.5	47.0	46.0	46.5	2	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0902398

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
99EA 3A	K0902398-001	79	89
AV-12	K0902398-005	83	85
AV-11	K0902398-006	79	88
AV-10	K0902398-007	98	93
AV-11DUP	KWG0902436-3	86	97
Method Blank	KWG0902436-5	97	111
Lab Control Sample	KWG0902436-4	96	97

Surrogate Recovery Control Limits (%)

Sur1 =	o-Terphenyl	50-150
Sur2 =	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0902436-5	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**19**	J	250	11	1	03/24/09	03/26/09	KWG0902436	
Residual Range Organics (RRO)	**200**	J	500	19	1	03/24/09	03/26/09	KWG0902436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	97	50-150	03/26/09	Acceptable
n-Triacontane	111	50-150	03/26/09	Acceptable

Comments: ______

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0902398
Date Collected: 03/19/2009
Date Received: 03/20/2009

Diesel and Residual Range Organics

Sample Name: 99EA 3A
Lab Code: K0902398-001

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**270**	Z	270	12	1	03/24/09	03/25/09	KWG0902436	
Residual Range Organics (RRO)	**310**	J	530	21	1	03/24/09	03/25/09	KWG0902436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	03/25/09	Acceptable
n-Triacontane	89	50-150	03/25/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009

Diesel and Residual Range Organics

Sample Name:	AV-12	**Units:**	ug/L
Lab Code:	K0902398-005	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**69**	J	270	12	1	03/24/09	03/25/09	KWG0902436	
Residual Range Organics (RRO)	**200**	J	530	21	1	03/24/09	03/25/09	KWG0902436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	83	50-150	03/25/09	Acceptable
n-Triacontane	85	50-150	03/25/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009

Diesel and Residual Range Organics

Sample Name:	AV-11	**Units:**	ug/L
Lab Code:	K0902398-006	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**59**	J	270	12	1	03/24/09	03/25/09	KWG0902436	
Residual Range Organics (RRO)	**560**	Z	530	21	1	03/24/09	03/25/09	KWG0902436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	79	50-150	03/25/09	Acceptable
n-Triacontane	88	50-150	03/25/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009

Diesel and Residual Range Organics

Sample Name:	AV-10	**Units:**	ug/L
Lab Code:	K0902398-007	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**4100**	Y	270	12	1	03/24/09	03/25/09	KWG0902436	
Residual Range Organics (RRO)	**1300**	Z	530	21	1	03/24/09	03/25/09	KWG0902436	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	98	50-150	03/25/09	Acceptable
n-Triacontane	93	50-150	03/25/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Extracted:**	03/24/2009
Sample Matrix:	Water	**Date Analyzed:**	03/25/2009

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	AV-11	**Units:**	ug/L
Lab Code:	K0902398-006	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG0902436

Analyte Name	**MRL**	**MDL**	**Sample Result**	AV-11DUP KWG0902436-3 **Duplicate Sample** **Result**	**Average**	**Relative Percent Difference**	**RPD Limit**
Diesel Range Organics (DRO)	260	12	59	54.0	57	9 #	30
Residual Range Organics (RRO)	520	20	560	150	360	116 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Extracted:**	03/24/2009
Sample Matrix:	Water	**Date Analyzed:**	03/25/2009

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG0902436

	Lab Control Sample KWG0902436-4 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	1440	1600	90	55-132
Residual Range Organics (RRO)	994	800	124	54-141

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview		
Sample Matrix:	Water		

Surrogate Recovery Summary
Pentachlorophenol

Extraction Method:	METHOD	**Units:**	PERCENT
Analysis Method:	8151M	**Level:**	Low

Sample Name	Lab Code	Sur1
99EA 3A	K0902398-001	80
TMW-11	K0902398-003	74
AV-12	K0902398-005	63
AV-11	K0902398-006	68
AV-10	K0902398-007	62
Method Blank	KWG0902359-4	63
Batch QC	K0902314-005	77
Batch QCMS	KWG0902359-1	83
Batch QCDMS	KWG0902359-2	74
Lab Control Sample	KWG0902359-3	71

Surrogate Recovery Control Limits (%)

Sur1 = 4-Bromo-2,6-dichlorophenol 22-117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	03/20/2009
		Date Analyzed:	03/20/2009

Pentachlorophenol

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG0902359-4	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F004.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	63	22-117	03/20/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/21/2009

Pentachlorophenol

Sample Name:	99EA 3A	**Units:**	ug/L
Lab Code:	K0902398-001	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F019.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	**Pentachlorophenol**	**1.1**		0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	80	22-117	03/21/09	Acceptable

Comments: ____________________

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/21/2009

Pentachlorophenol

Sample Name:	TMW-11	**Units:**	ug/L
Lab Code:	K0902398-003	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F020.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	74	22-117	03/21/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/21/2009

Pentachlorophenol

Sample Name:	AV-12	**Units:**	ug/L
Lab Code:	K0902398-005	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F021.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	63	22-117	03/21/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/21/2009

Pentachlorophenol

Sample Name:	AV-11	**Units:**	ug/L
Lab Code:	K0902398-006	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F022.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	68	22-117	03/21/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/20/2009
		Date Analyzed:	03/21/2009

Pentachlorophenol

Sample Name:	AV-10	**Units:**	ug/L
Lab Code:	K0902398-007	**Basis:**	NA
File ID:	J:\GC10\DATA\032009A\0320F023.D	**Level:**	Low
Instrument ID:	GC10		
Extraction Method:	METHOD	**Extraction Lot:**	KWG0902359
Analysis Method:	8151M	**Calibration ID:**	CAL8251
		Column1:	Rtx-1701
Sample Amount:	5 ml	**Column2:**	Rtx-35
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
87-86-5	Pentachlorophenol	0.16	U	0.50	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
4-Bromo-2,6-dichlorophenol	62	22-117	03/21/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Extracted:**	03/20/2009
Sample Matrix:	Water	**Date Analyzed:**	03/20/2009

Matrix Spike/Duplicate Matrix Spike Summary
Pentachlorophenol

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K0902314-005	**Basis:**	NA
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	8151M	**Extraction Lot:**	KWG0902359

		Batch QCMS KWG0902359-1 **Matrix Spike**			Batch QCDMS KWG0902359-2 **Duplicate Matrix Spike**					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Pentachlorophenol	ND	7.09	10.0	71	6.91	10.0	69	32-123	3	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation		**Service Request:**	K0902398
Project:	IP Longview		**Date Extracted:**	03/20/2009
Sample Matrix:	Water		**Date Analyzed:**	03/20/2009

Lab Control Spike Summary
Pentachlorophenol

Extraction Method:	METHOD		**Units:**	ug/L
Analysis Method:	8151M		**Basis:**	NA
			Level:	Low
			Extraction Lot:	KWG0902359

	Lab Control Sample KWG0902359-3 **Lab Control Spike**			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Pentachlorophenol	7.42	10.0	74	42-119

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0902398

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
99EA 3A	K0902398-001	58	69	71
99EA 3A-F	K0902398-002	59	69	72
TMW-11	K0902398-003	54	70	72
TMW-11-F	K0902398-004	59	70	73
AV-12	K0902398-005	47	73	72
AV-11	K0902398-006	53	71	70
AV-10	K0902398-007	0 *	0 *	69
AV-10DL	K0902398-007	70 D	86 D	78 D
AV-10DL	K0902398-007	80 D	87 D	75 D
Method Blank	KWG0902559-3	60	71	74
Lab Control Sample	KWG0902559-1	64	76	75
Duplicate Lab Control Sample	KWG0902559-2	62	72	73

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	39-122
Sur2 = Fluoranthene-d10	36-132
Sur3 = Terphenyl-d14	31-140

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG0902559-3	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F010.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092
Sample Amount:	1050 ml		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**14**		3.3	0.76	
91-57-6	**2-Methylnaphthalene**	**1.7**	J	3.3	0.65	
208-96-8	Acenaphthylene	3.3	U	3.3	0.24	
83-32-9	**Acenaphthene**	**0.50**	J	3.3	0.27	
132-64-9	Dibenzofuran	3.3	U	3.3	0.67	
86-73-7	Fluorene	3.3	U	3.3	0.21	
85-01-8	**Phenanthrene**	**2.1**	J	3.3	1.8	
120-12-7	**Anthracene**	**0.24**	J	3.3	0.20	
206-44-0	**Fluoranthene**	**2.0**	J	3.3	0.24	
129-00-0	**Pyrene**	**1.3**	J	3.3	0.27	
56-55-3	**Benz(a)anthracene**	**0.77**	J	3.3	0.25	
218-01-9	**Chrysene**	**0.61**	J	3.3	0.29	
205-99-2	**Benzo(b)fluoranthene**	**0.56**	J	3.3	0.24	
207-08-9	Benzo(k)fluoranthene	3.3	U	3.3	0.19	
50-32-8	**Benzo(a)pyrene**	**0.32**	J	3.3	0.27	
193-39-5	Indeno(1,2,3-cd)pyrene	3.3	U	3.3	0.28	
53-70-3	Dibenz(a,h)anthracene	3.3	U	3.3	0.25	
191-24-2	**Benzo(g,h,i)perylene**	**0.37**	J	3.3	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	60	39-122	03/27/09	Acceptable
Fluoranthene-d10	71	36-132	03/27/09	Acceptable
Terphenyl-d14	74	31-140	03/27/09	Acceptable

Comments: ______________________________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/30/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	99EA 3A	**Units:**	ng/L
Lab Code:	K0902398-001	**Basis:**	NA
File ID:	J:\MS11\DATA\033009\0330F007.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1010 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	Naphthalene	22	B	3.4	0.76	
91-57-6	2-Methylnaphthalene	4.0		3.4	0.65	
208-96-8	Acenaphthylene	22		3.4	0.24	
83-32-9	Acenaphthene	330		3.4	0.27	
132-64-9	Dibenzofuran	14		3.4	0.67	
86-73-7	Fluorene	120		3.4	0.21	
85-01-8	Phenanthrene	270		3.4	1.8	
120-12-7	Anthracene	290		3.4	0.20	
206-44-0	Fluoranthene	910		3.4	0.24	
129-00-0	Pyrene	860		3.4	0.27	
56-55-3	Benz(a)anthracene	530		3.4	0.25	
218-01-9	Chrysene	700		3.4	0.29	
205-99-2	Benzo(b)fluoranthene	1000		3.4	0.24	
207-08-9	Benzo(k)fluoranthene	290		3.4	0.19	
50-32-8	Benzo(a)pyrene	660		3.4	0.27	
193-39-5	Indeno(1,2,3-cd)pyrene	620		3.4	0.28	
53-70-3	Dibenz(a,h)anthracene	130		3.4	0.25	
191-24-2	Benzo(g,h,i)perylene	560		3.4	0.15	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	58	39-122	03/30/09	Acceptable
Fluoranthene-d10	69	36-132	03/30/09	Acceptable
Terphenyl-d14	71	31-140	03/30/09	Acceptable

Comments: ______________________________

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	99EA 3A-F	**Units:**	ng/L
Lab Code:	K0902398-002	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F015.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092
Sample Amount:	960 ml		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**40**	B	3.6	0.80	
91-57-6	**2-Methylnaphthalene**	**9.5**		3.6	0.68	
208-96-8	**Acenaphthylene**	**10**		3.6	0.25	
83-32-9	**Acenaphthene**	**300**		3.6	0.29	
132-64-9	**Dibenzofuran**	**14**		3.6	0.70	
86-73-7	**Fluorene**	**110**		3.6	0.22	
85-01-8	**Phenanthrene**	**34**		3.6	1.9	
120-12-7	**Anthracene**	**160**		3.6	0.21	
206-44-0	**Fluoranthene**	**27**		3.6	0.25	
129-00-0	**Pyrene**	**23**		3.6	0.29	
56-55-3	**Benz(a)anthracene**	**20**		3.6	0.27	
218-01-9	**Chrysene**	**3.8**		3.6	0.31	
205-99-2	**Benzo(b)fluoranthene**	**5.3**		3.6	0.25	
207-08-9	**Benzo(k)fluoranthene**	**1.4**	J	3.6	0.20	
50-32-8	**Benzo(a)pyrene**	**2.1**	J	3.6	0.29	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**1.6**	J	3.6	0.30	
53-70-3	**Dibenz(a,h)anthracene**	**0.50**	J	3.6	0.27	
191-24-2	**Benzo(g,h,i)perylene**	**1.7**	J	3.6	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	59	39-122	03/27/09	Acceptable
Fluoranthene-d10	69	36-132	03/27/09	Acceptable
Terphenyl-d14	72	31-140	03/27/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-11	**Units:**	ng/L
Lab Code:	K0902398-003	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F016.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092
Sample Amount:	990 ml		
% Solids:	NA		
Dilution Factor:	1		

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**70**	B	3.5	0.77	
91-57-6	**2-Methylnaphthalene**	**22**		3.5	0.66	
208-96-8	**Acenaphthylene**	**0.96**	J	3.5	0.25	
83-32-9	**Acenaphthene**	**13**		3.5	0.28	
132-64-9	**Dibenzofuran**	**9.6**		3.5	0.68	
86-73-7	**Fluorene**	**7.5**		3.5	0.22	
85-01-8	**Phenanthrene**	**11**		3.5	1.9	
120-12-7	**Anthracene**	**2.5**	J	3.5	0.21	
206-44-0	**Fluoranthene**	**16**		3.5	0.25	
129-00-0	**Pyrene**	**12**		3.5	0.28	
56-55-3	**Benz(a)anthracene**	**2.9**	J	3.5	0.26	
218-01-9	**Chrysene**	**5.6**		3.5	0.30	
205-99-2	**Benzo(b)fluoranthene**	**4.1**		3.5	0.25	
207-08-9	**Benzo(k)fluoranthene**	**1.6**	J	3.5	0.20	
50-32-8	**Benzo(a)pyrene**	**1.7**	J	3.5	0.28	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**1.6**	J	3.5	0.29	
53-70-3	Dibenz(a,h)anthracene	3.5	U	3.5	0.26	
191-24-2	**Benzo(g,h,i)perylene**	**1.4**	J	3.5	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	54	39-122	03/27/09	Acceptable
Fluoranthene-d10	70	36-132	03/27/09	Acceptable
Terphenyl-d14	72	31-140	03/27/09	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	TMW-11-F	**Units:**	ng/L
Lab Code:	K0902398-004	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F017.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 950 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**43**	B	3.6	0.80	
91-57-6	**2-Methylnaphthalene**	**10**		3.6	0.69	
208-96-8	**Acenaphthylene**	**28**		3.6	0.26	
83-32-9	**Acenaphthene**	**11**		3.6	0.29	
132-64-9	**Dibenzofuran**	**3.7**		3.6	0.71	
86-73-7	**Fluorene**	2.7	J	3.6	0.23	
85-01-8	**Phenanthrene**	**3.5**	J	3.6	1.9	
120-12-7	**Anthracene**	**2.2**	J	3.6	0.22	
206-44-0	**Fluoranthene**	**0.82**	J	3.6	0.26	
129-00-0	Pyrene	3.6	U	3.6	0.29	
56-55-3	Benz(a)anthracene	3.6	U	3.6	0.27	
218-01-9	Chrysene	3.6	U	3.6	0.31	
205-99-2	Benzo(b)fluoranthene	3.6	U	3.6	0.26	
207-08-9	Benzo(k)fluoranthene	3.6	U	3.6	0.20	
50-32-8	Benzo(a)pyrene	3.6	U	3.6	0.29	
193-39-5	Indeno(1,2,3-cd)pyrene	3.6	U	3.6	0.30	
53-70-3	Dibenz(a,h)anthracene	3.6	U	3.6	0.27	
191-24-2	Benzo(g,h,i)perylene	3.6	U	3.6	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	59	39-122	03/27/09	Acceptable
Fluoranthene-d10	70	36-132	03/27/09	Acceptable
Terphenyl-d14	73	31-140	03/27/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-12	**Units:**	ng/L
Lab Code:	K0902398-005	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F018.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 960 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**170**	B	3.6	0.80	
91-57-6	**2-Methylnaphthalene**	**54**		3.6	0.68	
208-96-8	**Acenaphthylene**	**2.6**	J	3.6	0.25	
83-32-9	**Acenaphthene**	**27**		3.6	0.29	
132-64-9	**Dibenzofuran**	**38**		3.6	0.70	
86-73-7	**Fluorene**	**29**		3.6	0.22	
85-01-8	**Phenanthrene**	**29**		3.6	1.9	
120-12-7	**Anthracene**	**30**		3.6	0.21	
206-44-0	**Fluoranthene**	**6.8**		3.6	0.25	
129-00-0	**Pyrene**	**17**		3.6	0.29	
56-55-3	**Benz(a)anthracene**	**2.1**	J	3.6	0.27	
218-01-9	**Chrysene**	**1.6**	J	3.6	0.31	
205-99-2	**Benzo(b)fluoranthene**	**2.9**	J	3.6	0.25	
207-08-9	**Benzo(k)fluoranthene**	**0.94**	J	3.6	0.20	
50-32-8	**Benzo(a)pyrene**	**1.7**	J	3.6	0.29	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**1.7**	J	3.6	0.30	
53-70-3	**Dibenz(a,h)anthracene**	**0.46**	J	3.6	0.27	
191-24-2	**Benzo(g,h,i)perylene**	**1.6**	J	3.6	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	47	39-122	03/27/09	Acceptable
Fluoranthene-d10	73	36-132	03/27/09	Acceptable
Terphenyl-d14	72	31-140	03/27/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-11	**Units:**	ng/L
Lab Code:	K0902398-006	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F019.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 980 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	Naphthalene	180	B	3.5	0.78	
91-57-6	2-Methylnaphthalene	59		3.5	0.67	
208-96-8	Acenaphthylene	1.9	J	3.5	0.25	
83-32-9	Acenaphthene	31		3.5	0.28	
132-64-9	Dibenzofuran	31		3.5	0.69	
86-73-7	Fluorene	25		3.5	0.22	
85-01-8	Phenanthrene	45		3.5	1.9	
120-12-7	Anthracene	5.8		3.5	0.21	
206-44-0	Fluoranthene	52		3.5	0.25	
129-00-0	Pyrene	41		3.5	0.28	
56-55-3	Benz(a)anthracene	23		3.5	0.26	
218-01-9	Chrysene	31		3.5	0.30	
205-99-2	Benzo(b)fluoranthene	44		3.5	0.25	
207-08-9	Benzo(k)fluoranthene	13		3.5	0.20	
50-32-8	Benzo(a)pyrene	30		3.5	0.28	
193-39-5	Indeno(1,2,3-cd)pyrene	27		3.5	0.29	
53-70-3	Dibenz(a,h)anthracene	5.3		3.5	0.26	
191-24-2	Benzo(g,h,i)perylene	25		3.5	0.16	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	39-122	03/27/09	Acceptable
Fluoranthene-d10	71	36-132	03/27/09	Acceptable
Terphenyl-d14	70	31-140	03/27/09	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/27/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-10	**Units:**	ng/L
Lab Code:	K0902398-007	**Basis:**	NA
File ID:	J:\MS11\DATA\032709A\0327F020.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1020 ml
% Solids: NA
Dilution Factor: 1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**1400**		3.4	0.76	
91-57-6	**2-Methylnaphthalene**	**45**		3.4	0.65	
208-96-8	Acenaphthylene	3.4	U	3.4	0.24	*
83-32-9	Acenaphthene	3.4	U	3.4	0.27	*
132-64-9	Dibenzofuran	3.4	U	3.4	0.67	*
86-73-7	Fluorene	3.4	U	3.4	0.21	*
85-01-8	Phenanthrene	3.4	U	3.4	1.8	*
120-12-7	Anthracene	3.4	U	3.4	0.20	*
206-44-0	Fluoranthene	3.4	U	3.4	0.24	*
129-00-0	**Pyrene**	**900**		3.4	0.27	
56-55-3	**Benz(a)anthracene**	**69**		3.4	0.25	
218-01-9	**Chrysene**	**140**		3.4	0.29	
205-99-2	**Benzo(b)fluoranthene**	**75**		3.4	0.24	
207-08-9	Benzo(k)fluoranthene	3.4	U	3.4	0.19	
50-32-8	**Benzo(a)pyrene**	**55**		3.4	0.27	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**37**		3.4	0.28	
53-70-3	Dibenz(a,h)anthracene	3.4	U	3.4	0.25	
191-24-2	**Benzo(g,h,i)perylene**	**33**		3.4	0.15	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	0	39-122	03/27/09	Outside Control Limits
Fluoranthene-d10	0	36-132	03/27/09	Outside Control Limits
Terphenyl-d14	69	31-140	03/27/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/30/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-10DL	**Units:**	ng/L
Lab Code:	K0902398-007	**Basis:**	NA
File ID:	J:\MS11\DATA\033009\0330F006.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1020 ml
% Solids: NA
Dilution Factor: 10

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**1800**	D	34	7.6	
91-57-6	2-Methylnaphthalene	34	U	34	6.5	
208-96-8	**Acenaphthylene**	**1300**	D	34	2.4	
83-32-9	**Acenaphthene**	**37000**	ED	34	2.7	
132-64-9	**Dibenzofuran**	**11000**	D	34	6.7	
86-73-7	**Fluorene**	**9700**	D	34	2.1	
85-01-8	**Phenanthrene**	**560**	D	34	18	
120-12-7	**Anthracene**	**1500**	D	34	2.0	
206-44-0	**Fluoranthene**	**1700**	D	34	2.4	
129-00-0	**Pyrene**	**1000**	D	34	2.7	
56-55-3	**Benz(a)anthracene**	**110**	D	34	2.5	
218-01-9	**Chrysene**	**74**	D	34	2.9	
205-99-2	**Benzo(b)fluoranthene**	**77**	D	34	2.4	
207-08-9	**Benzo(k)fluoranthene**	**35**	D	34	1.9	
50-32-8	**Benzo(a)pyrene**	**60**	D	34	2.7	
193-39-5	**Indeno(1,2,3-cd)pyrene**	**33**	JD	34	2.8	
53-70-3	**Dibenz(a,h)anthracene**	**10**	JD	34	2.5	
191-24-2	**Benzo(g,h,i)perylene**	**34**	D	34	1.5	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	70	39-122	03/30/09	Acceptable
Fluoranthene-d10	86	36-132	03/30/09	Acceptable
Terphenyl-d14	78	31-140	03/30/09	Acceptable

Comments:

Analytical Results

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Collected:**	03/19/2009
Sample Matrix:	Water	**Date Received:**	03/20/2009
		Date Extracted:	03/26/2009
		Date Analyzed:	03/30/2009

Polynuclear Aromatic Hydrocarbons

Sample Name:	AV-10DL	**Units:**	ng/L
Lab Code:	K0902398-007	**Basis:**	NA
File ID:	J:\MS11\DATA\033009\0330F008.D	**Level:**	Low
Instrument ID:	MS11		
Extraction Method:	EPA 3520C	**Extraction Lot:**	KWG0902559
Analysis Method:	8270C SIM	**Calibration ID:**	CAL8092

Sample Amount: 1020 ml
% Solids: NA
Dilution Factor: 50

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
91-20-3	**Naphthalene**	**1800**	D	170	38	
91-57-6	2-Methylnaphthalene	170	U	170	33	
208-96-8	**Acenaphthylene**	**1500**	D	170	12	
83-32-9	**Acenaphthene**	**46000**	D	170	14	
132-64-9	**Dibenzofuran**	**13000**	D	170	34	
86-73-7	**Fluorene**	**11000**	D	170	11	
85-01-8	**Phenanthrene**	**530**	D	170	90	
120-12-7	**Anthracene**	**1500**	D	170	10	
206-44-0	Fluoranthene	170	U	170	12	
129-00-0	Pyrene	170	U	170	14	
56-55-3	Benz(a)anthracene	170	U	170	13	
218-01-9	Chrysene	170	U	170	15	
205-99-2	Benzo(b)fluoranthene	170	U	170	12	
207-08-9	Benzo(k)fluoranthene	170	U	170	9.5	
50-32-8	Benzo(a)pyrene	170	U	170	14	
193-39-5	Indeno(1,2,3-cd)pyrene	170	U	170	14	
53-70-3	Dibenz(a,h)anthracene	170	U	170	13	
191-24-2	Benzo(g,h,i)perylene	170	U	170	7.5	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	39-122	03/30/09	Acceptable
Fluoranthene-d10	87	36-132	03/30/09	Acceptable
Terphenyl-d14	75	31-140	03/30/09	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Analyzed:**	03/27/2009
		Time Analyzed:	09:48

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\032709A\0327F002.D	**Lab Code:**	KWG0902624-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902624
Analysis Method:	8270C SIM		

		Naphthalene-d8		Acenaphthene-d10		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Results ==>	225,214	4.71	121,449	6.13	209,529	7.35
	Upper Limit ==>	450,428	5.21	242,898	6.63	419,058	7.85
	Lower Limit ==>	112,607	4.21	60,725	5.63	104,765	6.85
	ICAL Result ==>	239,255	4.81	140,641	6.21	226,448	7.44
Associated Analyses							
Method Blank	KWG0902559-3	202,494	4.71	107,671	6.13	178,007	7.35
Lab Control Sample	KWG0902559-1	198,774	4.71	107,003	6.13	172,495	7.35
Duplicate Lab Control Sample	KWG0902559-2	208,431	4.71	109,955	6.13	180,935	7.35
99EA 3A-F	K0902398-002	222,290	4.73	123,193	6.13	211,624	7.36
TMW-11	K0902398-003	209,836	4.71	111,789	6.13	176,194	7.36
TMW-11-F	K0902398-004	232,971	4.73	123,122	6.13	192,247	7.36
AV-12	K0902398-005	184,719	4.71	107,686	6.13	172,997	7.36
AV-11	K0902398-006	220,176	4.71	116,633	6.13	184,890	7.36
AV-10	K0902398-007	249,762	4.72	0*	0.00	0*	0.00

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Analyzed:**	03/27/2009
		Time Analyzed:	09:48

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\032709A\0327F002.D	**Lab Code:**	KWG0902624-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902624
Analysis Method:	8270C SIM		

		Chrysene-d12		Perylene-d12	
		Area	**RT**	**Area**	**RT**
	Results ==>	227,312	9.94	244,413	13.21
	Upper Limit ==>	454,624	10.44	488,826	13.71
	Lower Limit ==>	113,656	9.44	122,207	12.71
	ICAL Result ==>	275,883	10.08	311,249	13.44
Associated Analyses					
Method Blank	KWG0902559-3	191,539	9.93	210,908	13.19
Lab Control Sample	KWG0902559-1	191,631	9.93	218,903	13.19
Duplicate Lab Control Sample	KWG0902559-2	200,691	9.93	225,822	13.20
99EA 3A-F	K0902398-002	224,178	9.96	237,047	13.24
TMW-11	K0902398-003	195,080	9.94	213,472	13.22
TMW-11-F	K0902398-004	211,875	9.94	233,598	13.22
AV-12	K0902398-005	203,620	9.94	227,717	13.22
AV-11	K0902398-006	209,729	9.94	231,630	13.22
AV-10	K0902398-007	257,865	10.08	229,104	13.53

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Analyzed:**	03/30/2009
		Time Analyzed:	07:36

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\033009\0330F002.D	**Lab Code:**	KWG0902643-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902643
Analysis Method:	8270C SIM		

		Naphthalene-d8		Acenaphthene-d10		Phenanthrene-d10	
		Area	**RT**	**Area**	**RT**	**Area**	**RT**
	Results ==>	234,256	4.71	122,002	6.12	199,609	7.35
	Upper Limit ==>	468,512	5.21	244,004	6.62	399,218	7.85
	Lower Limit ==>	117,128	4.21	61,001	5.62	99,805	6.85
	ICAL Result ==>	239,255	4.81	140,641	6.21	226,448	7.44
Associated Analyses							
AV-10DL	K0902398-007	216,217	4.71	132,074	6.12	208,914	7.36
99EA 3A	K0902398-001	242,555	4.71	125,840	6.12	221,468	7.35
AV-10DL	K0902398-007	200,811	4.71	109,594	6.12	182,204	7.35

Results flagged with an asterisk (*) indicate values outside control criteria.

Client:	URS Corporation	**Service Request:**	K0902398
Project:	IP Longview	**Date Analyzed:**	03/30/2009
		Time Analyzed:	07:36

Internal Standard Area and RT Summary
Polynuclear Aromatic Hydrocarbons

File ID:	J:\MS11\DATA\033009\0330F002.D	**Lab Code:**	KWG0902643-2
Instrument ID:	MS11	**Analysis Lot:**	KWG0902643
Analysis Method:	8270C SIM		

		Chrysene-d12		Perylene-d12	
		Area	**RT**	**Area**	**RT**
	Results ==>	234,203	9.93	249,778	13.17
	Upper Limit ==>	468,406	10.43	499,556	13.67
	Lower Limit ==>	117,102	9.43	124,889	12.67
	ICAL Result ==>	275,883	10.08	311,249	13.44
Associated Analyses					
AV-10DL	K0902398-007	227,147	9.94	235,651	13.21
99EA 3A	K0902398-001	229,067	9.95	235,551	13.24
AV-10DL	K0902398-007	206,068	9.93	221,832	13.19

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K0902398
Date Extracted: 03/26/2009
Date Analyzed: 03/27/2009

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ng/L
Basis: NA
Level: Low
Extraction Lot: KWG0902559

	Lab Control Sample KWG0902559-1 Lab Control Spike			Duplicate Lab Control Sample KWG0902559-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	355	500	71	358	500	72	49-108	1	30
2-Methylnaphthalene	375	500	75	374	500	75	40-113	0	30
Acenaphthylene	374	500	75	372	500	74	56-113	0	30
Acenaphthene	370	500	74	371	500	74	56-111	0	30
Dibenzofuran	376	500	75	374	500	75	59-114	1	30
Fluorene	376	500	75	373	500	75	61-114	1	30
Phenanthrene	396	500	79	392	500	78	58-116	1	30
Anthracene	379	500	76	375	500	75	48-115	1	30
Fluoranthene	396	500	79	393	500	79	61-130	1	30
Pyrene	434	500	87	429	500	86	56-118	1	30
Benz(a)anthracene	438	500	88	428	500	86	55-118	2	30
Chrysene	409	500	82	403	500	81	61-119	1	30
Benzo(b)fluoranthene	413	500	83	413	500	83	57-124	0	30
Benzo(k)fluoranthene	418	500	84	415	500	83	65-121	1	30
Benzo(a)pyrene	446	500	89	446	500	89	44-122	0	30
Indeno(1,2,3-cd)pyrene	429	500	86	428	500	86	44-132	0	30
Dibenz(a,h)anthracene	420	500	84	413	500	83	51-131	2	30
Benzo(g,h,i)perylene	407	500	81	405	500	81	55-122	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

April 15, 2009 Analytical Report for Service Request No: K0902399

Paul Kalina
URS Corporation
1501 4th Avenue
Suite 1400
Seattle, WA 98101

RE: IP Longview

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on March 20, 2009. For your reference, these analyses have been assigned our service request number K0902399.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

RSenkbeil for

Ed Wallace
Project Chemist

EW/lb

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request No.: K0902399
Date Received: 03/20/09

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Four water samples were received for analysis at Columbia Analytical Services on 03/20/09. Minor discrepancies are noted on the chain of custody and/or cooler receipt and preservation form included in this data package. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Hydrocarbon Degrading Bacteria by Standard Methods/Brown and Braddock:
The Relative Percent Difference (RPD) for the replicate analysis of hydrocarbon degrading bacteria in sample 99EA 3A was outside the normal CAS control limits. The variability in the results is attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of these samples were observed.

Approved by RSenkbeil FOR Ed Wallace **Date** 04/17/09

Columbia Analytical Services INC

CHAIN OF CUSTODY

SR#: 99

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

PAGE ______ OF ______ COC # ______

PROJECT NAME IP Longview
PROJECT NUMBER
PROJECT MANAGER Paul Kalina
COMPANY/ADDRESS URS Corporation
1501 4th Ave Suite 1400
CITY/STATE/ZIP Seattle, WA
E-MAIL ADDRESS
PHONE # 206 438 2700 FAX #
SAMPLER'S SIGNATURE

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ Diesel☒ Oil☐ BTEX☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☒	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, [✓ SO4], PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, [✓ TOC], DOC (circle) [✓ NO2+NO3]	TOX 9020☐ AOX 1650☐ 506☐	8270C-SIM LL	HDB	HPC		REMARKS
99EA 3A	3/19/09	1240		GW	12				X					X				X	X		A	X	X		
TMW-11	|	1345		|	6									X							A				
AV-12	|	1445		|	10				X					X				X	X		A	X	X		
AV-11	|	1540		|	10				X					X				X	X		A	X	X		
AV-10		1635		|	10				X					X				X	X		A	X	X		

8

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. # ______

Bill To: ______

TURNAROUND REQUIREMENTS

_____ 24 hr. _____ 48 hr.

_____ 5 Day

✓ Standard (10-15 working days)

_____ Provide FAX Results

______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS: Reporting limits must be below MTCA B levels for "PAHs". Please make sure PAHs reported match analyte list as indicated by the letter above. Please verify which analysis will be billed to URS with Paul Kalina or Theresa [illegible]

RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:		RECEIVED BY:	
Signature	Date/Time 3/19/09	Signature	Date/Time	Signature	Date/Time	Signature	Date/Time
Printed Name Jesse Michalik	Firm URS	Printed Name	Firm	Printed Name	Firm	Printed Name	Firm

RCOC #1 06/08

PC Ed

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

Client / Project: URS   Service Request K09 02399

Received: 3/19/09   Opened: 3/20/09   By: BT

SHORT HOLD TIME

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* *Courier* [✓ *Hand Delivered*]
2. Samples were received in: (circle) [✓ *Cooler*] *Box* *Envelope* *Other* ______ *NA*
3. Were custody seals on coolers? NA Y [✓ N] If yes, how many and where? ______
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: ______ [✓ NA] Y N

5. **Temperature of cooler(s) upon receipt (°C):**	3.2	1.4	3.3	
Temperature Blank (°C):	N/A	0.4	2.6	
Thermometer ID:	262	263	261	
6. If applicable, list Chain of Custody Numbers:				

7. Packing material used. [✓ *Inserts*] *Baggies* *Bubble Wrap* *Gel Packs* [✓ *Wet Ice*] *Sleeves* *Other* ______
8. Were custody papers properly filled out (ink, signed, etc.)? NA [✓ Y] N
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA [✓ Y] N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA [✓ Y] N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* NA [✓ Y] N
12. **Were appropriate bottles/containers and volumes received for the tests indicated?** NA [✓ Y] N
13. Were the pH-preserved bottles tested* received at the appropriate pH? *Indicate in the table below* NA [✓ Y] N
14. Were VOA vials and 1631 Mercury bottles received without headspace? *Indicate in the table below.* NA [✓ Y] N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** NA [✓ Y] N
16. Was C12/Res negative? [✓ NA] Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Does not include all pH preserved sample aliquots received. See sample receiving SOP (SMO-GEN).

Additional Notes, Discrepancies, & Resolutions: Rec'd 4 empty 1L amber's, 2 500mL HCL's, and 2 40mL amber voas not used in coolers.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	URS Corporation	**Service Request :**	K0902399
Project Name :	IP Longview	**Date Collected :**	03/19/09
Project Number :	NA	**Date Received :**	03/20/09
Sample Matrix :	WATER		

Hydrocarbon Degrading Bacteria

Prep Method :	Brown and Braddock	Units :	MPN/100mL
Analysis Method	SM 9221 C	Basis :	NA
Test Notes :			

Sample Name	**Lab Code**	**MRL**	**MDL**	**Dilution Factor**	**Date Prepared**	**Date Analyzed**	**Result**	**Result Notes**
99EA 3A	K0902399-001	1000	1000	1	3/20/2009	04/10/09	65000	
AV-12	K0902399-002	1000	1000	1	3/20/2009	04/10/09	1000	
AV-11	K0902399-003	1000	1000	1	3/20/2009	04/10/09	7000	
AV-10	K0902399-004	1000	1000	1	3/20/2009	04/10/09	1000	

SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	URS Corporation	**Service Request :**	K0902399
Project Name :	IP Longview	**Date Collected :**	3/19/2009
Project Number :	NA	**Date Received :**	3/20/2009
Sample Matrix :	WATER	**Date Prepared :**	03/20/09
		Date Analyzed :	04/10/09

Duplicate Summary
Inorganic Parameters

Sample Name :	99EA 3A	Units :	MPN/100mL
Lab Code :	K0902399-001DUP	Basis :	NA
Test Notes :			

Analyte	**Prep Method**	**Analysis Method**	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**Result Notes**
Hydrocarbon Degrading Bacteria	Brown and Braddock	SM 9221 C	1000	65000	110000	87500	51	*

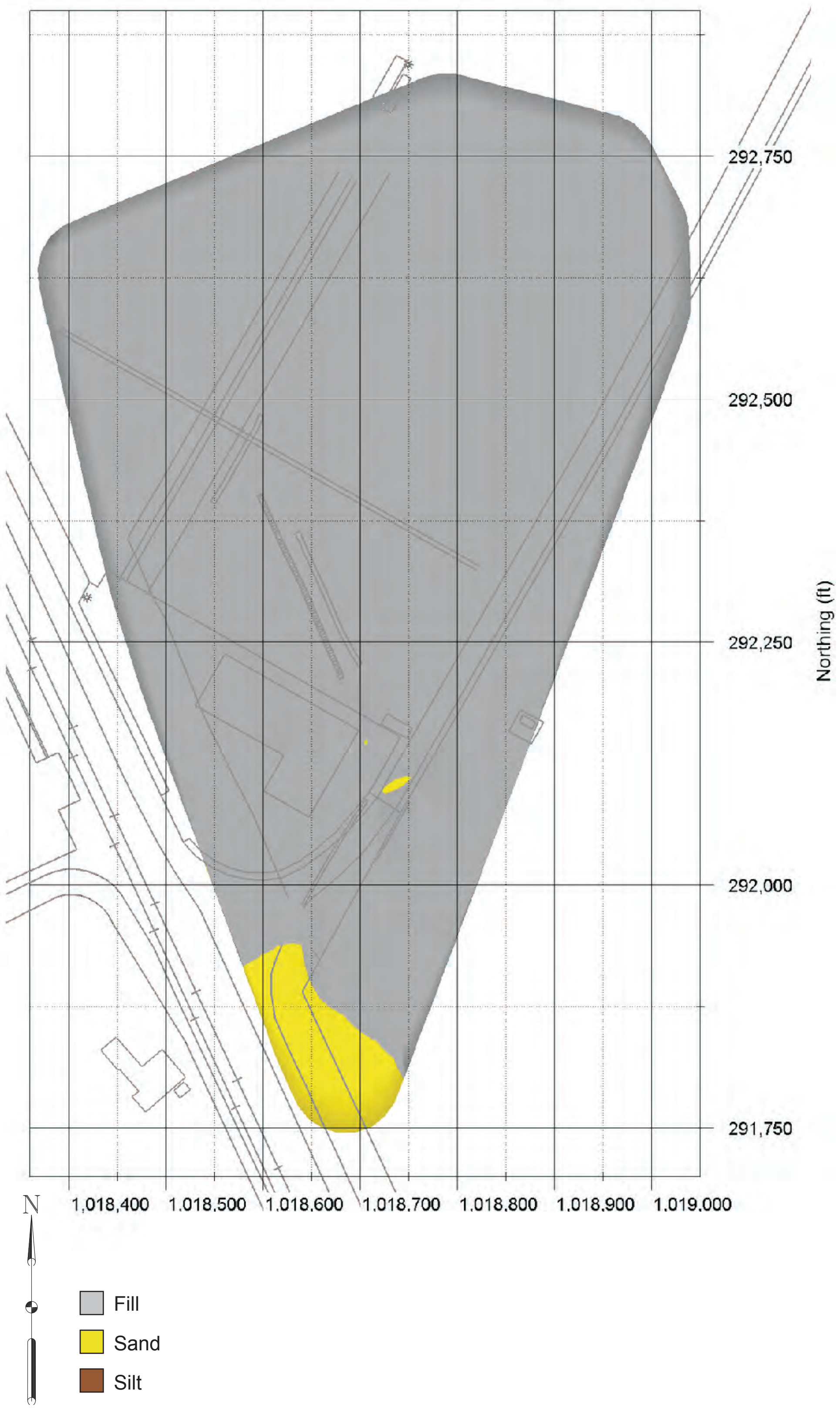
SM Standard Methods for the Examination of Water and Wastewater, 20th Ed., 1998.

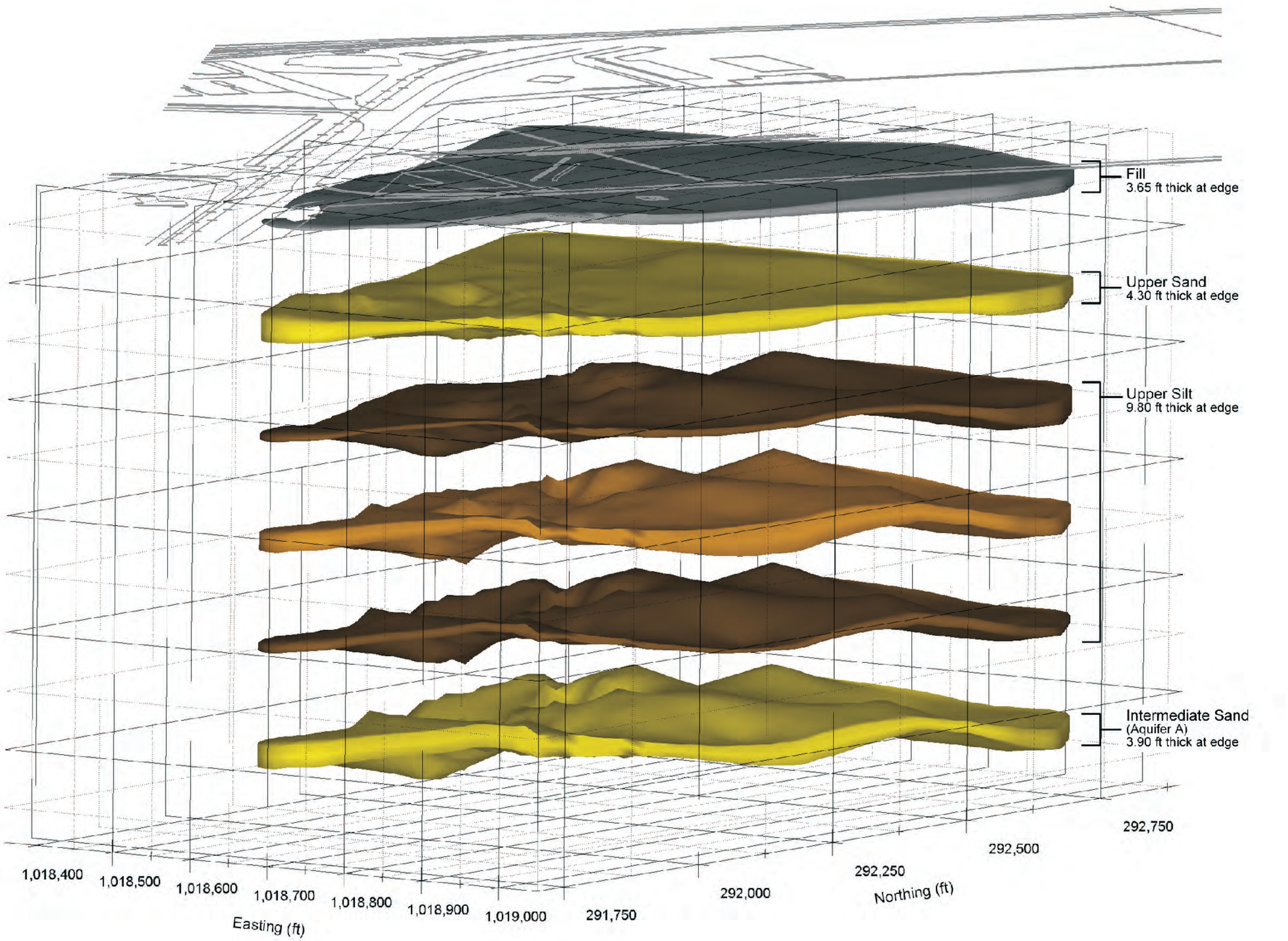
Report By: MKANALY

Appendix H

Environmental Visualization System Model Outputs - 2009

33759250_14.cdr



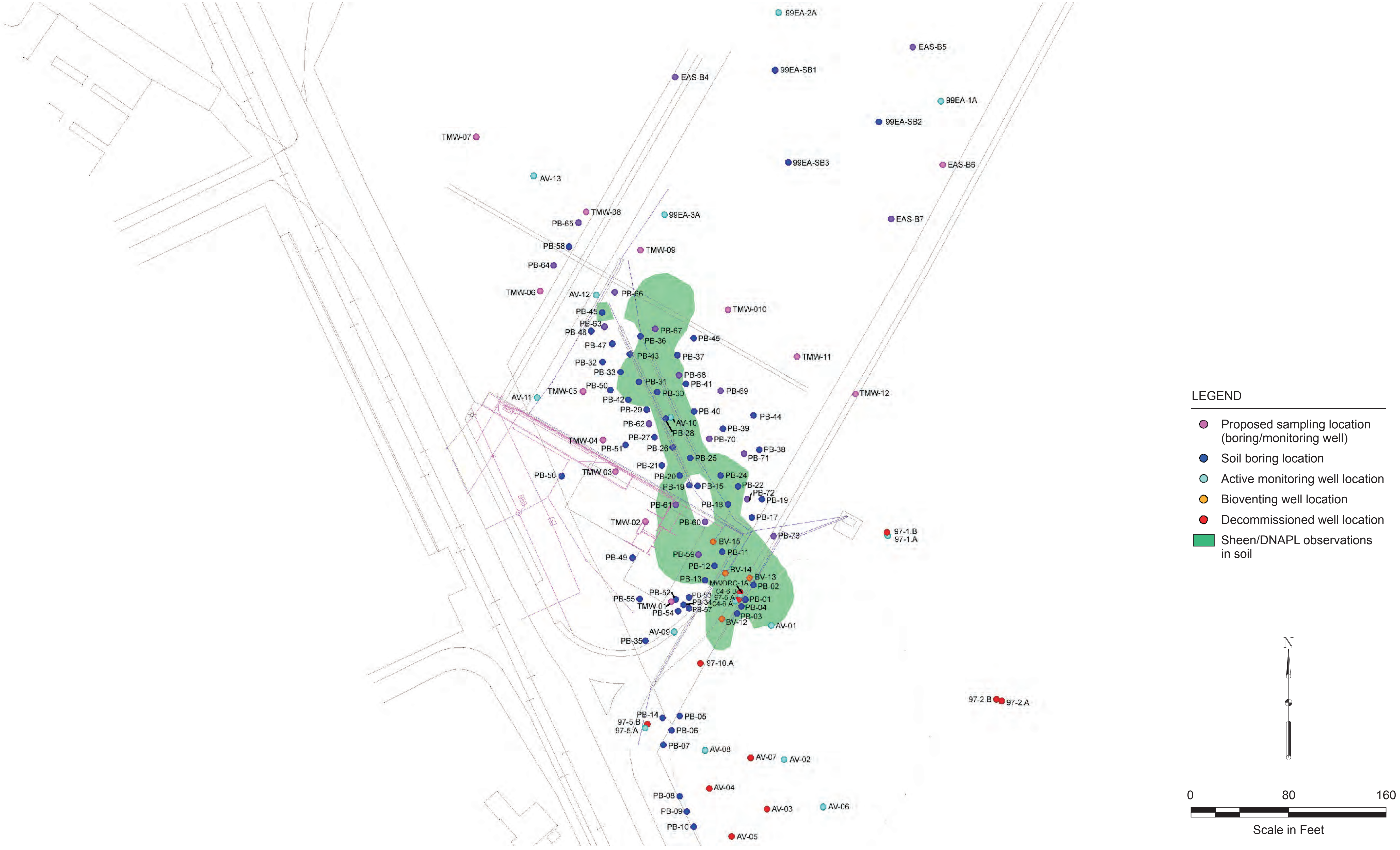


International Paper Longview, WA	Project No. 33759250

URS

Site Geology

33759250_14.cdr

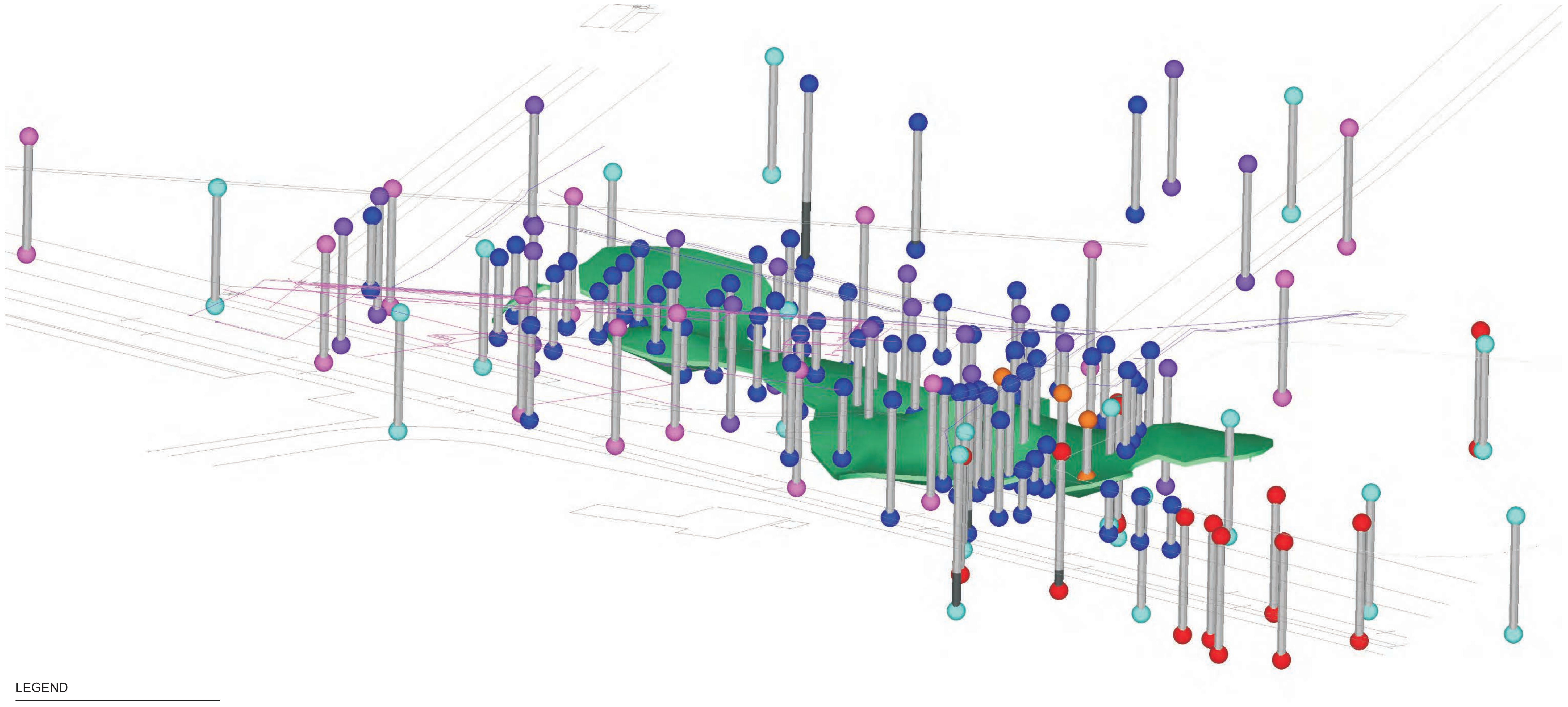


International Paper
Longview, WA

Project No.
33759250

Extent of Sheen/DNAPL Observations
Plan View

33759250_14.cdr



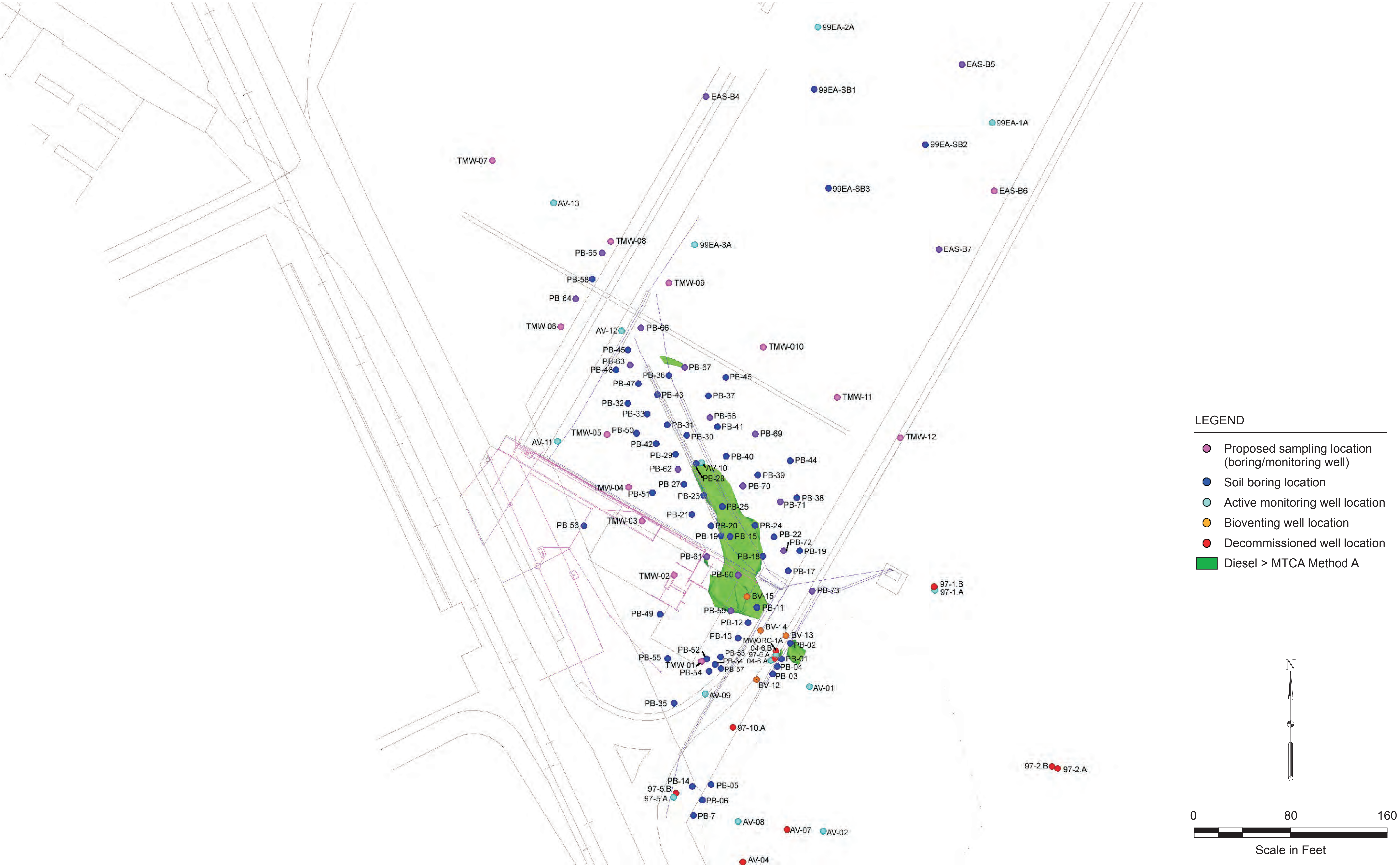
LEGEND

- 🟣 Proposed sampling location (boring/monitoring well)
- 🔵 Soil boring location
- ● Active monitoring well location
- 🟠 Bioventing well location
- 🔴 Decommissioned well location
- 🟩 Sheen/DNAPL observations in soil

International Paper Longview, WA	Project No. 33759250
URS	

Extent of Sheen/DNAPL Observations
Oblique View

33759250_14.cdr



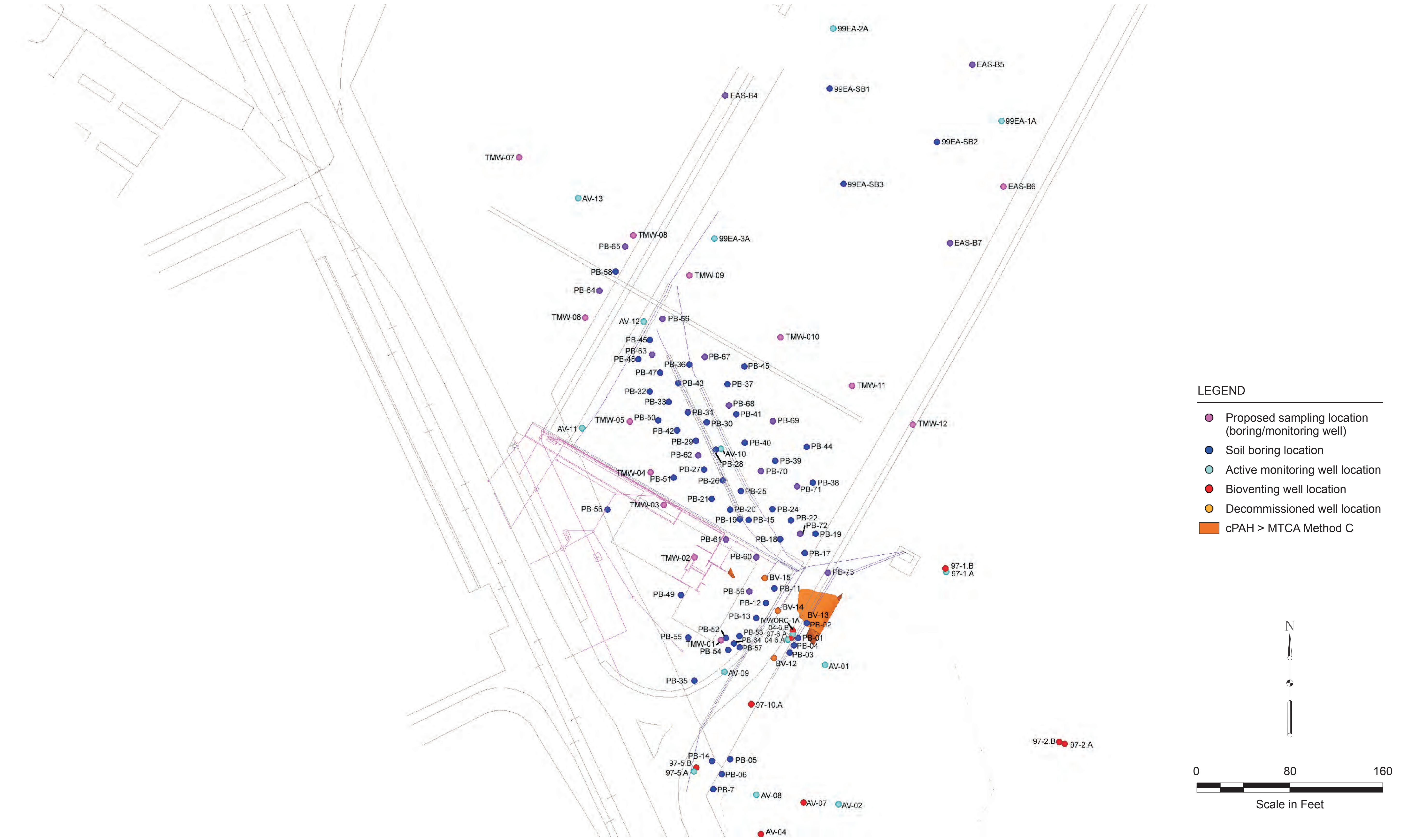
LEGEND

- ● Proposed sampling location (boring/monitoring well)
- ● Soil boring location
- ● Active monitoring well location
- ● Bioventing well location
- ● Decommissioned well location
- 🟩 Diesel > MTCA Method A

International Paper Longview, WA	Project No. 33759250
URS	

Extent of Diesel-Impacted Soils

33759250_14.cdr

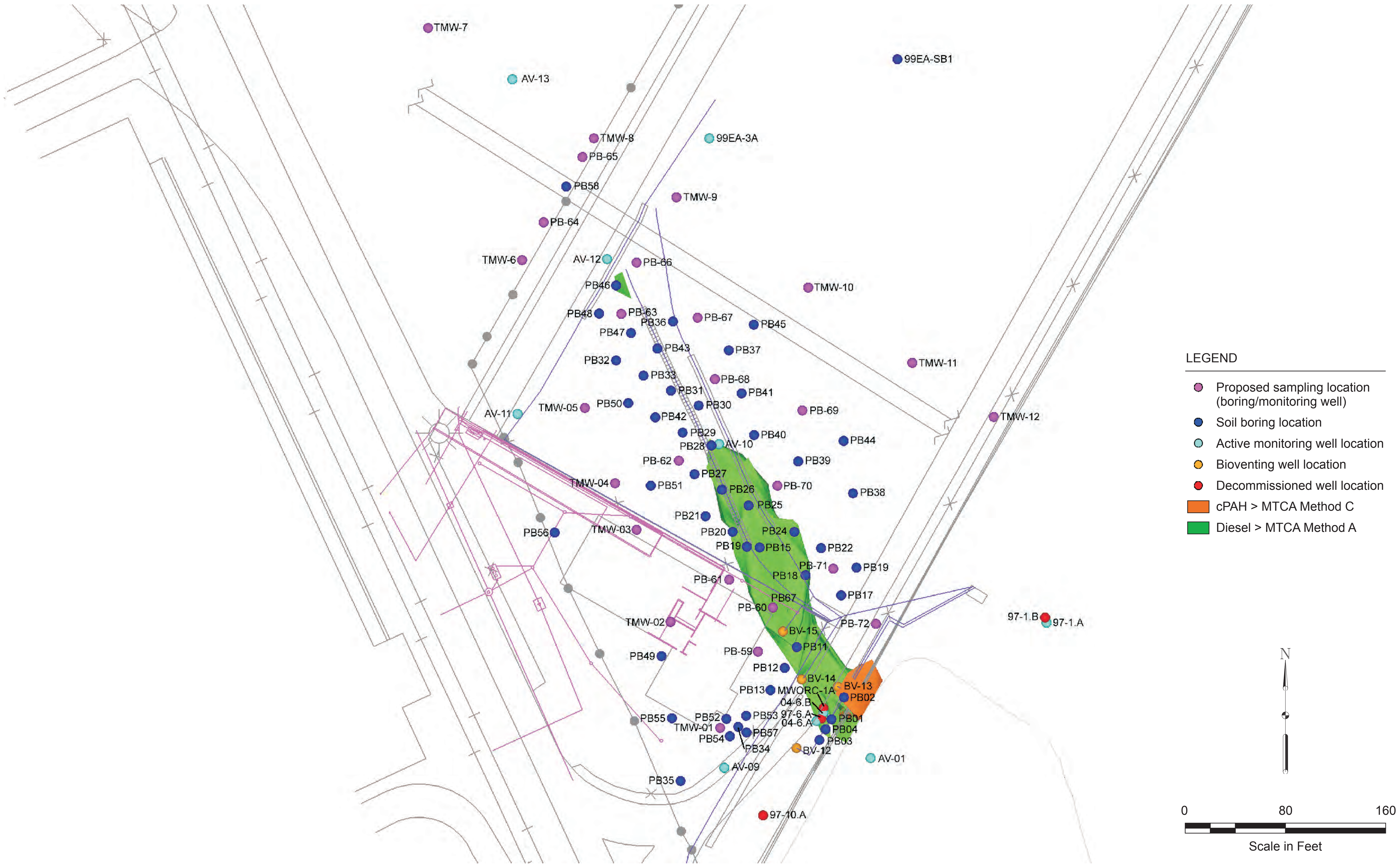


International Paper Longview, WA	Project No. 33759250

URS

Extent of cPAH-Impacted Soils

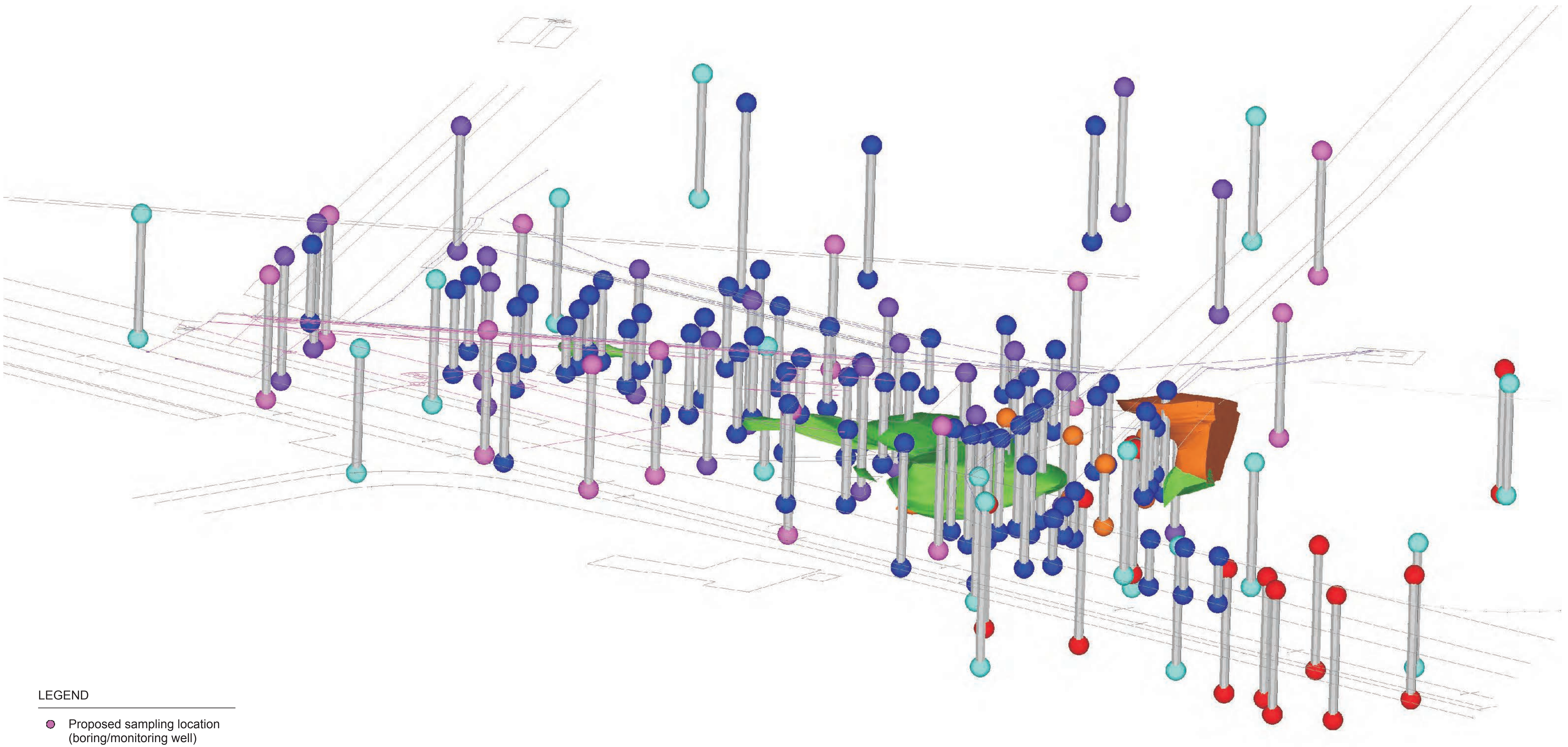
33759250_14.cdr



International Paper Longview, WA	Project No. 33759250
URS	

Extent of Impacted Soils
(2007 MTCA Cleanup Criteria) Plan View

33759250_14.cdr

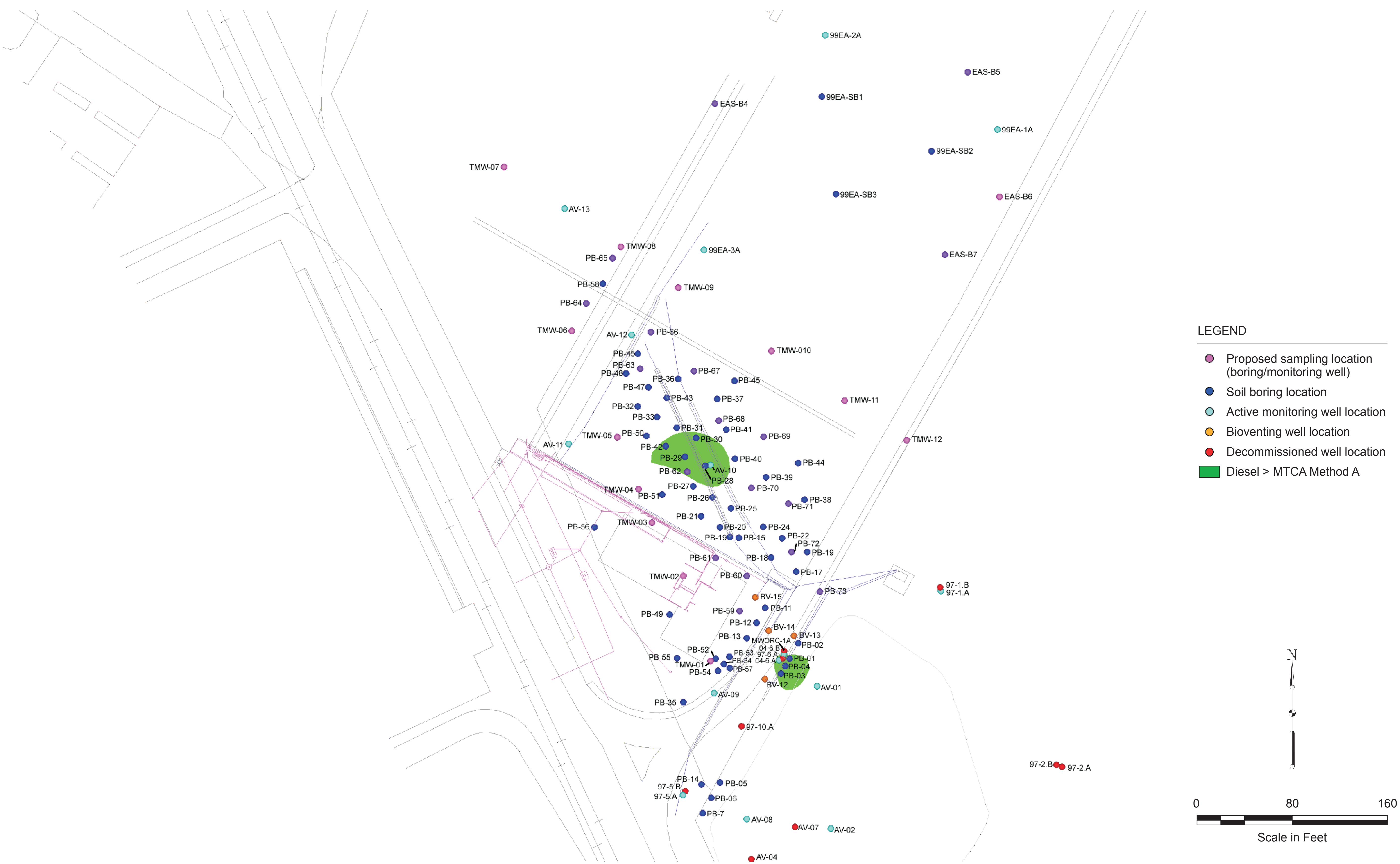


LEGEND

- ● Proposed sampling location (boring/monitoring well)
- ● Soil boring location
- ● Active monitoring well location
- ● Bioventing well location
- ● Decommissioned well location
- 🟧 cPAH > MTCA Method C
- 🟩 Diesel > MTCA Method A

International Paper Longview, WA	Project No. 33759250	Extent of Impacted Soils (2007 MTCA Cleanup Criteria) Oblique View
URS		

33759250_14.cdr



International Paper Longview, WA	Project No. 33759250
URS	

Extent of Diesel-Impacted Groundwater

International Paper Longview, WA	Project No. 33759250

URS

Extent of cPAH-Impacted Groundwater

33759250_14.cdr

International Paper
Longview, WA

Project No.
33759250

URS

Extent of Impacted Groundwater
(2007 MTCA Cleanup Criteria)

Appendix I

Feasibility Study Cleanup Action Alternative Calculations

EXPANDED COVER SYSTEM DISPOSAL VOLUME CALCULATIONS

URS

				Number of Pages	2
		Prjct #	33759250.07030	**Number of Sheets**	2
Job	IP Longview RI/FS	**Des'd**	Cary Brown	**Date**	April 28, 2011
Description	Soil Capacity Calculations	**Check'd**	Paul Kalina	**Date**	April 28, 2011

										Reference		Row
A	B	C	D	E	F	G	H	I	J	K	L	M

1.0 PROJECT INPUT

PROJECT	IP Longview RI/FS	**Client:**	International Paper
Engineer	Cary Brown	**City:**	Longview
Project No.	33759250.07030	**State:**	Washington

2.0 DESIGN OBJECTIVE

The objective of this analysis is to estimate the volume of soil which could potentially be placed into an expanded cover system. Two options were considered:
Option 1 - Raise the limits of the current cover system using the same slopes
Option 2 - Replace / expand the NE side of the current cover system with steeper slopes

3.0 REFERENCES

1 Description and Summary of Expanded Cover System
2 Option 1 Elevation View
3 Option 1 Plan View (Hand drawn on Drawing C-2)
4 Option 2 Plan View (CAD revised version of Drawing C-2 with modified contours)

4.0 GENERAL ASSUMPTIONS

1 Option 1 - Maintain existing slopes of less than 7 %
2 Option 2 - Increase slopes to no greater than 15 %
3 All volumes are shown in "Bank Volume". No expansion factor has been applied
4
5
6
7

4.1 SPREADSHEET USE

The spreadsheet uses the following color convention for cells used for the analysis in the spreadsheet

🟨	User input values
🟦	Calculated or referenced values input from another cell

EXPANDED COVER SYSTEM DISPOSAL VOLUME CALCULATIONS

URS

				Number of Pages		2
		Prjct #	33759250.07030	**Number of Sheets**		2
Job	IP Longview RI/FS	**Des'd**	Cary Brown	**Date**	April 28, 2011	
Description	Soil Capacity Calculations	**Check'd**	Paul Kalina	**Date**	April 28, 2011	
					Reference	**Row**

A	B	C	D	E	F	G	H	I	J	K	L	M

5.0 SPECIFIC ASSUMPTIONS AND CALCULATIONS

5.1 VOLUME - OPTION 1

The potential volume of waste if the cover is expanded with existing slopes

Average Length of Expansion = 80 ft

Average Width of Expansion = 40 ft

Contaminated Area = 3,200 ft^2

Height of Expansion = 4 ft

Expanded Capacity Volume = 12,800 ft^3

Expanded Capacity Volume = 474 CY

5.1 VOLUME - OPTION 2

The potential volume of waste if the cover is expanded to the NE with increased slopes

Contaminated Area = 36,000 ft^2 from CAD

Expanded Capacity Volume = 1,682 CY from CAD

Expand Existing Landfill Cover System

URS evaluated the potential to expand the capacity of the existing cover system for long term disposal of contaminated soil. The purpose of the evaluation was to determine the potential to place additional soil above the existing cover system. Additional disposal volumes were calculated for two potential options.

- Option 1: Raise the top of the landfill and maintain existing slopes
- Option 2: Expand the northeast side of the landfill and increase slopes

Option 1

Assuming the existing slopes of the cover system was maintained a potential 475 cubic yards (CY) of additional capacity could be realized. This assumes the additional waste would be placed above elevation 17 feet. Portions of the landfill below the cover material elevation 17 feet would remain the same.

Option 2

This option calculated the additional capacity if portions of the existing cover system was removed and reconstructed with steeper slopes. If this were done, potentially 1,680 CY of additional fill could be placed with slopes of around 10 percent.

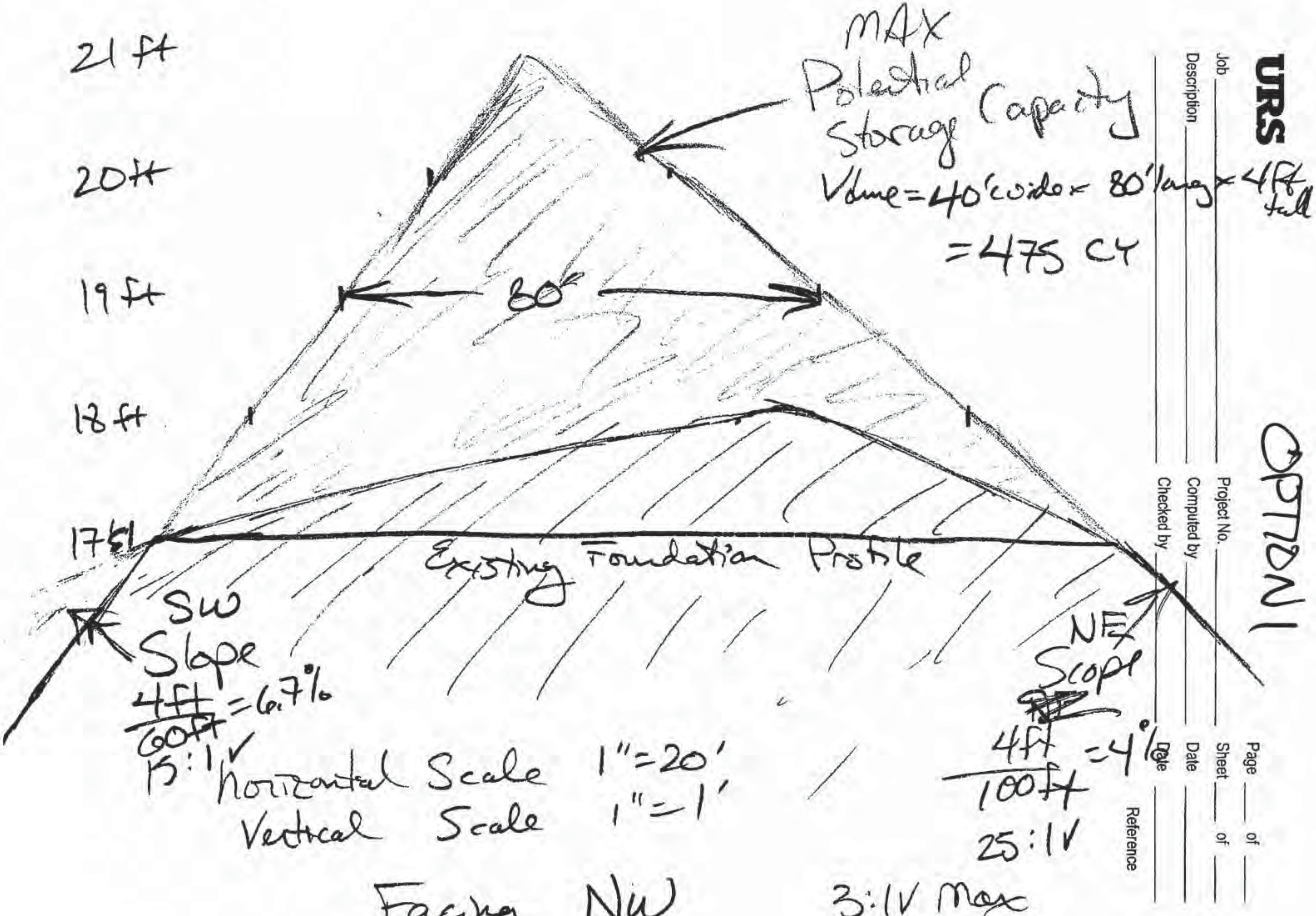
Conclusion

The only way to create enough disposal capacity within the confines of the existing barrier wall and cover system would be to use option 2.

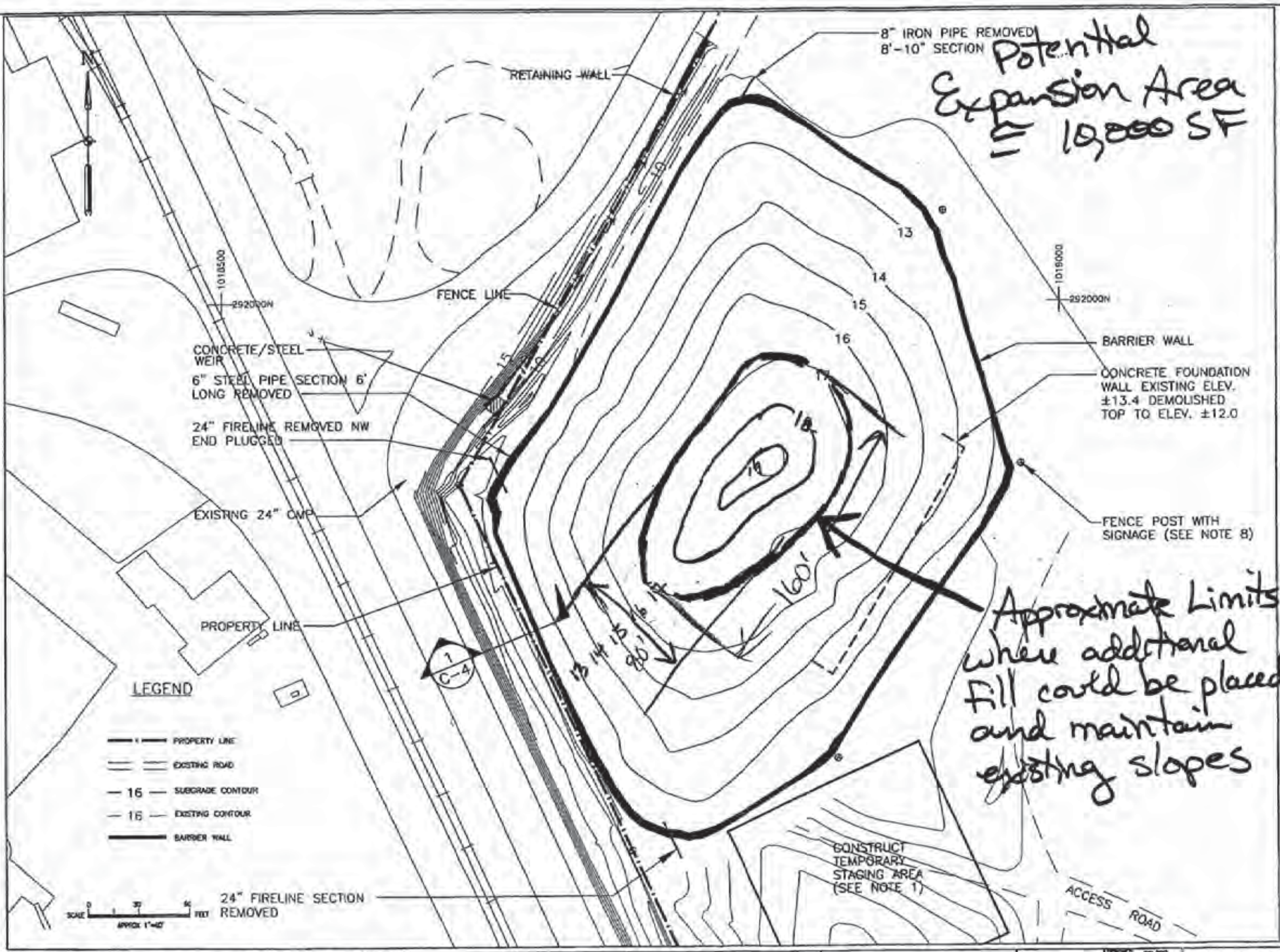
URS

OPTION 1

Job
Description
Project No.
Computed by
Checked by
Page ____ of ____
Sheet ____ of ____
Date
Date
Reference



OPTION 1



Potential Expansion Area ≅ 10,000 SF

Approximate Limits where additional fill could be placed and maintain existing slopes

NOTES:

1. CONSTRUCT TEMPORARY STAGING AREA AND ACCESS ROAD AT LOCATIONS AS SHOWN. SIZE STAGING AREA AS NEEDED, SUBJECT TO APPROVAL BY THE RESIDENT ENGINEER.

2. TEMPORARY GRADING WILL BE REQUIRED TO SUPPORT BARRIER WALL CONSTRUCTION EQUIPMENT. TEMPORARY SLOPES SHALL NOT BE STEEPER THAN 3 HORIZONTAL TO 1 VERTICAL UNLESS APPROVED BY THE RESIDENT ENGINEER. FOUNDATION SOILS FOR TEMPORARY GRADING SHALL BE PROOFROLLED. TEMPORARY FILL SHALL BE COMPACTED TO AT LEAST 90% MODIFIED PROCTOR MAXIMUM DRY DENSITY. TEMPORARY GRADES SHALL ALLOW FOR CONTROLLED DRAINAGE OFF OF WORK AREAS. TEMPORARY GRADING PLAN TO BE APPROVED BY THE RESIDENT ENGINEER.

3. TEMPORARY GRADING MAY REQUIRE INTERRUPTION OF FLOW WITHIN DRAINAGE DITCHES ALONG THE PERIMETER OF THE SITE. PROVISIONS SUCH AS REALIGNMENT, TEMPORARY PIPES, OR CULVERTS SHALL BE INSTALLED TO MITIGATE FLOODING. TEMPORARY DRAINAGE PLAN TO BE APPROVED BY THE RESIDENT ENGINEER.

4. CONSTRUCT BARRIER WALL TO ALIGNMENT SHOWN ON PLANS. THE BARRIER WALL SHALL BE CONSTRUCTED TO ELEVATION −30.00 COLUMBIA RIVER DATUM. THE BARRIER WALL SHALL MEET THE REQUIREMENTS SET FORTH IN THE ENGINEERING DESIGN REPORT.

5. DEMOLISH AND DISPOSE OF EXISTING GEOMEMBRANE CAP WHERE NECESSARY TO MEET GEOMEMBRANE FOUNDATION GRADES. SEE SECTION 3, SHEET C-4.

6. GRADES SHOWN FOR GEOMEMBRANE FOUNDATION ARE ESTIMATED. ACTUAL FOUNDATION GRADES TO BE DETERMINED DURING CONSTRUCTION BY THE RESIDENT ENGINEER, UNDER THE CRITERIA PRESENTED IN THE ENGINEERING DESIGN REPORT. CUT AREAS OF THE FOUNDATION SHALL BE PROOFROLLED. FILL REQUIRED FOR GRADING SHALL BE PLACED AND COMPACTED TO A MINIMUM OF 90% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY.

7. PLACE 30-MIL PVC LINER WITHIN AREA BOUNDED BY BARRIER WALL. PRIMARY SEAMING TO BE PERFORMED WITH HOT WEDGE WELDING. SECONDARY AND REPAIR WORK MAY BE SOLVENT WELDED IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS. FIELD WELD AS NECESSARY. TIE INTO BARRIER WALL AS SHOWN ON SECTION 1, SHEET C-4. PVC SUPPLIER SHALL BE APPROVED BY THE RESIDENT ENGINEER.

8. NOTE BARRIER WALL TO BE MARKED WITH 6" FENCE POST WITH THE FOLLOWING METAL SIGNAGE "CAUTION BARRIER WALL BELOW GRADE"

10/29/99

BARRY C. O'MEARA
32538
EXPIRES: 3/28/00

REV	DESCRIPTION OF REVISION	BY	DATE
1	NORTH WALL POINT RELOCATION	BCO	9/08/99
2	RECORD TO LOCATIONS	BCO	10/29/99

RECORD DRAWING

International Paper

URS Greiner Woodward Clyde
1501 FOURTH AVENUE, SUITE 1500
SEATTLE, WASHINGTON 98101-1662
TEL: (206) 343-7933 FAX: (206) 343-0513

WARNING
IF BAR DOES NOT MEASURE 1/2" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

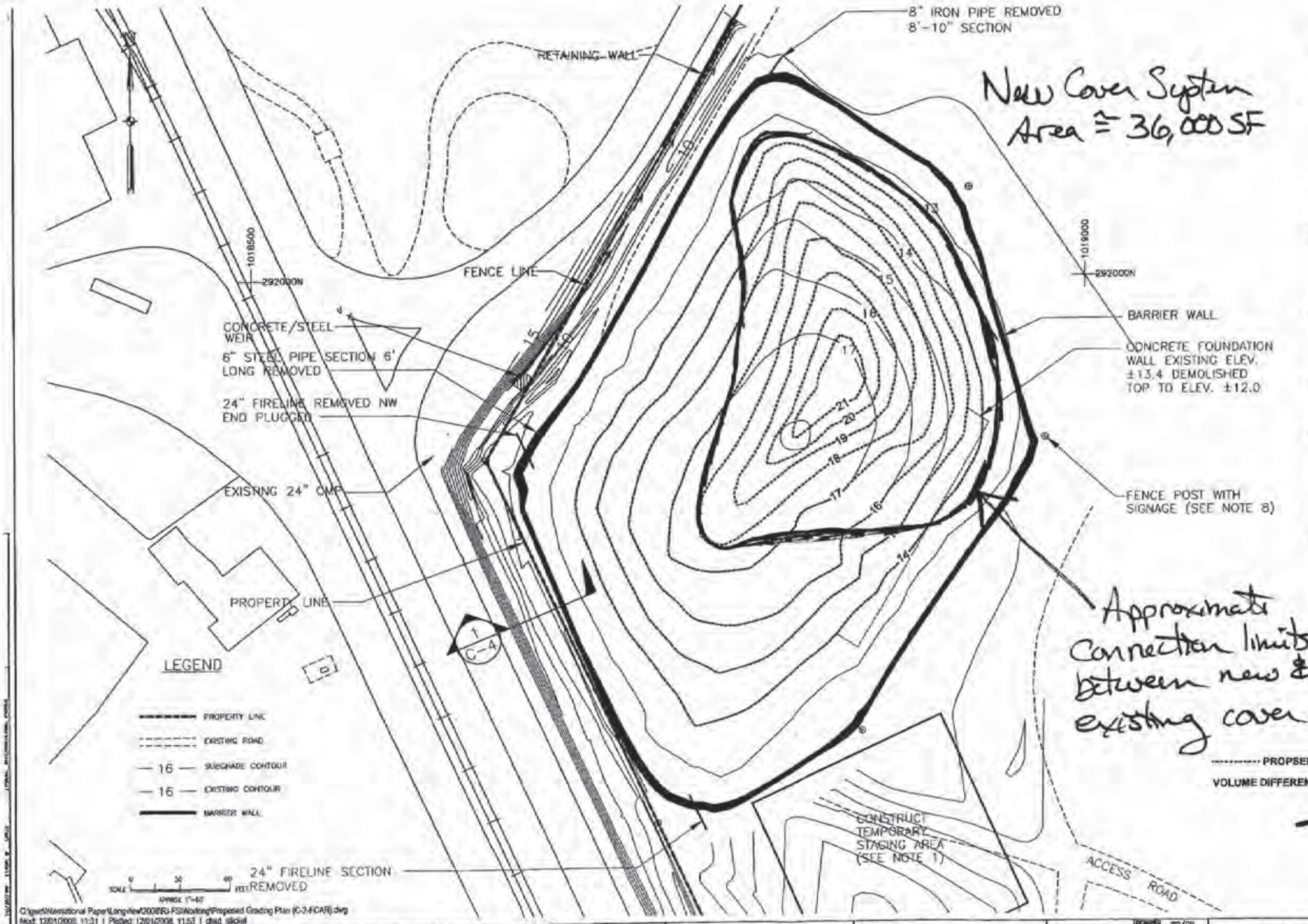
DESIGNED	SP/DR
DRAWN	BLH
CHECKED	DR
PEER REVIEWED	ADS
PROJECT MANAGER	RS
DATE	2/12/99
DWG SCALE	1"=60'

INTERNATIONAL PAPER LONGVIEW, WA

BARRIER WALL ALIGNMENT AND SUBGRADE GRADING PLAN

REVISION 2
PROJECT 61C07566
DRAWING NO. C-2

OPTION 2



New Cover System
Area ≅ 36,000 SF

Approximate Connection limits between new & existing cover materials

.... PROPSED GRADING PLAN

VOLUME DIFFERENCE: 1,681.66 CU. YD.<FILL>

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8. NOTE BARRIER WALL TO BE MARKED WITH 6' FENCE POST WITH THE FOLLOWING METAL SIGNAGE "CAUTION BARRIER WALL BELOW GRADE"

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Mod: 12/01/2008, 11:31 | Plotted: 12/01/2008, 11:53 | chad_stickel

REV	DESCRIPTION OF REVISION	BY	DATE
1	NORTH WALL POINT RELOCATION	BCO	9/06/99
2	RECORD TO LOCATIONS	BCO	10/28/99

RECORD
DRAWING

International Paper

URS Greiner Woodward Clyde
1501 FOURTH AVENUE, SUITE 1500
SEATTLE, WASHINGTON 98101-1662
TEL: (206) 343-7933 FAX: (206) 343-0513

WARNING
0 1/4 1/2
IF BAR DOES NOT MEASURE 1/2" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

DESIGNED	SP/GR
DRAWN	RLH
CHECKED	GR
PEER REVIEWED	ADS
PROJECT MANAGER	RS
DATE	2/12/99
DWG SCALE	1"=60'

INTERNATIONAL PAPER LONGVIEW, WA

BARRIER WALL ALIGNMENT AND
SUBGRADE GRADING PLAN

REVISION 2
PROJECT 91C07900
DRAWING NO. C−2

IP Longview
Manufacturing Facility Area
Feasibility Study

Quantity and Mass Removal Calculations by Alternative

Notes and Conversions

Abbreviations and Acronyms

sqft -	square feet
ft -	feet
cyds-	cubic yards
kg -	kilogram
gal -	gallon
lbs -	pounds

Conversions

1 ton =	907.19405	kg
1 cyd =	201.987	gal
1 ug =	2.20E-09	lb

IP Longview
Manufacturing Facility Area
Feasibility Study

Quantity and Mass Removal Calculations by Alternative

Alternative: S1 - Comprehensive Excavation

	Parameter	**Quantity**	**Units**	**Basis**
(a)	**Total Treatment Area**	**34,700**	**sqft**	**Polygon area calculated in CAD**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	7,700	sqft	Calculated as a-b-d
(d)	Treatment Area Beneath Building	2,100	sqft	Polygon area calculated in CAD
(e)	Total DNAPL Area	13,700	sqft	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
	Treatment Volume (Excavation)			
(i)	DNAPL	170	cyds	Calculated volume based on polygon area and DNAPL thickness (e*f)
(j)	Soil > Method C	6,300	cyds	Calculated as (a*g)-i
(k)	Overburden	3,900	cyds	Calculated as a*h
	Total Excavation Volume	*10,370*	*CY*	Calculated as i + j + k
	Total Treatment Volume	**6,470**	**CY**	Calculated as i + j
	Soil Characteristics			
(l)	Soil density	1.5	tons/cyd	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in SE Treatment Area			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	Concentrations in NW Treatment Area			
(r)	Mean cPAH	13,887	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(s)	Mean DRO	3,200,000	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(t)	Mean Napthalene	204,690	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
	Concentrations in Treatment Area Beneath Building			
(u)	Mean cPAH	6,317	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(v)	Mean DRO	7,807,000	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(w)	Mean Napthalene	4,466	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
	COC Removal Quantities			
	DNAPL	1,550	gal	Calculated as i*m*n
	cPAH	124	lbs	Calculated as (j*l*o*b/a)+(j*l*r*c/a)+(j*l*u*d/a)
	DRO	151,451	lbs	Calculated as (j*l*p*b/a)+(j*l*s*c/a)+(j*l*v*d/a)
	Napthalene	24,488	lbs	Calculated as (j*l*q*b/a)+(j*l*t*c/a)+(j*l*w*d/a)
	Total Mass of COCs	**176,000**	**lbs**	

IP Longview
Manufacturing Facility Area
Feasibility Study

Quantity and Mass Removal Calculations by Alternative

Alternative: S2 - Comprehensive Excavation Outside Building Footprint

	Parameter	Quantity	Units	Basis
(a)	**Total Treatment Area**	**32,600**	**sqft**	**Polygon area calculated in CAD**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	7,700	sqft	Calculated as a-b-d
(d)	Treatment Area Beneath Building	-	sqft	No treatment occurring beneath building
(e)	DNAPL Area Outside Building	12,800	sqft	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
	Treatment Volume (Excavation)			
(i)	DNAPL	160	cyds	Calculated volume based on polygon area and DNAPL thickness (e*f)
(j)	Soil > Method C	5,900	cyds	Calculated as (a*g)-i
(k)	Overburden	3,600	cyds	Calculated as a*h
	Total Excavation Volume	*9,660*	*CY*	Calculated as i + j + k
	Total Treatment Volume	**6,060**	**CY**	Calculated as i + j
	Soil Characteristics			
(l)	Soil density	1.5	tons/cyd	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in SE Treatment Area			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	Concentrations in NW Treatment Area			
(r)	Mean cPAH	13,887	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(s)	Mean DRO	3,200,000	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(t)	Mean Napthalene	204,690	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
	COC Removal Quantities			
	DNAPL	1,450	gal	Calculated as i*m*n
	cPAH	116	lbs	Calculated as (j*l*o*b/a)+(j*l*r*c/a)+(j*l*u*d/a)
	DRO	142,070	lbs	Calculated as (j*l*p*b/a)+(j*l*s*c/a)+(j*l*v*d/a)
	Napthalene	24,405	lbs	Calculated as (j*l*q*b/a)+(j*l*t*c/a)+(j*l*w*d/a)
	Total Mass of COCs	**167,000**	**lbs**	

IP Longview
Manufacturing Facility Area
Feasibility Study

Quantity and Mass Removal Calculations by Alternative

Alternative: S3 - DNAPL Excavation Outside Building Footprint

	Parameter	Quantity	Units	Basis
(a)	**Total Treatment Area**	**24,900**	**sqft**	**Polygon area calculated in CAD**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	-	sqft	No treatment occurring in the NW Treatment Area
(d)	Treatment Area Beneath Building	-	sqft	No treatment occurring beneath building
(e)	DNAPL Area Outside Building	12,800	sqft	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
	Treatment Volume (Excavation)			
(i)	DNAPL	160	cyds	Calculated volume based on polygon area and DNAPL thickness (e*f)
(j)	Soil > Method C	4,500	cyds	Calculated as (a*g)-i
(k)	Overburden	2,800	cyds	Calculated as a*h
	Total Excavation Volume	*7,460*	*CY*	Calculated as i + j + k
	Total Treatment Volume	**4,660**	**CY**	Calculated as i + j
	Soil Characteristics			
(l)	Soil density	1.5	tons/cyd	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in SE Treatment Area			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	COC Removal Quantities			
	DNAPL	1,450	gal	Calculated as i*m*n
	cPAH	58	lbs	Calculated as (j*l*o*b/a)+(j*l*r*c/a)+(j*l*u*d/a)
	DRO	128,508	lbs	Calculated as (j*l*p*b/a)+(j*l*s*c/a)+(j*l*v*d/a)
	Napthalene	23,516	lbs	Calculated as (j*l*q*b/a)+(j*l*t*c/a)+(j*l*w*d/a)
	Total Mass of COCs	**152,000**	**lbs**	

IP Longview
Manufacturing Facility Area
Feasibility Study

Quantity and Mass Removal Calculations by Alternative

Alternative: S4 - DNAPL Excavation Outside Building Footprint, Limited Excavation Inside

	Parameter	Quantity	Units	Basis
(a)	**Total Treatment Area**	**26,400**	**sqft**	**Calculated as b+c+d**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	-	sqft	No treatment occurring in the NW Treatment Area
(d)	Treatment Area Beneath Building	1,500	sqft	Assumes 70% of soil beneath building can be excavated with limited impact to building
(e)	Total DNAPL Area	13,700	sqft	Polygon area calculated in CAD
(e1)	DNAPL Area Inside Building	900	sqft	Polygon area calculated in CAD
	<u>Treatment Thickness</u>			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
	<u>Treatment Volume (Excavation)</u>			
(i)	DNAPL	170	cyds	Calculated volume based on polygon area and DNAPL thickness outside building, 70% of volume under building ((e-e1)*f+e1*f*0.7
(j)	Soil > Method C	4,700	cyds	Calculated as (a*g)-i
(k)	Overburden	2,900	cyds	Calculated as a*h
	Total Excavation Volume	*7,770*	*CY*	Calculated as i + j + k
	Total Treatment Volume	**4,870**	**CY**	Calculated as i + j
	<u>Soil Characteristics</u>			
(l)	Soil density	1.5	tons/cyd	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	<u>Concentrations in SE Treatment Area</u>			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	<u>Concentrations in Treatment Area Beneath Building</u>			
(u)	Mean cPAH	6,317	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(v)	Mean DRO	7,807,000	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(w)	Mean Napthalene	4,466	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
	<u>COC Removal Quantities</u>			
	DNAPL	1,550	gal	Calculated as i*m*n
	cPAH	62	lbs	Calculated as (j*l*o*b/a)+(j*l*r*c/a)+(j*l*u*d/a)
	DRO	132,848	lbs	Calculated as (j*l*p*b/a)+(j*l*s*c/a)+(j*l*v*d/a)
	Napthalene	23,169	lbs	Calculated as (j*l*q*b/a)+(j*l*t*c/a)+(j*l*w*d/a)
	Total Mass of COCs	**156,000**	**lbs**	

IP Longview
Manufacturing Facility Area
Feasibility Study

Quantity and Mass Removal Calculations by Alternative

Alternative: S5 - Solidification Outside Building Footprint

	Parameter	Quantity	Units	Basis
(a)	**Total Treatment Area**	**32,600**	**sqft**	**Polygon area calculated in CAD**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	7,700	sqft	Calculated as a-b-d
(d)	Treatment Area Beneath Building	-	sqft	No treatment occurring beneath building
(e)	DNAPL Area Outside Building	12,800	sqft	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
(h1)	Silt treated under target zone	1	ft	Assumed thickness of soil solidified under the target treatment zone
	Treatment Volume (Solidification)			
(i)	DNAPL	160	cyds	Calculated volume based on polygon area and DNAPL thickness (e*f)
(j)	Soil > Method C	5,900	cyds	Calculated as (a*g)-i
(k)	Overburden	3,600	cyds	Calculated as a*h
(k1)	Solidified Silt Underburden	1,200	cyds	Calculated as a*h1
	Total Disturbed Volume	*10,860*	*CY*	Calculated as i+j+k+k1
	Total Solidified Volume	**7,260**	**CY**	Calculated as i+j+k1
	Soil Characteristics			
(l)	Soil density	1.5	tons/cyd	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in SE Treatment Area			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	Concentrations in NW Treatment Area			
(r)	Mean cPAH	13,887	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(s)	Mean DRO	3,200,000	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(t)	Mean Napthalene	204,690	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
	COC Removal Quantities			
	DNAPL	1,450	gal	Calculated as i*m*n
	cPAH	116	lbs	Calculated as (j*l*o*b/a)+(j*l*r*c/a)+(j*l*u*d/a)
	DRO	142,070	lbs	Calculated as (j*l*p*b/a)+(j*l*s*c/a)+(j*l*v*d/a)
	Napthalene	24,405	lbs	Calculated as (j*l*q*b/a)+(j*l*t*c/a)+(j*l*w*d/a)
	Total Mass of COCs	**167,000**	**lbs**	

IP Longview
Manufacturing Facility Area
Feasibility Study

Quantity and Mass Removal Calculations by Alternative

Alternative: S5A - Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop

	Parameter	**Quantity**	**Units**	**Basis**
(a)	**Total Treatment Area**	**32,600**	**sqft**	**Polygon area calculated in CAD**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	7,700	sqft	Calculated as a-b-d
(d)	Treatment Area Beneath Building	-	sqft	No soil treatment occurring beneath building, only free product recovery
(e)	Total DNAPL Area	13,700	sqft	Polygon area calculated in CAD
(e1)	DNAPL Area Inside Building	900	sqft	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
(h1)	Silt treated under target zone	1	ft	Assumed thickness of soil solidified under the target treatment zone
	Treatment Volume Outside Building Footprint			
(i)	DNAPL	160	cyds	Calculated volume based on polygon area and DNAPL thickness outside building ((e-e1)*f)
(j)	Soil > Method C	5,900	cyds	Calculated as (a*g)-i
(k)	Overburden	3,600	cyds	Calculated as a*h
(k1)	Solidified Silt Underburden	1,200	cyds	Calculated as a*h1
	Total Disturbed Volume	*10,860*	*CY*	Calculated as i+j+k+k1
	Total Solidified Volume	**7,260**	**CY**	Calculated as i+j+k1
	Treatment Volume Inside Building Footprint			
(l)	DNAPL	10	cyds	Calculated volume based on polygon area and DNAPL thickness inside building (e1*f)
	Soil Characteristics			
(m)	Soil density	1.5	tons/cyd	Engineer's estimate
(n)	Porosity	30%	Percent	Engineer's estimate
(o)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in SE Treatment Area			
(p)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(r)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	Concentrations in NW Treatment Area			
(s)	Mean cPAH	13,887	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(t)	Mean DRO	3,200,000	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(u)	Mean Napthalene	204,690	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
	Treatment Efficacy (DNAPL Recovery Under Building Only)			
(y)	Estimated % Reduction DNAPL	50%	Percent	Engineer's estimate
	COC Removal Quantities			
	DNAPL	1,500	gal	Calculated as i*n*o+l*n*o*y
	cPAH	116	lbs	Calculated as (j*m*p*b/a)+(j*m*s*c/a)+(j*m*v*d/a)
	DRO	142,070	lbs	Calculated as (j*m*q*b/a)+(j*m*t*c/a)+(j*m*w*d/a)
	Napthalene	24,405	lbs	Calculated as (j*m*r*b/a)+(j*m*u*c/a)+(j*m*x*d/a)
	Total Mass of COCs	**167,000**	**lbs**	

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Quantity and Mass Removal Calculations by Alternative

Alternative: S5B - Solidification Outside and Inside Building Footprint with Relocation of Soil Near Railroad Tracks

	Parameter	**Quantity**	**Units**	**Basis**
(a)	**Total Treatment Area**	**34,700**	**SF**	**Calculated b+c+c1+d**
(b)	Solidification Area Outside Building (SE)	23,700	SF	Polygon area calculated in CAD
(c)	Excavation and Relocate Area (NW)	7,700	SF	Polygon area calculated in CAD
(c1)	Excavation and Relocate Area (NW) 80' RR tracks	1,200	SF	Polygon area calculated in CAD
(d)	Treatment Area Beneath Building	2,100	SF	Polygon area calculated in CAD
(e)	Total DNAPL Area	13,700	SF	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	FT	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	FT	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	FT	Generalized mean fill thickness based on observations in boring logs
(h1)	Silt treated under target zone	1	FT	Assumed thickness of soil solidified under the target treatment zone
	Treatment Volume (Solidification)			
(i)	DNAPL	170	CY	Calculated volume based on polygon area and DNAPL thickness (e*f)
(j)	Soil > Method C	6,300	CY	Calculated as (a*g)-i
(k)	Overburden	3,900	CY	Calculated as a*h
(k1)	Solidified Silt Underburden	1,000	CY	Calculated as (b+d)*h1
	Total Disturbed Volume	*11,370*	*CY*	Calculated as i+j+k+k1
	Total Solidified Volume	**7,470**	**CY**	Calculated as i+j+k1
	Total Relocated Volume	**1,650**	**CY**	Calculated as (c+c1)*g
	Soil Characteristics			
(l)	Soil density	1.5	tons/CY	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in Solidification Area Outside the Building (SE Treatment Area)			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	Concentrations in Excavation Area (NW Treatment Area)			
(r)	Mean cPAH	13,887	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(s)	Mean DRO	3,200,000	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(t)	Mean Napthalene	204,690	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
	Concentrations in Treatment Area Beneath Building			
(u)	Mean cPAH	6,317	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(v)	Mean DRO	7,807,000	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(w)	Mean Napthalene	4,466	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
	COC Removal Quantities			
	DNAPL	1,550	gal	Calculated as i*m*n
	cPAH	124	lbs	Calculated as (j*l*o*b/a)+(j*l*r*c/a)+(j*l*o*c1/a)+(j*l*u*d/a)
	DRO	151,451	lbs	Calculated as (j*l*p*b/a)+(j*l*s*c/a)+(j*l*p*c1/a)+(j*l*v*d/a)
	Napthalene	24,488	lbs	Calculated as (j*l*q*b/a)+(j*l*t*c/a)+(j*l*q*c1/a)+(j*l*w*d/a)
	Total Mass of COCs	**176,000**	**lbs**	

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Quantity and Mass Removal Calculations by Alternative

Alternative: S5C - Solidification Outside Building Footprint, Electrical Resistance Heating Treatment under Mechanics Shop

	Parameter	**Quantity**	**Units**	**Basis**
(a)	**Total Treatment Area**	**34,700**	**sqft**	**Calculated b+c+d**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(b1)	ERH Area within SE Treatment Area	5,200	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	7,700	sqft	Calculated in Alt S5
(d)	ERH Treatment Area Beneath Building	2,100	sqft	Polygon area calculated in CAD
(e)	Total DNAPL Area	13,700	sqft	Polygon area calculated in CAD
(e1)	DNAPL Area in ERH Treatment Area	4,200	sqft	Polygon area calculated in CAD
	<u>Treatment Thickness</u>			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
(h1)	Silt treated under target zone	1	ft	Assumed thickness of soil solidified under the target treatment zone
	<u>Treatment Volume (Solidification)</u>			
(i)	DNAPL	120	cyds	Calculated volume based on polygon area and DNAPL thickness (e-e1*f)
(j)	Soil > Method C	5,000	cyds	Calculated as (a-b1-d)*g-i
(k)	Overburden	3,000	cyds	Calculated as (a-b1-d)*h
(k1)	Solidified Silt Underburden	1,000	cyds	Calculated as (a-b1-d)*h1
	Total Disturbed Volume	*9,120*	*CY*	Calculated as i+j+k+k1
	Total Solidified Volume	**6,120**	**CY**	Calculated as i+j+k1
	<u>Treatment Volume (ERH)</u>			
(l)	DNAPL	50	cyds	Calculated volume based on polygon area and DNAPL thickness (e1*f)
(m)	Soil > Method C	1,300	cyds	Calculated as (b1+d)*g-l
(n)	Overburden	810	cyds	Calculated as (b1+d)*h
(n1)	Heated Silt Underburden	270	cyds	Calculated as (b1+d)*h1
	Total ERH Volume	**2,430**	**CY**	Calculated as l+m+n1
	<u>Soil Characteristics</u>			
(o)	Soil density	1.5	tons/cyd	Engineer's estimate
(p)	Porosity	30%	Percent	Engineer's estimate
(q)	NAPL Saturation	15%	Percent	Engineer's estimate
	<u>Concentrations in SE Treatment Area</u>			
(r)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(s)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(t)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	<u>Concentrations in NW Treatment Area</u>			
(u)	Mean cPAH	13,887	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(v)	Mean DRO	3,200,000	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(w)	Mean Napthalene	204,690	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
	<u>Concentrations in Treatment Area Beneath Building</u>			
(x)	Mean cPAH	6,317	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(y)	Mean DRO	7,807,000	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(z)	Mean Napthalene	4,466	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
	<u>Treatment Efficacy (ERH Only)</u>			
(aa)	Estimated % Reduction Naph.	50%	Percent	Estimated reduction based on treatability study
(bb)	Estimated % Reduction DRO	75%	Percent	Estimated reduction based on treatability study
(cc)	Estimated % Reduction DNAPL	75%	Percent	Estimated reduction based on treatability study and engineer's estimate
	<u>COC Removal Quantities</u>			
	DNAPL	1,430	gal	Calculated as (i*p*q)+(l*p*q*cc)
	cPAH	114	lbs	Calculated as j*o*r*(b-b1)/(a-b1-d)+j*o*u*c/(a-b1-d)+m*o*r*aa*b1/(b1+d)+m*o*x*aa*d/(b1+d)
	DRO	142,552	lbs	Calculated as j*o*s*(b-b1)/(a-b1-d)+j*o*v*c/(a-b1-d)+m*o*s*bb*b1/(b1+d)+m*o*y*bb*d/(b1+d)
	Napthalene	22,071	lbs	Calculated as j*o*t*(b-b1)/(a-b1-d)+j*o*w*c/(a-b1-d)+m*o*t*aa*b1/(b1+d)+m*o*z*aa*d/(b1+d)
	Total Mass of COCs	**165,000**	**lbs**	

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Quantity and Mass Removal Calculations by Alternative

Alternative: S6 - DNAPL Treatment by Electrical Resistance Heating

	Parameter	Quantity	Units	Basis
(a)	**Total Treatment Area**	**27,000**	**sqft**	**Calculated as b+c+d**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	-	sqft	No treatment occurring in the NW Treatment Area
(d)	Treatment Area Beneath Building	2,100	sqft	Polygon area calculated in CAD
(e)	Total DNAPL Area	13,700	sqft	Polygon area calculated in CAD
(e1)	DNAPL Area Inside Building	900	sqft	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
(h1)	Silt treated under target zone	1	ft	Assumed thickness of soil partially heated under the target treatment zone
	Treatment Volume (ERH)			
(i)	DNAPL	170	cyds	Calculated volume based on polygon area and DNAPL thickness (e*f)
(j)	Soil > Method C	4,800	cyds	Calculated as (a*g)-i
(k)	Overburden	3,000	cyds	Calculated as a*h
(k1)	Heated Silt Underburden	1,000	cyds	Calculated as a*h1
	Total ERH Volume	**5,970**	**CY**	Calculated as i+j+k1
	Soil Characteristics			
(l)	Soil density	1.5	tons/cyd	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in SE Treatment Area			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	Concentrations in Treatment Area Beneath Building			
(u)	Mean cPAH	6,317	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(v)	Mean DRO	7,807,000	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(w)	Mean Napthalene	4,466	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
	Treatment Efficacy			
(x)	Estimated % Reduction Naph.	50%	Percent	Estimated reduction based on treatability study
(y)	Estimated % Reduction DRO	75%	Percent	Estimated reduction based on treatability study
(z)	Estimated % Reduction DNAPL	75%	Percent	Estimated reduction based on treatability study and engineer's estimate
	COC Removal Quantities			
	DNAPL	1,160	gal	Calculated as i*m*n*z
	cPAH	32	lbs	Calculated as (j*l*o*x*b/a)+(j*l*r*x*c/a)+(j*l*u*x*d/a)
	DRO	101,368	lbs	Calculated as (j*l*p*y*b/a)+(j*l*s*y*c/a)+(j*l*v*y*d/a)
	Napthalene	11,569	lbs	Calculated as (j*l*q*x*b/a)+(j*l*t*x*c/a)+(j*l*w*x*d/a)
	Total Mass of COCs	**113,000**	**lbs**	

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Quantity and Mass Removal Calculations by Alternative

Alternative: S7 - DNAPL Excavation and Electrical Resistance Heating

	Parameter	Quantity	Units	Basis
(a)	**Total Treatment Area**	**27,000**	**sqft**	**Calculated as b+c+d**
(b)	SE Treatment Area	24,900	sqft	Polygon area calculated in CAD
(c)	NW Treatment Area	-	sqft	No treatment occurring in the NW Treatment Area
(d)	Treatment Area Beneath Building	2,100	sqft	Polygon area calculated in CAD
(e)	Total DNAPL Area	13,700	sqft	Polygon area calculated in CAD
(e1)	DNAPL Area Inside Building	900	sqft	Polygon area calculated in CAD
	Treatment Thickness			
(f)	DNAPL	0.33	ft	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	ft	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	ft	Generalized mean fill thickness based on observations in boring logs
(h1)	Silt treated under target zone	1	ft	Assumed thickness of soil partially heated under the target treatment zone
	Treatment Volume (Excavation)			
(i)	DNAPL	160	cyds	Calculated volume based on polygon area and DNAPL thickness (e-e1*f)
(j)	Soil > Method C	4,450	cyds	Calculated as (b*g)-i
(k)	Overburden	2,800	cyds	Calculated as b*h
	Total Excavation Volume	*7,410*	*CY*	Calculated as i+j+k
	Total Treatment Volume	**4,610**	**CY**	Calculated as i + j
	Treatment Volume (ERH)			
(l)	DNAPL	10	cyds	Calculated volume based on polygon area and DNAPL thickness (e1*f)
(m)	Soil > Method C	380	cyds	Calculated as (d*g)-l
(n)	Overburden	230	cyds	Calculated as d*h
(n1)	Heated Silt Underburden	100	cyds	Calculated as a*h1
	Total ERH Volume	**490**	**CY**	Calculated as l+m+n1
	Soil Characteristics			
(o)	Soil density	1.5	tons/cyd	Engineer's estimate
(p)	Porosity	30%	Percent	Engineer's estimate
(q)	NAPL Saturation	15%	Percent	Engineer's estimate
	Concentrations in SE Treatment Area			
(r)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(s)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(t)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	Concentrations in Treatment Area Beneath Building			
(x)	Mean cPAH	6,317	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(y)	Mean DRO	7,807,000	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(z)	Mean Napthalene	4,466	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
	Treatment Efficacy (ERH Only)			
(aa)	Estimated % Reduction Naph.	50%	Percent	Estimated reduction based on treatability study
(bb)	Estimated % Reduction DRO	75%	Percent	Estimated reduction based on treatability study
(cc)	Estimated % Reduction DNAPL	75%	Percent	Estimated reduction based on treatability study and engineer's estimate
	COC Removal Quantities			
	DNAPL	1,520	gal	Calculated as (i*p*q)+(l*p*q*cc)
	cPAH	61	lbs	Calculated as (j*o*r*b/(b+c))+(j*o*u*c/(b+c))+(m*o*x*aa)
	DRO	133,755	lbs	Calculated as (j*o*s*b/(b+c))+(j*o*v*c/(b+c))+(m*o*y*bb)
	Napthalene	23,257	lbs	Calculated as (j*o*t*b/(b+c))+(j*o*w*c/(b+c))+(m*o*z*aa)
	Total Mass of COCs	**157,000**	**lbs**	

Appendix J

Feasibility Study Cost Estimates

Appendix J

Cost Estimate Worksheets

ALTERNATIVE S1 COMPREHENSIVE EXCAVATION

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Remediation		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	YES		**Groundwater Treatment**	No	
Soil Treatment Area	34,700	SF	**GW Treatment Area**	NA	
Treatment Perimeter	1,120	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	6,500	CY	**Treatment Depth**	8	FT bgs

Alternative Specific Assumptions

1 10,400 CY of soil will be excavated over 34,700 SF area
2 A portion of the Port's maintenance building will be removed to access contaminated soil
3 Some of the Port's maintenance operations will be temporarily moved
4 Average depth of excavation will be 8 FT bgs
5 3,900 CY of soil excavated will be clean overburden materials
6 6,500 CY of soil excavated will be above Method C cleanup levels
7 510 CY of soil containing DNAPL will be treated by RCRA stabilization with CAMU approval
8 All soil with DNAPL will be transported to Arlington, OR for RCRA stabilization
9 Non DNAPL contaminated soil above Method C will be landfilled as CAMU-eligible waste in Arlington, OR
10 Existing utilities will need to be removed and replaced following excavation activities
11 5 months will be needed to perform the work
12 Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$2,107,758	1	Mobilization / Demobilization	1	LS	$67,000	$67,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	4	Demo Port's Maintenance Building (east corner)	3,000	SF	$25	$75,000
	5	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	6	Decommission Groundwater Monitoring & Biovent Wells	35	EA	$920	$32,200
	7	Specialty Subcontractors (surveyor, utility locate)	1	LS	$8,000	$8,000
	8	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	9	Demo Retaining Wall	160	LF	$75	$12,000
	10	Install Freeze Wall Shoring for Building (200 LF)	4,200	SF	$34	$142,800
	11	Install Freeze Wall Shoring for Excavation Perimeter (720 LF)	15,120	SF	$31	$468,720
	12	Install Sheet Pile Wall Shoring along Slurry Wall (100 LF)	2,500	SF	$45	$112,500
	13	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	14	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	15	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$27	$105,300
	16	Excavation and Stockpiling of Contaminated Soil	6,500	CY	$28	$182,000
	17	Loading of Contaminated Soil	9,750	TN	$6	$58,500
	18	Import of Clean Fill to the Site	6,500	CY	$20	$130,000
	19	Contaminated Water Handling and Environmental Protection	1	LS	$32,500	$32,500
	20	Backfill and Compaction of Excavation	10,400	CY	$9	$93,600
	21	Asphalt Paving of Site	32,600	SF	$4	$130,400
	22	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	23	Rebuild Retaining Wall	160	LF	$150	$24,000
	24	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	25	Reconstruct Maintenance Building (east corner)	3,000	SF	$50	$150,000
	26	Monitoring Well Installation	10	EA	$5,400	$54,000
	27	Contractor Reporting and Closeout Submittals	290	HR	$90	$26,100
Contaminated Waste Disposal and Transportation						
$1,870,318	1	NAPL Soil (CAMU RCRA Stabilization) Costs	765	TN	$255	$195,075
	2	Transportation Costs to RCRA Stabilization Facility	765	TN	$55	$42,075
	3	Liquid NAPL Material Disposal Costs (Incinerator)	3,100	GAL	$10	$31,000
	4	Liquid NAPL Transportation Costs to Incinerator	62	DRUM	$250	$15,500
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	9,000	TN	$115	$1,035,000
	6	Transportation Costs to Subtitle C Landfill	9,000	TN	$55	$495,000
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	60	TN	$30	$1,800
	8	Transportation Costs to Subtitle D Landfill	60	TN	$25	$1,500
	9	Contaminated Water Treatment and Disposal	195,000	GAL	$0.20	$39,000
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$3,978,076**
Contractor Contingency (%)			**20**	%	$3,978,076	$795,615
Total Contractor Costs						**$4,770,000**

ALTERNATIVE S1 COMPREHENSIVE EXCAVATION (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$4,770,000	$95,400
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$4,770,000	$47,700
	3	Engineering Design (% DCC)	3	%	$4,770,000	$143,100
	4	Planning for temporary relocation of Port Maintenance Ops	100	HR	$135	$13,500
	5	Bid & RFI Support	60	HR	$135	$8,100
	6	Construction Oversight and QA (% DCC)	5	%	$4,770,000	$238,500
	7	Confirmational Sample Collection and Reporting	1	LS	$30,000	$30,000
	8	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$629,300**
Engineering Contingency (%)			**10**	%	$629,300	$62,930
Total Engineering Costs						**$692,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling)			***2***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$629,800
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	***%***		**$431,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$5,462,000	**$5,462,000**
TOTAL O&M COSTS (PRESENT WORTH)			$431,000	**$5,893,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$382,000	**$6,275,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$164,000	**$6,439,000**
TOTAL PRESENT-WORTH COST				**$6,400,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch

LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S2 COMPREHENSIVE EXCAVATION OUTSIDE BUILDING FOOTPRINT

Client	International Paper	**Estimator**	Melanie Young, AECOM
Location	Longview, Washington	**Report Date**	12/18/2015
Project	MFA Remediation	**Last Updated**	12/2/2015
Document	RI/FS Cost Estimate	**Source of Costs**	Engineer's Estimate
Soil Removal	YES	**Groundwater Treatment**	No
Soil Treatment Area	32,600 SF	**GW Treatment Area**	NA
Treatment Perimeter	1,120 LF	**GW Treatment Method**	NA
Soil Disposal Volume	6,100 CY	**Treatment Depth**	8 FT bgs

Alternative Specific Assumptions

1 9,700 CY of soil will be excavated over 32,600 SF area
2 Some of the Port's maintenance operations will be temporarily moved
3 Average depth of excavation will be 8 FT bgs
4 3,600 CY of soil excavated will be clean overburden materials
5 6,100 CY of soil excavated will be above Method C cleanup levels
6 480 CY of the contaminated soil excavated will contain NAPL
7 All soil with DNAPL will be transported to Arlington, OR for RCRA stabilization
8 Non DNAPL contaminated soil above Method C will be landfilled as CAMU-eligible waste in Arlington, OR
9 Existing utilities will need to be removed and replaced following excavation activities
10 3 months will be needed to perform the work
11 Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,831,208	1	Mobilization / Demobilization	1	LS	$67,000	$67,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	4	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	5	Decommission Groundwater Monitoring & Biovent Wells	35	EA	$920	$32,200
	6	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	7	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	8	Demo Retaining Wall	160	LF	$75	$12,000
	9	Install Freeze Wall Shoring for Building (200 LF)	4,200	SF	$34.00	$142,800
	10	Install Freeze Wall Shoring for Excavation Perimeter (720 LF)	15,120	SF	$31.00	$468,720
	11	Install Sheet Pile Wall Shoring along Slurry Wall (100 LF)	2,500	SF	$45.00	$112,500
	12	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	13	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	14	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,600	CY	$27	$97,200
	15	Excavation and Stockpiling of Contaminated Soil	6,100	CY	$28	$170,800
	16	Contaminated Water Handling and Environmental Protection	1	LS	$30,000	$30,000
	17	Loading of Contaminated Soil	9,150	TN	$6	$54,900
	18	Import of Clean Fill to the Site	6,100	CY	$20	$122,000
	19	Backfill and Compaction of Excavation	9,700	CY	$9	$87,300
	20	Asphalt Paving of Site Excavation Area	32,600	SF	$4	$130,400
	21	Rebuild Access Road (150 LF)	3,750	SF	$5	$18,750
	22	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	23	Rebuild Retaining Wall	160	LF	$150	$24,000
	24	Monitoring Well Installation	10	EA	$5,400	$54,000
	25	Contractor Reporting and Closeout Submittals	200	HR	$90	$18,000
Contaminated Waste Disposal and Transportation						
$1,680,968	1	NAPL Soil (CAMU RCRA Stabilization) Costs	720	TN	$255	$183,600
	2	Transportation Costs to RCRA Stabilization Facility	720	TN	$55	$39,600
	3	Liquid NAPL Material Disposal Costs (Incinerator)	2,900	GAL	$10	$29,000
	4	Liquid NAPL Transportation Costs to Incinerator	58	DRUM	$250	$14,500
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	8,000	TN	$115	$920,000
	6	Transportation Costs to Subtitle C Landfill	8,000	TN	$55	$440,000
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	60	TN	$30	$1,800
	8	Transportation Costs to Subtitle D Landfill	60	TN	$25	$1,500
	9	Contaminated Water Treatment and Disposal	183,000	GAL	$0.20	$36,600
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$3,512,176**
Contractor Contingency (%)			**20**	%	$3,512,176	$702,435
Total Contractor Costs						**$4,210,000**

ALTERNATIVE S2 COMPREHENSIVE EXCAVATION OUTSIDE BUILDING FOOTPRINT (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$4,210,000	$84,200
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$4,210,000	$42,100
	3	Engineering Design (% DCC)	3	%	$4,210,000	$126,300
	4	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	5	Bid & RFI Support	60	HR	$135	$8,100
	6	Construction Oversight and QA (% DCC)	5	%	$4,210,000	$210,500
	7	Confirmational Sample Collection and Reporting	1	LS	$30,000	$30,000
	8	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$567,700**
Engineering Contingency (%)			**10**	%	$567,700	$56,770
Total Engineering Costs						**$624,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update IC Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling)			***2***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$629,800
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	***%***		**$431,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$4,830,000	**$4,830,000**
TOTAL O&M COSTS (PRESENT WORTH)			$431,000	**$5,260,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$337,000	**$5,597,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$145,000	**$5,742,000**
TOTAL PRESENT-WORTH COST				**$5,700,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CF: cubic feet
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch

LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S3 DNAPL EXCAVATION OUTSIDE BUILDING FOOTPRINT

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Area Remediation		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	YES		**Groundwater Treatment**	No	
Soil Treatment Area	24,900	SF	**GW Treatment Area**	NA	
Treatment Perimeter	850	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	4,700	CY	**Treatment Depth**	8	FT bgs

Alternative Specific Assumptions

1 7,500 CY of soil will be excavated over 24,900 SF area
2 Some of the Port's maintenance operations will be temporarily moved
3 Average depth of excavation will be 8 FT bgs
4 2,800 CY of soil excavated will be clean overburden materials
5 4,700 CY of soil excavated will be above Method C cleanup levels
6 480 CY of soil containing DNAPL will be treated by RCRA stabilization with CAMU approval
7 All soil with DNAPL will be transported to Arlington, OR, for RCRA stabilization
8 Non DNAPL contaminated soil above Method C will be landfilled as CAMU-eligible waste in Arlington, OR
9 Existing utilities will need to be removed and replaced following excavation activities
10 2-3 months will be needed to perform the work
11 Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,531,512	1	Mobilization / Demobilization	1	LS	$67,000	$67,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	4	Demo Horizontal Bioventing Wells	800	LF	$37	$29,600
	5	Decommission Groundwater Monitoring & Biovent Wells	25	EA	$920	$23,000
	6	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	7	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	8	Demo Retaining Wall	160	LF	$75	$12,000
	9	Install Freeze Wall Shoring for Building (200 LF)	4,200	SF	$34	$142,800
	10	Install Freeze Wall Shoring for Excavation Perimeter (550 LF)	11,550	SF	$31	$358,050
	11	Install Sheet Pile Wall Shoring along Slurry Wall (100 LF)	2,500	SF	$45	$112,500
	12	Remove Surface Asphalt in Storage Yard and Road	24,900	SF	$0.88	$21,912
	13	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	14	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	2,800	CY	$27	$75,600
	15	Excavation and Stockpiling of Contaminated Soil	4,700	CY	$28	$131,600
	16	Loading of Contaminated Soil	7,050	TN	$6	$42,300
	17	Contaminated Water Handling and Environmental Protection	1	LS	$25,000	$25,000
	18	Import of Clean Fill to the Site	4,700	CY	$20	$94,000
	19	Backfill and Compaction of Excavation	7,500	CY	$9	$67,500
	20	Asphalt Paving of Site Excavation Area	24,900	SF	$4	$99,600
	21	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	22	Rebuild Retaining Wall	160	LF	$150	$24,000
	23	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	24	Monitoring Well Installation	7	EA	$5,400	$37,800
	25	Contractor Reporting and Closeout Submittals	160	HR	$90	$14,400
Contaminated Waste Disposal and Transportation						
$1,506,725	1	NAPL Soil (CAMU RCRA Stabilization) Costs	720	TN	$255	$183,600
	2	Transportation Costs to RCRA Stabilization Facility	720	TN	$55	$39,600
	3	Liquid NAPL Material Disposal Costs (Incinerator)	2,900	GAL	$10	$29,000
	4	Liquid NAPL Transportation Costs to Incinerator	58	DRUM	$250	$14,500
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	7,050	TN	$115	$810,750
	6	Transportation Costs to Subtitle C Landfill	7,050	TN	$55	$387,750
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	45	TN	$30	$1,350
	8	Transportation Costs to Subtitle D Landfill	45	TN	$25	$1,125
	9	Contaminated Water Treatment and Disposal	140,000	GAL	$0.20	$28,000
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	650	TN	$8	$5,200
	11	Transportation Costs to Asphalt Recycler	650	TN	$9	$5,850
Subtotal Contractor Costs						**$3,038,237**
Contractor Contingency (%)			**20**	%	$3,038,237	$607,647
Total Contractor Costs						**$3,650,000**

ALTERNATIVE S3 DNAPL EXCAVATION OUTSIDE BUILDING FOOTPRINT (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$3,650,000	$73,000
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$3,650,000	$36,500
	3	Engineering Design (% DCC)	4	%	$3,650,000	$146,000
	4	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	5	Bid & RFI Support	60	HR	$135	$8,100
	6	Construction Oversight and QA (% DCC)	5	%	$3,650,000	$182,500
	7	Confirmational Sample Collection and Reporting	1	LS	$20,000	$20,000
	8	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$532,600**
Engineering Contingency (%)			**10**	%	$532,600	$53,260
Total Engineering Costs						**$586,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling)			***2***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,582.50
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$629,800
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	***%***		**$431,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$4,240,000	**$4,240,000**
TOTAL O&M COSTS (PRESENT WORTH)			$431,000	**$4,670,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$292,000	**$4,962,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$127,000	**$5,089,000**
TOTAL PRESENT-WORTH COST				**$5,100,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S4 DNAPL EXCAVATION OUTSIDE BUILDING FOOTPRINT, LIMITED EXCAVATION INSIDE

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Remediation		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	YES		**Groundwater Treatment**	No	
Soil Treatment Area	26,400	SF	**GW Treatment Area**	NA	
Treatment Perimeter	850	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	4,900	CY	**Treatment Depth**	8	FT bgs

Alternative Specific Assumptions

1 8,000 CY of soil will be excavated over 26,400 SF area
2 A portion of the Port's maintenance building will be removed to access contaminated soil
3 Some of the Port's maintenance operations will be temporarily moved
4 Average depth of excavation will be 8 FT bgs
5 2,900 CY of soil excavated will be clean overburden materials
6 4,900 CY of soil excavated will be above Method C cleanup levels
7 170 CY will be excavated from inside the building over a 1,500 SF area
8 510 CY of soil containing DNAPL will be treated by RCRA stabilization with CAMU approval
9 All soil with DNAPL will be transported to Arlington, OR, for RCRA stabilization
10 Non DNAPL contaminated soil above Method C will be landfilled as CAMU-eligible waste in Arlington, OR
11 Existing utilities will need to be removed and replaced following excavation activities
12 5 months will be needed to perform the work
13 Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,616,522	1	Mobilization / Demobilization	1	LS	$67,000	$67,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	4	Demo Port's Maintenance Building Interior Floor Slab	1,500	SF	$13	$19,500
	5	Demo Horizontal Bioventing Wells	800	LF	$37	$29,600
	6	Decommission Groundwater Monitoring & Biovent Wells	25	EA	$920	$23,000
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	9	Demo Retaining Wall	160	LF	$75	$12,000
	10	Install Freeze Wall Shoring for Building (200 LF)	4,200	SF	$34	$142,800
	11	Install Freeze Wall Shoring for Excavation Perimeter (550 LF)	11,550	SF	$31	$358,050
	12	Install Sheet Pile Wall Shoring along Slurry Wall (100 LF)	2,500	SF	$45	$112,500
	13	Remove Surface Asphalt in Storage Yard and Road	24,900	SF	$0.88	$21,912
	14	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	15	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	2,900	CY	$27	$78,300
	16	Specialty excavation of Contaminated Soil inside building	170	CY	$75	$12,750
	17	Excavation and Stockpiling of Contaminated Soil	4,900	CY	$28	$137,200
	18	Loading Contaminated Soil for Off-Site Disposal	7,605	TN	$6	$45,630
	19	Contaminated Water Handling and Environmental Protection	1	LS	$27,500	$27,500
	20	Import of Clean Fill to the Site	5,070	CY	$20	$101,400
	21	Backfill and Compaction of Excavation	7,970	CY	$9	$71,730
	22	Asphalt Paving of Site Excavation Area	24,900	SF	$4.00	$99,600
	23	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	24	Rebuild Retaining Wall	160	LF	$150	$24,000
	25	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	26	Reconstruct Maintenance Building Interior Floor Slab	1,500	SF	$18	$27,000
	27	Monitoring Well Installation	7	EA	$5,400	$37,800
	28	Contractor Reporting and Closeout Submittals	160	HR	$90	$14,400
Contaminated Waste Disposal and Transportation						
$1,576,275	1	NAPL Soil (CAMU RCRA Stabilization) Costs	765	TN	$255	$195,075
	2	Transportation Costs to RCRA Stabilization Facility	765	TN	$55	$42,075
	3	Liquid NAPL Material Disposal Costs (Incinerator)	3,100	GAL	$10	$31,000
	4	Liquid NAPL Transportation Costs to Incinerator	62	DRUM	$250	$15,500
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	7,350	TN	$115	$845,250
	6	Transportation Costs to Subtitle C Landfill	7,350	TN	$55	$404,250
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	45	TN	$30	$1,350
	8	Transportation Costs to Subtitle D Landfill	45	TN	$25	$1,125
	9	Contaminated Water Treatment and Disposal	148,000	GAL	$0.20	$29,600
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	650	TN	$8	$5,200
	11	Transportation Costs to Asphalt Recycler	650	TN	$9	$5,850
Subtotal Contractor Costs						**$3,192,797**
Contractor Contingency (%)			**20**	%	$3,192,797	$638,559
Total Contractor Costs						**$3,830,000**

ALTERNATIVE S4 DNAPL EXCAVATION OUTSIDE BUILDING FOOTPRINT, LIMITED EXCAVATION INSIDE (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$3,830,000	$76,600
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$3,830,000	$38,300
	3	Engineering Design (% DCC)	4	%	$3,830,000	$153,200
	4	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	5	Bid & RFI Support	60	HR	$135	$8,100
	6	Construction Oversight and QA (% DCC)	5	%	$3,830,000	$191,500
	7	Confirmational Sample Collection and Reporting	1	LS	$20,000	$20,000
	8	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$554,200**
Engineering Contingency (%)			**10**	%	$554,200	$55,420
Total Engineering Costs						**$610,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling)			***2***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$629,800
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	***%***		**$431,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$4,440,000	**$4,440,000**
TOTAL O&M COSTS (PRESENT WORTH)			$431,000	**$4,870,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$306,000	**$5,176,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$133,000	**$5,309,000**
TOTAL PRESENT-WORTH COST				**$5,300,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S5 SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Remediation		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	NO		**Groundwater Treatment**	No	
Soil Treatment Area	32,600	SF	**GW Treatment Area**	NA	
Treatment Perimeter	1,110	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	0	CY	**Treatment Depth**	9	FT bgs

Alternative Specific Assumptions

1 7,300 CY of soil will be solidified over 32,600 SF area
2 Some of the Port's maintenance operations will be temporarily moved
3 Zone of solidification will be 3 to 9 FT bgs
4 3,600 CY of clean overburden materials will be excavated prior to treatment
5 Existing utilities will need to be removed and replaced following treatment activities
6 Approximately 5 months will be needed to perform the work
7 Site will be restored to existing conditions following remediation, although grades may be modified
8 No solidification spoils or overburden soil will be disposed of off-site. All material is planned for re-use
9 Water is readily available on site

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,681,044	1	Mobilization / Demobilization	1	LS	$225,000	$225,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	400	CY	$300	$120,000
	4	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	6	Decommission Groundwater Monitoring & Biovent Wells	40	EA	$920	$36,800
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	9	Demo Retaining Wall	160	LF	$75	$12,000
	10	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	11	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	12	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,600	CY	$27	$97,200
	13	Storm Water Handling and Environmental Protection	1	LS	$11,000	$11,000
	14	Solidification Materials (8% NewCem Slag Cement)	876	TN	$130	$113,880
	15	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	219	TN	$230	$50,370
	16	Solidification Materials (0.5% Caustic Soda)	55	TN	$1,275	$69,806
	17	Solidification Labor and Equipment	7,300	CY	$60	$438,000
	18	Geotextile Fabric Marker Layer over Solidified Soil	3,800	SY	$1.75	$6,650
	19	Import of Clean Backfill for Transition Grades	1,700	CY	$20	$34,000
	19	Backfill and Compaction of Excavation	3,600	CY	$9	$32,400
	20	Asphalt Paving of Excavation, Solidification, and Transition Areas	32,600	SF	$4	$130,400
	21	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	22	Rebuild Retaining Wall	160	LF	$150	$24,000
	23	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	24	Monitoring Well Installation	10	EA	$5,400	$54,000
	25	Contractor Reporting and Closeout Submittals	160	HR	$90	$14,400
Contaminated Waste Disposal and Transportation						
$14,368	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	0	TN	$115	$0
	6	Transportation Costs to Subtitle C Landfill	0	TN	$55	$0
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	0	TN	$30	$0
	8	Transportation Costs to Subtitle D Landfill	0	TN	$25	$0
	9	Contaminated Water Treatment and Disposal	0	GAL	$0.20	$0
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$1,695,412**
Contractor Contingency (%)			**20**	%	$1,695,412	$339,082
Total Contractor Costs						**$2,030,000**

ALTERNATIVE S5 SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$2,030,000	$40,600
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$2,030,000	$40,600
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	7	%	$2,030,000	$142,100
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$2,030,000	$101,500
	8	Confirmational Sample Collection and Reporting	1	LS	$33,000	$33,000
	9	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$507,400**
Engineering Contingency (%)			**10**	%	$507,400	$50,740
Total Engineering Costs						**$558,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical Performance of Solidified Soil)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$2,590,000	**$2,590,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$3,240,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$162,000	**$3,402,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$78,000	**$3,480,000**
TOTAL PRESENT-WORTH COST				**$3,500,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
RCRA: Resource Conservation and Recovery Act
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S5A SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT, DNAPL RECOVERY UNDER MECHANICS SHOP

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Area Remediation		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineers Estimate	
Soil Removal	NO		**Groundwater Treatment**	No	
Soil Treatment Area	33,500	SF	**GW Treatment Area**	NA	
Treatment Perimeter	1,110	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	0	CY	**Treatment Depth**	9	FT bgs

Alternative Specific Assumptions

1 7,300 CY of soil will be solidified over 32,600 SF area
2 Some of the Port's maintenance operations will be temporarily moved
3 Zone of solidification will be 3 to 9 feet bgs
4 3,600 CY of clean overburden materials will be excavated prior to treatment
5 Existing utilities will need to be removed and replaced following treatment activities
6 Approximately 6 months will be needed to perform construction work
7 Site will be restored to existing conditions following remediation, although grades may be modified
8 No solidification spoils or overburden soil will be disposed of off-site. All material is planned for re-use
9 Water is readily available on site
10 An additional 900 SF under the Mechanics Shop will implement active DNAPL Recovery
11 DNAPL recovery will require installing five 4-inch wells and pneumatic DNAPL recovery pumps in the Mechancs Shop NE corner.
12 Heaters will be used in each recovery well to enhance DNAPL recovery

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,760,219	1	Mobilization / demobilization	1	LS	$225,000	$225,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	400	CY	$300	$120,000
	4	Temporary relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Horizontal bioventing wells & connection piping	800	LF	$37	$29,600
	6	Decommission groundwater monitoring & biovent wells	40	EA	$920	$36,800
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo underground utilities and fencing	1	LS	$28,000	$28,000
	9	Demo retaining wall	160	LF	$75	$12,000
	10	Remove surface asphalt in storage yard and road	32,600	SF	$0.88	$28,688
	11	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,600	CY	$27	$97,200
	12	Remove 42-inch HDPE culvert and replace after excavation	125	LF	$150	$18,750
	13	Storm water handling and Environmental Protection	1	LS	$11,000	$11,000
	14	Solidification Materials (8% NewCem Slag Cement)	876	TN	$130	$113,880
	15	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	219	TN	$230	$50,370
	16	Solidification Materials (0.5% Caustic Soda)	55	TN	$1,275	$69,806
	17	Solidification Labor and Equipment	7,300	CY	$60	$438,000
	18	Geotextile fabric marker layer over solidified soil	3,800	SY	$1.75	$6,650
	19	Import of clean backfill for transition grades	1,700	CY	$20	$34,000
	20	Backfill and Compaction of Excavation	3,600	CY	$9	$32,400
	21	Asphalt Paving of Excavation, Solidification, and Transition Areas	32,600	SF	$4	$130,400
	22	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	23	Rebuild retaining wall	160	LF	$150	$24,000
	24	Replace connection piping for bioventing system	600	LF	$40	$24,000
	25	Monitoring Well Installation	10	EA	$5,400	$54,000
	26	Product Recovery Well Installation	5	EA	$6,000	$30,000
	27	DNAPL Recovery Equipment and Supplies	1	LS	$23,600	$23,600
	28	Heaters for Recovery Wells	5	EA	$175	$875
	29	Product Recovery System Installation and Startup	1	LS	$17,500	$17,500
	30	Contractor Reporting and Closeout Submittals	240	HR	$90	$21,600
Contaminated Waste Disposal and Transportation						
$15,515	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	50	GAL	$10	$500
	4	Liquid NAPL Transportation Costs to Incinerator	1	DRUM	$250	$250
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	0	TN	$115	$0
	6	Transportation Costs to Subtitle C Landfill	0	TN	$55	$0
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	0	TN	$30	$0
	8	Transportation Costs to Subtitle D Landfill	0	TN	$25	$0
	9	Contaminated water treatment and disposal	0	GAL	$0.20	$0
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	869	TN	$8	$6,948
	11	Transportation Costs to Asphalt Recycler	869	TN	$9	$7,817
Subtotal Contractor Costs						**$1,775,734**
Contractor Contingency (%)			**20**	%	$1,775,734	$355,147
Total Contractor Costs						**$2,130,000**

ALTERNATIVE S5A SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT, DNAPL RECOVERY UNDER MECHANICS SHOP

(CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$2,130,000	$42,600
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$2,130,000	$42,600
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	7	%	$2,130,000	$149,100
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$2,130,000	$106,500
	8	System Startup (if applicable)	1	LS	$5,000	$5,000
	9	Confirmational Sample Collection and Reporting	1	LS	$33,000	$33,000
	10	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$528,400**
Engineering Contingency (%)			**10**	%	$528,400	$52,840
Total Engineering Costs						**$581,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LONG-TERM MONITORING COSTS						
Annual O&M Cost (DNAPL Recovery)			***3***	***Years of Annual O&M***		
$57,080	1	Project Management & Coordination	48	HR	$135	$6,480
	2	Mob/Demob for O&M (monthly)	12	EA	$1,800	$21,600
	3	Monthly O&M Labor	12	EA	$1,500	$18,000
	4	Equipment Repair and Supplies	1	LS	$7,500	$7,500
	5	Annual Product Recovery Reporting	1	EA	$3,500	$3,500
Subtotal Annual O&M Cost (DNAPL Recovery)						**$57,080**
O&M Contingency (DNAPL Recovery)			25	%	$57,080	$14,270
Total Annual O&M Cost (DNAPL Recovery)						**$71,400**
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)						**$15,036**
O&M Contingency (ICs Maintenance and Asphalt Inspection/Repair as Needed)			25	%	$15,036	$3,759
Total Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)						**$18,800**
Total Annual O&M Cost						**$90,200**
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical performance of solidified soil)			***13***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$123,100**
Total Non-Routine O&M Cost		Estimated to be 2% of Construction Costs				$2,500
Total O&M and LTM Cost		***Years till project completion***	***30***			$1,208,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$920,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$2,710,000	**$2,710,000**
TOTAL O&M COSTS (PRESENT WORTH)			$920,000	**$3,630,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$170,000	**$3,800,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$81,000	**$3,881,000**
TOTAL PRESENT-WORTH COST				**$3,900,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
RCRA: Resource Conservation and Recovery Act
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S5B SOLIDIFICATION OUTSIDE AND INSIDE BUILDING FOOTPRINT WITH RELOCATION OF SOIL NEAR RAILROAD TRACKS

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Area Remediation		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineers Estimate	
Soil Removal	NO		**Groundwater Treatment**	No	
Soil Treatment Area	34,700	SF (32,600 outside and 2,100 inside building)	**GW Treatment Area**	NA	
Treatment Perimeter	1,110	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	0	CY	**Treatment Depth**	9	FT bgs

Alternative Specific Assumptions

1 5,300 CY of soil will be solidified over 23,700 SF area outside building footprint
1,650 CY of soil will be relocated from 8,900 SF area 80 ft from the edge of rail and combined with other soils to be solidified
2 500 CY of soil will be solidified from a 2,100 SF area under the Mechanics Shop
3 Some of the Port's maintenance operations will be temporarily moved
4 The portion of the building with lower ceiling height will be removed and reconstructed following solidification
5 3,900 CY of clean overburden materials will be excavated prior to treatment
6 Zone of solidification will be 6 feet thick (3 to 9 feet bgs) and the zone of excavation will be 5 feet thick (3 to 8 feet bgs)
7 Volumetric Expansion of the 7,450 CY of solidified soil will be 35% and will result in an additional 2,600 CY of material on site
8 The total volume of solidified soil on site to remain on site is estimated to be 10,050 CY
9 Existing utilities will need to be removed and replaced following treatment activities
10 Approximately 3 to 4 months will be needed to perform the work
11 2 weeks will be needed for mob / demob
12 6 to 8 weeks will be needed for the solidification / stabilization tasks
13 Site will be restored to existing conditions following remediation, but with new higher grades and no retaining wall
14 No solidification spoils or overburden soil will be disposed of off-site. All material is planned for re-use.
15 Water is readily available on site

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,968,070	1	Mobilization / Demobilization	1	LS	$225,000	$225,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	350	CY	$300	$105,000
	4	Temporary relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	6	Decommission Groundwater Monitoring & Bioventing Wells	40	EA	$920	$36,800
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	9	Demo Retaining Wall	220	LF	$75	$16,500
	10	Demo Portion of Building with Lower Roof Height	2,500	SF	$25	$62,500
	11	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	12	Remove 42-inch HDPE Culvert and Replace after Solidification	125	LF	$150	$18,750
	13	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$27	$105,300
	14	Stormwater Handling and Environmental Protection	1	LS	$11,000	$11,000
	15	Excavate Soil from 3 to 8 feet bgs within 80 feet of Railroad Tracks	1,650	CY	$14	$23,100
	16	Relocate and Backfill Soil from Near the Railroad Tracks	1,650	CY	$9	$14,850
	17	Solidification Materials (8% NewCem Slag Cement)	894	TN	$130	$116,220
	18	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	224	TN	$230	$51,405
	19	Solidification Materials (0.5% Caustic Soda)	56	TN	$1,275	$71,241
	20	Solidification Labor and Equipment Outside Building Footrprint	6,950	CY	$60	$417,000
	21	Solidification Labor and Equipment Under Mechanics Shop	500	CY	$60	$30,000
	22	Geotextile Fabric Marker Layer Over Solidified Soil	2,867	SF	$1.75	$5,017
	23	Import of Clean Backfill for Transition Grades	1,700	CY	$20	$34,000
	24	Additional Import of Backfill Material to Replace Relocated Soil	1,600	CY	$20	$32,000
	25	Backfill and Compaction of Overburden Soil Stockpiles on Site	3,900	CY	$11	$42,900
	26	Backfill and Compaction of Transitional Backfill Material	3,300	CY	$9	$29,700
	27	Asphalt Paving of Excavation, Solidification, and Transition Areas	32,600	SF	$4	$130,400
	28	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	29	Reconstruct Lower Roof Height Portion of Maintenance Building	2,500	SF	$50	$125,000
	30	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	31	Monitoring Well Installation	10	EA	$5,400	$54,000
	32	Contractor Reporting and Closeout Submittals	200	HR	$90	$18,000
Contaminated Waste Disposal and Transportation						
$14,368	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	0	TN	$115	$0
	6	Transportation Costs to Subtitle C Landfill	0	TN	$55	$0
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	0	TN	$30	$0
	8	Transportation Costs to Subtitle D Landfill	0	TN	$25	$0
	9	Contaminated water treatment and disposal	0	GAL	$0.20	$0
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$1,982,438**
Contractor Contingency (%)			**20**	%	$1,982,438	$396,488
Total Contractor Costs						**$2,379,000**

ALTERNATIVE S5B SOLIDIFICATION OUTSIDE AND INSIDE BUILDING FOOTPRINT WITH RELOCATION OF SOIL NEAR RAILROAD TRACKS

(CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$2,379,000	$47,580
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$2,379,000	$47,580
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	7	%	$2,379,000	$166,530
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$2,379,000	$118,950
	8	Conformational Sample Collection and Reporting	1	LS	$33,000	$33,000
	9	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$563,240**
Engineering Contingency (%)			**10**	%	$563,240	$56,324
Total Engineering Costs						**$620,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LONG-TERM MONITORING COSTS						
Annual O&M Cost (Institutional Controls Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical performance of solidified soil)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years till project completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$2,999,000	**$2,999,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$3,648,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$190,000	**$3,838,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$90,000	**$3,928,000**
TOTAL PRESENT-WORTH COST				**$3,900,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch

IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
RCRA: Resource Conservation and Recovery Act
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S5C SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT, ERH TREATMENT UNDER MECHANICS SHOP

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Area Remediation		**Last Updated**	12/3/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineers Estimate	
Soil Removal	NO		**Groundwater Treatment**	No	
Soil Treatment Area	34,700	SF	**GW Treatment Area**	NA	
Treatment Perimeter	1,200	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	0	CY	**Treatment Depth**	9	FT bgs

Alternative Specific Assumptions

1 6,100 CY of soil will be solidified over 27,400 SF area
2 A 7,300 SF area SW of the retaining wall, including 2,100 SF inside the NE building corner will also be thermally treated
3 Some of the Port's maintenance operations will be temporarily moved
4 Zone of solidification will be 3 to 9 feet bgs
5 Zone of treatment inside building will be 3 to 9 feet bgs
6 3,000 CY of clean overburden materials will be excavated prior to treatment
7 Existing utilities will need to be removed and replaced following treatment activities
8 6 months will be needed to perform the ERH work after design is complete
9 2 months be needed for mob / demob
10 4 to 5 weeks will be needed for the solidification / stabilization tasks
11 Site will be restored to existing conditions following remediation, although grades may be modified
12 No solidification spoils or overburden soil will be disposed of off site. All material is planned for re-use
13 Water is readily available on site

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$2,323,643	1	Mobilization / demobilization	1	LS	$240,000	$240,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	400	CY	$300	$120,000
	4	Temporary relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Horizontal bioventing wells & connection piping	800	LF	$37	$29,600
	6	Decommission groundwater monitoring & biovent wells	40	EA	$920	$36,800
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo underground utilities and fencing	1	LS	$28,000	$28,000
	9	Demo retaining wall	160	LF	$75	$12,000
	10	Remove surface asphalt in storage yard and road	27,400	SF	$0.88	$24,112
	11	Remove 42-inch HDPE culvert and replace after excavation	125	LF	$150	$18,750
	12	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,000	CY	$27	$81,000
	13	Storm water handling and Environmental Protection	1	LS	$11,000	$11,000
	14	Subsurface Installations by ERH Contractor	1	LS	$42,000	$42,000
	15	Drilling & Analytical Services for subsurface ERH installations	1	LS	$70,500	$70,500
	16	ERH Surface installations and startup	1	LS	$180,750	$180,750
	17	ERH Operations	1	LS	$348,000	$348,000
	18	Electrical Connection and Usage charges	1	LS	$102,750	$102,750
	19	Activated Carbon Usage	1	LS	$7,000	$7,000
	20	Other Misc. ERH operational costs	1	LS	$14,250	$14,250
	21	Solidification Materials (8% NewCem Slag Cement)	732	TN	$130	$95,160
	22	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	183	TN	$230	$42,090
	23	Solidification Materials (0.5% Caustic Soda)	46	TN	$1,275	$58,331
	24	Solidification Labor and Equipment	6,100	CY	$60	$366,000
	25	Geotextile fabric marker layer over solidified soil	3,800	SY	$1.75	$6,650
	26	Import of clean backfill for transition grades	1,700	CY	$20	$34,000
	27	Backfill and Compaction of Excavation	3,000	CY	$9	$27,000
	28	Asphalt Paving of Excavation, Solidification, and Transition Areas	27,400	SF	$4.00	$109,600
	29	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	30	Rebuild retaining wall	160	LF	$150	$24,000
	31	Replace connection piping for bioventing system	600	LF	$40	$24,000
	32	Monitoring Well Installation	10	EA	$5,400	$54,000
	33	Contractor Reporting and Closeout Submittals	380	HR	$90	$34,200
Contaminated Waste Disposal and Transportation						
$30,294	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	1,000	GAL	$10	$10,000
	4	Liquid NAPL Transportation Costs to Incinerator	20	DRUM	$250	$5,000
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	0	TN	$115	$0
	6	Transportation Costs to Subtitle C Landfill	0	TN	$55	$0
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	0	TN	$30	$0
	8	Transportation Costs to Subtitle D Landfill	0	TN	$25	$0
	9	Contaminated water treatment and disposal	0	GAL	$0.20	$0
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	900	TN	$8	$7,197
	11	Transportation Costs to Asphalt Recycler	900	TN	$9	$8,097
Subtotal Contractor Costs						**$2,353,937**
Contractor Contingency (%)			**20**	%	$2,353,937	$470,787
Total Contractor Costs						**$2,820,000**

ALTERNATIVE S5C SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT, ERH TREATMENT UNDER MECHANICS SHOP

(CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$2,820,000	$56,400
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$2,820,000	$56,400
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	7	%	$2,820,000	$197,400
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$2,820,000	$141,000
	8	System Startup (if applicable)	0	LS	$0	$0
	9	Confirmational Sample Collection and Reporting	1	LS	$33,000	$33,000
	10	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$633,800**
Engineering Contingency (%)			**10**	%	$633,800	$63,380
Total Engineering Costs						**$697,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LONG-TERM MONITORING COSTS						
Annual O&M Cost (Institutional Controls Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25%	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical performance of solidified soil)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25%	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years till project completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$3,520,000	**$3,520,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$4,170,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$226,000	**$4,396,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$106,000	**$4,502,000**
TOTAL PRESENT-WORTH COST				**$4,500,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
ERH: electrical resistance heating
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
RCRA: Resource Conservation and Recovery Act
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S6 DNAPL TREATMENT BY ERH

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Remediation		**Last Updated**	12/3/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	NO		**Groundwater Treatment**	No	
Soil Treatment Area	27,000	SF	**GW Treatment Area**	NA	
Treatment Perimeter	830	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	0	CY	**Treatment Depth**	9	FT bgs

Alternative Specific Assumptions

1 6,000 CY of soil will be thermally treated in a 27,000 SF area
2 A 2,100 SF area inside the NE building corner will also be thermally treated
3 Some of the Port's maintenance operations will be temporarily moved
4 The building will remain in place
5 Zone of treatment will be 3 to 9 FT bgs
6 No excavation work will be necessary
7 Drill cuttings and other miscellanous materials will be disposed off site
8 Existing utilities will need to be removed and replaced following treatment activities
9 9 months will be needed to perform the work
10 Site will be restored to existing conditions following remediation
11 Retaining wall can remain in place
12 No shoring for the building or slurry wall will be necessary

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$2,918,800	1	Mobilization/Demobilization	1	LS	$489,000	$489,000
	3	Contractor Design and Work Plans	1	LS	$86,000	$86,000
	4	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	6	Decommission Groundwater Monitoring & Biovent Wells	35	EA	$920	$32,200
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	9	Storm Water Handling and Environmental Protection	1	LS	$17,500	$17,500
	10	Subsurface Installations by ERH Contractor	1	LS	$133,000	$133,000
	11	General Trenching and Site Restoration Work	1	LS	$50,000	$50,000
	12	Drilling & Analytical Services for Subsurface ERH Installations	1	LS	$234,000	$234,000
	13	Upgrade Electrical Service to Treatment Pad	1	LS	$40,000	$40,000
	14	ERH Surface Installations and Startup	1	LS	$461,000	$461,000
	15	ERH Operations	1	LS	$726,000	$726,000
	16	Electrical Connection and Usage Charges	1	LS	$289,000	$289,000
	17	Activated Carbon Usage	1	LS	$7,000	$7,000
	18	Contaminated Water Handling	1	LS	$50,000	$50,000
	19	Other Misc. ERH Operational Costs	1	LS	$15,000	$15,000
	20	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	21	Replace Utilities to Builidng	1	LS	$75,000	$75,000
	22	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	23	Monitoring Well Installation	10	EA	$5,400	$54,000
	24	Contractor Reporting and Closeout Submittals	200	HR	$90	$18,000
Contaminated Waste Disposal and Transportation						
$50,085	1	NAPL Soil (CAMU RCRA Stabilization) Costs	5	TN	$255	$1,275
	2	Transportation Costs to RCRA Stabilization Facility (30-ton min)	30	TN	$55	$1,650
	3	Liquid NAPL Material Disposal Costs (Incinerator)	2,300	GAL	$10	$23,000
	4	Liquid NAPL Transportation Costs to Incinerator	46	DRUM	$250	$11,500
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	30	TN	$115	$3,450
	6	Transportation Costs to Subtitle C Landfill	30	TN	$55	$1,650
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	10	TN	$30	$300
	8	Transportation Costs to Subtitle D Landfill (30-ton min)	30	TN	$25	$750
	9	Contaminated Water Treatment and Disposal	30,000	GAL	$0.20	$6,000
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	30	TN	$8	$240
	11	Transportation Costs to Asphalt Recycler	30	TN	$9	$270
Subtotal Contractor Costs						**$2,968,885**
Contractor Contingency (%)			**30**	%	$2,968,885	$890,665.50
Total Contractor Costs						**$3,860,000**

ALTERNATIVE S6 DNAPL TREATMENT BY ERH (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$3,860,000	$77,200
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$3,860,000	$38,600
	3	Engineering Design (% DCC)	5	%	$3,860,000	$193,000
	4	Planning for Temporary Relocation of Port Maintenance Ops	100	HR	$135	$13,500
	5	Bid & RFI Support	80	HR	$135	$10,800
	6	Construction Oversight and QA (% DCC)	5	%	$3,860,000	$193,000
	7	Confirmational Sample Collection & Reporting Including Drilling	1	LS	$33,000	$33,000
	8	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$612,100**
Engineering Contingency (%)			**10**	%	$612,100	$61,210
Total Engineering Costs						**$673,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (Weekly Temp Monitoring for 6 months)			*1*	*Years of Annual O&M*		
$36,440	1	Project Management and Communication	104	HR	$135	$14,040
	2	Weekly Temperature Readings	104	HR	$100	$10,400
	3	Monthly Reports	6	EA	$2,000	$12,000
Subtotal Annual O&M Cost (WeeklyTemp Monitoring)						**$36,440**
O&M Contingency (Weekly Temp Monitoring)			25%	%	$36,440	$9,110
Total Annual O&M Cost (Weekly Temp Monitoring)						**$45,600**
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			*30*	*Years of Annual O&M*		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)						**$15,036**
O&M Contingency (ICs Maintenance and Asphalt Inspection/Repair as Needed)			25%	%	$15,036	$3,759
Total Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)						**$18,800**
Total Annual O&M Cost						**$64,400**
Annual LTM Cost (Monitoring and Sampling)			*2*	*Years of Annual LTM*		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25%	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$97,300**
Total O&M and LTM Cost		*Years Until Project Completion*	*30*			$675,000
Present-Worth O&M Cost		*Presumed Interest Rate*	*3%*			**$476,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$4,530,000	**$4,530,000**
TOTAL O&M COSTS (PRESENT WORTH)			$476,000	**$5,010,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$309,000	**$5,319,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$136,000	**$5,455,000**
TOTAL PRESENT-WORTH COST				**$5,500,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALTERNATIVE S7 DNAPL EXCAVATION AND ERH

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	12/18/2015	
Project	MFA Remediation		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	Yes		**Groundwater Treatment**	No	
Soil Treatment Area	27,000	SF	**GW Treatment Area**	NA	
Treatment Perimeter	850	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	4,600	CY	**Treatment Depth**	8 outside	FT bgs
				9 inside	FT bgs

Alternative Specific Assumptions

1 7,400 CY of soil will be excavated over 24,900 SF area
2 A 2,100 SF area inside the NE building corner will also be thermally treated
3 Some of the Port's maintenance operations will be temporarily moved
4 The building will remain in place
5 Zone of treatment inside building will be 3 to 9 FT bgs
6 Average depth of excavation will be 8 feet bgs outside the building
7 Excavation work will only be done outside the building
8 2,800 CY of soil excavated will be clean overburden materials
9 4,600 CY of soil excavated will be above Method C cleanup levels
10 480 CY of soil containing DNAPL will be treated by RCRA stabilization with CAMU approval
11 All soil with DNAPL will be transported to Arlington, OR, for RCRA stabilization
12 Non DNAPL contaminated soil above Method C will be landfilled as CAMU-eligible waste in Arlington, OR
13 Drill cuttings and other misc. materials will be disposed of off-site
14 Existing utilities will need to be removed and replaced following treatment activities
15 1.5 to 2 years will be needed to perform the work
16 Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$2,451,322	1	Mobilization/Demobilization (Excavation & ERH)	1	LS	$150,000	$150,000
	2	Contractor Design and Work Plans	1	LS	$70,000	$70,000
	3	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	4	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	5	Decommission Groundwater Monitoring & Biovent Wells	25	EA	$920	$23,000
	6	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	7	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	8	Demo Retaining Wall	160	LF	$75	$12,000
	9	Install Sheet Pile Wall Shoring for Building (200 LF)	5,000	SF	$45	$225,000
	10	Install Freeze Wall Shoring for Excavation Perimeter (550 LF)	11,550	SF	$31	$358,050
	11	Install Sheet Pile Wall Shoring along Slurry Wall (100 LF)	2,500	SF	$45	$112,500
	12	Storm Water Handling and Environmental Protection	1	LS	$15,000	$15,000
	13	Subsurface Installations by ERH Contractor	1	LS	$18,000	$18,000
	14	Drilling & Analytical Services for Subsurface ERH Installations	1	LS	$41,310	$41,310
	15	ERH Surface Installations and Startup	1	LS	$181,000	$181,000
	16	ERH Operations	1	LS	$314,000	$314,000
	17	Electrical Connection and Usage Charges	1	LS	$79,000	$79,000
	18	Activated Carbon Usage	1	LS	$10,000	$10,000
	19	Other Misc. ERH Operational Costs	1	LS	$16,000	$16,000
	20	Remove Surface Asphalt in Storage Yard and Road	24,900	SF	$0.88	$21,912
	21	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	22	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	2,800	CY	$27	$75,600
	23	Excavation and Stockpiling of Contaminated Soil	4,600	CY	$28	$128,800
	24	Loading of Contaminated Soil	6,900	TN	$6	$41,400
	25	Contaminated Water Handling and Environmental Protection	1	LS	$27,500	$27,500
	26	Import of Clean Fill to the Site	4,600	CY	$20	$92,000
	27	Backfill and Compaction of Excavation	7,400	CY	$9	$66,600
	28	Asphalt Paving of Site Excavation Area	24,900	SF	$4	$99,600
	29	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	30	Rebuild Retaining Wall	160	LF	$150	$24,000
	31	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	32	Monitoring Well Installation	10	EA	$5,400	$54,000
	33	Contractor Reporting and Closeout Submittals	380	HR	$90	$34,200
Contaminated Waste Disposal and Transportation						
$1,479,385	1	NAPL Soil (CAMU RCRA Stabilization) Costs	720	TN	$255	$183,600
	2	Transportation Costs to RCRA Stabilization Facility	720	TN	$55	$39,600
	3	Liquid NAPL Material Disposal Costs (Incinerator)	3,100	GAL	$10	$31,000
	4	Liquid NAPL Transportation Costs to Incinerator	62	DRUM	$250	$15,500
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	6,900	TN	$115	$793,500
	6	Transportation Costs to Subtitle C Landfill	6,900	TN	$55	$379,500
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	45	TN	$30	$1,350
	8	Transportation Costs to Subtitle D Landfill	45	TN	$25	$1,125
	9	Contaminated Water Treatment and Disposal	143,000	GAL	$0.20	$28,600
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	330	TN	$8	$2,640
	11	Transportation Costs to Asphalt Recycler	330	TN	$9	$2,970
Subtotal Contractor Costs						**$3,930,707**
Contractor Contingency (%)			**25**	%	$3,930,707	$982,677
Total Contractor Costs						**$4,910,000**

ALTERNATIVE S7 DNAPL EXCAVATION AND ERH (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	1.5	%	$4,910,000	$73,650
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$4,910,000	$49,100
	3	Engineering Design (% DCC)	3	%	$4,910,000	$147,300
	4	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	5	Bid & RFI Support	100	HR	$135	$13,500
	6	Construction Oversight and QA (% DCC)	5	%	$4,910,000	$245,500
	7	Confirmational Sample Collection & Reporting Including Drilling	1	LS	$33,000	$33,000
	8	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$628,550**
Engineering Contingency (%)			**10**	%	$628,550	$62,855
Total Engineering Costs						**$691,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (Weekly Temp Monitoring for 6 months)			***1***	***Years of Annual O&M***		
$18,220	1	Project Management and Communication	52	HR	$135	$7,020
	2	Weekly Temperature Readings	52	HR	$100	$5,200
	3	Monthly Reports	6	EA	$1,000	$6,000
Subtotal Annual O&M Cost (WeeklyTemp Monitoring)						**$18,220**
O&M Contingency (Weekly Temp Monitoring)			25	%	$18,220	$4,555
Total Annual O&M Cost (Weekly Temp Monitoring)						**$22,800**
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)						**$15,036**
O&M Contingency (ICs Maintenance and Asphalt Inspection/Repair as Needed)			25	%	$15,036	$3,759
Total Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)						**$18,800**
Total Annual O&M Cost						**$41,600**
Annual LTM Cost (Monitoring and Sampling)			***2***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$74,500**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$653,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$454,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$5,600,000	**$5,600,000**
TOTAL O&M COSTS (PRESENT WORTH)			$454,000	**$6,050,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$393,000	**$6,443,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$168,000	**$6,611,000**
TOTAL PRESENT-WORTH COST				**$6,600,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
ERH: electrical resistance heating
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

ALT GW1 ERH AND ENHANCED BIODEGRADATION

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	9/21/2015	
Project	MFA Remediation		**Last Updated**	9/4/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	No		**GW Treatment**	No	
Soil Treatment Area	0	SF	**GW Treatment Area**	55,000	SF
Treatment Perimeter	1,200	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	40	CY	**Treatment Depth**	50	FT bgs

Alternative Specific Assumptions

1 71,000 CY of soil will be thermally treated in a 55,000 SF area
2 A 1,000 SF area inside the northeast building corner will also be thermally treated
3 Some of the Port's maintenance operations will be temporarily moved
4 The building will remain in place
5 Zone of treatment will be 15 to 50 FT bgs
6 Except for the access road (Paper Way) well completions and equipment will be surface mounted
7 No excavation of contaminated soil will be necessary
8 Drill cuttings and other miscellaneous materials will be disposed of off site
9 Existing utilities will need to be removed and replaced following treatment activities
10 Two years will be needed to perform active portion of the GW treatment work
11 Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$7,081,650	1	Mobilization	1	LS	$1,377,000	$1,377,000
	2	Contractor Design and Work Plans	1	LS	$146,300	$146,300
	3	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	4	Demo Horizontal Bioventing Wells	200	LF	$37	$7,400
	5	Decommission Groundwater Monitoring & Biovent Wells	45	EA	$920	$41,400
	6	Specialty Subcontractors (surveyor, utility locates)	1	LS	$20,000	$20,000
	7	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	8	Storm Water Handling and Environmental Protection	1	LS	$10,000	$10,000
	9	Subsurface Installations by ERH Contactor(214 electrodes, 23 TMPs)	1	LS	$251,200	$251,200
	10	General Trenching and Site Restoration Work	1	LS	$13,000	$13,000
	11	Drilling & Analytical Services for subsurface ERH installations	1	LS	$857,400	$857,400
	12	Upgrade Electrical Service to Treatment Pad (4,500 kW)	1	LS	$55,000	$55,000
	13	ERH Surface installations and startup	1	LS	$798,600	$798,600
	14	ERH Operations	1	LS	$1,641,300	$1,641,300
	15	Electrical Connection and Usage charges	1	LS	$1,359,800	$1,359,800
	16	Activated Carbon Usage	1	LS	$7,000	$7,000
	17	Other Misc. ERH Operational Costs	1	LS	$26,700	$26,700
	18	Chemical Injection of ORC using Push Probe (4 events)	4	EA	$34,000	$136,000
	19	ORC Advanced Chemical or Equal	8,000	LBS	$11	$88,000
	20	Rebuild Access Road (150 LF)	3,750	SF	$5	$18,750
	21	Monitoring Well Installation (12 wells to 50 feet)	12	EA	$7,200	$86,400
	22	Demobilization	1	LS	$50,000	$50,000
	23	Contractor Reporting and Closeout Submittals	360	HR	$90	$32,400
Contaminated Waste Disposal and Transportation						
$186,510	1	NAPL Soil (CAMU RCRA Stabilization) Costs	10	TN	$255	$2,550
	2	Transportation Costs to RCRA Stabilization Facility	10	TN	$55	$550
	3	Liquid NAPL Material Disposal Costs (Incinerator)	5,000	GAL	$10	$50,000
	4	Liquid NAPL Transportation Costs to Incinerator	100	DRUM	$250	$25,000
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	40	TN	$115	$4,600
	6	Transportation Costs to Subtitle C Landfill	40	TN	$55	$2,200
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	20	TN	$30	$600
	8	Transportation Costs to Subtitle D Landfill	20	TN	$25	$500
	9	Contaminated Water Treatment and Disposal	500,000	GAL	$0.20	$100,000
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	30	TN	$8	$240
	11	Transportation Costs to Asphalt Recycler	30	TN	$9	$270
Subtotal Contractor Costs						**$7,268,160**
Contractor Contingency (%)			**25**	%	$7,268,160	$1,817,040
Total Contractor Costs						**$9,090,000**

ALT GW1 ERH AND ENHANCED BIODEGRADATION (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	1	%	$9,090,000	$90,900
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$9,090,000	$90,900
	3	Engineering Design (% DCC)	4	%	$9,090,000	$363,600
	4	Planning for Temporary Relocation of Port Maintenance Ops	100	HR	$135	$13,500
	5	Bid & RFI Support	80	HR	$135	$10,800
	6	Construction Oversight and QA (% DCC)	2	%	$9,090,000	$181,800
	7	Institutional Controls	1	LS	$5,000	$5,000
	8	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$809,500**
Engineering Contingency (%)			**10**	%	$809,500	$80,950
Total Engineering Costs						**$890,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (Weekly Temp Monitoring for 1 year)			***1***	***Years of Annual O&M***		
$50,760	1	Project Management and Communication	104	HR	$135	$14,040
	2	Weekly Temperature Readings	208	HR	$90	$18,720
	3	Monthly Reports	12	EA	$1,500	$18,000
Subtotal Annual O&M Cost						**$50,760**
O&M Contingency			25	%	$50,760	$12,690
Total Annual O&M Cost						**$63,450**
Annual LTM Cost (Annual MNA monitoring and IC)			***4***	***Years of Annual LTM***		
$32,080	1	Project Management & Coordination	60	HR	$135	$8,100
	2	Institutional Controls Monitoring	1	LS	$1,000	$1,000
	3	Mobilization/Demobilization for Sampling (two person crew)	1	EA	$1,800	$1,800
	4	Pickup Truck Rental	4	DY	$65	$260
	5	Lodging and Meals (2 people 3 days each)	6	DY	$130	$780
	6	Sampling Labor and Supplies	12	EA	$400	$4,800
	7	Analytical Testing (DRO)	13	EA	$70	$910
	8	Analytical Testing (SVOCs)	13	EA	$310	$4,030
	9	Analytical Testing (PAHs)	13	EA	$200	$2,600
	10	IDW Disposal	1	EA	$300	$300
	11	Annual Reporting	1	LS	$7,500	$7,500
Subtotal Annual LTM Cost						**$32,080**
LTM Contingency			25	%	$32,080	$8,020
Total Annual LTM Cost						**$40,100**
Total O&M and LTM Cost		***Years Until Project Completion***	***4***			$223,850
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	**%**		**$210,658**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$9,980,000	**$9,980,000**
TOTAL O&M COSTS (PRESENT WORTH)			$211,000	**$10,200,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$727,000	**$10,927,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$299,000	**$11,226,000**
TOTAL PRESENT-WORTH COST				**$11,200,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CUL: cleanup level
CY: cubic yard
DCC: direct capital costs
DRO: diesel range organics
DY: Day
EA: each
ERH: electrical resistive heating
FT: feet
GAL: gallon
GW: groundwater
HDPE: high density polyethylene
HR: hour
IC: institutional control
IDW: investigation-derived waste
IN: inch
kW: kilowatts
LBS: pounds
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
MNA: monitored natural attenuation
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
ORC: oxygen releasing compound
PAH: polycyclic aromatic hydrocarbons
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
SF: square feet
SVOC: semi volatile organics compound
TMP: temperature monitoirng point
TN: ton

ALT GW2 CHEMICAL OXIDATION AND MONITORED NATURAL ATTENUATION

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	9/21/2015	
Project	MFA Remediation		**Last Updated**	9/4/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	No		**GW Treatment**	Yes	
Soil Treatment Area	0	SF	**GW Treatment Area**	55,000	SF
Treatment Perimeter	1,200	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	14	CY	**Treatment Depth**	50	FT bgs

Alternative Specific Assumptions

1. 77,000 CY of soil/GW will be treated in a 55,000 SF area via chemical injection and monitored natural attenuation
2. Modified Fenton's Reagent will be injected by direct injection methods 4 times over a 2 year period
3. A 1,000 SF area inside the northeast building corner will also be treated
4. Some of the Port's maintenance operations will be temporarily moved during injection events
5. The building will remain in place and no excavation work will be necessary
6. All well completions will be flush mounted
7. Zone of injection will be 14 to 48 FT bgs (treatment from 12 to 50 FT bgs) by approximately 137 injection points
8. Drill cuttings and other misc materials will be disposed of off site
9. Existing utilities will need be preciesely located to avoid during treatment activities
10. 4 injection events will be perform over a 2 year period
11. Each injection event will take between 20 and 40 days to complete
12. GW and soil samples will be taken from 8 locations before and after each injection event
13. 6 years of monitoring will be performed following the two years of injection
14. The site groundwater will meet CUL after 8 years
15. Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$2,711,550	1	Mobilization	1	LS	$60,000	$60,000
	2	Contractor Design and Work Plans	160	HR	$90	$14,400
	3	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	4	Demo Horizontal Bioventing Wells	200	LF	$37	$7,400
	5	Decommission Groundwater Monitoring & Biovent Wells	45	EA	$920	$41,400
	6	Specialty Subcontractors (surveyor, utility locates)	1	LS	$20,000	$20,000
	7	Demo Fencing	1	LS	$5,000	$5,000
	8	Environmental Protection	1	LS	$5,000	$5,000
	9	Pre and Post Injection Groundwater Monitoring (8 locations)	4	LS	$26,000	$104,000
	10	1st Injection of Modified Fenton's Reagent (100%)	1	LS	$720,000	$720,000
	11	2nd Injection of Modified Fenton's Reagent (100%)	1	LS	$720,000	$720,000
	12	3rd Injection of Modified Fenton's Reagent (50%) Hot Spot	1	LS	$360,000	$360,000
	13	4th Injection of Modified Fenton's Reagent (50%) Hot Spot	1	LS	$360,000	$360,000
	14	Chemical Injection Reporting (4 events)	4	EA	$7,500	$30,000
	15	General Site Restoration Work	1	LS	$10,000	$10,000
	16	Rebuild Access Road (150 LF)	3,750	SF	$5	$18,750
	17	Monitoring Well Installation for Oxidation and MNA	21	EA	$7,200	$151,200
	18	Demobilization	1	LS	$40,000	$40,000
	19	Contractor Reporting and Closeout Submittals	160	HR	$90	$14,400
Contaminated Waste Disposal and Transportation						
$15,865	1	NAPL Soil (CAMU RCRA Stabilization) Costs	2	TN	$255	$510
	2	Transportation Costs to RCRA Stabilization Facility	2	TN	$55	$110
	3	Liquid NAPL Material Diposal Costs (Incinerator)	200	GAL	$10	$2,000
	4	Liquid NAPL Transportation Costs to Incinerator	4	DRUM	$250	$1,000
	5	Transportation Charge for Small Loads to Aragonite, UT	1	LS	$4,000	$4,000
	6	CAMU-Eligible Material Diposal Costs (Subtitle C Landfill)	6	TN	$115	$690
	7	Transportation Costs to Subtitle C Landfill	6	TN	$55	$330
	8	Transportation Charge for Small Loads to Arlington, OR	1	LS	$1,000	$1,000
	9	Non-Hazardous Material Diposal Costs (Subtitle D)	13	TN	$30	$390
	10	Transportation Costs to Subtitle D Landfill	13	TN	$25	$325
	11	Contaminated Water Treatment and Disposal	10,000	GAL	$0.50	$5,000
	12	Non-Hazardous Material Diposal Costs (Asphalt Recycling)	30	TN	$8	$240
	13	Transportation Costs to Asphalt Recycler	30	TN	$9	$270
Subtotal Contractor Costs						**$2,727,415**
Contractor Contingency (%)			**20**	%	$2,727,415	$545,483
Total Contractor Costs						**$3,270,000**

ALT GW2 CHEMICAL OXIDATION AND MONITORED NATURAL ATTENUATION (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$3,270,000	$65,400
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$3,270,000	$65,400
	3	Pre-Design Investigation Testing (% DCC)	3	%	$3,270,000	$98,100
	4	Engineering Design (% DCC)	5	%	$3,270,000	$163,500
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	80	HR	$135	$10,800
	7	Construction Oversight and QA (% DCC)	3	%	$3,270,000	$98,100
	8	ICs	1	LS	$5,000	$5,000
	9	Closure Documentation & Reporting	1	LS	$35,000	$35,000
Subtotal Engineering Costs						**$554,800**
Engineering Contingency (%)			**10**	%	$554,800	$55,480
Total Engineering Costs						**$610,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs)			***8***	***Years of Annual O&M***		
$1,000		ICs Monitoring	1	LS	$1,000	$1,000
Subtotal Annual O&M Cost						**$1,000**
O&M Contingency			25	%	$1,000	$250
Total Annual O&M Cost						**$1,250**
Annual LTM Cost (Annual GW monitoring, 2 years during treatment & 6 years after)			***8***	***Years of Annual LTM***		
$33,344	1	Project Management & Coordination	60	HR	$135	$8,100
	2	Mobilization/Demobilization for Sampling (two person crew)	1	EA	$1,800	$1,800
	3	Pickup Truck Rental	4	DY	$85	$340
	4	Lodging and Meals (2 people 3 days each)	6	DY	$169	$1,014
	5	Sampling Labor and Supplies	12	EA	$400	$4,800
	6	Analytical Testing (DRO)	13	EA	$70	$910
	7	Analytical Testing (SVOCs)	13	EA	$310	$4,030
	8	Analytical Testing (PAHs)	13	EA	$200	$2,600
	9	Analytical Testing (MNA Specific)	13	EA	$150	$1,950
	10	IDW Disposal	1	EA	$300	$300
	11	Annual Reporting	1	LS	$7,500	$7,500
Subtotal Annual LTM Cost						**$33,344**
LTM Contingency			25	%	$32,080	$8,336.00
Total Annual LTM Cost						**$41,680**
Total O&M and LTM Cost		***Years Until Project Completion***	***8***			$343,440
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	***%***		**$301,355**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cummulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$3,880,000	**$3,880,000**
TOTAL O&M COSTS (PRESENT WORTH)			$301,000	**$4,180,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$262,000	**$4,442,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$116,000	**$4,558,000**
TOTAL PRESENT-WORTH COST				**$4,560,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CUL: cleanup level
CY: cubic yard
DCC: direct capital costs
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
GW: groundwater
HDPE: high density polyethylene
HR: hour
IC: institutional control
IDW: investigation-derived waste
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
PAH: polycyclic aromatic hydrocarbons
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
SF: square feet
SVOC: semi volatile organics compound
TN: ton

ALT GW3 ACTIVE BIOSPARGING

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	9/21/2015	
Project	MFA Remediation		**Last Updated**	9/4/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	No		**GW Treatment**	Yes	
Soil Treatment Area	0	SF	**GW Treatment Area**	55,000	SF
Treatment Perimeter	1,200	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	10	CY	**Treatment Depth**	50	FT bgs

Alternative Specific Assumptions

1 71,000 CY of soil/GW will be treated in a 55,000 SF area via active biosparging
2 No work will be done inside the northeast building corner in support of GW treatment
3 The Port's maintenance operations will be not be significantly impacted
4 The building will remain in place
5 Six additional biosparge wells and 12 new monitoring wells will be needed
6 All well completions and piping will be installed underground
7 Zone of treatment will be 15 to 50 FT bgs
8 Horizontal piping installations will be completed by excavator
9 Drill cuttings and other miscellaneous materials will be disposed of off site
10 Existing utilities will not be impacted by treatment activities
11 An active biosparge system will be operated for 16 years before CUL are achieved.
12 Biosparge system operation will include monthly site visits for 16 years.
13 4 years of monitoring will be performed following biosparge system shut down
14 Site will be restored to existing conditions following remediation

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$278,950	1	Mobilization	1	LS	$15,000	$15,000
	2	Contractor Design and Work Plans	80	HR	$100	$8,000
	3	Inconvenience Fee for Disruption of Port's maintenance ops	1	LS	$10,000	$10,000
	4	Specialty Subcontractors (surveyor, utility locates)	1	LS	$6,000	$6,000
	5	Monitoring Well Installation	7	EA	$7,200	$50,400
	6	BioVenting Well Installation	6	EA	$10,000	$60,000
	7	BioVenting Connection Piping Installation	350	LF	$60	$21,000
	8	BioVenting System Upgrade and Connections	1	LS	$30,000	$30,000
	9	BioVenting System Startup Testing and Monitoring	100	HR	$90	$9,000
	10	BioVenting Well and System Upgrade Reporting	1	LS	$10,000	$10,000
	11	General SiteRestoration Work	1	LS	$20,000	$20,000
	12	Resurface Access Road (150 LF)	3,750	SF	$5	$18,750
	13	Demobilization	1	LS	$10,000	$10,000
	14	Contractor Reporting and Closeout Submittals	120	HR	$90	$10,800
Contaminated Waste Disposal and Transportation						
$8,244	1	NAPL Soil (CAMU RCRA Stabilization) Costs	1	TN	$255	$255
	2	Transportation Costs to RCRA Stabilization Facility	1	TN	$55	$55
	3	Liquid NAPL Material Disposal Costs (Incinerator)	50	GAL	$10	$500
	4	Liquid NAPL Transportation Costs to Incinerator	1	DRUM	$250	$250
	5	Transportation Charge for Small Loads to Aragonite, UT	1	LS	$4,000	$4,000
	6	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	2	TN	$130	$260
	7	Transportation Costs to Subtitle C Landfill	2	TN	$55	$110
	8	Transportation Charge for Small Loads to Arlington, OR	1	LS	$1,000	$1,000
	9	Non-Hazardous Material Disposal Costs (Subtitle D)	12	TN	$51	$612
	10	Transportation Costs to Subtitle D Landfill	12	TN	$41	$492
	11	Contaminated Development Water Treatment and Disposal	200	GAL	$1	$200
	12	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	30	TN	$8	$240
	13	Transportation Costs to Asphalt Recycler	30	TN	$9	$270
Subtotal Contractor Costs						**$287,194**
Contractor Contingency (%)			**20**	%	$287,194	$57,439
Total Contractor Costs						**$345,000**

ALT GW3 ACTIVE BIOSPARGING (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	10	%	$345,000	$34,500
	2	Regulatory Review, Coordination, and Meetings (% DCC)	6	%	$345,000	$20,700
	3	Engineering Design (% DCC)	22	%	$345,000	$75,900
	4	Coordination with Port Maintenance Ops	20	HR	$135	$2,700
	5	Bid & RFI Support	60	HR	$135	$8,100
	6	Construction Oversight and QA (% DCC)	8	%	$345,000	$27,600
	7	ICs	1	LS	$5,000	$5,000
	8	Closure Documentation & Reporting	1	LS	$20,000	$20,000
Subtotal Engineering Costs						**$194,500**
Engineering Contingency (%)			**10**	%	$194,500	$19,450
Total Engineering Costs						**$214,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (Bioventing system O&M, IC Monitoring)			***16***	***Years of Annual O&M***		
$40,800	1	ICs Monitoring	1	LS	$2,000	$2,000
	2	Monthly O&M Visits	12	EA	$1,400	$16,800
	3	Annual Electricity Consumption (Combined 20 hp motors)	12	MO	$1,250	$15,000
	4	Miscellaneous Supplies & Replacement Parts	1	LS	$1,000	$1,000
	5	Bioventing System O&M Reporting	1	LS	$6,000	$6,000
Subtotal Annual O&M Cost						**$40,800**
O&M Contingency			25	%	$40,800	$10,200
Total Annual O&M Cost						**$51,000**
Annual LTM Cost (Annual GW monitoring)			***20***	***Years of Annual LTM***		
$41,055	1	Project Management & Coordination	60	HR	$135	$8,100
	2	Mobilization/Demobilization for Sampling (two person crew)	1	EA	$1,800	$1,800
	3	Pickup Truck Rental	5	DY	$65	$325
	4	Lodging and Meals (2 people, 3 days each)	10	DY	$169	$1,690
	5	Sampling Labor and Supplies	18	EA	$400	$7,200
	6	Analytical Testing (DRO)	23	EA	$70	$1,610
	7	Analytical Testing (SVOCs)	23	EA	$310	$7,130
	8	Analytical Testing (PAHs)	23	EA	$200	$4,600
	9	IDW Disposal	2	EA	$300	$600
	10	Annual Reporting	1	LS	$8,000	$8,000
Subtotal Annual LTM Cost						**$41,055**
LTM Contingency			25	%	$41,055	$10,264
Total Annual LTM Cost						**$51,319**
Total O&M and LTM Cost		***Years Until Project Completion***	***20***			$1,840,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	***%***		**$1,404,110**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$559,000	**$559,000**
TOTAL O&M COSTS (PRESENT WORTH)			$1,404,000	**$1,960,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$27,600	**$1,987,600**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$16,800	**$2,004,400**
TOTAL PRESENT-WORTH COST				**$2,000,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CUL: cleanup level
CY: cubic yard
DCC: direct capital costs
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
GW: groundwater
HDPE: high density polyethylene
hp: horsepower
HR: hour
IC: institutional control
IDW: investigation-derived waste
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
MO: months
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
PAH: polycyclic aromatic hydrocarbons
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
SF: square feet
SVOC: semi volatile organics compound
TN: ton

ALT GW4 MONITORED NATURAL ATTENUATION

Client	International Paper		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washington		**Report Date**	9/21/2015	
Project	MFA Remediation		**Last Updated**	9/8/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineer's Estimate	
Soil Removal	No		**GW Treatment**	Yes	
Soil Treatment Area	0	SF	**GW Treatment Area**	55,000	SF
Treatment Perimeter	1,200	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	2	CY	**Treatment Depth**	50	FT bgs

Alternative Specific Assumptions

1 MNA will be used for to reduce groundwater concentrations in the aquifer
2 The Port's maintenance operations will be not be impacted by MNA
3 The building will remain in place and no access will be needed
4 All new monitoring well completions will have flush mount completions
5 Drill cuttings and other miscellaneous materials will be disposed of off site
6 Existing utilities will not be impacted by MNA activities
7 MNA will take 30 years before CUL are achieved
8 MNA will include one annual site visit for 30 years
9 One IC monitoring inspection will be performed each year
10 Site will be restored to existing conditions following completion of MNA

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$104,700	1	Mobilization	1	LS	$6,000	$6,000
	2	Contractor Design and Work Plans	30	HR	$90	$2,700
	3	Contractor Coordination with Port's maintenance c	10	HR	$90	$900
	4	Specialty Subcontractors (surveyor, utility locates)	1	LS	$2,000	$2,000
	5	Monitoring Well Installation	12	EA	$7,200	$86,400
	6	Demobilization	1	LS	$4,000	$4,000
	7	Contractor Reporting and Closeout Submittals	30	HR	$90	$2,700
Contaminated Waste Disposal and Transportation						
$6,597	1	NAPL Soil (CAMU RCRA Stabilization) Costs	1	TN	$255	$255
	2	Transportation Costs to RCRA Stabilization Facility	1	TN	$55	$55
	3	Liquid NAPL Material Disposal Costs (Incinerator)	50	GAL	$10	$500
	4	Liquid NAPL Transportation Costs to Incinerator	1	DRUM	$250	$250
	5	Transportation Charge for Small Loads to Aragonite, UT	1	LS	$4,000	$4,000
	6	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	1	TN	$130	$130
	7	Transportation Costs to Subtitle C Landfill	1	TN	$55	$55
	8	Non-Hazardous Material Disposal Costs (Subtitle D)	1	TN	$30	$30
	9	Transportation Costs to Subtitle D Landfill	1	TN	$22	$22
	10	Transportation Charge for Small Loads to Oregon	1	LS	$1,000	$1,000
	11	Contaminated Development Water Treatment and Disposal	100	GAL	$3.00	$300
	12	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	0	TN	$8	$0
	13	Transportation Costs to Asphalt Recycler	0	TN	$9	$0
Subtotal Contractor Costs						**$111,297**
Contractor Contingency (%)			**20**	%	$111,297	$22,259
Total Contractor Costs						**$134,000**

ALT GW4 MONITORED NATURAL ATTENUATION (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	20	%	$134,000	$26,800
	2	Regulatory Review, Coordination, and Meetings (% DCC)	25	%	$134,000	$33,500
	3	Engineering Design (% DCC)	25	%	$134,000	$33,500
	4	Coordination with Port Maintenance Ops	16	HR	$135	$2,160
	5	Bid & RFI Support	10	HR	$135	$1,350
	6	Construction Oversight and QA (% DCC)	10	%	$134,000	$13,400
	7	ICs	1	LS	$5,000	$5,000
	8	Closure Documentation & Reporting	1	LS	$12,000	$12,000
Subtotal Engineering Costs						**$127,710**
Engineering Contingency (%)			**10**	%	$127,710	$12,771
Total Engineering Costs						**$140,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs)			***30***	***Years of Annual O&M***		
$2,000	1	ICs Monitoring	1	LS	$2,000	$2,000
Subtotal Annual O&M Cost						**$2,000**
O&M Contingency			25	%	$2,000	$500
Total Annual O&M Cost						**$2,500**
Annual LTM Cost (Annual groundwater monitoring)			***30***	***Years of Annual LTM***		
$43,710	1	Project Management & Coordination	50	HR	$135	$6,750
	2	Mobilization/Demobilization for Sampling (two person crew)	1	EA	$1,800	$1,800
	3	Pickup Truck Rental	6	DY	$85	$510
	4	Lodging and Meals (2 people 5 days each)	10	DY	$169	$1,690
	5	Sampling Labor and Supplies	20	EA	$400	$8,000
	6	Analytical Testing (DRO)	22	EA	$70	$1,540
	7	Analytical Testing (SVOCs)	22	EA	$310	$6,820
	8	Analytical Testing (PAHs)	22	EA	$200	$4,400
	9	Analytical Testing (MNA Specific)	22	EA	$150	$3,300
	10	IDW Disposal	3	EA	$300	$900
	11	Annual Reporting	1	LS	$8,000	$8,000
Subtotal Annual LTM Cost						**$43,710**
LTM Contingency			25	%	$43,710	$10,927.50
Total Annual LTM Cost						**$54,638**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$1,710,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3***	***%***		**$1,119,920**

ALTERNATIVE COST SUMMARY			Rounded Total	Cumulative Total
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$274,000	**$274,000**
TOTAL O&M COSTS (PRESENT WORTH)			$1,120,000	**$1,390,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$10,700	**$1,400,700**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$8,220	**$1,408,920**
TOTAL PRESENT-WORTH COST				**$1,410,000**

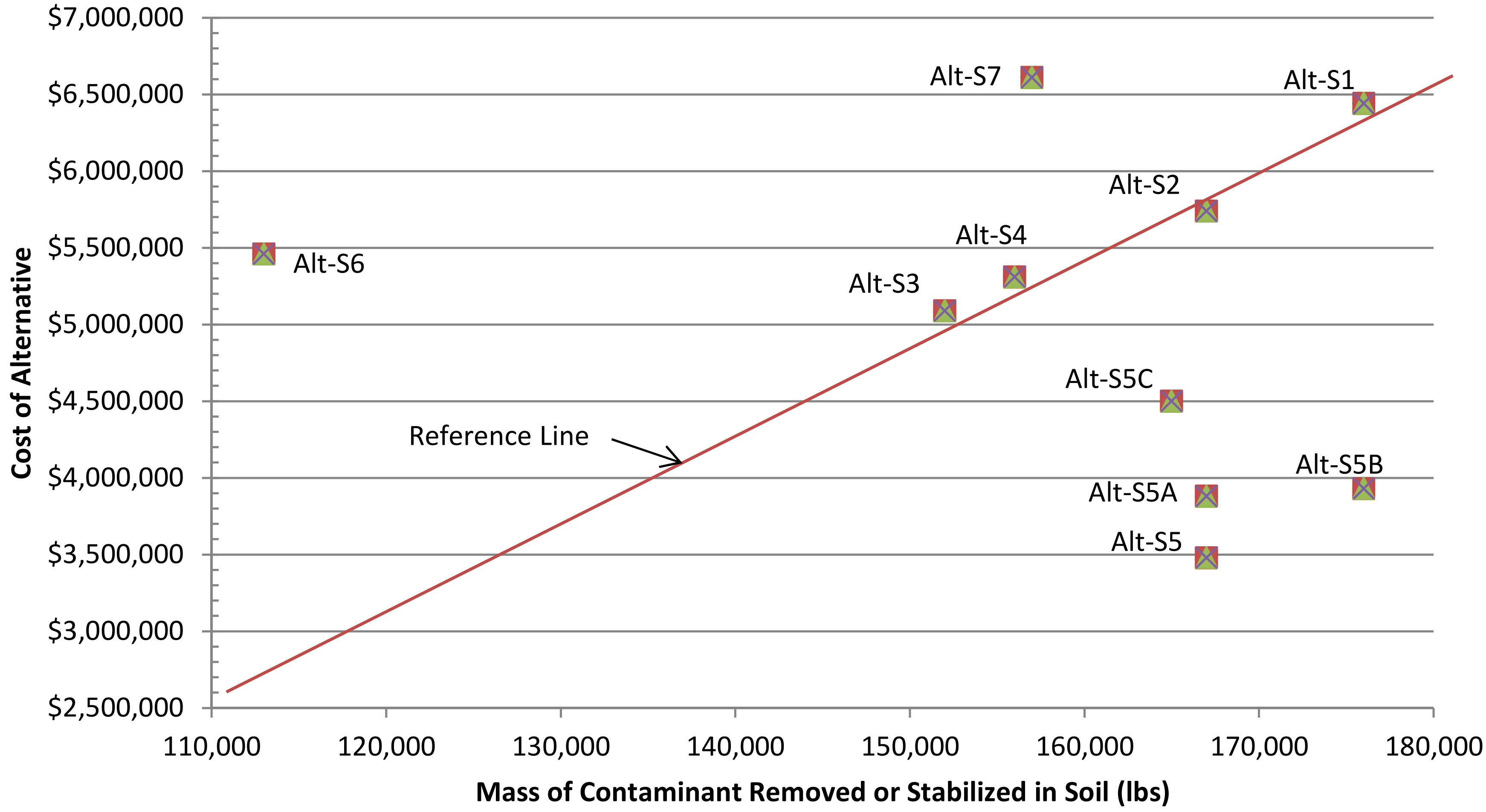
ACRONYMS AND ABBREVIATIONS:

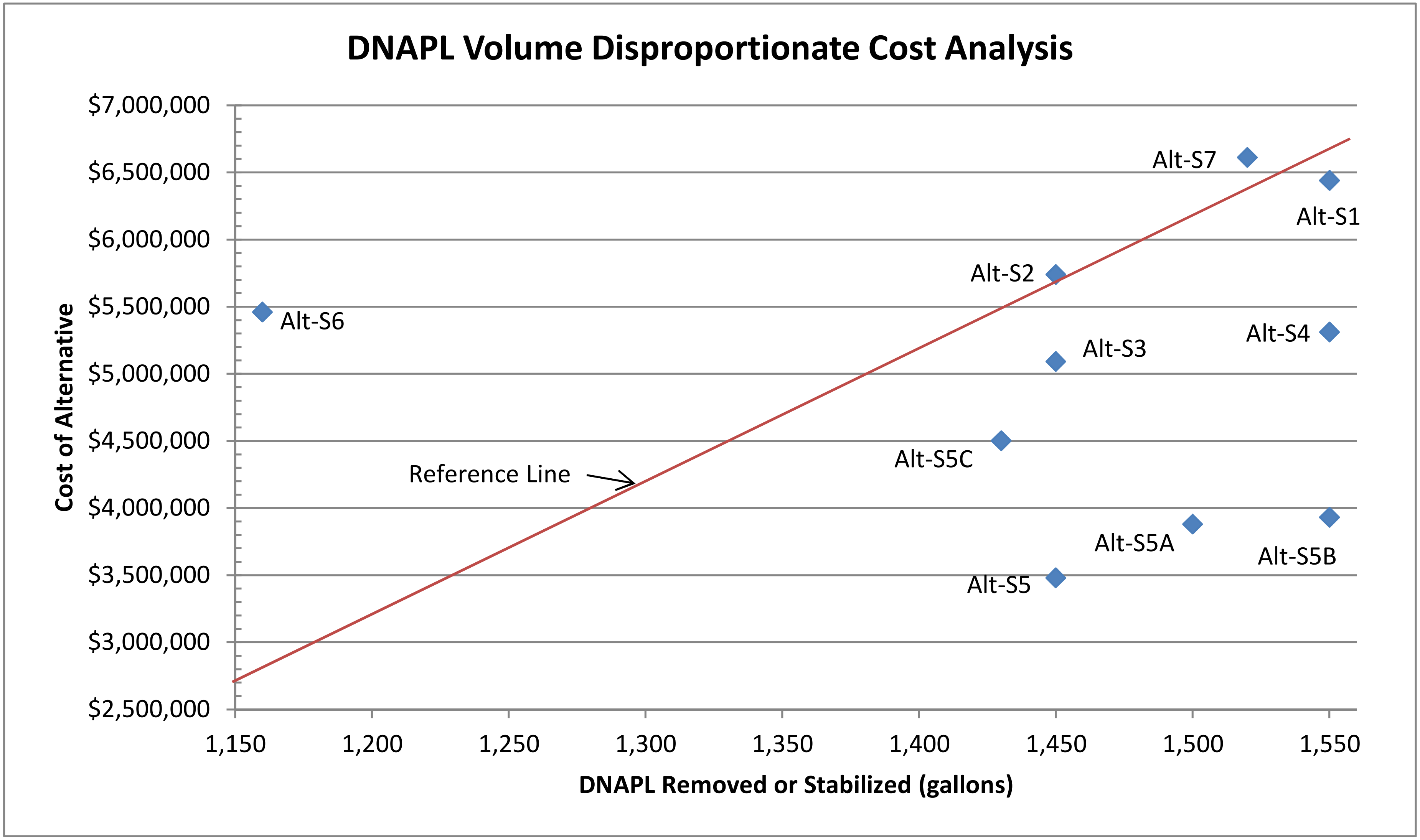
bgs: below ground surface
CAMU: Corrective Action Management Unit
CUL: cleanup level
CY: cubic yard
DCC: direct capital costs
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
GW: groundwater
HDPE: high density polyethylene
hp: horsepower
HR: hour
IC: institutional control
IDW: investigation-derived waste
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
MNA: monitored natural attenuation
MO: months
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
PAH: polycyclic aromatic hydrocarbons
QA: quality assurance
RCRA: Resource Conservation and Recovery Act
RFI: request for information
RI/FS: remedial investigation and feasibility study
SF: square feet
SVOC: semi volatile organics compound
TN: ton

Appendix J

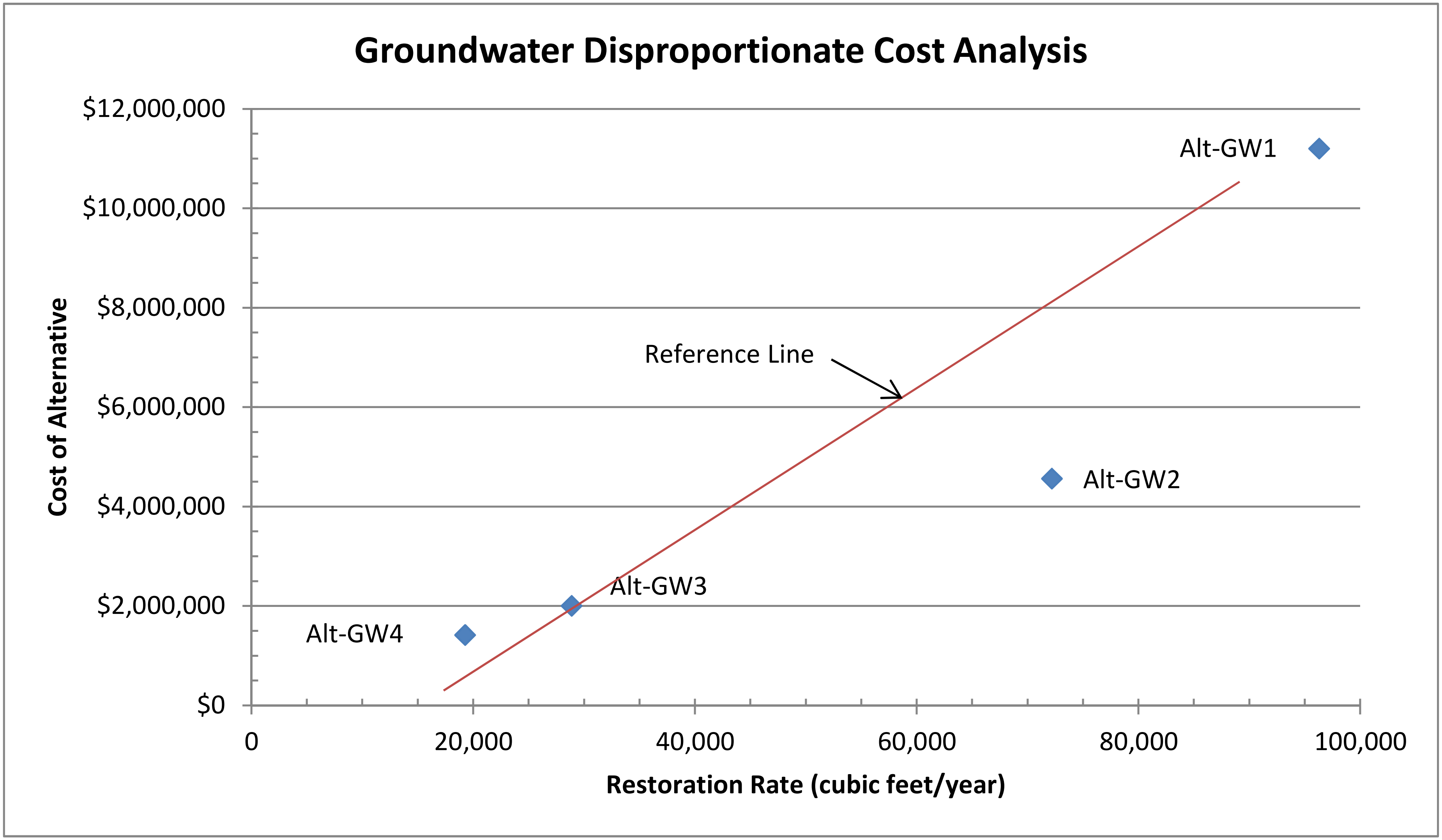
Disproportionate Cost Analysis Graphs

Soil Mass Disproportionate Cost Analysis





DNAPL Volume Disproportionate Cost Analysis


Groundwater Disproportionate Cost Analysis
$12,000,000
$10,000,000
$8,000,000
$6,000,000
$4,000,000
$2,000,000
$0
Cost of Alternative
0
20,000
40,000
60,000
80,000
100,000
Restoration Rate (cubic feet/year)
Alt-GW1
Alt-GW2
Alt-GW3
Alt-GW4
Reference Line

Appendix K

Revised Alternative S5B Cleanup Action Alternative Technical Memorandum

TECHNICAL MEMORANDUM

To: Kaia Peterson, Washington State Department of Ecology

From: Paul Kalina, AECOM
Cary Brown, AECOM

cc: Philip Slowiak, International Paper Company
Lisa Hendriksen, Port of Longview

Date: May 4, 2015

Subject: ***Cleanup Action Alternative Technical Memorandum***
Revised Alternative S5B
Port of Longview Maintenance Facility Area, Longview, Washington

Attachments:
Figure 1 – Alternative S5B, Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks (Revised RI/FS Figure 7-8)
Figure 2 – Alternative S5B, Proposed Treatment Area Zones and Post-Remediation Site Grades
Figure 3 – Alternative S5B, Conceptual Building Solidification and Demolition Limits (Revised RI/FS Figure 7-9)
Table 1 – Summary of Alternative S5B Issue Resolution
Table 2 – Comparison of Soil Alternative Components (Revised RI/FS Table 7-1)
Table 3 – Comparison of Soil Alternative S5B Costs (Revised RI/FS Table 9-1)
Table 4 –Soil Disproportionate Cost Analysis Summary (Revised RI/FS Table 9-3)
Attachment 1 – Figures from the Draft Revised Feasibility Study (FS)
Attachment 2 – Revised Alternative S5B Volume and Mass Calculations (Revised for Appendix I)
Attachment 3 – Revised Cost Estimate for Alternative S5B (Revised for Appendix J)

1.0 INTRODUCTION

AECOM (formerly URS Corporation) submitted draft revised FS sections to the Washington State Department of Ecology (Ecology) in February 2014 on behalf of International Paper Company (International Paper) (URS 2014), and comments were received from Ecology in September 2014 (Ecology 2014). Based on the comments received from Ecology and subsequent meetings with Port of Longview (Port), the preferred soil cleanup action alternative

(Alternative S5B) is being revised to address Ecology comments, as well as issues and concerns raised by the Port. The purpose of this cleanup action alternative technical memorandum (Memorandum) is to:

- Provide a description of the original Alternative S5B presented in the draft revised FS sections (URS 2014)
- Document the resolution of Ecology's comments and Port issues and concerns regarding Alternative S5B (see Table 1)
- Provide a description of revised Alternative S5B
- Solicit input from the stakeholders on the revised cleanup action alternative prior to producing the draft final revised remedial investigation/FS report (RI/FS Report)

Because the Port's environmental/facilities team plans to present this revised cleanup action alternative at the Port of Longview Commission meeting on Tuesday, May 12, 2015, International Paper and the Port are requesting that comments on this Memorandum be provided prior to Monday, May 11, 2015.

2.0 SUMMARY OF ORIGINAL ALTERNATIVE S5B

This section describes the preferred soil cleanup action alternative, Alternative S5B-Solidification Outside and Inside Building Footprint, presented in the revised FS submitted in February 2014 (URS 2014). Alternative S5B consists of in-place mechanical mixing of solidifying agents with soil at the Maintenance Facility Area (MFA) located outside and inside the footprint of the Port's Mechanics Shop building that contains dense non-aqueous phase liquid (DNAPL) or chemicals of concern (COCs) at concentrations exceeding cleanup levels. The area planned for solidification is shown on RI/FS Figure 7-8 (URS 2014), which is included in Attachment 1. The mixing agent would be selected, based on the bench-scale treatability testing already performed and future pilot testing, to bind the COCs within a modified matrix exhibiting permeability orders of magnitude lower than the surrounding soil. This treatment reduces the likelihood of COC migration by diverting groundwater around the treated matrix, and binding the impacted media within the matrix. The mixing agents used inside the building footprint would be identical to the mix design selected for outside the building footprint; however, the mechanical mixing method used may differ. Solidification outside the building would be performed using mechanical mixing techniques such as mixing with large-diameter augers, excavator buckets, or specialized *in situ* blenders manufactured by Lang Tool Company. Large-diameter augers could not be used inside the building because of head space limitations. Therefore, solidification inside the building footprint would be performed using medium-diameter telescoping augers, excavator buckets, or specialized *in situ* blenders.

Alternative S5B includes performing a pilot test on a 1,600-square foot section (approximately 5 percent of the total treatment area) of the site prior to full-scale implementation. The pilot-test would be performed to further refine the mix design and determine the preferred mixing tools and techniques for full-scale remediation. The pilot test would include permeability, leachability, strength, cure time, and volumetric expansion testing similar to what was performed during bench-scale testing. During the pilot test, additional soil sampling would also be performed to determine whether soil 3-feet below ground surface (bgs) exceeds preliminary cleanup levels and, if not, whether segregating additional soils below this level would benefit the project by reducing the volume of soil requiring solidification.

Full-scale solidification is conservatively assumed to include soil exceeding preliminary cleanup levels from 3 to 10 feet bgs within the designated treatment boundary. Outside the building footprint, the existing clean fill materials (0- to 3-feet bgs) would be removed and temporarily stockpiled for reuse after solidification. Solidification would extend horizontally to immediately adjacent to the building and the treated wood products area (TWP Area) slurry wall and be completed in an alternating pattern to protect them from damage. Impediments such as two existing retaining walls located near the Mechanics Shop building and along the east side of the road, as well as a large storm water culvert pipe would be removed and reconstructed following solidification activities. The solidified soil would be covered with new geotextile fabric overlaid by reused clean fill (previously excavated from the site and stockpiled prior to solidification) and new asphalt. The new asphalt surface would not be impermeable, but it is anticipated that the majority of storm water would drain along the surface and/or within the clean fill above the solidified soil. It would not be necessary to prevent infiltration through the new asphalt because the hydraulic conductivity of the solidified soil would be orders of magnitude lower than other subsurface materials.

Because the solidification process results in volumetric expansion of the treated soils, an average height increase of approximately 2.5 feet would be conservatively estimated. The increased volume of material in the treatment area would result in higher elevations in the area south of the new railroad spur. The site grade can be increased in a manner that maintains current drainage patterns and provides the Port a smooth level working surface, because portions of the road and the storage yard surface are low compared to surrounding areas. Clean structural fill, similar to the crushed rock below the existing paved area, would be imported to transition between the new higher grades where solidification would be completed and the surrounding existing grade. Solidified soil would only be moved within the treatment limits under Ecology's Area of Contamination (AOC) policy and would be covered with approximately 3 feet of clean structural fill to permit the Port to perform shallow excavation work in the future without encountering COC-containing materials.

Inside the building footprint, the existing concrete floor within the treatment area would be removed. In addition, it may be necessary to remove some non-structural components of the exterior walls in order to provide equipment access to the treatment areas. The concrete floor would be removed and clean fill would be excavated and stockpiled for reuse or off-site disposal. Performing solidification under the building would include solidification of accessible materials directly beneath the exterior building walls. Small alternating areas below the exterior building walls would be sequentially solidified and allowed to harden. Once the initial treated areas cure, the untreated materials between treated areas would be solidified without compromising the building structure. Because of volumetric expansion of solidified soil under the building, the top surface of solidified soil would be immediately below the foundation. Therefore to provide a layer of clean material under the floor, solidified materials which extend to within 18 inches of the floor would be removed and taken off-site for disposal. A geotextile barrier fabric would be placed above the solidified soil and would be covered with clean structural fill, from the stockpiled clean fill, prior to installing a new concrete floor. A conceptual layout showing solidification under the building is shown on RI/FS Figure 7-9 (URS 2014), which is included in Attachment 1.

Implementation of this soil alternative includes evaluation and mitigation of impacts to Port operations. Port operations would be impacted by temporarily limiting access to the work truck storage bays along the east side of the building for 1 to 2 months. A portion of the MFA storage yard south of the rail spur would not be accessible to the Port for the majority of the construction period, which is estimated to be 4 to 6 months. There would likely be temporary short-term interruptions in utilities to the Mechanics Shop building when excavation or solidification work is performed near utilities. In addition, the Port would need to temporarily move all equipment and supplies out of the designated areas within the building where the solidification would be completed. Approximately 2 months would be needed to complete solidification inside the storage bays and the parts storage areas, which could be performed concurrently with the solidification outside the building. The building would be restored to previous conditions following solidification.

Original Alternative S5B for soil would include the following significant elements:

1. Identifying applicable or relevant and appropriate requirements (ARARs) and substantive requirements

2. Designing the cleanup action, including pilot-scale testing of the mixing agent and various mechanical mixing equipment and methods based on the results reported in the final *in situ* treatability study report (URS 2013)

3. Planning for temporary revisions to Port building and maintenance yard operations

4. Implementing a pilot-scale test in a 40- by 40-foot area of the site where DNAPL is present and documenting findings and recommendations in a report

5. Performing additional soil sampling to determine whether soil below 3-feet bgs exceeds cleanup levels and, if not, whether segregating additional soils below this level would benefit the project by reducing the volume of soil requiring solidification

6. Decommissioning horizontal and vertical bioventing wells within the solidification area

7. Demolishing and reconstructing utilities and yard features, including yard pavement, roadways, storm water culverts, fencing, and retaining walls

8. Decommissioning and replacing groundwater monitoring wells located within the solidification area

9. Removing non-structural exterior building wall components to allow equipment access to the building

10. Removing the concrete floor inside the building
11. Protecting or removing and replacing existing utilities under the building
12. Excavating, stockpiling, and analytical testing of clean overburden materials to confirm reuse as backfill
13. Temporarily storing and reusing all clean overburden material to maintain approximately 3 feet of clean fill above all solidified soils
14. Sequentially stabilizing and solidifying soil under the building foundation to protect the building during solidification
15. Mechanically solidifying soil under the building and outside the building footprint
16. Grading surface of solidified soil and installing a geotextile fabric or other physical marker above the solidified soil to demarcate the top of the solidified soil
17. Reusing clean fill materials stockpiled on site and importing clean structural fill as needed to meet new site grades
18. Replacing building wall components and the concrete floor of the building
19. Implementing environmental protection measures during construction (e.g., storm water pollution protection plan), including handling and treatment of construction storm water
20. Closure reporting
21. Long-term monitoring of leachate and physical performance of solidified soil

Original Alternative S5B components and the estimated quantities of contaminated media and contaminants that would be remediated are summarized in Table 2, and detailed calculations are provided in RI/FS Appendix I (URS 2014). All soil with COCs exceeding the cleanup levels and exhibiting DNAPL would be solidified above the Upper Silt at the MFA including under the Mechanics Shop building under this alternative.

3.0 RESOLUTION OF ISSUES REGARDING ALTERNATIVE S5B

As previously discussed, comments on the revised FS were received from Ecology in September 2014 (Ecology 2014). In those comments and in subsequent discussions, Ecology recommended that International Paper and the Port meet to discuss Port issues and concerns related to potential future site uses, particularly in regard to the management of volumetric expansion of soils during *in situ* soil solidification under the preferred cleanup action alternative (Alternative S5B). International Paper subsequently met with the Port on December 10, 2014. A follow-up conference call between International Paper and the Port occurred on March 20, 2015, and an additional meeting was held between International Paper and the Port at the Seattle AECOM office on March 27, 2015. Comments, issues, and concerns identified by Ecology and the Port regarding Alternative S5B during these communications are summarized in Table 1. This table also provides a summary of the analysis performed related to the issues and the resolutions reached by International Paper and the Port.

4.0 SUMMARY OF REVISED ALTERNATIVE S5B

Based on meetings and discussions between International Paper and the Port, the preferred soil cleanup action alternative (Alternative S5B) has been revised as shown in Figures 1, 2, and 3. The area proposed for excavation and solidification outside and inside the building is shown on Figure 1. Figure 2 presents the three proposed treatment zones (see further description below in bullet 1) and the depth to solidified soil. Figure 3 shows the proposed limits of building demolition and solidification inside the building. The revisions to Alternative S5B, as compared to the original Alternative S5B, are discussed below and summarized in Table 2:

1. Three distinct treatment area zones are proposed as follows:

    a. Zone 1: Zone 1 includes the area in the vicinity of and extending 80 feet to the south of the railroad tracks (see Figures 1 and 2). Soil that contains COCs at concentrations exceeding the preliminary cleanup levels in this zone would be excavated to the top of the Upper Silt instead of being solidified in place. Excavated material would be relocated within the AOC from Zone 1 to Zones 2 and 3, and all impacted soil would be treated by *in situ* solidification in Zones 2 and 3. The excavated area (Zone 1) would be backfilled to site grade using clean imported materials. This would provide the Port with unrestricted site use in this area during potential future development (e.g., future rail dump pit).

    b. Zone 2: Zone 2 includes a 20-foot wide utility corridor and a 23-foot wide area that includes the nearby access road referred to as “North Tie Road” (see Figure 2). Within this zone, soil that contains DNAPL or COCs at concentrations exceeding the preliminary cleanup levels would be treated using *in situ* solidification, along with soil relocated from Zone 1. Solidified material would only be present below 3 feet bgs. Three feet of clean material (0.5 feet of asphalt and 2.5 feet of clean fill) would be placed above the solidified material and a layer of geotextile fabric. This would provide the Port with ability to perform utility and other general site work without restrictions within this 3 foot depth.

    c. Zone 3: Zone 3 includes the remainder of the treatment area at the site (see Figure 2). Within this zone, soil that contains DNAPL or COCs at concentrations exceeding cleanup levels would be treated using *in situ* solidification to within one foot of the ground surface. One foot of clean material (0.5 feet of asphalt or concrete and 0.5 feet of clean fill) would be placed above the solidified material and a layer of geotextile fabric.

2. The site would be graded to manage volumetric expansion of the solidified materials and provide a more uniform site topography, enhance drainage, and maintain control of storm water in the vicinity of the Mechanics Shop building. A strip drain would be installed

along the north and east perimeter of the building (see Figure 3) to route storm water to the Port's existing storm water treatment system.

3. The portion of the Mechanics Shop building above the solidification treatment area would be completely removed to allow solidification using the same methods utilized for outside the building footprint (see Figure 3). The concrete floor, exterior wall footings, and utilities would be removed in the part of the building with lower ceiling heights. This would increase solidification efficiency and reduce mobilization costs associated with specialized labor and equipment needed for working inside a building. It would also eliminate the need for more complicated specialized solidification work below the exterior walls and around building footings, and is thus expected to speed up solidification work and reduce risks associated with working inside a structure. Following solidification, the portion of the building removed would be reconstructed on new footings and a new concrete floor would be poured.

4. Based upon additional analysis, *in situ* solidification in Zones 2 and 3 would be completed to approximately 9-feet bgs on average, or approximately 1 foot into the Upper Silt rather than 2 feet as previously proposed in the original alternative.

5. Volumetric expansion is assumed to be 35 percent which is conservative based upon the 26 to 36 percent range identified during bench-scale treatability testing of preferred Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda), because reduced solidification material is expected to be used in the final mix design.

6. Based on solidification of soils from 3-to 9-feet bgs under the building, calculations indicate that the top surface of solidified soil could be near the concrete floor slab. Solidified materials within 1 foot of the concrete floor slab would be relocated to outside the building footprint within Zone 3.

7. During pilot testing, further characterization of shallow soil in Zone 1 would be conducted to assess whether any shallow soil could be removed from *in situ* solidification treatment. Any shallow soil identified as containing concentrations of COCs below cleanup levels could be placed above solidified soil within Zones 2 and 3 to provide additional depth in which the Port could work during potential future development. Other options include using the material as backfill in Zone 1, and the site grades in Zones 2 and 3 could be reduced slightly with the reduced volume of material requiring solidification.

8. Additional evaluation of the upper and lower surfaces of the Upper Sand has been performed to refine the estimated volume of solidified soil included in the FS. Additional design-level analysis indicates that, on average over the treatment area, the thickness of the COC-impacted soil would be less than the current FS estimate of 5 feet. Therefore, the information currently included in FS calculations, figures, and cost estimates is considered to be appropriate for inclusion in the FS. Further analysis of solidification volumes could be performed during the design phase, as appropriate.

Based on these modifications to the alternative, revised Alternative S5B includes the following significant elements:

1. Identifying ARARs and substantive requirements
2. Designing the cleanup action, including pilot-scale testing of the mixing agent and various mechanical mixing equipment and methods based on the results reported in the final *in situ* treatability study report (URS 2013)
3. Planning for temporary revisions to Port building and maintenance yard operations
4. Implementing a pilot-scale test in a 40- by 40-foot area of the site where DNAPL is present and documenting findings and recommendations in a report
5. Performing additional soil sampling to determine whether soil below 3-feet bgs exceeds preliminary cleanup levels and, if not, whether segregating additional soils below this level would benefit the project by reducing the volume of soil requiring solidification
6. Decommissioning horizontal and vertical bioventing wells within the solidification area
7. Demolishing and reconstructing utilities and yard features, including yard pavement, roadways, storm water culverts, fencing, and retaining walls (where necessary)
8. Decommissioning and replacing groundwater monitoring wells located within the solidification area
9. Demolishing the portion of the Mechanics Shop building with lower ceiling heights including removing the concrete floor inside the building and the exterior wall footings
10. Protecting or removing and replacing existing utilities under the building
11. Excavating, stockpiling, and analytical testing of clean overburden material to confirm reuse as backfill
12. Temporarily storing and reusing all clean overburden material
13. Excavating and relocating contaminated soil within 80 feet of the railroad tracks
14. Mechanically solidifying soil in Zones 2 and 3 and relocated soil from Zone 1
15. Grading surface of solidified soil and installing a geotextile fabric or other physical marker above the solidified soil to demarcate the top of the solidified soil

16. Reusing clean fill materials stockpiled on site above solidified soil in Zones 2 and 3, and as backfill in Zone 1

17. Importing and placing clean fill as necessary to backfill Zone 1 and transition between existing grades and the new higher elevations in Zones 2 and 3

18. Reconstructing the portion of the building removed for solidification including the concrete floor inside the building and the exterior wall footings

19. Implementing environmental protection measures during construction (e.g., storm water pollution protection plan), including handling and treatment of construction storm water

20. Closure reporting

21. Long-term monitoring of leachate and physical performance of solidified soil

Revised Alternative S5B components and the estimated quantities of contaminated media and contaminants that would be remediated are summarized in Table 2. Detailed calculations for revised Alternative S5B are provided in Attachment 2. All soil with COCs exceeding the cleanup levels and exhibiting DNAPL would be solidified above the Upper Silt at the MFA including under the Mechanics Shop building under this alternative.

The cost estimate for revised Alternative S5B is included in Attachment 3, and summarized and compared to the cost of the original Alternative S5B in Table 3. The revised Soil Disproportionate Cost Analysis summary is included in Table 4. Because there is no significant difference in the cost of revised Alternative S5B compared to the original cost of Alternative S5B and there is no difference in the benefits between the revised and original alternatives, the disproportionate cost analysis shown on RI/FS Figure 9-1 (URS 2014), which is included in Attachment 1, has not changed. Therefore, the rankings of the alternatives have not changed, the revised Alternative S5B is still the preferred alternative for remediation at the site, and the revised Alternative S5B will replace the original Alternative S5Bin the Draft Final RI/FS Report.

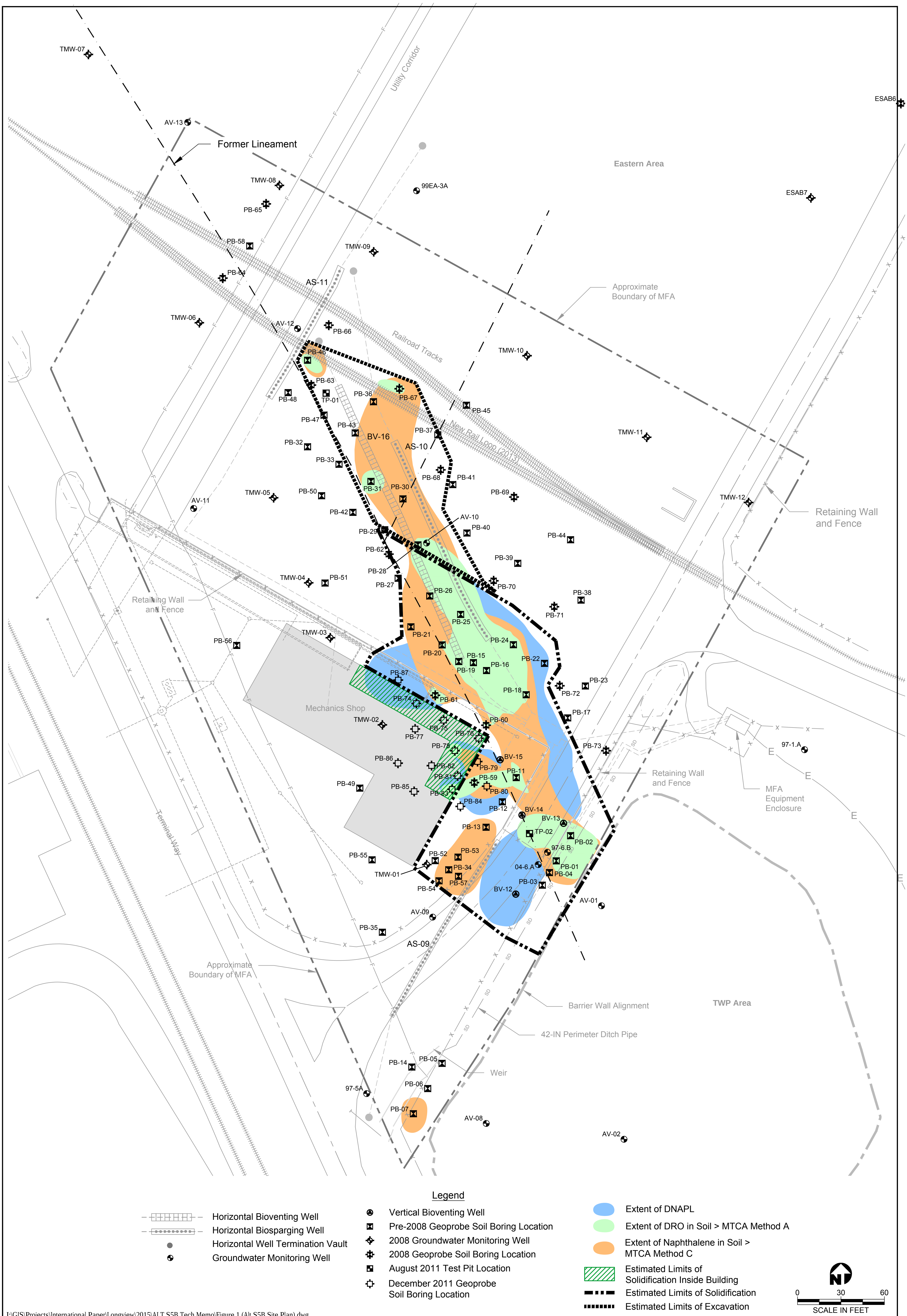
5.0 REFERENCES

URS Corporation (URS). 2014. Draft Final Revised Remedial Investigation/Feasibility Study (FS Sections Only), Port of Longview, Maintenance Facility Area, International Paper, Longview, Washington. February 28.

———. 2013. Final *In Situ* Soil Remediation Treatability Study Report, Port of Longview's Maintenance Facility Area, Longview, Washington. June 28.

Washington State Department of Ecology (Ecology). 2014. Ecology comments to International Paper on the Draft Final Revised FS Sections, Port of Longview Maintenance Facility Area, dated February 2014, September 9, 2014.

Figures



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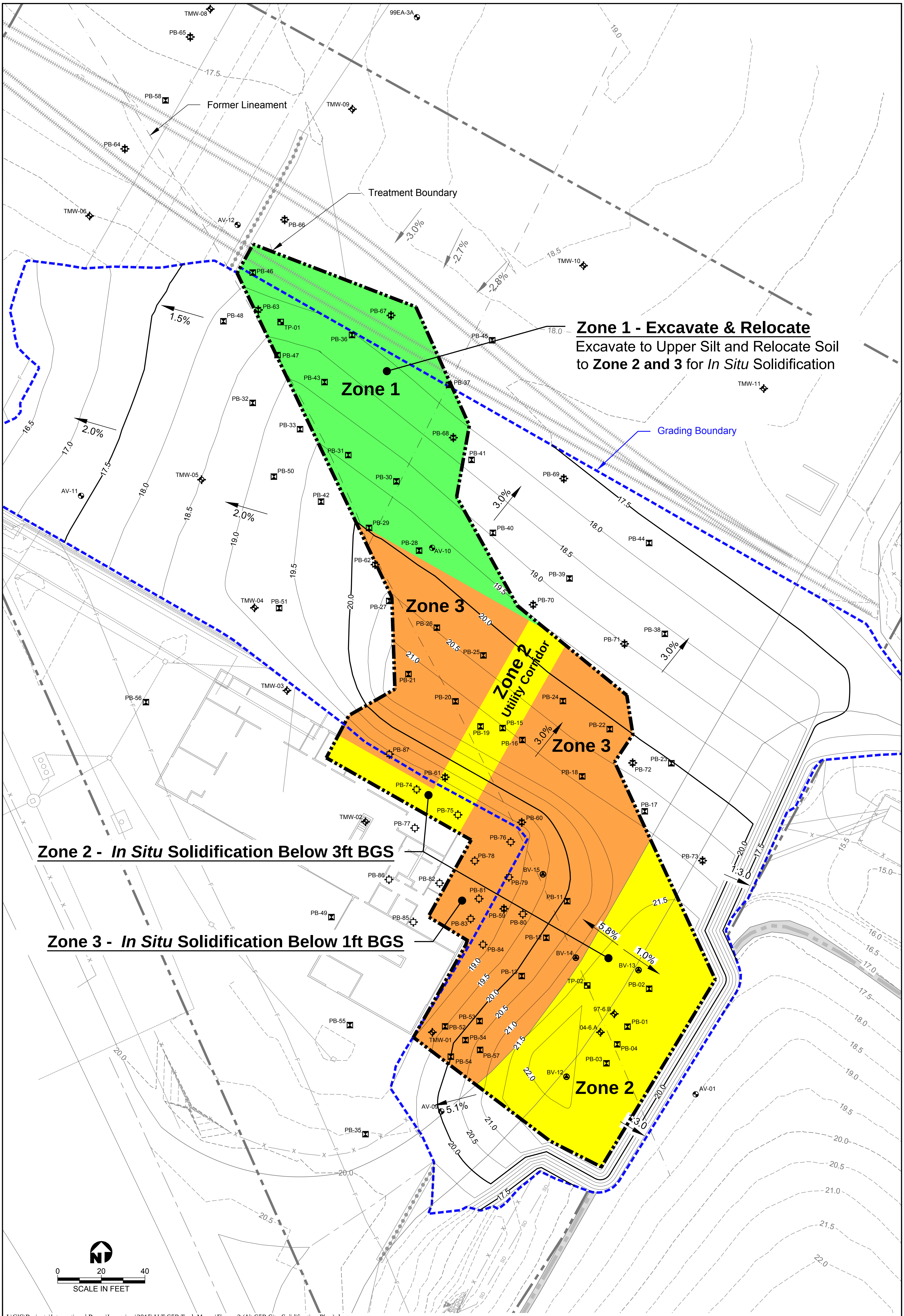
International Paper Longview, WA	Project No. 33764232	Alternative S5B Solidification Outside and Inside Building Footprint with Relocation of Soil Near Railroad Tracks	Figure 1
AECOM			



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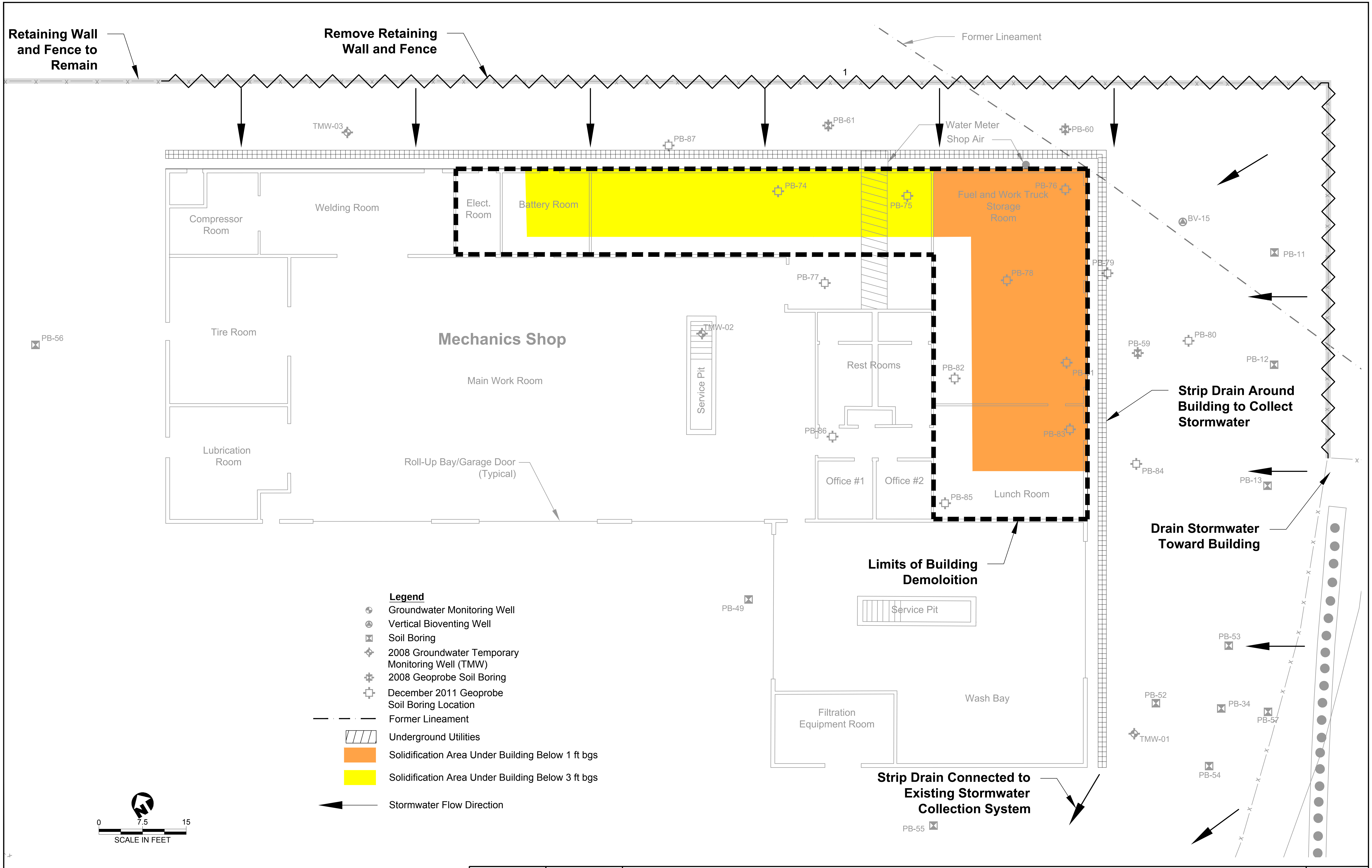
International Paper Longview, WA	Project No. 33764232
AECOM	

Alternative S5B
Proposed Treatment Area Zones and Post
Remediation Site Grades

Figure
2



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International Paper Longview, WA	Project No. 33764232	Alternative S5B Conceptual Building Solidification Layout	Figure 3
AECOM			

Tables

Table 1
Summary of Alternative S5B Issue Resolution

Date	Comment/Issue	Analysis	Resolution
12/9/13	Port of Longview - in a meeting at the Port of Longview to discuss the Cleanup Action Alternative Conceptual Technical Memorandum, the Port of Longview expressed concerns related to volumetric expansion associated with proposed solidification methods and the proposed concept of raising site grade across the treatment area to account for that expansion.	International Paper and the Port of Longview discussed potential modifications to site grade and various options related to locations of solidified material and clean fill.	The Port of Longview indicated that site grade changes that fit the rest of the site could be considered. International Paper indicated that various methods for maintaining a clean working layer at grade would be evaluated, including incorporation of off-site disposal. The description of revised Alternative S5B (Section 4 of this technical memorandum) describes volumetric expansion considerations related to site grade modifications.
9/8/14	Ecology – FS Section 5.2.1, page 5-2, second paragraph – Revise the first sentence to “Because subsurface contamination remains beneath the existing asphalt paved area, potential future construction projects have to follow existing institutional controls at the site.” In addition, International Paper and the Port of Longview should meet to discuss institutional controls in place or needed to prevent current construction workers from being exposed to subsurface contamination.	International Paper and the Port of Longview have met to discuss potential future construction projects and institutional controls associated with cleanup action alternatives, and preferred Alternative S5B has been modified accordingly.	FS text will be revised as stated in Ecology comment, and analysis has been performed regarding cleanup action alternative logistics with respect to potential future construction projects.
	Ecology – FS Section 6.4.2.3, **Area of Contamination (AOC) Policy**, etc., page 6-13 – In the fourth sentence revise to state “Consolidation <u>or</u> in-situ treatment...” In the fifth sentence, delete “as long as managed in land-based units.”	Preferred Alternative S5B has been modified to incorporate Port of Longview requests for removal of impacted soil from the rail corridor.	FS text will be revised as stated in Ecology comment, and analysis has been performed regarding cleanup action alternative logistics with respect to movement of impacted soil within the Area of Contamination.
	Ecology – FS Section 7.4.7 **Alternative S5B – Solidification Outside and Inside Building Footprint**, page 7-20, paragraph 2 – International Paper and the Port of Longview should meet and discuss what depth of subgrade material would be adequate for a workable layer under the maintenance building.	International Paper and the Port of Longview have met to discuss clean fill subgrade depth requirements, and preferred Alternative S5B has been modified accordingly.	FS text will be revised to discuss modifications made to the preferred Alternative S5B to clarify subgrade depths.

Table 1 (continued)
Summary of Alternative S5B Issue Resolution

Date	Comment/Issue	Analysis	Resolution
	Ecology FS Section 9.1.6 – References to issues associated with volumetric expansion – described in Section 7.4.5 (page 7-16 and page 7-17) and Section 7.4.7 (pages 7-20 and 7-21) – should be included in the discussion of Alternative S5 (and other stabilization alternatives) in Section 9.1.6.	International Paper and the Port of Longview have met to discuss volumetric expansion issues and preferred Alternative S5B has been modified accordingly to incorporate treatment area re-grading.	FS text will be revised regarding cleanup action alternative logistics with respect to treatment area re-grading and incorporation of zones with varying depths of clean fill.
12/10/14	Port of Longview – in meeting at Port of Longview's office, the Port of Longview expressed interest in evaluating site re-grading as method for maintaining adequate depth of clean fill in which unrestricted work could be performed.	Initial solidification volume estimates were produced and incorporated into proposed post-construction site grade contours.	Alternative S5B was modified to incorporate site grade contours to discuss with the Port of Longview.
	Port of Longview – in meeting at Port of Longview's office, the Port of Longview expressed interest in evaluating movement of impacted soil within Area of Contamination to accommodate potential future dump pit construction near the rail loop. Proposed pit dimensions were 250- to 300-feet long, 40-feet deep, and 50-feet wide.	Three distinct zones were created within the treatment area to provide an area near the rail loop (Zone 1) where only clean fill would be remain after construction.	Alternative S5B was modified to incorporate a zone near the rail loop in which soil would be excavated and relocated further south within the Area of Contaminations to address Port potential future use requirements.
	Port of Longview - in meeting at the Port of Longview's office, the Port of Longview expressed concerns regarding the incorporation of future costs to the Port of Longview and potential restrictions on future development into the disproportionate cost analysis (DCA) in which alternatives are evaluated in the FS.	International Paper and the Port of Longview have discussed potential future development in the MFA and have discussed various cleanup action alternative options related to potential development costs and other issues.	Alternative S5B was modified to incorporate considerations related to future Port of Longview development costs.
	Port of Longview - in meeting at Port of Longview's office, the Port of Longview expressed concerns regarding proposed restrictive covenants associated with cleanup action alternatives considered in the FS.	International Paper and the Port of Longview discussed issues associated with proposed restrictive covenants.	Alternative S5B was modified to minimize impacts associated with proposed restrictive covenants.

Table 1 (continued)
Summary of Alternative S5B Issue Resolution

Date	Comment/Issue	Analysis	Resolution
2/10/15	Port of Longview –in an e-mail to International Paper, the Port proposed a new hybrid alternative that combined elements of solidification from Alternative S5 with excavation and off-site disposal elements from Alternative S1.	International Paper and the Port of Longview discussed new alternative concepts related to combining solidification with excavation and offsite disposal.	International Paper has evaluated combining excavation and offsite disposal with solidification, and has revised Alternative S5B solidification areas in order to address potential future impacts related to Port of Longview operations and development.
3/20/15	Port of Longview – during conference call between the Port of Longview and International Paper, the Port of Longview expressed interest in site grade contours and treatment zones incorporated into revised Alternative S5B.	A figure illustrating proposed post-construction grade contours and multiple treatment zones was discussed with the Port of Longview.	A meeting occurred March 27, 2014 at the AECOM Seattle office.
3/27/15	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a desire to increase the area of clean fill near the rail loop (Zone 1) to a distance of 80 feet from the existing rail loop.	An analysis was made regarding the increased volume of material that would need to be incorporated within post-construction grade contours.	Alternative S5B was modified to incorporate a larger zone near the rail loop (Zone 1) in which soil would be excavated and relocated further south within the Area of Contaminations to address Port potential future use requirements.
	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a desire to further evaluate solidification volumes to further refine grading contours. A need for directing storm water in the vicinity of the Mechanics Shop toward an existing storm water treatment system south of the Mechanics Shop was also expressed.	Modeling of contouring of upper and lower surfaces of the Upper Sand was performed to refine treatment volume estimates, and resulting volumes were incorporated into proposed post-construction site grade contours.	Alternative S5B was modified to incorporate site grade contours that meet both Port logistical requirements and storm water control requirements.
	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a desire to create an additional treatment zone for potential future utility corridor usage.	International Paper and the Port of Longview discussed proposed corridor dimensions.	An additional treatment zone was created using the proposed utility corridor dimensions of 3-feet deep and 20-feet wide and the resulting estimated volume was incorporated into proposed post-construction site grade contours.

Table 1 (continued)
Summary of Alternative S5B Issue Resolution

Date	Comment/Issue	Analysis	Resolution
3/27/15 (continued)	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a willingness to evaluate trading shallower working depths in some portions of the treatment area to gain deeper working depths in other portions of the treatment area. A shallow working depth in which solidified material was located directly below the asphalt was proposed for all areas other than near the rail loop (Zone 1) and the utility corridor and road (Zone 2).	Three treatment zones were created with working depth of 1 foot bgs (Zone 3), a working depth of 3 feet bgs (the utility corridor and road, comprising Zone 2), and a working depth to the top of the Upper Silt (at approximately 8 feet bgs, in Zone 1). The resulting estimated volumes were incorporated into proposed post-construction site grade contours.	Alternative S5B was modified to incorporate these three treatment zones and site grade contours that meet both Port logistical requirements and storm water control requirements.
	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a willingness to evaluate trading additional building demolition and general site solidification methods at a lower overall cost than originally proposed more specialized interior solidification methods.	A cost-benefit evaluation was performed regarding solidification methods and associated demolition requirements.	Alternative S5B was modified to incorporate the use of general site solidification methods throughout the treatment area, with additional building demolition included.
	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a desire to further evaluate shallow soil data with regard to determining whether any shallow soil within the treatment area could be identified as less impacted and eliminated from treatment in order to minimize solidification volumes and resulting changes to site grade. The Port of Longview and International Paper discussed existing shallow soil data in the MFA and the potential for completing additional pre-design characterization of shallow soil to further determine the quantity of soil that could potentially be reused on site as backfill or disposed of off-site as CAMU-eligible waste.	An evaluation of existing shallow soil data was performed.	A portion of Zone 1 near the rail loop is the only portion of the treatment area identified from existing data in which shallow soil could be potentially segregated from treatment, but this would likely result in less than a 70-cy (~3%) difference in total treatment volume. Other logistical efficiencies are anticipated to provide greater gains. Pre-design sampling will be used to supplement the existing shallow soil data to allow additional characterization of shallow soil that can be potentially reused on site as backfill.
	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a desire to further evaluate placement of impacted soil from within the treatment area within the TWP Area to further reduce costs.	An evaluation of logistics and associated costs was performed regarding placement of impacted MFA soil within the TWP Area under the Area of Contamination policy.	A previous evaluation was revisited with the conclusion that placement of MFA soil within the TWP Area would result in higher costs than off-site disposal, making this option likely not warranted.

Table 1 (continued)
Summary of Alternative S5B Issue Resolution

Date	Comment/Issue	Analysis	Resolution
	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a desire to further consider costs and logistics associated with limited off-site disposal.	International Paper evaluated incorporation of disposal options into revised Alternative S5B including an analysis of costs and benefits currently associated with the DCA in the FS.	The Port of Longview and International Paper agreed that excavation and disposal was a more costly cleanup action alternative component than *in situ* solidification, and that the higher costs need to be offset by greater benefit in order to be evaluated favorably in the DCA included in the FS. In the spirit of cooperation the Port of Longview and International Paper agree that the Port of Longview's proposed hybrid alternative would not score the highest under DCA methodology, and therefore have determined that revised Alternative S5B is a solution that the Port of Longview could accommodate if approved by the Port Commission. However, during the cleanup action pre-design, there will be additional soil characterization performed to determine whether there are any additional opportunities to reduce the volume of soil to be solidified.
	Port of Longview – in meeting at AECOM's Seattle office, the Port of Longview expressed a desire to evaluate costs associated with incorporating requested modifications to preferred Alternative S5B.	An evaluation of the cost estimate for preferred Alternative S5B was performed after modifications were incorporated.	Both additional costs and some cost savings were realized during the incorporation of modifications to preferred Alternative S5B, resulting in a total cost within approximately $10,000 of the original alternative cost ($3.4M).

Table 2
Comparison of Soil Alternative Components
International Paper, Longview WA

Soil Alternative Component	Soil Alternatives		Δ S5B
	S5B (2/28/14)	S5B REV	
Conceptual Details			
Disruption of Port's Use of Building and Yard	✓	✓	--
Remove Asphalt Paving and Engineered Cap	✓	✓	--
Remove Retaining Wall	✓	✓	--
Rebuild Retaining Wall	✓	○	✓
Partial Building Demolition	○	✓	✓
Building Walls Remains Intact	✓	○	✓
Install Shoring to Protect Building	○	○	--
Install Shoring to Protect Slurry Wall	○	○	--
Prevent Water from Entering Treatment Area	○	○	--
Treat or Remove Soil under the Building	✓	✓	--
In Situ Soil Treatment	✓	✓	--
Excavation of Clean Soil Necessary	✓	✓	--
Excavation of Contaminated Soil Necessary	○	✓	✓
Off-Site Disposal of Contaminated Materials	○	○	--
Contaminated Soil Would Remain On Site	✓	✓	--
Alternative Details			
Length of Retaining Wall Removed (FT)	220	220	--
Depth of Clean Overburden (FT)	3	3	--
Depth of Treatment (FT)	10	9[a]	1[a]
DNAPL Area Treated			
DNAPL Area outside Building (SF)	12,800	12,800	--
DNAPL Area under Building (SF)	900	900	--
Total DNAPL Area Treated (SF)	**13,700**	**13,700**	**--**
Treatment Area			
Treatment Area outside Building (SF)	32,600	32,600	--
Treatment Area under Building (SF)	2,100	2,100	--
Total Treatment Area (SF)	**34,700**	**34,700**	**--**
Area with COCs or DNAPL Not Treated by Alternative (SF)	0	0	--
Estimated Implementation Time			
Construction/Mob/Demob (Months)	7	7	--
System Operations (Months)	0	0	--
LTM after Treatment (Years)	10	10	--
Total Time (Years)	**10.6**	**10.6**	**--**

Table 2 (Continued)
Comparison of Soil Alternative Components
International Paper, Longview WA

Soil Alternative Component	Soil Alternatives		Δ S5B
	S5B (2/28/14)	S5B REV	
Treatment Details			
Target Treatment Volumes			
Targeted Non-DNAPL Soil Volume (CY)	6,300	6,300	--
Targeted DNAPL Soil Volume (CY)	170	170	--
Total Targeted Treatment Volume (CY)	**6,470**	**6,470**	--
Excavation Volumes			
Total Excavation Volume (CY)	3,900	5,550[b]	1,650[b]
Overburden Excavation Volume (CY)	3,900	3,900	--
Treatment Volume Excavated (CY)	**0**	**1,650**[b]	**1,650**[b]
Mass of COCs Targeted (LBS)	176,000	176,000	--
Untreated Mass of COCs Remaining On Site (LBS)	0	0	--
DNAPL Volume Treated (Gallons)	1,550	1,550	--
Untreated DNAPL Volume Remaining On Site (Gallons)	0	0	--
In Situ Soil Treatment (CY)	9,070	7,470[c]	-1,600[c]
Untreated DNAPL Soil Remaining on Site (CY)	0	0	--
Total Untreated Soil Remaining on Site (CY)	0	0	--
Off-Site Disposal Volumes			
Non-DNAPL Soil Disposal (CY)	0	0	--
DNAPL Soil Disposal needing Stabilization (CY)	0	0	--
CAMU-Eligible Disposal (TN)	0	0	--
DNAPL Soil Disposal (TN)	0	0	--
DNAPL Contaminated Liquid Disposal (Gallons)	0	0	--

Notes:

a - Depth of treatment refined after further consideration of site-specific information.

b - Excavation volume is greater under S5B REV due to excavation and relocation of soil from within 80 feet of the railroad tracks to the in situ solidification area.

c - In situ solidification volume is decreased as a result of the solidification zone from 3 to 9 feet bgs, rather than 3 to 10 feet bgs.

✓- included
○ - not included
Δ - difference
Highlighting indicates difference (Δ) between original and revised Alternative S5B

CAMU - corrective action management unit
CY - cubic yards
DNAPL - dense nonaqueous phase liquid
FT - feet
LBS - pounds
LTM - long-term monitoring
SF - square feet
TN - tons

Table 3
Comparison of Soil Alternative S5B Costs
International Paper, Longview, WA

Task	Soil Alternatives		
	S5B (2/28/14)	S5B REV	Δ S5B
Capital Direct Costs (Select Tasks)			
Mobilization/Demobilization	$265,000	$200,000	-$65,000
Demo and Rebuild Portion of Building	--	$188,000	$188,000
Solidification Labor Outside Building Footprint	$423,000	$348,000	-$75,000
Solidification Labor Under Building	$110,000	$25,000	-$85,000
Solidification Materials (Cement/Grout/Soda)	$199,000	$164,000	-$35,000
Excavate and Relocate Soil Within 80 ft of RR Tracks	--	$59,000	$59,000
Geotextile Fabric Marker Layer over Solidified Soil	$7,000	$5,000	-$2,000
Additional Backfill Import Due to Relocated Soil	--	$32,000	$32,000
Backfill and Compaction of Transitional Material	$32,000	$30,000	-$2,000
Rebuild Retaining Wall	$24,000	--	-$24,000
Net Cost Impact of Select Tasks			**-$9,000**
Subtotals			
Capital Direct Costs	$2,320,000	$2,311,000	-$9,000
Capital Indirect Costs	$609,000	$608,000	-$1,000
Total Capital Costs	**$2,929,000**	**$2,919,000**	**-$10,000**
O&M Totals			
Total O&M Costs (X years)	$263,000	$263,000	$0
Total Capital and O&M Costs	$3,192,000	$3,182,000	-$10,000
Years of O&M	10	10	0
Annualized O&M Costs	$26,000	$26,000	$0
PW O&M Costs [a]	**$224,000**	**$224,000**	**$0**
Other Costs			
Sales Tax	$186,000	$185,000	-$1,000
Agency Oversight	$88,000	$88,000	$0
Project Totals			
Total Capital and PW O&M Costs	**$3,153,000**	**$3,143,000**	**-$10,000**
Total Project PW [a]	**$3,427,000**	**$3,416,000**	**-$11,000**
Total Project Cost	**$3.4M**	**$3.4M**	**$0.0M**

Notes:

[a] Present worth costs were calculated using a 3% discount rate.
Discount Rate (3%) = Interest Rate (6%) - Inflation (3%).

Δ - difference

M - million
O&M - operation and maintenance
PW - present worth
REV - revised
S5B - solidification inside and outside building footprint
All line item costs in this table have been rounded to nearest $1,000

Table 4
Soil Disproportionate Cost Analysis Summary
International Paper, Longview, WA

Alternative No.	Description	Volume Treated		Mass Removed or Stabilized		Cost ($)	
		DNAPL Removed (gallons)	Relative Benefit	COC Mass Removed (lbs)	Relative Benefit	Total Estimated Project Cost	Relative Cost
S1	Comprehensive Excavation (Baseline)	**1,550**	1.00	**176,000**	1.00	$5,830,000	0.94
S2	Comprehensive Excavation Outside Building Footprint	1,450	0.00	167,000	0.80	$5,200,000	0.73
S3	DNAPL Excavation Outside Building Footprint	1,450	0.00	152,000	0.47	$4,530,000	0.50
S4	DNAPL Excavation Outside Building Footprint, Limited Excavation Inside	**1,550**	1.00	156,000	0.56	$4,720,000	0.57
S5	Solidification Outside Building Footprint	1,450	0.00	167,000	0.80	**$3,030,000**	0.00
S5A	Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop	1,500	0.50	167,000	0.80	$3,380,000	0.12
S5B (2/28/14)	Solidification Outside and Inside Building Footprint	**1,550**	1.00	**176,000**	1.00	$3,420,000	0.13
S5B REV	Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks	**1,550**	1.00	**176,000**	1.00	$3,410,000	0.13
S5C	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop	1,520	0.70	169,000	0.84	$4,160,000	0.38
S6	DNAPL Treatment by ERH	1,470	0.20	131,000	0.00	$4,650,000	0.54
S7	DNAPL Excavation and ERH	1,540	0.90	159,000	0.62	$6,010,000	1.00
Minimum:		1,450	NA	131,000	NA	$3,030,000	NA
Maximum:		1,550	NA	176,000	NA	$6,010,000	NA

Notes:

COC - chemical of concern

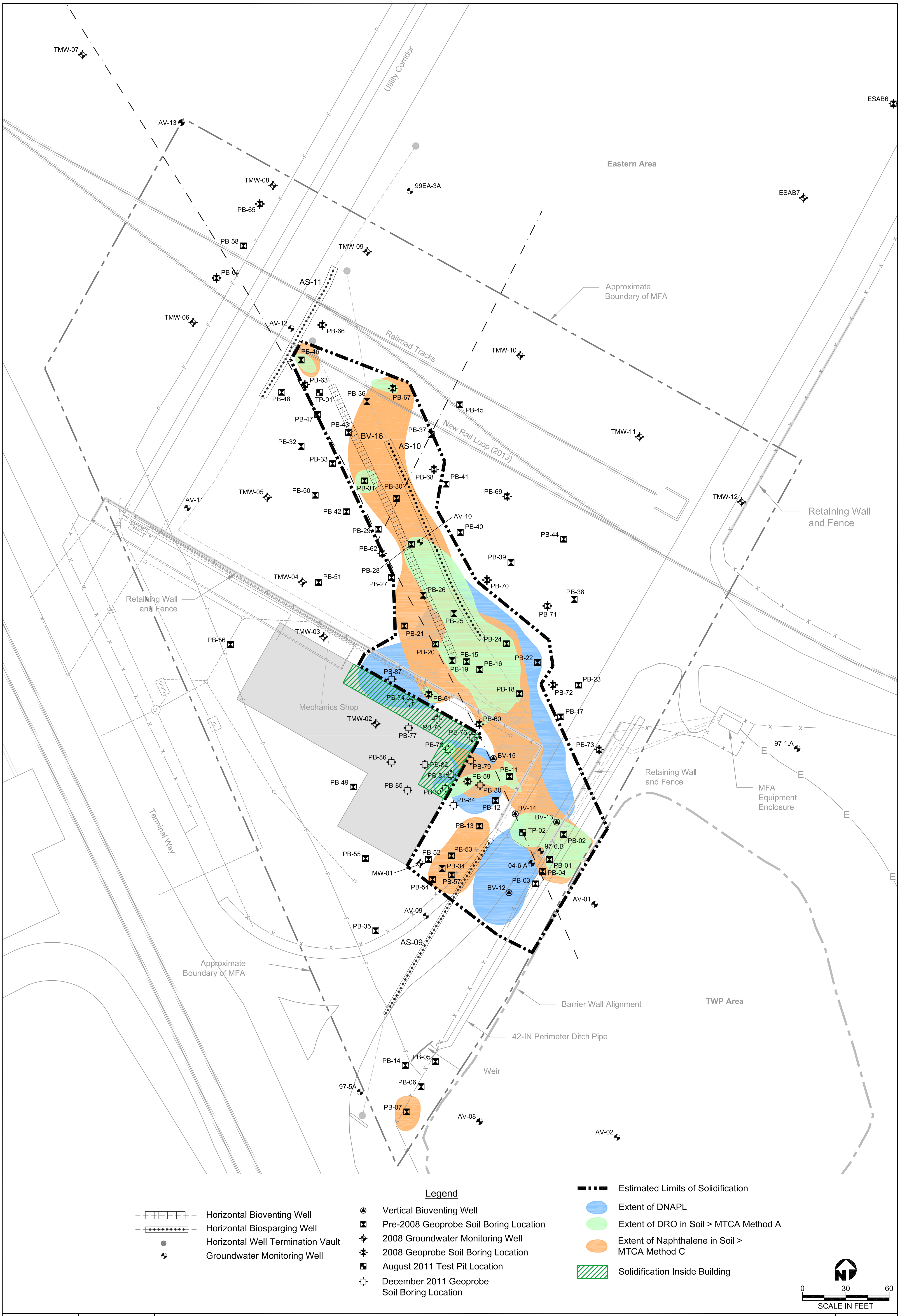
DNAPL - dense nonaqueous phase liquid

ERH - electrical resistance heating

Attachments

Attachment 1

Figures from the Draft Revised Feasibility Study



International Paper
Longview, WA

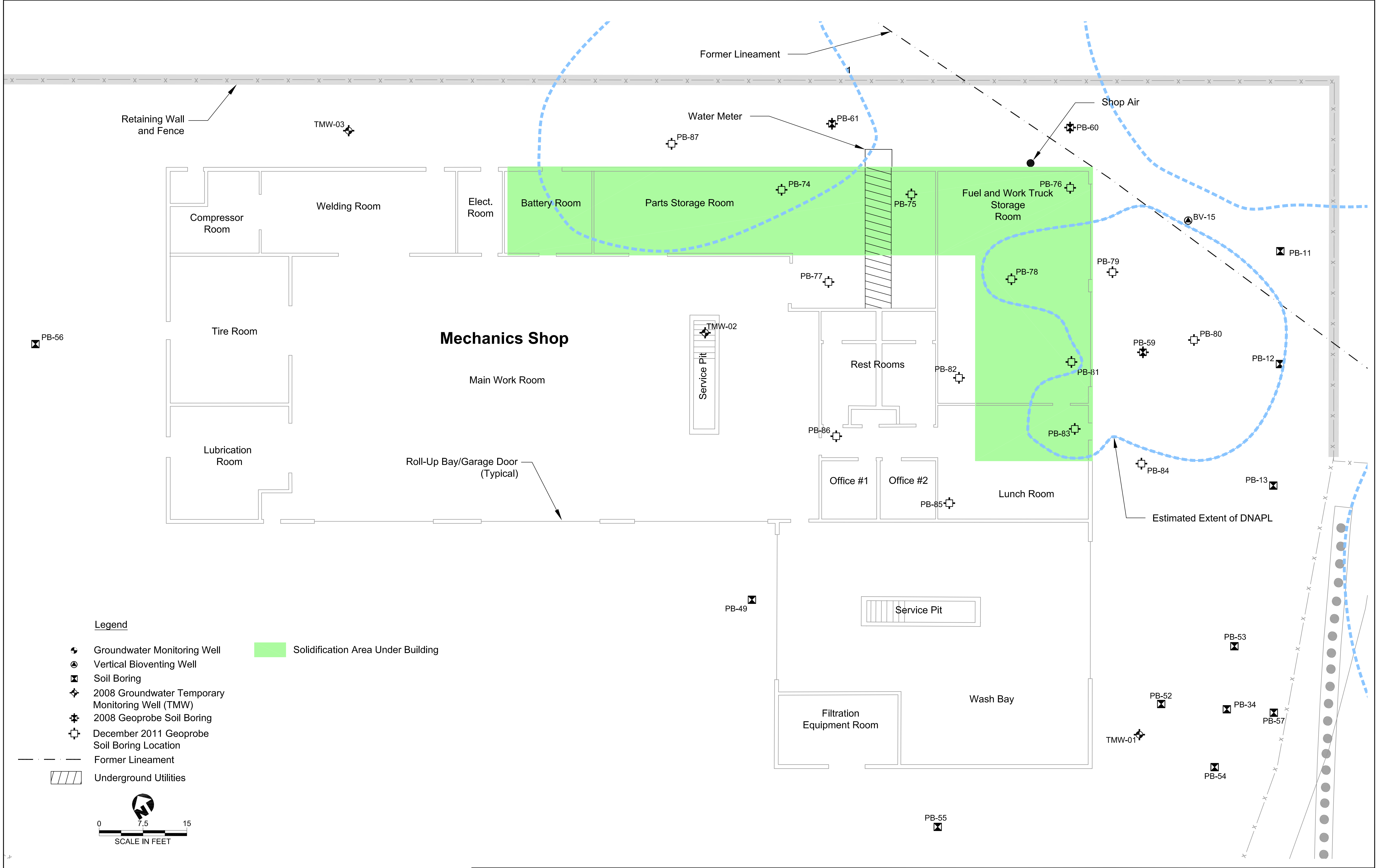
Project No.
33764232

URS

Alternative S5B - Solidification Outside and Inside Building Footprint

Figure
7-8

J:\GIS\Projects\International Paper\Longview\2013\FS\Fig 7-8 Alt 5B Solid with Jet Grout.dwg
Mod: 01/09/2014, 08:43 | Plotted: 01/23/2014, 16:12 | john_knobbs



International Paper
Longview, WA

Project No.
33764232

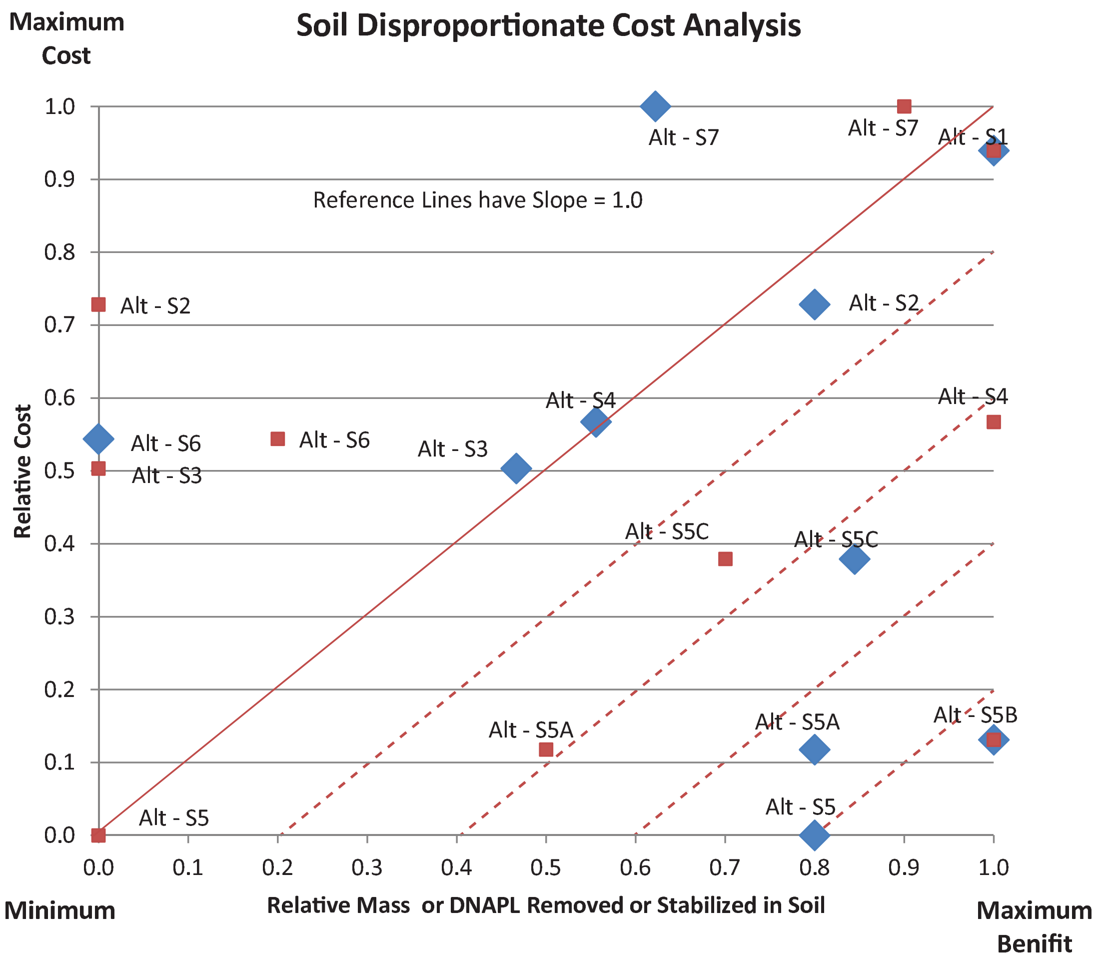
URS

Alternative S5B - Conceptual Building Solidification Layout

Figure
7-9

J:\GIS\Projects\International Paper\Longview\2013\FS\Fig 7-9 Alt 5B Build Solid.dwg
Mod: 01/27/2014, 08:38 | Plotted: 01/27/2014, 08:40 | john_knobbs

33764232_07.ai



Titles of Alternatives

S1	Comprehensive Excavation (Baseline)
S2	Comprehensive Excavation Outside Building Footprint
S3	"DNAPL Excavation Outside Building Footprint"
S4	"DNAPL Excavation Outside Building Footprint, Limited Excavation Inside"
S5	"Solidification Outside Building Footprint"
S5A	"Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop"
S5B	"Solidification Outside Building Footprint, Solidification under Mechanics Shop"
S5C	Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop
S6	DNAPL Treatment by ERH
S7	DNAPL Excavation and ERH

◆ Relative Mass
■ Relative DNAPL Volume

International Paper
Longview, WA

Project No.
33764232

URS

Disproportionate Cost Analysis for Soil Alternatives

Figure
9-1

Attachment 2

Revised Alternative S5B Volume and Mass Calculations

Attachment 2

Revised Alternative S5B Volume and Mass Calculations

IP Longview
Manufacturing Facility Area
Feasibility Study

Last Updated: April 16, 2015 by Melanie Young

Quantity and Mass Removal Calculations by Alternative

Alternative: Revised S5B - Solidification Outside and Inside Building Footprint and Relocation of Soil Near the Railroad Tracks

	Parameter	Quantity	Units	Basis
(a)	**Total Treatment Area**	**34,700**	**SF**	**Calculated b+c+c1+d**
(b)	Solidification Area Outside Building (SE)	23,700	SF	Polygon area calculated in CAD
(c)	Excavation and Relocate Area (NW)	7,700	SF	Polygon area calculated in CAD
(c1)	Excavation and Relocate Area (NW) 80' RR tracks	1,200	SF	Polygon area calculated in CAD
(d)	Treatment Area Beneath Building	2,100	SF	Polygon area calculated in CAD
(e)	Total DNAPL Area	13,700	SF	Polygon area calculated in CAD
	<u>Treatment Thickness</u>			
(f)	DNAPL	0.33	FT	Generalized mean DNAPL thickness based on observations in boring logs
(g)	Soil > Method C	5	FT	Generalized mean soil thickness, base of fill to top of upper silt
(h)	Clean Overburden	3	FT	Generalized mean fill thickness based on observations in boring logs
(h1)	Silt treated under target zone	1	FT	Assumed thickness of soil solidified under the target treatment zone
	<u>Treatment Volume (Solidification)</u>			
(i)	DNAPL	170	CY	Calculated volume based on polygon area and DNAPL thickness (e*f)
(j)	Soil > Method C	6,300	CY	Calculated as (a*g)-i
(k)	Overburden	3,900	CY	Calculated as a*h
(k1)	Solidified Silt Underburden	1,000	CY	Calculated as (b+d)*h1
	Total Disturbed Volume	*11,370*	*CY*	Calculated as i+j+k+k1
	Total Solidified Volume	**7,470**	**CY**	Calculated as i+j+k1
	Total Relocated Volume	**7,920**	**CY**	Calculated as c*g
	<u>Soil Characteristics</u>			
(l)	Soil density	1.5	tons/CY	Engineer's estimate
(m)	Porosity	30%	Percent	Engineer's estimate
(n)	NAPL Saturation	15%	Percent	Engineer's estimate
	<u>Concentrations in Solidification Area Outside the Building (SE Treatment Area)</u>			
(o)	Mean cPAH	4,297	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(p)	Mean DRO	9,519,000	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
(q)	Mean Napthalene	1,741,887	ug/kg	95% UCL Mean of soil samples in SE Treatment Area
	<u>Concentrations in Excavation Area (NW Treatment Area)</u>			
(r)	Mean cPAH	13,887	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(s)	Mean DRO	3,200,000	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
(t)	Mean Napthalene	204,690	ug/kg	95% UCL Mean of soil samples in NW Treatment Area
	<u>Concentrations in Treatment Area Beneath Building</u>			
(u)	Mean cPAH	6,317	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(v)	Mean DRO	7,807,000	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
(w)	Mean Napthalene	4,466	ug/kg	95% UCL Mean of soil samples in Treatment Area Beneath Building
	<u>COC Removal Quantities</u>			
	DNAPL	1,550	gal	Calculated as i*m*n
	cPAH	124	lbs	Calculated as (j*l*o*b/a)+(j*l*r*c/a)+(j*l*o*c1/a)+(j*l*u*d/a)
	DRO	151,451	lbs	Calculated as (j*l*p*b/a)+(j*l*s*c/a)+(j*l*p*c1/a)+(j*l*v*d/a)
	Napthalene	24,488	lbs	Calculated as (j*l*q*b/a)+(j*l*t*c/a)+(j*l*q*c1/a)+(j*l*w*d/a)
	Total Mass of COCs	**176,000**	**lbs**	

Attachment 3

Revised Cost Estimate for Alternative S5B

ALTERNATIVE S5B SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT, SOLIDIFICATION UNDER MECHANICS SHOP AND RELOCATION OF SOIL NEAR THE RAILROAD TRACKS

Client	International Paper		**Estimator**	Cary Brown, AECOM	
Location	Longview, Washington		**Report Date**	NA	
Project	MFA Area Remediation		**Last Updated**	4/15/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineers Estimate	
Soil Removal	NO		**Groundwater Treatment**	No	
Soil Treatment Area	34,700	SF (32,600 outside and 2,100 inside building)	**GW Treatment Area**	NA	
Treatment Perimeter	1,110	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	0	CY	**Treatment Depth**	9	FT bgs

Alternative Specific Assumptions

1 5,300 CY of soil will be solidified over 23,700 SF area outside building footprint
1,650 CY of soil will be relocated from 8,900 SF area 80 ft from the edge of rail and combined with other soils to be solidified
2 500 CY of soil will be solidified from a 2,100 SF area under the Mechanics Shop
3 Some of the Port's maintenance operations will be temporarily moved
The portion of the building with lower ceiling height will be removed and reconstructed following solidification
4 3,900 CY of clean overburden materials will be excavated prior to treatment
5 Zone of solidification will be 6 feet thick (3 to 9 feet bgs) and the zone of excavation will be 5 feet thick (3 to 8 feet bgs)
Volumetric Expansion of the 7,450 CY of solidified soil will be 35% and will result in an additional 2,600 CY of material on site
The total volume of solidified soil on site to remain on site is estimated to be 10,050 CY
6 Existing utilities will need to be removed and replaced following treatment activities
7 Approximately 3 to 4 months will be needed to perform the work
8 2 weeks will be needed for mob / demob
9 6 to 8 weeks will be needed for the solidification / stabilization tasks
10 Site will be restored to existing conditions following remediation, but with new higher grades and no retaining wall
11 No solidification spoils or overburden soil will be disposed of off-site. All material is planned for re-use.
12 Water is readily available on site

Red font indicates updates made to the original Alternative S5B cost estimate submitted to Ecology

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,911,572	1	Mobilization / Demobilization	1	LS	$200,000	$200,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	400	CY	$300	$120,000
	4	Temporary relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	6	Decommission Groundwater Monitoring & Bioventing Wells	40	EA	$920	$36,800
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	9	Demo Retaining Wall	160	LF	$75	$12,000
	10	Demo Portion of Building with Lower Roof Height	2,500	SF	$25	$62,500
	11	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	12	Remove 42-inch HDPE Culvert and Replace after Solidification	125	LF	$150	$18,750
	13	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$29	$113,100
	14	Stormwater Handling and Environmental Protection	1	LS	$11,000	$11,000
	15	Excavate Soil from 3 to 8 feet bgs within 80 feet of Railroad Tracks	1,650	CY	$27	$44,550
	16	Relocate and Backfill Soil from Near the Railroad Tracks	1,650	CY	$9	$14,850
	17	Solidification Materials (8% NewCem Slag Cement)	894	TN	$80	$71,520
	18	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	224	TN	$115	$25,747
	19	Solidification Materials (0.5% Caustic Soda)	56	TN	$1,200	$67,050
	20	Solidification Labor and Equipment Outside Building Footrprint	6,950	CY	$50	$347,500
	21	Solidification Labor and Equipment Under Mechanics Shop	500	CY	$50	$25,000
	22	Geotextile Fabric Marker Layer Over Solidified Soil	2,867	SY	$1.75	$5,017
	23	Import of Clean Backfill for Transition Grades	1,700	CY	$20	$34,000
	24	Additional Import of Backfill Material to Replace Relocated Soil	1,600	CY	$20	$32,000
	25	Backfill and Compaction of Overburden Soil Stockpiles on Site	3,900	CY	$9	$35,100
	26	Backfill and Compaction of Transitional Backfill Material	3,300	CY	$9	$29,700
	27	Asphalt Paving of Excavation, Solidification, and Transition Areas	54,000	SF	$4	$216,000
	28	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	-	Rebuild Retaining Wall	0	LF	$150	$0
	29	Reconstruct Lower Roof Height Portion of Maintenance Building	2,500	SF	$50	$125,000
	30	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	31	Monitoring Well Installation	10	EA	$5,400	$54,000
	32	Contractor Reporting and Closeout Submittals	200	HR	$90	$18,000
Contaminated Waste Disposal and Transportation						
$14,368	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$245	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$50	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	0	TN	$110	$0
	6	Transportation Costs to Subtitle C Landfill	0	TN	$50	$0
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	0	TN	$30	$0
	8	Transportation Costs to Subtitle D Landfill	0	TN	$22	$0
	9	Contaminated water treatment and disposal	0	GAL	$0.20	$0
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$1,925,940**
Contractor Contingency (%)			**20**	%	$1,925,940	$385,188
Total Contractor Costs						**$2,311,000**

ALTERNATIVE S5B SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT, SOLIDIFICATION UNDER MECHANICS SHOP (CONTINUED)
AND RELOCATION OF SOIL NEAR THE RAILROAD TRACKS

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$2,311,000	$46,220
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$2,311,000	$46,220
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	7	%	$2,311,000	$161,770
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$2,311,000	$115,550
	8	System Startup (if applicable)	0	LS	$0	$0
	9	Conformational Sample Collection and Reporting	1	LS	$33,000	$33,000
	10	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$552,360**
Engineering Contingency (%)			**10**	%	$552,360	$55,236
Total Engineering Costs						**$608,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LONG-TERM MONITORING COSTS						
Annual O&M Cost (None)			***0***	***Years of Annual O&M***		
$0	1	Not Used	0	EA	$0	$0
	2	Not Used	0	EA	$0	$0
	3	Not Used	0	EA	$0	$0
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical performance of solidified soil)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Total Annual O&M and LTM Cost						$26,300
Total Non-Routine O&M Cost		Estimated to be 2% of Construction Costs				$0
Total O&M and LTM Cost		***Years till project completion***	***10***			$263,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***0.03***			**$224,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$2,919,000	**$2,919,000**
TOTAL O&M COSTS (PRESENT WORTH)			$224,000	**$3,143,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$185,000	**$3,328,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$87,600	**$3,416,000**
TOTAL PRESENT-WORTH COST				**$3,420,000**

Appendix L

Draft Interim Feasibility Study Clarification Deliverables

DRAFT INTERIM FEASIBILITY STUDY CLARIFICATION DELIVERABLES
International Paper Company Responses to Ecology's September 8, 2014 Comments on the February 2014 Feasibility Study Sections of the Draft Final Revised RI/FS Report
prepared by AECOM for International Paper Company
Port of Longview Maintenance Facility Area, Longview, Washington

Date of Response:	June 22, 2015	Prepared for International Paper Company by: AECOM	Project Number: 60395232 / 33765217	

Document Title: **Feasibility Study Sections – Draft Final Revised RI/FS Report, February 2014 Port of Longview Maintenance Facility Area, Longview, Washington**	**Reviewer: Washington State Department of Ecology**

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
Ecology Comment No. 1	Section 5.2.1 **Human Exposure Pathways**, page 5-2, first complete paragraph	Revise the first bullet to state: "The existing asphalted paved area limits ingestion, dermal contact, and particulate exposure routes to impacted surface soils." In addition:	**Response:** Text will be revised as requested in Ecology comment.
		• To avoid confusion, throughout the revised RI/FS Report (including all tables), the existing asphalt paved area should not be referred to as an engineered cap.	**Response:** Noted, and "engineered cap" references will be revised as requested in Ecology comment.
		• In comments on the previous version of the RI/FS Report, Ecology asked International Paper to clearly describe or show in figures details about construction of the existing asphalt paving. In a revised Section 1.3 **Current Land Use**, International Paper should include more details about the paving in the storage area and provide a cross-section figure showing the construction of the paving.	**Response:** An Alternative S5B cross section figure (Figure 4 - attached) has been produced to identify surface completion details and surface completion descriptions will be added to text.
		• Ecology previously asked International Paper to determine whether existing asphalt paving would be adequate for contaminated soils left in place (see soil	**Response:** An Alternative S5B cross section figure (Figure 4 - attached) has been produced to identify surface completion details and text will be clarified regarding the adequacy of

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
		alternatives S3, S4, S6, and S7). These discussions should be included in the next version of the RI/FS Report.	standard paving to address contaminated soils left in place.
		- For the remedial alternatives that include engineered caps over excavated or treated areas of solidified/stabilized soils (see soil alternative S5, S5A, S5B, and S5C), the RI/FS Report should provide specific construction details for the new engineered cap.	**Response:** An Alternative S5B cross section figure (Figure 4 - attached) has been produced to identify paving cross section detail, and text will be clarified regarding proposed paving configuration.
		- If existing or replacement asphalt is part of the cleanup action for the MFA, the revised RI/FS Report should include costs for long-term monitoring and maintenance of the integrity of the asphalt paved area.	**Response:** Long-term pavement monitoring and maintenance costs will be included in cost estimates.
Ecology Comment No. 2	Section 5.2.1, page 5-2, second paragraph	Revise the first sentence to "Because subsurface contamination remains beneath the existing asphalt paved area, potential future construction projects have to follow existing institutional controls at the site." In addition, International Paper and the Port of Longview should meet to discuss institutional controls in place or needed to prevent current construction workers from being exposed to	**Response:** Text will be revised as requested in Ecology comment. International Paper has discussed with the Port of Longview the institutional controls that are currently in place and that will need to remain in place related to subsurface construction workers. The text will include additional discussion in this regard.

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
		subsurface contamination.	
Ecology Comment No. 3	Figure 5-1 **Potential Exposure Pathways, Maintenance Facility Area**	Add Footnote no. 2 ("Additional pathways complete if soil beneath the cap is disturbed and/or a groundwater supply well is installed.") to the heading of **Current Potential Receptors**. This will acknowledge potential pathways of exposure for current workers that may be exposed during construction.	**Response:** Figure 5-1 (attached) has been revised as requested in Ecology comment.
Ecology Comment No. 4	Section 6.1, **Preliminary Cleanup Levels** and remainder of FS	In previous comments on the RI/FS Report, Ecology asked International Paper to revise discussions to reflect soil to groundwater cleanup levels as the preliminary cleanup levels. The entire RI/FS Report should be revised to reflect this, including tables and figures. Cleanup levels for the MFA must not be merely based on what was used for the TWP Area, but must be based on current MTCA regulations and guidance regarding cleanup levels.	**Response:** Clarifications will be made as necessary to text, tables, and figures to identify soil to groundwater cleanup levels as preliminary cleanup levels, and those cleanup levels will be based upon current CLARC database values.
Ecology Comment No. 5	Section 6.2 **Preliminary Remediation**	Revise the beginning of the third sentence to state: "Treatment or removal of DNAPL as a source at the MFA is a	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
	Levels, first paragraph, page 6-3	primary consideration,"	
Ecology Comment No. 6	Section 6.3 **Preliminary Points of Compliance**, page 6-4, second paragraph, second sentence starting with "Empirical data from the site…"	This and the following sentences are inconsistent with WAC 173-340-720(8)(c), which states that where "a conditional point of compliance is proposed, the person responsible … shall demonstrate all practical methods of treatment are to be used in site cleanup." The paragraph should refer to discussions of treatment methods for groundwater in Section 7 **Development of Cleanup Alternatives** and discussions of restoration time frame for groundwater in Section 8 **Analysis of Cleanup Alternatives**.	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 7	Section 6.4.2.3 ***Hazardous Waste and Environmental Media Management***	Delete the phrase "and for which Ecology does not provide a "contained-in" determination." The contained-in policy does not apply to groundwater treatment residuals.	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
	, LDRs, 40 CFR 268, WAC 173-303-140, page 6-12, first paragraph, last sentence		
Ecology Comment No. 8	Section 6.4.2.3, **Area of Contamination (AOC) Policy**, etc., page 6-13	In the fourth sentence revise to state "Consolidation or in-situ treatment..." In the fifth sentence, delete "as long as managed in land-based units."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 9	Section 6.4.2.3, **CAMUs, 40 CFR 264.555, WAC 173-303-646910**, page 6-14	Because there are no permitted hazardous waste landfills in Washington state, the reference in the heading to this section should be to WAC 173-303-646920, instead of -646910. Since WAC 173-303-64660(3)(d)(vi) does not apply to CAMU-eligible wastes disposed into a permitted offsite hazardous waste landfill, in the first incomplete paragraph on page 6-14, delete the sentence starting with "Treatment required by these treatment standards must . . ." Delete "minimum" in the following sentence. In the last paragraph, instead of referring to the CAMU permitted facility, refer to	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
		the permitted hazardous waste landfill.	
Ecology Comment No. 10	Section 6.4.2.3, **CAMUs**, etc., ***Applicability to Soil and Groundwater Alternatives***, page 6-14	In the first sentence, instead of referring to a CAMU permitted facility, refer to a permitted hazardous waste landfill.	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 11	Section 6.4.2.4 ***Dewatering Water Management*****, Clean Water Act Pretreatment Regulations, 40 CFR 503.5**, ***Applicability to Soil and***	This paragraph refers to Chapter 173-350 WAC, which are the solid waste handling standards. This reference should be corrected.	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
	Groundwater Alternatives, page 6-15		
Ecology Comment No. 12	Section 6.4.2.5 **Air Quality**, second paragraph, page 6-16	Is the reference to exempt sources in Chapter 173-340 WAC in the third paragraph correct? Should it be to Chapter 173-400 WAC or Chapter 173-460 WAC?	**Response:** Text in the second sentence of the second paragraph of Section 6.4.2.5 regarding exemptions will be revised to reference Chapter 173-460 rather than Chapter 173-340 WAC per SWCAA 400-101 as follows: “For instance, sources are exempt if they emit less than the following: 1.0 tons per year combined criteria and VOCs, 0.005 tons per year lead, 1.0 tons per year ozone depleting substances, and 1.0 tons per year toxic air pollutants or less than the applicable small quantity emission rate under Chapter 173-460, whichever is less.”
Ecology Comment No. 13	Section 7.4.7 **Alternative S5B – Solidification Outside and Inside Building Footprint**, page 7-20, paragraph 2	International Paper and the Port of Longview should meet and discuss what depth of subgrade material would be adequate for a workable layer under the maintenance building.	**Response:** International Paper has discussed with the Port of Longview the Mechanics Shop subgrade depth that is currently in place and that will be necessary in the future. An Alternative S5B cross section figure (Figure 4 – attached) has been produced to identify subgrade details, and text will be clarified as necessary.

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
Ecology Comment No. 14	Section 7.4.1 **Baseline Alternative (Alternative S1) – Comprehensive Excavation**, page 7-11, last paragraph	The FS Report states "No concentrations of COCs exceeding the cleanup level would remain in soil above the Upper Silt in the MFA under the baseline alternative." Section 7.1.1 on page 7-2 states that in at least some areas, COCs have migrated through the Upper Silt and presumably contaminated the Upper Silt. A cleanup action based on comprehensive excavation would need to carefully consider whether to remove the Upper Silt in these areas since untreated DNAPL could possible migrate into Aquifer A as a result of excavation. This comment applies to all soil alternatives relying on excavation. If a soil alternative includes removal of contaminated portions of the Upper Silt, how does International Paper plan to prevent DNAPL from migrating into the lower aquifer? If the contaminated Upper Silt remains in place, how will costs associated with the contamination (financial assurance, compliance monitoring) be addressed?	**Response:** Text will be revised to clarify that the excavation alternatives do not include excavation into the Upper Silt because of the risk of breaching this aquitard and contaminating Aquifer A. Text will also be added to clarify that COCs in the Upper Silt will not be addressed under the excavation alternatives, but that COCs in the Upper Silt will be treated under the solidification alternatives. Alternatives where COCs remain in the Upper Silt will include long-term monitoring costs.
Ecology Comment No. 15	Section 7.4.3 **Alternative S3 – DNAPL Excavation Outside Building**	In the second half of the first sentence, revise to state: "with the asphalt paved area and the building structure acting as containment to limit direct contact with soils exceeding cleanup levels."	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
	Footprint, page 7-13, first paragraph		
Ecology Comment No. 16	Section 7.4.4 **Alternative S4 – DNAPL Excavation Outside Building Footprint, Limited Excavation Inside**, page 7-14, second paragraph	In the second half of the first sentence, revise to state: "with the asphalt paved area and the building structure acting as containment to limit direct contact with soils exceeding cleanup levels."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 17	Section 7.4.5 **Alternative S5 – Solidification Outside Building Footprint,**	The pilot test should also include tests to determine how long it would take mixed soils to cure or set.	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
	page 7-16, third paragraph		
Ecology Comment No. 18	Section 7.4.9 **Alternative S6 – DNAPL Treatment by Electrical Resistance Heating**, page 7-24, second paragraph	In the second half of the first sentence, revise to state: "with the asphalt paved area acting as containment to limit direct contact with soils exceeding cleanup levels."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 19	Section 7.4.10 **Alternative S7 – DNAPL Excavation and Electrical Resistance Heating**, page 7-25, second paragraph	In the second half of the first sentence, revise to state: "with the asphalt paved area acting as containment to limit direct contact with soils exceeding cleanup levels."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment	Table 7-1	For Soil Alternative S1, it says that no contaminated soil would remain on site and that no long-term monitoring	**Response:** Text will be revised to clarify that long-term monitoring would be required following the implementation

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
No. 20	**Comparison of Soil Alternative Components**	would be required after treatment. How does this statement address contamination in the Upper Silt and contamination that has traveled through the Upper Silt into the lower aquifer (Section 7.1.1 **Lateral and Vertical Extent of Soil Requiring Cleanup**) that may remain on site because of the possibility of DNAPL migrating into the lower aquifer during excavation?	of excavation alternatives, since COCs will remain in the Upper Silt (as also stated in response to Comment No. 14). We will also reference the associated values shown in the attached Long-Term Effectiveness Percentage Calculations spreadsheet in this revised text.
Ecology Comment No. 21	Section 8 **Analysis of Cleanup Alternatives**, page 8-1, end of paragraph 4	Add "limits future costs associated with contaminated media left on site" to the last sentence.	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 22	Section 8.1.1 **Baseline Alternative (Alternative S1) – Comprehensive**	Revise the third sentence to state: "This soil alternative meets the requirements under MTCA that removal of sources would be conducted for liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions."	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
	Excavation, page 8-1, first paragraph		
Ecology Comment No. 23	Sections 8.1.1, 8.1.2, 8.1.3, and 8.1.4, pages 8-1 through 8-4	For the soil alternatives with excavation and offsite disposal, WAC 173-340-370(1) states that Ecology expects that treatment technologies will be emphasized at sites containing liquid wastes and areas of contaminated with high concentrations of hazardous substances. How do these excavation alternatives address this expectation for treatment?	**Response:** Text will be revised as requested in Ecology comment to clarify the manner in which specific alternatives address Ecology's expectation for treatment.
Ecology Comment No. 24	Section 8.1.2 **Alternative S2 – Comprehensive Excavation Outside Building Footprint**, page 8-2, second paragraph	Revise the first sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions."	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
Ecology Comment No. 25	Section 8.1.3 **Alternative S3 – DNAPL Excavation Outside Building Footprint**, page 8-3, second paragraph	Revise the first sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 26	Section 8.1.4 **Alternative S4 – DNAPL Excavation Outside Building Footprint, Limited Excavation Inside**, page 8-4, second paragraph	Revise the first sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to remove as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions."	**Response:** Text will be revised as requested in Ecology comment.
Ecology	Section 8.1.5	Revise the first sentence to state: "This soil alternative	**Response:** Text will be revised as requested in Ecology

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
Comment No. 27	**Alternative S5 – Solidification Outside Building Footprint**, page 8-5, first complete paragraph	meets the requirements under MTCA that a reasonable effort would be made to treat as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions." Revise the last sentence to state: "Treatment of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater."	comment.
Ecology Comment No. 28	Section 8.1.6 **Alternative S5A – Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop**, page 8-6, first	Revise the first sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions." Revise the last sentence to state: "Treatment of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater."	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
	paragraph		
	Section 8.1.7 **Alternative S5B – Solidification Outside and Inside Building Footprint**, page 8-6, first paragraph	Revise the last sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions." Revise the last sentence to state: "Treatment of the residual COC source in soil by implementation of this soil alternative is expected to prevent the future dissolution of COCs into groundwater."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 29	Section 8.1.8 **Alternative S5C – Solidification Outside Building Footprint, Electrical Resistance Heating**, page 8-7, first paragraph	Revise the last sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to treat as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions."	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
Ecology Comment No. 30	Section 8.1.9 **Alternative S6 – DNAPL Treatment by Electrical Resistance Heating**, first paragraph	Revise the last sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to remove and treat as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 31	Section 8.1.10 **Alternative S7 – DNAPL Excavation and Electrical Resistance Heating**, page 8-8, first paragraph	Revise the last sentence to state: "This soil alternative meets the requirements under MTCA that a reasonable effort would be made to remove and treat as sources liquid wastes or media with high concentrations of hazardous substances (WAC 173-340-360(2)(c)(ii)(A)) for groundwater cleanup actions."	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 32	Section 8.2 **Evaluation of Groundwater Alternatives**, page 8-8, first paragraph	Revise the first sentence to state: "This analysis assumes that the companion soil alternative selected meets the requirements under MTCA that treatment or removal of the source of the release will be conducted for liquid wastes and areas contaminated with high concentrations of hazardous	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
		substances (WAC 173-340-360(2)(c)(ii)(A)."	
Ecology Comment No. 33	Section 8.2, pages 8-8 and 8-9, first paragraph	The third sentence states that all groundwater alternatives are considered permanent. This conflicts with the discussion in Section 6.2 **Preliminary Remediation Levels** and all previous discussions in Section 8.1 **Evaluation of Soil Alternatives** that reference nonpermanent groundwater cleanup actions in WAC 173-304-360(2)(c)(ii).	**Response:** We have not identified references to nonpermanent groundwater cleanup actions in the identified text other than in the general discussion related to Preliminary Remediation Levels. Groundwater cleanup actions evaluated in the FS are all considered to be permanent groundwater cleanup actions.
Ecology Comment No. 34	Section 8.2, page 8-9, first complete paragraph	Correct the reference in the first sentence to WAC 173-340-360(2)(c)(ii)(B). This paragraph should also state how the soil alternatives implement groundwater containment, including barriers, to the maximum extent practicable to avoid lateral and vertical expansion of the groundwater volume affected.	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 35	Section 8.2.1 **Baseline Alternative (Alternative GW1) – Electrical**	There are references in this paragraph to the "alternate" POC that should be corrected to reference the "conditional" POC.	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
	Resistance Heating and Biodegradation, page 8-9, first paragraph		
Ecology Comment No. 36	Section 9 **Selection of Preferred Cleanup Alternatives**	This section of the RI/FS Report should include discussion from WAC 173-340-370(1) regarding expectations for cleanup action alternatives where treatment technologies will be emphasized at sites containing liquid wastes and areas contaminated with high concentrations of hazardous substances.	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 37	Section 9.1.2 **Permanence**, pages 9-6 through 9-9	The discussion of soil alternatives that include solidification need to clearly address the characteristics and volume of the treatment residuals generated. Because Alternative S6 (**DNAPL Treatment by Electrical Resistance Heating**) permanently reduces or destroys a large volume of hazardous substances it should be ranked higher in permanence.	**Response:** Text will be revised as requested in Ecology comment.
Ecology	Section 9.1.4	The discussion in this section confuses treatment to destruct	**Response:** Text will be revised as requested in Ecology

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
Comment No. 38	**Effectiveness over the Long Term**, pages 9-10 and 9-1	or detoxify (WAC 173-340-360(3)(f)(iv)) for effectiveness over the long term at the site, with treatment required for off-site disposal of media contaminated with listed waste. The description of the soil alternatives should be revised as given below:	comment.
		- Alternative S1 (**Comprehensive Excavation**) – Off-site disposal of 100 percent of target soil volume.	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
		- Alternative S2 (**Comprehensive Excavation Outside Building Footprint**) – Off-site disposal of approximately 94 percent of target soil volume and on-site containment of 6 percent.	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
		- Alternative S3 (**DNAPL Excavation Outside Building Footprint**) – Off-site disposal of 72 percent of target soil volume and on-site containment of 28 percent.	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
		- Alternative S4 (**DNAPL Excavation Outside Building Footprint, Limited Excavation Inside**) – Off-site disposal of approximately 75 percent of target soil volume and on-site	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.

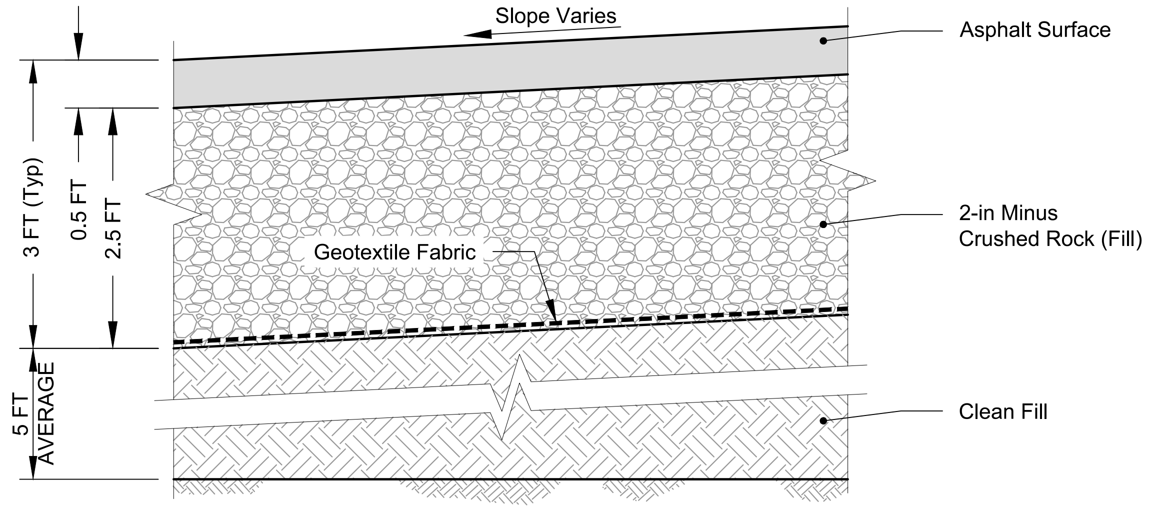
Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
		containment of 25 percent	
		• Alternative S5 (**Solidification Outside Building Footprint**) – Solidification of approximately 94 percent of target soil volume and on-site containment of 6 percent	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
		• Alternative S5A (**Solidification Outside Building Footprint, DNAPL Recovery under Mechanics Shop**) – Solidification of approximately 94 percent of target soil volume, off-site disposal of 3 percent of target soil volume, and on-site containment of 3 percent of target soil volume under the Mechanics Shop.	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
		• Alternative S5B (**Solidification Outside and Inside Building Footprint**) – Solidification of 100 percent of target soil volume.	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
		• Alternative S5C (**Solidification Outside Building Footprint, ERH Treatment under Mechanics Shop**) – Solidification of approximately 94 percent of target soil volume and	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.

Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
		destruction of approximately 6 percent of target soil volume.	
		- Alternative S6 (**DNAPL Treatment by Electrical Resistance Heating**) – Off-site disposal or destruction of 78 percent of target soil volume with on-site containment of 22 percent	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
		- Alternative S7 (**DNAPL Excavation and Electrical Resistance Heating**) – Off-site disposal of 70 percent of target soil volume, on-site containment of 24 percent of target soils outside building , and destruction of 6 percent of target soil volume under the building footprint	**Response:** Text will be revised as requested in Ecology comment to reflect values identified in the attached Long-Term Effectiveness Percentage Calculations spreadsheet.
Ecology Comment No. 39	Section 9.1.6 **Technical and Administrative Implementability**	A reference to the pilot testing described in Section 7.4.5 (**Alternative S5 – Solidification Outside Building Footprint Alternative**) on page 7-16 should be included in the discussion of Alternative S5 (and other stabilization alternatives) in Section 9.1.6.	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 40	Section 9.1.6	References to issues associated with volumetric expansion – described in Section 7.4.5 (page 7-16 and page 7-17) and Section 7.4.7 (pages 7-20 and 7-21) – should be included in	**Response:** Text will be revised as requested in Ecology comment.

Ecology Comment Number	Document Reference	Ecology Comment	International Paper Company Response
		the discussion of Alternative S5 (and other stabilization alternatives) in Section 9.1.6.	
Ecology Comment No. 41	Section 9.2.1.1 **Quantitative Protectiveness Evaluation Component**, page 9-16, last paragraph	The first sentence should refer to Figure 9-2 (**Disproportionate Cost Analysis for Groundwater Alternatives**).	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 42	Section 9.2.1.2 **Qualitative Protectiveness Evaluation Component**, pages 9-16 and 9-17	This section should include discussion of all the elements of protectiveness in WAC 173-340-360(3)(f)(i), such as the time required to reduce risk and attain cleanup standards and the improvement in overall environmental quality. The discussion in this section is limited to on-site and off-site risks.	**Response:** Text will be revised as requested in Ecology comment.
Ecology Comment No. 43	Section 9.3.2 **Preferred Groundwater**	Provide a table like Table 9-5 (**MTCA Criteria Rankings Summary for Soil Alternatives**) for the groundwater alternatives. Use this table to outline the discussion in this	**Response:** Text will be revised as requested in Ecology comment.

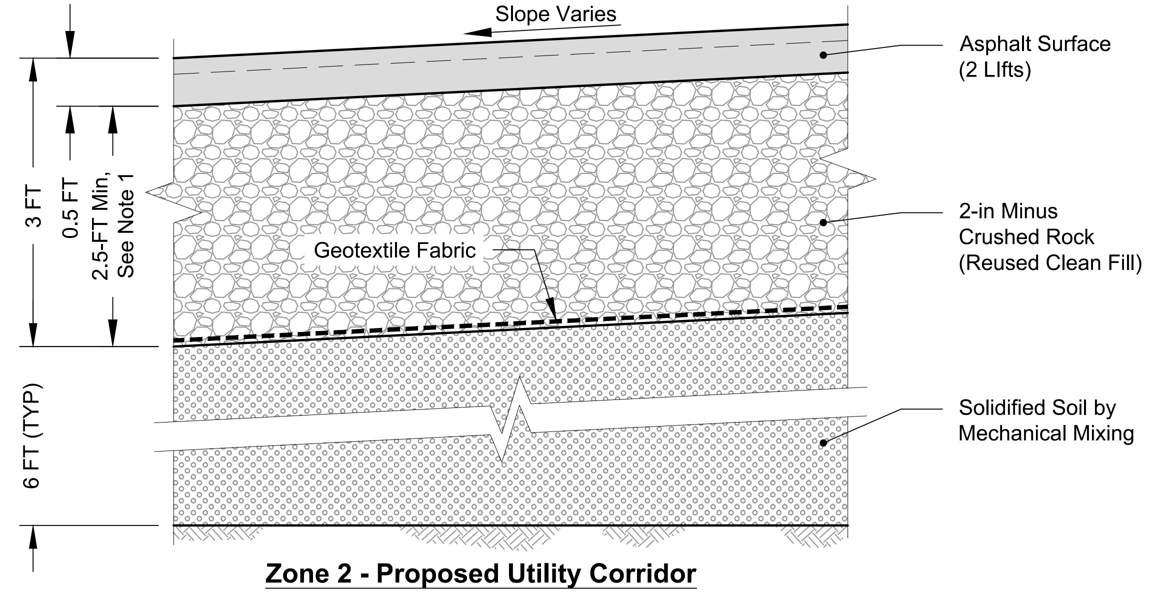
Ecology Comment Number	**Document Reference**	**Ecology Comment**	**International Paper Company Response**
	Alternative, page 9-22	section.	
Ecology Comment No. 44	Section 9.3.2 **Preferred Groundwater Alternative**, page 9-22	Provide a table like Table 9-5 (**MTCA Criteria Rankings Summary for Soil Alternatives**) for the groundwater alternatives. Use this table to outline the discussion in this section.	**Response:** A new Table 9-6 (attached) has been produced as requested to identify the rankings summary for groundwater alternatives.

End of Comments



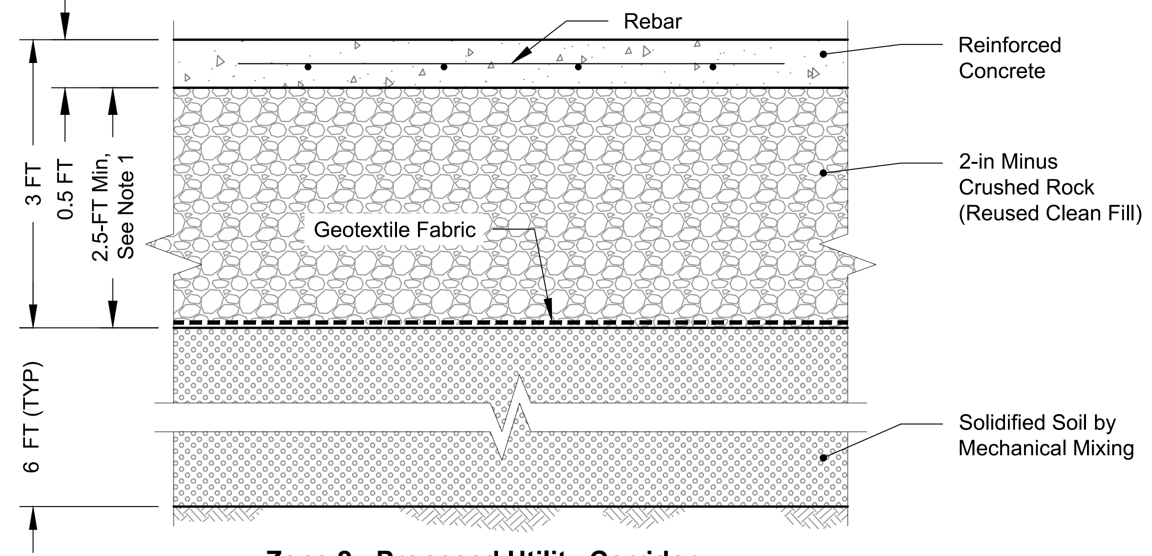
Zone 1 - Proposed Paved Area

Not to Scale



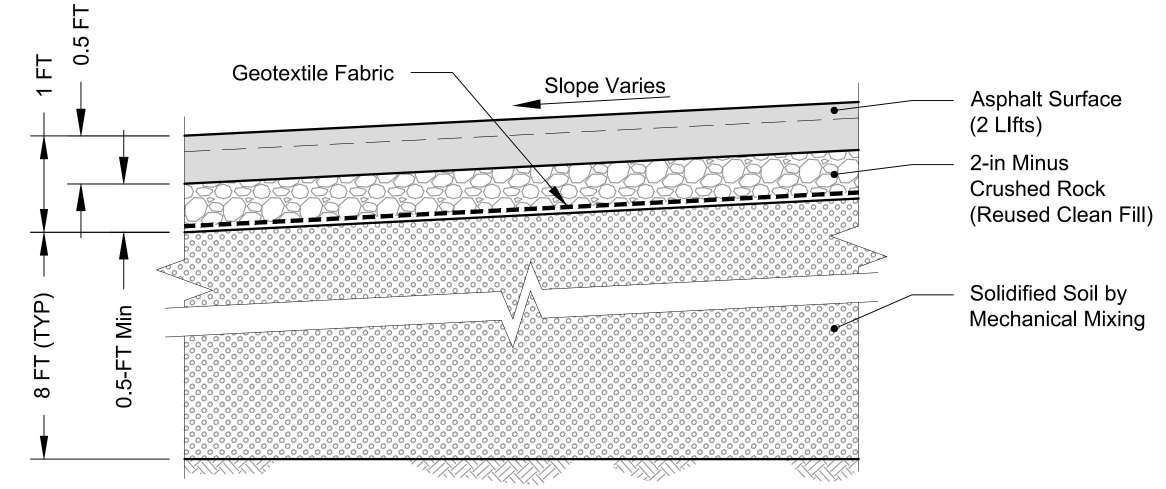
Zone 2 - Proposed Utility Corridor Asphalt Paved Area (ISS Below 3ft BGS)

Not to Scale



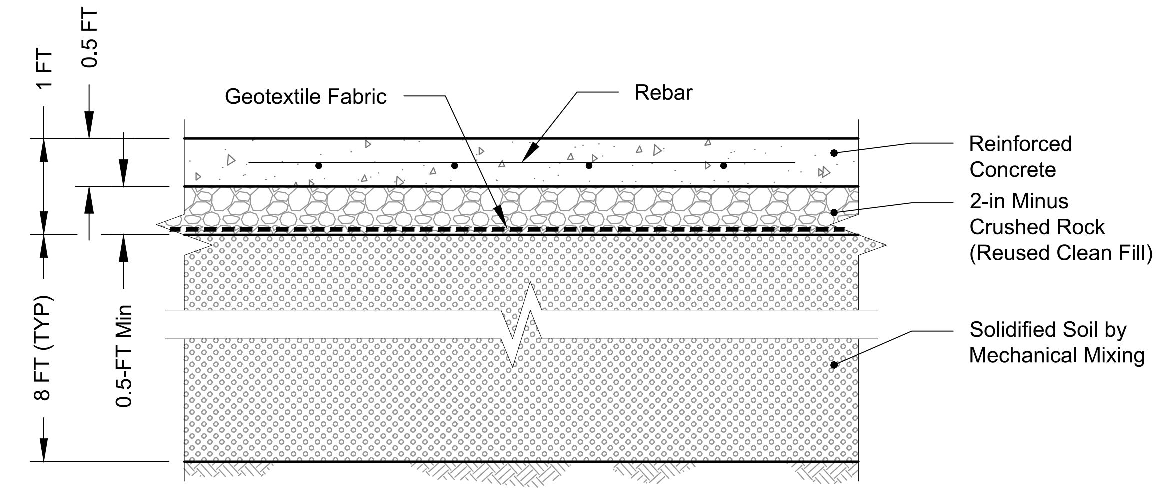
Zone 2 - Proposed Utility Corridor Inside Building (ISS Below 3ft BGS)

Not to Scale



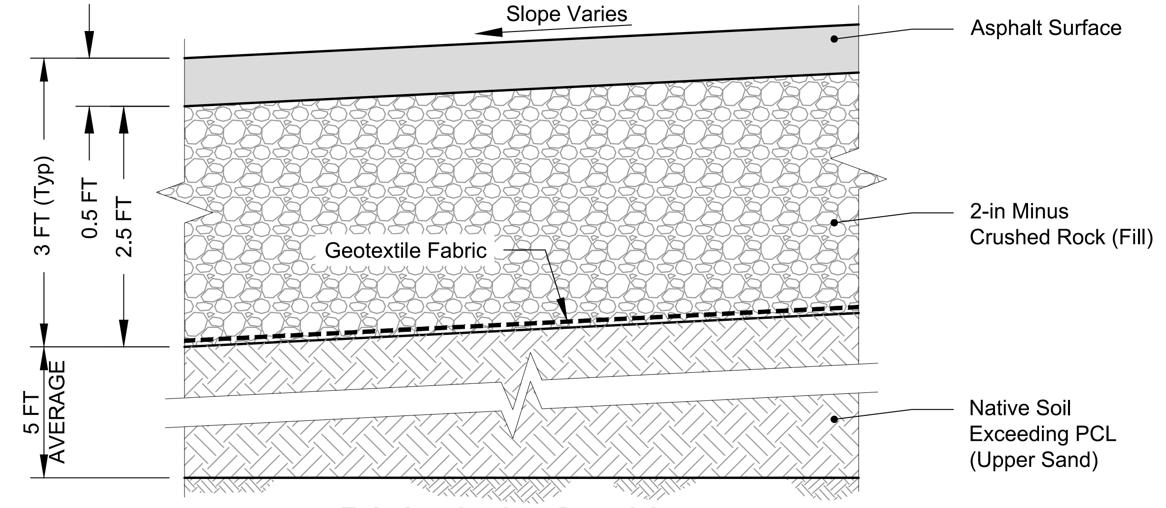
Zone 3 - Proposed Asphalt Paved Area (ISS Below 1ft BGS)

Not to Scale



Zone 3 - Proposed Concrete Floor Inside Building (ISS Below 1ft BGS)

Not to Scale



Existing Asphalt Paved Area

Not to Scale

Notes:

1. The 2.5-ft min assumes moving and regrading of solidified soil will be necessary in some areas.
2. ISS = In Situ Solidification

J:\GIS\Projects\International Paper\Longview\2015\ALT S5B Tech Memo\Figure 4 (Cover Details).dwg
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International Paper Longview, WA	Project No. 33764232	Alternative S5B Proposed Treatment Area Zone Cover Details	Figure 4
AECOM			

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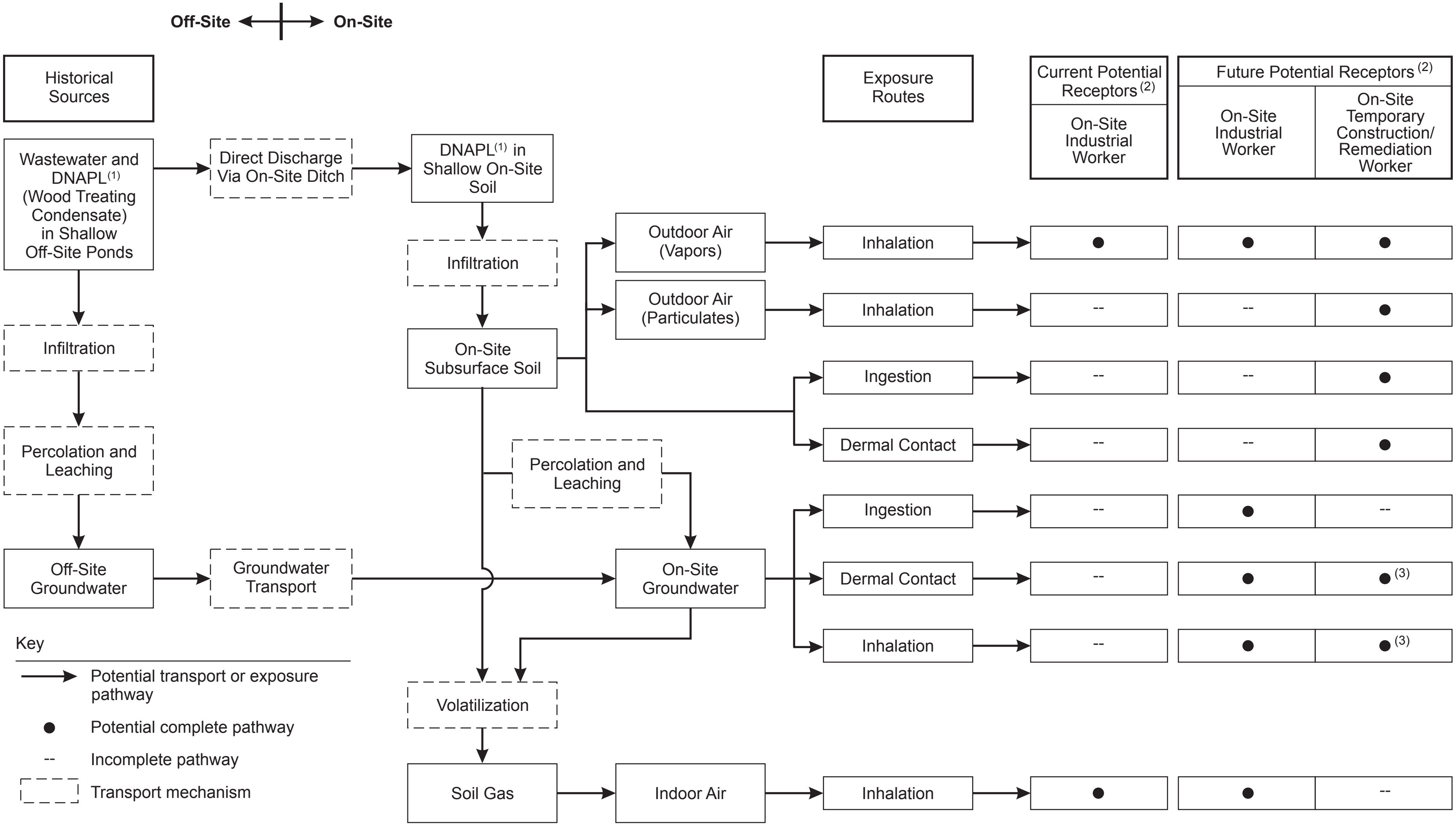


(1) DNAPL = Dense non-aqueous phase liquid

(2) Additional pathways only complete if soil beneath cap is disturbed and/or a groundwater supply well is installed.

(3) Construction workers might have limited contact via dermal exposure and inhalation of volatiles if they encounter shallow groundwater.

International Paper
Longview, WA

Project No.
33759250

URS

Potential Exposure Pathways
Maintenance Facility Area

Figure
5-1

MFA FS Long-Term Effectiveness Percentage Calculations

Alternative	Total Area Remediated (sqft)	Thickness Remediated (ft)	Volume Remediated (CY)	Off-Site Disposal		On-Site Containment		On-Site Solidification		On-Site ERH Treatment		Totals	
				Volume	%	Volume	%	Volume	%	Volume	%	Volume	%
S1	34,700	5	6,400	6,400	100%	0	0%	0	0%	0	0%	6,400	100%
S2	34,700	5	6,400	6,000	94%	400	6%	0	0%	0	0%	6,400	100%
S3	34,700	5	6,400	4,600	72%	1,800	28%	0	0%	0	0%	6,400	100%
S4	34,700	5	6,400	4,900	77%	1,500	23%	0	0%	0	0%	6,400	100%
S5	34,700	5	6,400	0	0%	400	6%	6,000	94%	0	0%	6,400	100%
S5A[1]	34,700	5	6,400	0	0%	400	6%	6,000	94%	0	0%	6,400	100%
S5B	34,700	5	6,400	0	0%	0	0%	6,400	100%	0	0%	6,400	100%
S5C[2]	34,700	5	6,400	0	0%	0	0%	5,070	79%	1,350	21%	6,400	100%
S6	34,700	5	6,400	0	0%	1,400	22%	0	0%	5,000	78%	6,400	100%
S7	34,700	5	6,400	4,600	72%	1,400	22%	0	0%	400	6%	6,400	100%

Note: The volumes shown on this table are calculated from the area and thickness assumed for remediation.

[1] Free-product recovery will occur beneath the building. However, soil will not be treated or removed beneath the building. Thus, this alternative relies on containment of soil beneath the building.

[2] ERH treatment area extends beyond the building footprint to the north and east.

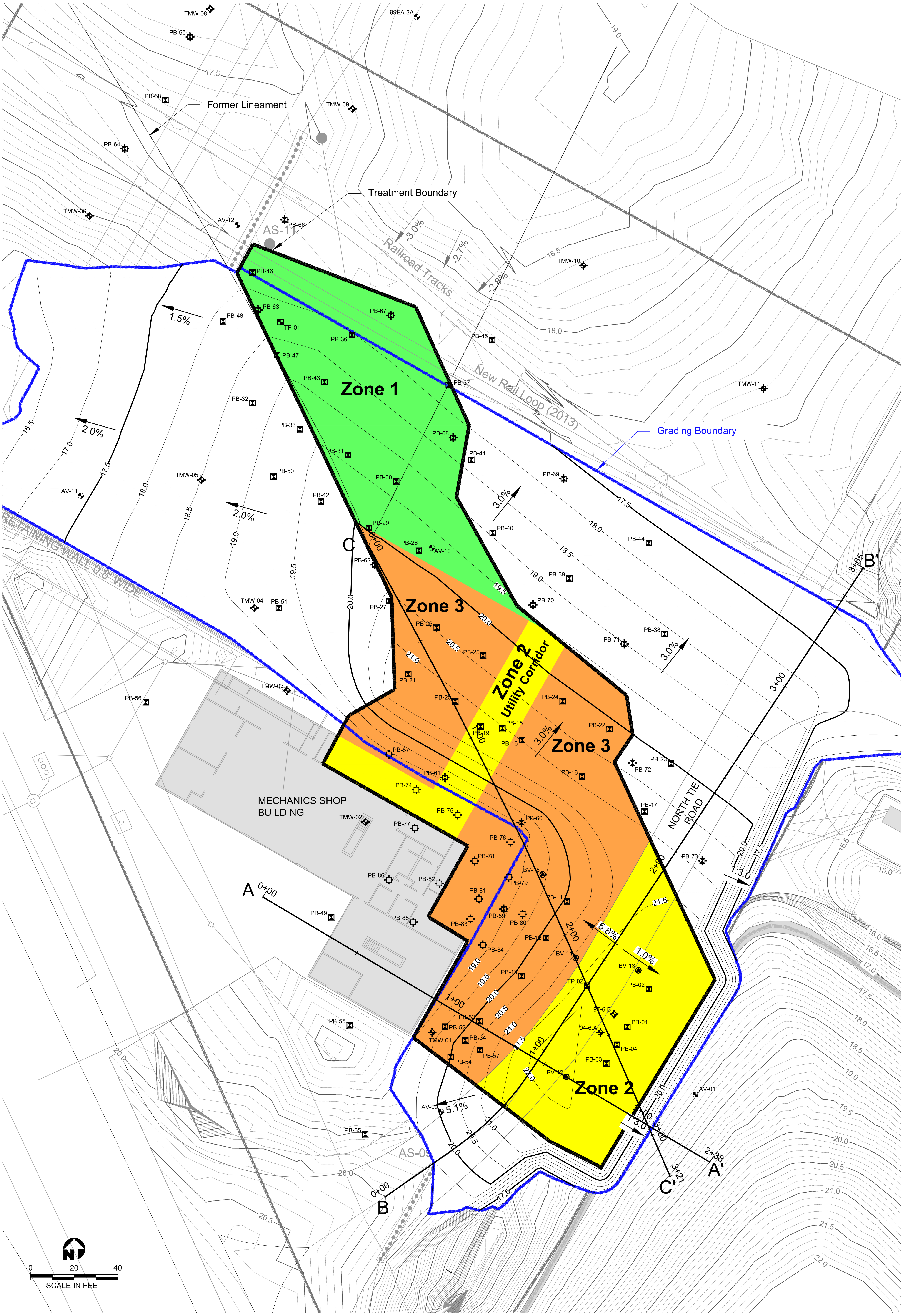
Table 9-6
MTCA Criteria Rankings Summary for Groundwater Alternatives

Alternative	Protectiveness Rank	Permanence Rank	Cost (PW) Rank	Long-Term Effectiveness Rank	Short-Term Risk Rank	Implementability Rank	Public Concerns Rank	Sum of Individual Ranks	Combined Rank
GW1	1	2	4	2	4	4	2	19	4
GW2	2	2	3	2	3	3	2	17	2
GW3	3	3	2	3	2	2	4	19	3
GW4	4	3	1	3	1	1	3	16	1

Notes:
GW1 - Electrical Resistance Heating and Enhanced Biodegradation
GW2 - Chemical Oxidation and Monitored Natural Attenuation
GW3 - Active Biosparging
GW4 - Monitored Natural Attenuation
PW - Present Worth Cost

Appendix M

Alternative S5B Site Grade Cross Sections



International Paper
Longview, WA

Project No.
60395232

AECOM

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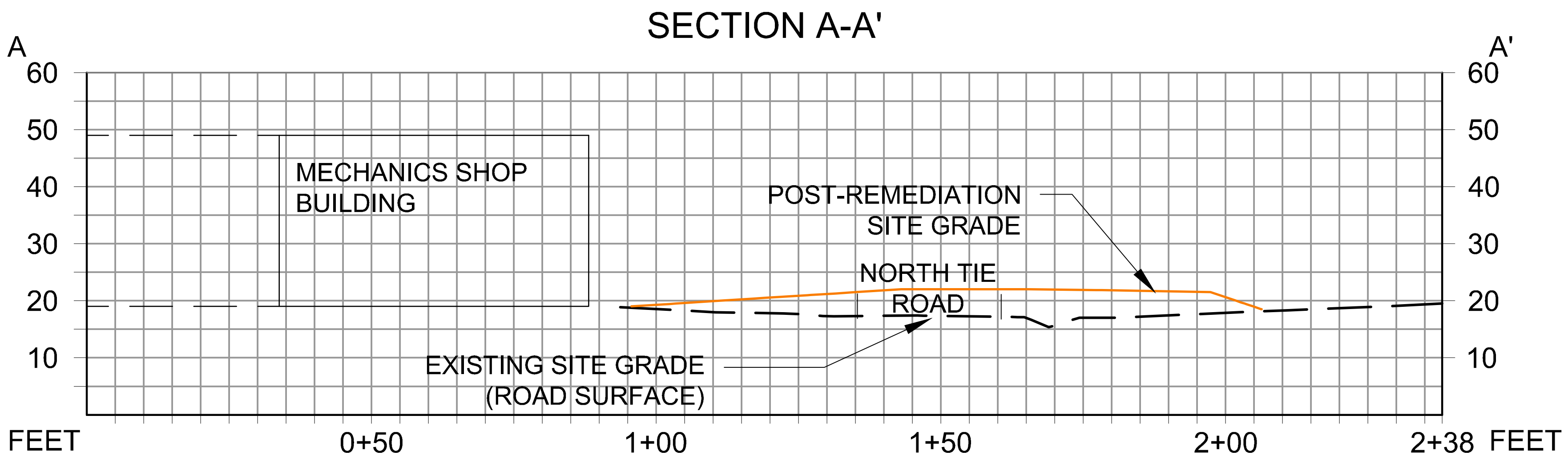
Mod: 12/17/2015, 13:06 | Plotted: 12/17/2015, 14:21 | powellb

Alternative S5B Site Grade
Cross Section Location Figure

Figure M-1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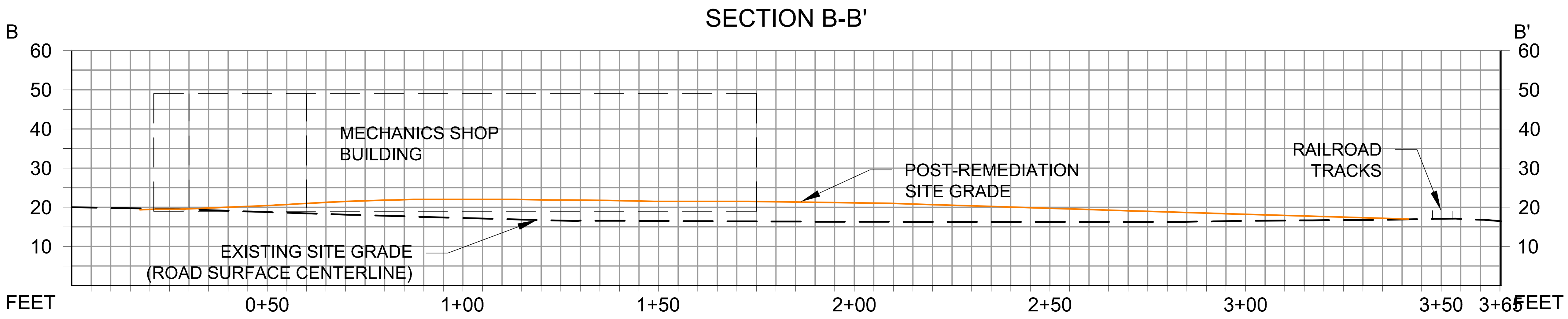
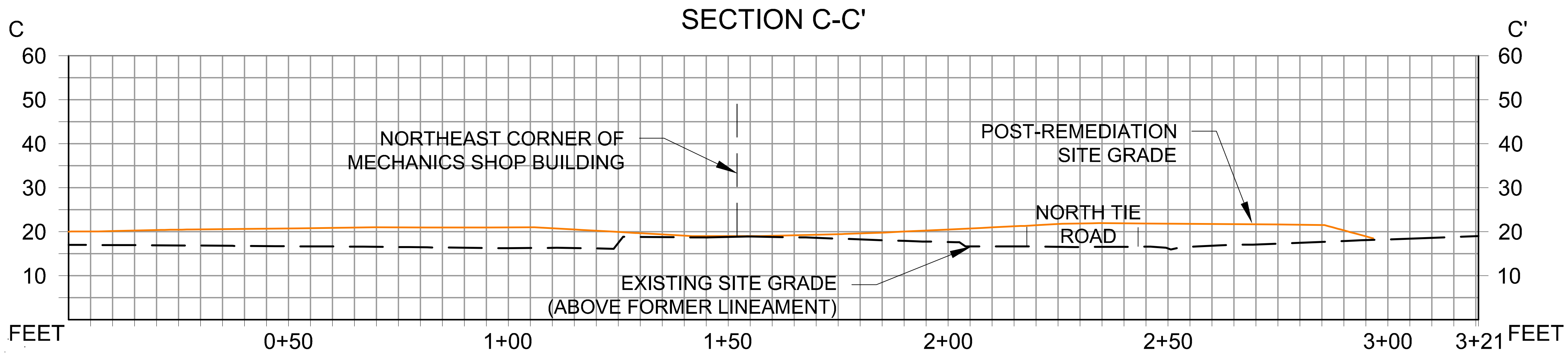

SECTION B-B'


SECTION C-C'

0 15 30
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Project No. 60395232

Alternative S5B
Site Grade Cross Sections A-A', B-B', and C-C'

Figure M-2

Addendum to Public Review Draft Remedial Investigationa/Feasibility Study Report, Port of Longview Maintenance Facility Area, Longview, Washington

Date	**Document**	**Subject**	**Ecology comments embedded**
August 10, 2017	Email from Charles Hoffman (Ecology) to Kaia Petersen (Ecology)	Review of technical memorandum submitted by AECOM on July 21, 2017	No
July 21, 2017	Technical memorandum from Paul Kalina (AECOM) to Kaia Petersen (Ecology)	International Paper Comments on Additional Port Communication, Port of Longview Maintenance Facility Area, Longview, Washington	Yes
July 13, 2017	Letter from Norm Krehbiel (Port of Longview) to Maia Bellon (Ecology)	Port of Longview Maintenance Facility Area	No
May 26, 2017	Email from Lisa Hendriksen (Port of Longview) to Eva Edmonson (Ecology)	Transmittal of draft comment matrix with Port of Longview's responses to Ecology's comment letter dated May 5, 2017	No
	Attachment to May 26, 2017 email	Table 1 – Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017	Yes
May 25, 2017	Memo from Charles Hoffman (Ecology) to Kaia Petersen (Ecology)	Shoring Cost Estimate for Excavation/Solidification of Contaminated Soils, Port of Longview's Proposal	No
May 2, 2017	Letter from Kaia Petersen (Ecology) to Lisa Hendriksen (Port of Longview)	Cost estimates included in Port of Longview's submittal of April 14, 2017	No
April 14, 2017	Letter from Lisa Hendriksen (Port of Longview) to Kaia Petersen (Ecology)	Port of Longview's Proposed Alternative for Remediation of the MFA Site and Responses to Comments included in January 31, 2017 letter from K. Petersen	Yes
March 7, 2017	Letter from John Level (Assistant Attorney General) to Brien Flanagan (Schwabe, Williamson & Wyatt, PC)	Response to letter dated February 28, 2017	No
February 28, 2017	Letter from Brien Flanagan (Schwabe, Williamson & Wyatt, PC) to John Level (Assistant Attorney General) and Sally Toteff (Ecology)	Response to January 31, 2017 Department of Ecology Letter to Lisa Hendriksen, Port of Longview	No

Date	**Document**	**Subject**	**Ecology comments embedded**
January 31, 2017	Letter from Kaia Petersen (Ecology) to Lisa Hendriksen (Port of Longview)	Review of Port of Longview's submittal of September 27, 2016 on Combined Port Alternative	No
September 27, 2016	Memo from Lisa Hendriksen (Port of Longview) to Kaia Petersen and Ava Edmonson (Ecology)	Port of Longview Alternative	Yes
	Attachment 1 to September 27, 2016 submittal; memo from Chris Bailey (GeoEngineers) to Lisa Hendriksen; dated March 10, 2016	Development of additional alternative for MFA cleanup action	Yes
	Attachment 2 to September 27, 2016 submittal	Table with comparison of alternatives (Existing S1, Existing S5B, POL Proposed)	Yes
	Attachment 3 to September 27, 2016 submittal; dated 9/9/2016	Cost estimate, Combined Port Alternative – All Disposal as CAMU	Yes
	Attachment 4 to September 27, 2016 submittal; dated 9/9/2016	Cost estimate, Combined Port Alternative – 2/3 Disposal as CAMU	Yes
	Attachment 5 to September 27, 2016 submittal	Port of Longview Issue Timeline	No
March 23, 2016	Memorandum from Chuck Hoffman (Ecology) to Kaia Petersen (Ecology)	International Paper/Port of Longview – Post-Remediation Site Grades in Maintenance Facility Area (MFA) along North Tie Road	No

From: Hoffman, Charles (ECY)
To: Petersen, Kaia (ECY)
Subject: Port of Longview, Review of AECOM Technical Memorandum
Date: Thursday, August 10, 2017 3:19:31 PM

Hi Kaia,

I reviewed the July 21, 2017, technical memorandum from Paul Kalina, AECOM, to you that has the subject lines: "International Paper Comments on Additional Port Communications, Port of Longview Maintenance Facility Area, Longview Washington". I also reviewed parts of the most recent draft RI/FS by AECOM and some past correspondence and documents by the Port of Longview and AECOM that were submitted in email messages.

The preferred alternative in the draft RI/FS, Alternative S5B, in-situ soil solidification (ISS), would solidify and immobilize contamination by mechanically mixing contaminated soils with bentonite clay, cement, and caustic soda. This process results in an approximate 35 percent increase in volume of the solidified soils. AECOM has addressed the increase in soil volume with a site grading plan that would accommodate Port equipment. The cost estimate by AECOM for this alternative is $4,400,000.

The Port is presently objecting to leaving some of solidified contaminated soils at the site and to the change in grade that would result from implementation of Alternative S5B. The Port has proposed a variation of Alternative S5B, called the Combined Port Alternative, that includes ISS but also proposes excavation and off-site disposal of approximately half of the contaminated soils. The Combined Port Alternative would result in a site topography similar to the present condition and would have a greater depth of clean fill over the solidified contaminated soils.

The Port's engineering consultant, GeoEngineers, provided a cost estimate for the Combined Port Alternative of $4,600,000. However, this cost estimate does not include shoring of some areas where the excavation would be deeper than 4 feet, and has some different work areas (e.g. size of area for building demolition) and unit costs compared to the estimate by AECOM. The lack of shoring costs and different work areas and unit costs makes a cost comparison of the two alternatives difficult to evaluate.

AECOM modified the GeoEngineers cost estimate by adding costs for shoring where potentially required, increasing the depth (and cost) of a sheet pile wall along the existing slurry wall, adding a cost for contaminated water treatment and disposal, and adjusting some areas and unit costs for consistency with areas and unit costs in the Alternative S5B estimate. The modifications are consistent with AECOM's cost estimate. The estimate by GeoEngineers proposes disposal of contaminated soils at both Subtitle C and Subtitle D landfills. AECOM changed that to soil disposal at only a Subtitle C landfill. This results in an approximate $90,000 increase to soil disposal costs in the AECOM modification. AECOM acknowledges this modification states that costs would have to be included in the estimate to characterize which soils could be disposed of at a Subtitle D landfill. With these and some other minor changes, the AECOM modification to the cost estimate for the Combined Port Alternative is $5,900,000.

The modifications AECOM made to GeoEngineers' cost estimate for the Combined Port Alternative are appropriate to provide a cost estimate comparison of Alternative S5B and the Combined Port Alternative. I concur with AECOM's analysis and modifications.

TECHNICAL MEMORANDUM

To: Kaia Peterson, Washington State Department of Ecology

From: Paul Kalina, AECOM

cc: Philip Slowiak, International Paper Company

Date: July 21, 2017

Subject: ***International Paper Comments on Additional Port Communications Port of Longview Maintenance Facility Area, Longview, Washington***

EXECUTIVE SUMMARY

For over ten years International Paper Company (International Paper) has been preparing a draft remedial investigation/feasibility study (RI/FS) report for the Maintenance Facility Area at the Port of Longview (Port) located in Longview, Washington. Throughout the RI/FS development process, International Paper has sought to accommodate the Port's evolving development objectives for the site which have referenced plans for various potential storage uses as well as a future dump pit. In May 2015, the Port stated that it was prepared to support the preferred cleanup action alternative identified in the draft RI/FS report (Alternative S5B). This culminated in the subsequent approval by the Washington Department of Ecology (Ecology) in late 2015 of the public review draft RI/FS report that was submitted to Ecology on December 21, 2015. The Port proposed additional modifications regarding site grades that were also incorporated by International Paper into the public review draft RI/FS report that was submitted to Ecology on July 12, 2016.

Notwithstanding the foregoing, the Port raised further objections to Alternative S5B, culminating in a series of additional communications dated September 2016 through May 2017. Moreover, the Port proposed an alternative remedy, referred to by Ecology and herein as the Combined Port Alternative. Ecology has requested that International Paper address these additional Port communications regarding Alternative S5B as well as the Combined Port Alternative.

As discussed in detail below, Alternative S5B is the preferred remedial alternative because it provides the highest degree of protection of human health and the environmental in relation to associated costs. By contrast, the Combined Port Alternative is driven by developmental objectives and has an associated additional cost of $1.5 million with no significant additional benefit related to protection of human health and the environment.

1.0 INTRODUCTION AND GENERAL COMMENTS

AECOM Technical Services, Inc. (AECOM) has revised and submitted a public review draft of a remedial investigation/feasibility study (RI/FS) report to the Washington Department of Ecology (Ecology) on behalf of International Paper Company (International Paper). The RI sections of that report summarize the environmental data acquired through investigations conducted in the Maintenance Facility Area (MFA) at the Port of Longview (Port) located in Longview, Washington. The FS sections of that report develop cleanup action alternatives for impacted media in the MFA and provide the rationale for selecting a preferred cleanup action alternative. The preferred cleanup action alternative for MFA site soils is identified as *Alternative S5B - Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks*. The preferred cleanup action alternative for MFA site groundwater is identified as *Alternative GW4 – Monitored Natural Attenuation.*

Following the submittal of the public review draft RI/FS report to Ecology on July 12, 2016, the Port submitted additional communications to Ecology regarding Alternative S5B and an additional alternative that combines *in situ* soil solidification with soil excavation, referred to by Ecology and herein as the Combined Port Alternative. Ecology has forwarded the following additional Port communications to International Paper and has requested comments on those communications:

- September 27, 2016 email from Lisa Hendriksen to Ava Edmonson and Kaia Petersen, transmitting the Port’s preferred alternative for the MFA site (Port 2016)
- January 31, 2017 email from Lorna Gadwa to Lisa Hendriksen, transmitting Ecology’s comments on the Port’s September 27, 2016 submittal (Ecology 2017a)
- February 28, 2017 email from Kay Syravong to Sally Toteff and John Level, transmitting letter from Brien Flanagan regarding Ecology’s January 31 comments (Schwabe Williamson & Wyatt 2017)
- March 7, 2017 email from John Level to Brien Flanagan in response to Brien’s February 28 letter to Sally Toteff and John Level (Washington State Attorney General 2017a)
- April 14, 2017 email from Lisa Hendriksen to Kaia Petersen, transmitting the Port’s proposed alternative for remediation of the MFA site and response to comments in Ecology’s January 31 letter (Port 2017a)
- May 2, 2017 email from Lorna Gadwa to Lisa Hendriksen, transmitting Ecology’s comments on cost estimates for shoring in the Port’s proposed alternative for the MFA site (Ecology 2017b)
- May 25, 2017 memo and figures from Charles Hoffman to Kaia Petersen with cost estimates for shoring (Ecology 2017c)
- May 30, 2017 email from Ava Edmonson to Kaia Petersen, forwarding May 26 email from Lisa Hendriksen to Ava Edmonson with draft comment matrix with responses to Ecology’s comment letter dated May 5 (Ecology 2017d)

International Paper reviewed the above Port communications, and focused specifically on the communications dated January 31, April 14, May 2, and May 30 of 2017, as requested by Ecology. The Port communications generally fall into the following categories:

- Institutional Control Requirements
- Volumetric Expansion of Soil During Solidification and Impact on Site Grades
- Disproportionate Cost Analysis (DCA) and Selection of Remedies

International Paper's general comments on these issues are summarized here:

Institutional Control Requirements

In the September 27, 2016 communication referenced above, the Port identifies a concern that "the presence of solidified soil triggers the need for deed restrictions at the site," and refers to an expanded "footprint of the area of required deed restrictions." Ecology requires institutional controls when MTCA Method C cleanup levels are used and when a conditional point of compliance is established and, therefore, an environmental covenant with similar footprints will be required for both Alternative S5B and would be required for the Combined Port Alternative. The need for similar institutional controls under both alternatives was stated clearly by Ecology in the January 31, 2017 communication referenced above.

Volumetric Expansion of Soil During Solidification and Impact on Site Grades

International Paper has addressed Port comments regarding volumetric expansion and site grades previously by incorporating post-remediation site grades that the Port identified as acceptable into Alternative S5B. In the September 27, 2016 communication referenced above, the Port referred to an "increased effect on topography of what is currently a flat storage area." In fact, post-remediation site grades were developed not to exceed existing site grades and are therefore very similar. Grading during remediation is proposed to fill in existing low areas and address significant existing differences in elevation between the Mechanics Shop and the portion of the site to the north that is currently separated by a retaining wall. During remediation, the site would be graded to both manage volumetric expansion of the solidified materials and to create more uniform site topography, enhance drainage, and maintain control of storm water in the vicinity of the Mechanics Shop building.

Based on additional previous Port comments, the grades in Alternative S5B were further modified from 3% to 2% grades (transverse direction) to accommodate Port equipment. The modified text on page 7-25 of the July 12, 2016 public review draft RI/FS report now states that post-remediation site grades shall not exceed a 2% slope in the transverse direction or a 5% slope in the longitudinal direction (access road) along equipment transport routes and in equipment operational areas in order to allow the Port to transport and operate existing equipment.

DCA for Groundwater and Selection of Groundwater Remedy

In the April 14, 2017 communication referenced above, the Port recommends selecting an aggressive cleanup action alternative, *Alternative GW2 – Chemical Oxidation with Monitored Natural Attenuation*, as the preferred cleanup action alternative, with *Alternative GW4 – Monitored Natural Attenuation* as a contingent remedy. A contingent remedy is by definition a remedy that is kept in reserve, to be implemented only if a less aggressive remedy is not successful. Because solidification of soil that acts as a source to groundwater is expected to significantly improve groundwater quality and because Alternative GW4 achieved the highest combined rank in applying MTCA's seven criteria and Alternative GW4 is the preferred remedy for groundwater. The need to implement the more aggressive Alternative GW2 as a contingent remedy would be further evaluated as a component of MTCA’s standard periodic review process. The Cleanup Action Plan will clearly set the criteria to be used for evaluating the performance of Alternative GW4 if and when implementation of the contingent remedy (Alternative GW2) is warranted. This approach provides assurance that groundwater at the Port property would be adequately treated, if conditions are unchanged after the soil remedy is implemented, or chemical concentrations do not appear to be able to reach cleanup levels within a reasonable time frame.

DCA for Soil, Consideration of Public Concerns, and Selection of Soil Remedy

The Port continues to incorrectly contend that future development costs should be incorporated into the DCA elements of long-term effectiveness, protectiveness, and consideration of public concern in order to differentiate between the benefits of Alternative S5B and the Combined Port Alternative. MTCA intends for those elements of the DCA to be evaluated in relation to protection of human health and the environment. Future development costs are outside the scope of the DCA under MTCA.

The long-term effectiveness of solidification does not depend on whether or not it is disturbed in the future. The solidification process permanently reduces the mobility of contamination. It is not a reversible process. Landfills can and do fail. Therefore, it is appropriate to rank disposal in an engineered, lined and monitored facility lower than solidification for long-term effectiveness. In accordance with WAC 173-340-360(3)(f)(iv), Ecology generally ranks solidification’s long-term effectiveness higher than off-site disposal in an engineered, lined, and monitored facility. The Port’s evaluation of long-term effectiveness in the April 14, 2017 communication referenced above does not consider the effectiveness of the off-site portion of the remedy, the risks associated with disposal of contaminated soil in a landfill, and the need for long-term monitoring of the landfill.

The Port’s evaluations of protectiveness and management of short-term risks in the April 14, 2017 communication referenced above do not consider off-site impacts and risks and equates protectiveness to the on-site protectiveness, which is not consistent with MTCA guidance. Off-site impacts and risks should also be considered in these evaluations.

Thus the Port confuses the evaluation of permanence with the evaluation of protectiveness. Whether the soil is solidified on site or is transported and disposed of at a landfill, the toxicity of that soil remains the same, because chemicals of concern have not been destroyed. However, solidification permanently reduces the mobility of contaminants by changing the characteristics of the contaminated soil. With off-site disposal, mobility is only reduced because of the engineering controls at the landfill, and if the engineering controls fail, then contamination can be released to the environment. Therefore, landfill disposal is considered more reversible than solidification.

In the April 14, 2017 communication referenced above, the Port states that International Paper “proposes a preferred alternative that lacks permanence due to the increase volume,” and incorrectly identifies excavation and off-site disposal as having a greater degree of permanence than solidification. Off-site disposal is not a treatment technology, and does not result in changes to the soil characteristics. There is no reduction in toxicity or volume of hazardous substances. Mobility is only reduced because of the engineering controls at the landfill, and if the engineering controls fail, then contamination can be released to the environment. Therefore, the reduction in mobility is not as permanent as the reduction in mobility achieved through the solidification process, where the soil characteristics are modified. Therefore, the Combined Port Alternative, which combines solidification with excavation and off-site disposal (from RI/FS report *Alternative S1 – Comprehensive Excavation*), does not provide greater permanence than Alternative S5B, where all soil is solidified.

The Port also states that the Combined Port Alternative "combines the cost saving elements of IP's solidifacting alternative (S5B) and the permanence of the disposal alternative (S1)" and that the costs of the Combined Port Alternative "will depend, in part, on the volume of solidified soils to be disposed of as CAMU-eligible waste." The Port also "understands that alternative S1 appears disproportionately costly" in the September 27, 2016 communication referenced above.

Costs for both Alternative S5B and the Combined Port Alternative have been updated as part of this International Paper response to include identical assumptions and ensure fair direct comparison between Alternative S5B and the Combined Port Alternative, as discussed in the January 31, 2017 communication. The additional excavation and disposal associated with the Combined Port Alternative results in an additional $1.5 million cost and no significant additional benefits related to protection of human health and the environment when compared to Alternative S5B. The Combined Port Alternative, therefore, is also disproportionately costly for the same reason that the Port identifies Alternative S1 as disproportionately costly, and Alternative S5B is the preferred cleanup action alternative for the MFA under MTCA.

2.0 BACKGROUND

The former International Paper site is located in Longview, Washington (Figure 1). The site is located on the north side of the Columbia River, approximately 66 miles upstream (east) from the Pacific Ocean and less than 2 miles downstream (west) of the confluence of the Columbia and Cowlitz Rivers. International Paper once owned approximately 900 acres in the vicinity of the site, prior to selling the property to the Port, Pacific Fibre, and Longview Fibre. The Port purchased the property that included the former Treated Wood Products (TWP) Area in 1999 (Figure 2). Additional Port property borders the TWP Area on all sides. Port vehicle maintenance currently takes place in the Mechanics Shop located northwest of the former TWP Area in the Maintenance Facility Area (MFA) (Figure 3).

The TWP Area became inactive in 1982 and corrective action and closure activities included construction of a subsurface barrier wall. During the construction of the subsurface barrier wall in 1997, potentially impacted soils were observed outside the wall alignment. Subsequent investigations were conducted to evaluate impacted media outside the barrier wall. Those investigations and the associated evaluation of possible cleanup action alternatives for the MFA were initially presented in the 2011 draft revised RI/FS report (URS 2011a).

Comments on the 2011 draft revised RI/FS report were received from Ecology on July 18, 2011 (Ecology 2011), and International Paper provided responses to Ecology comments on August 8, 2011 (URS 2011b). Results from a subsequent Mechanics Shop investigation (URS 2012), and *in situ* soil treatability study (URS 2013a) were incorporated into revised cleanup action alternatives in a cleanup action alternative conceptual technical memorandum (URS 2013b).

Based on comments received from Ecology and the Port and the subsequent discussions with them, International Paper modified Alternative S5B for incorporation into the 2014 draft final RI/FS report (FS sections only, URS 2014). The modified Alternative S5B included partial demolition of the Mechanics Shop building including removal of the concrete floor over soils to be remediated and removal of the non-structural building wall components adjacent to the area to be remediated within the building footprint. The modified alternative included mechanical mixing of the solidification materials within the building footprint using lower profile, smaller equipment that would fit inside the building.

Comments on the 2014 draft final revised RI/FS report (FS sections only), were received from Ecology in September 2014 (Ecology 2014). In those comments and in subsequent discussions, Ecology recommended that International Paper and the Port meet to discuss Port issues and concerns related to potential future site uses, particularly in regard to the management of volumetric expansion of soils during *in situ* soil solidification under the preferred cleanup action alternative (Alternative S5B). International Paper subsequently met with the Port on December 10, 2014. A follow-up conference call between International Paper and the Port occurred on March 20, 2015, and an additional meeting was held between International Paper and the Port at the Seattle AECOM office on March 27, 2015. In those meetings and discussions, the Port proposed revisions to preferred soil cleanup action alternative (Alternative S5B) that were incorporated by International Paper. The revised Alternative S5B was then presented to Ecology by International Paper in the cleanup action alternative technical memorandum (AECOM 2015a). The revisions to Alternative S5B proposed by the Port and incorporated by International Paper are summarized both below and in Table 1 (attached):

1. Three distinct treatment area zones were proposed as follows:

    a. Zone 1: Zone 1 includes the area in the vicinity of and extending 80 feet to the south of the MFA railroad tracks (see Figures 4 and 5). Soil that contains COCs at concentrations exceeding the preliminary cleanup levels in this zone would be excavated to the top of the Upper Silt instead of being solidified in place. Excavated material would be relocated within the AOC from Zone 1 to Zones 2 and 3, and all impacted soil would be treated by *in situ* solidification in Zones 2 and 3. The excavated area (Zone 1) would be backfilled to site grade using clean imported materials. This would provide the Port with unrestricted site use in this area during potential future development (e.g., future rail dump pit).

    b. Zone 2: Zone 2 includes a 20-foot wide utility corridor and a 23-foot wide area that includes the nearby access road referred to as “North Tie Road” (see Figure 5). Within this zone, soil that contains DNAPL or COCs at concentrations exceeding the preliminary cleanup levels would be treated using *in situ* solidification, along with soil relocated from Zone 1. Solidified material would only be present below 3 feet bgs. Three feet of clean material (0.5 feet of asphalt and 2.5 feet of clean fill) would be placed above the solidified material and a layer of geotextile fabric. This would provide the Port with ability to perform utility and other general site work without restrictions within this 3 foot depth.

   c. Zone 3: Zone 3 includes the remainder of the treatment area at the site (see Figure 5). Within this zone, soil that contains DNAPL or COCs at concentrations exceeding cleanup levels would be treated using *in situ* solidification to within one foot of the ground surface. One foot of clean material (0.5 feet of asphalt or concrete and 0.5 feet of clean fill) would be placed above the solidified material and a layer of geotextile fabric.

2. The site would be graded to manage volumetric expansion of the solidified materials and provide a more uniform site topography, enhance drainage, and maintain control of storm water in the vicinity of the Mechanics Shop building. A strip drain would be installed along the north and east perimeter of the building (see Figure 6) to route storm water to the Port's existing storm water treatment system.

3. The portion of the Mechanics Shop building above the solidification treatment area would be completely removed to allow solidification using the same methods utilized for outside the building footprint (see Figure 6). The concrete floor, exterior wall footings, and utilities would be removed in the part of the building with lower ceiling heights. This would increase solidification efficiency and reduce mobilization costs associated with specialized labor and equipment needed for working inside a building. It would also eliminate the need for more complicated specialized solidification work below the exterior walls and around building footings, and is thus expected to speed up solidification work and reduce risks associated with working inside a structure. Following solidification, the portion of the building removed would be reconstructed on new footings and a new concrete floor would be poured.

4. Based upon additional analysis, *in situ* solidification in Zones 2 and 3 would be completed to approximately 9-feet bgs on average, or approximately 1 foot into the Upper Silt rather than 2 feet as previously proposed in the original alternative.

5. Volumetric expansion is assumed to be 35 percent which is conservative based upon the 26 to 36 percent range identified during bench-scale treatability testing of preferred Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda).

6. Based on solidification of soils from 3-to 9-feet bgs under the building, calculations indicate that the top surface of solidified soil could be near the concrete floor slab. Solidified materials within 1 foot of the concrete floor slab would be relocated to outside the building footprint within Zone 3.

7. During pilot testing, further characterization of shallow soil in Zone 1 would be conducted to assess whether any shallow soil could be removed from *in situ* solidification

treatment. Any shallow soil identified as containing concentrations of COCs below cleanup levels could be placed above solidified soil within Zones 2 and 3 to provide additional depth in which the Port could work during potential future development. Other options include using the material as backfill in Zone 1, and the site grades in Zones 2 and 3 could be reduced slightly because of the reduced volume of material requiring solidification.

Comments on the cleanup action alternative technical memorandum and revised Alternative S5B were received from Ecology on May 12, 2015 (Ecology 2015a) and comments on the FS clarification deliverables were received from Ecology on July 2, 2015 (Ecology 2015b). Based on the comments and approval received from Ecology on the cleanup action alternative technical memorandum and revised Alternative S5B, International Paper submitted the 2015 draft final revised RI/FS report to Ecology on October 8, 2015 (AECOM 2015c). This culminated in the subsequent approval by Ecology in late 2015 of the public review draft RI/FS report that was submitted to Ecology on December 21, 2015 (AECOM 2015d). The Port proposed additional modifications regarding site grades that were also incorporated by International Paper into the public review draft RI/FS report that was submitted to Ecology on July 12, 2016 (AECOM 2016).

3.0 SPECIFIC COMMENTS ON ADDITIONAL PORT COMMUNICATIONS

This section provides International Paper's specific comments on the additional communications provided by the Port regarding:

- Alternative S5B
- Combined Port Alternative
- Cleanup Action Alternative Costs

3.1.1 Specific Comments On Port Communications Regarding Alternative S5B

The issues and concerns that the Port has identified regarding Alternative S5B in their comments include the following general categories:

- General Issues and Concerns
- Contaminated Material Volumes
- Excavation Worker Risks
- Institutional Control Requirements
- Site Grades
- Future Maintenance and Development Costs
- Contaminant Leaching
- Disproportionate Cost Analysis (DCA) for Soil and Selection of Soil Remedy
- DCA for Groundwater and Selection of Groundwater Remedy
- Public Concerns

General comments related to primary issues identified by the Port in additional communications regarding Alternative S5B are provided in the first section of this memorandum. Detailed responses to the Port's issues are provided in Table 2, which has been organized by the above categories.

3.1.2 Specific Comments Regarding the Combined Port Alternative

International Paper's detailed comments on the Combined Port Alternative, which was transmitted by the Port in the September 27, 2016 communication and subsequent communications referenced above, are provided in Table 3, and are also summarized below:

- The horizontal footprint of deed restrictions will be identical for the Combined Port Alternative and Alternative S5B.
- Construction logistics and costs related to the proposed future rail dump pit would be identical for the Combined Port Alternative and Alternative S5B, because in both alternatives soil would be excavated from within 80 feet of the rail spur (Zone 1). Following construction, both alternatives would provide an equivalent depth (8 feet) of clean fill in Zone 1, with equivalent risks to future workers.
- Approximately 50% of the contaminated soil is targeted for off-site disposal with the Combined Port Alternative, which is a significant volume, not a moderate volume that will result in off-site impacts and significant additional costs.
- The Port Alternative would still have a net increase in the volume of contaminated soil, although less than Alternative S5B, because approximately 50% of the targeted soil would be solidified with the Combined Port Alternative.
- The depth of clean fill over the solidified soil in the Combined Port Alternative would be 3.4 feet including the base course, not 5 to 6 feet.
- Using an "apples-to-apples" comparison of costs for Alternative S5B and the Combined Port Alternative, the Combined Port Alternative would cost $1.5 million more than Alternative S5B (see Exhibits A and B).
- Site field screening and analytical data indicate that shallow soil contamination (beneath the 3 feet of base course) may be quite extensive, even in the northwestern, downgradient portion of the site. Therefore, for purposes of cost estimation, all of this soil was assumed to be contaminated for Alternative S5B, and the revised cost estimate International Paper prepared for the Combined Port Alternative (Exhibit B) also assumes all of the soil would be disposed of as CAMU-eligible waste in a Subtitle C landfill.

Separate from the September 27, 2016 communication, the Port transmitted an April 14, 2017 communication which included tables which addressed Ecology's comments to the September 27, 2016 communications from the Port. International Paper revised the Port's tables to address the Port's responses to Ecology's comments and those are included in Exhibit C.

3.1.3 Specific Comments Regarding Cleanup Action Alternative Costs

On April 14, 2017, the Port first proposed a detailed alternative remedy (the Combined Port Alternative) with a detailed cost estimate. Thus International Paper evaluated and updated cost estimates for both Alternative S5B and the Combined Port Alternative, . In this evaluation, it has been determined that when Alternative S5B was previously revised to include relocation of soil near the MFA railroad tracks based on input received from the Port, costs for the following items were inadvertently left out of the revised cost estimate :

- Freeze wall shoring around Zone 1
- Zone 1 soil characterization to attempt to reduce soil volume moved to Zone 3 for solidification
- Water management costs for Zone 1

An updated cost estimate in which the above three line items have been added is provided in Exhibit A. All changes made to the cost are highlighted in yellow for ease in identifying changes. In addition, a cover sheet providing a summary of Alternative S5B, specific cost assumptions, and a list of the changes made to the cost estimate is provided in Exhibit A.

In order to perform an “apples-to-apples” comparison between Alternative S5B and the Combined Port Alternative, the cost estimate for the Combined Port Alternative was also updated (Exhibit B). The costs included for Alternative S5B above were also added to the costs for the Combined Port Alternative, and the following assumptions were used to further modify the costs of the Combined Port Alternative to keep it consistent with Alternative S5B:

- Solidification would be performed using large-diameter augers (note that this method of solidification has the added benefit of reducing the risk of breaching the Upper Silt when compared to bucket mixing)
- Freeze wall shoring would be used for both the northwestern, downgradient excavation area and the southeastern, upgradient excavation area, and not sheet pile shoring, except as noted in the following bullet (this has the added benefit of reducing the volume of contaminated groundwater that must be managed)
- Sheet pile shoring would only be used adjacent to the TWP slurry wall
- 35% soil expansion for solidification
- All soil (below 3 feet bgs) would be disposed of at a Subtitle C landfill

Additional revisions including adjusting areas, lengths, depths, and unit costs were made to the Combined Port Alternative cost estimate to keep it consistent with Alternative S5B. All changes made to the cost estimate are highlighted in yellow for ease in identifying changes. All of the changes are also detailed in a cover sheet for the updated Combined Port Alternative cost estimate, and a cost estimate for the original Combined Port Alternative is also presented in a format consistent with Alternative S5B for ease of comparison (Exhibit B).

On May 2, 2017, Ecology provided comments on the Port’s April 14, 2017 communication. The Port addressed those comments in a table transmitted to Ecology in May 2017, which is referenced as the May 30, 2017 communication. International Paper’s additional responses to the comments in the above-referenced table are set forth in Exhibit D.

4.0 CONCLUSION

International Paper has diligently worked with Ecology and the Port to produce and revise the RI/FS report for the MFA. This has included a process extending over ten years during which International Paper has sought to accommodate the Port's evolving development objectives for the MFA. Those accommodations are described in Tables 1 and 2 attached to this Memorandum. The public review draft RI/FS report submitted to Ecology on July 12, 2016, has been prepared consistent with the Model Toxics Control Act (MCTA) requirements and supports *Alternative S5B - Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks* as the preferred soil remedy and *Alternative GW4 – Monitored Natural Attenuation* as the preferred groundwater remedy.

International Paper has evaluated cleanup action alternatives for the MFA in accordance with MTCA methodology, including developing a comparison of benefits to costs with a DCA. *In situ* solidification of MFA soils was identified through the DCA as providing the highest degree of protection of human health and the environment in relation to associated costs.

Moreover, International Paper has met with the Port on multiple occasions since the submittal of the draft revised RI/FS report in 2011, and International Paper has incorporated multiple modifications to accommodate requests by the Port related to potential future development. The revised cleanup action alternative identified as Alternative S5B in the July 12, 2016 Public Review Draft RI/FS Report incorporates modifications to accommodate current Port equipment and uses as well as potential future Port equipment and uses.

The Port has proposed adding excavation and offsite disposal to Alternative S5B to create an additional cleanup action alternative referred to by Ecology and herein as the Combined Port Alternative. A DCA comparison of the Combined Port Alternative to Alternative S5B indicates that the Combined Port Alternative has an associated additional cost of $1.5 million with no significant additional benefits related to protection of human health and the environment.

The request to incorporate additional excavation and offsite disposal at an additional cost of $1.5M is not justified by the DCA, and the revised cleanup action alternative identified as Alternative S5B in the July 12, 2016 Public Review Draft RI/FS Report is the appropriate cleanup action alternative for the MFA.

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Figures

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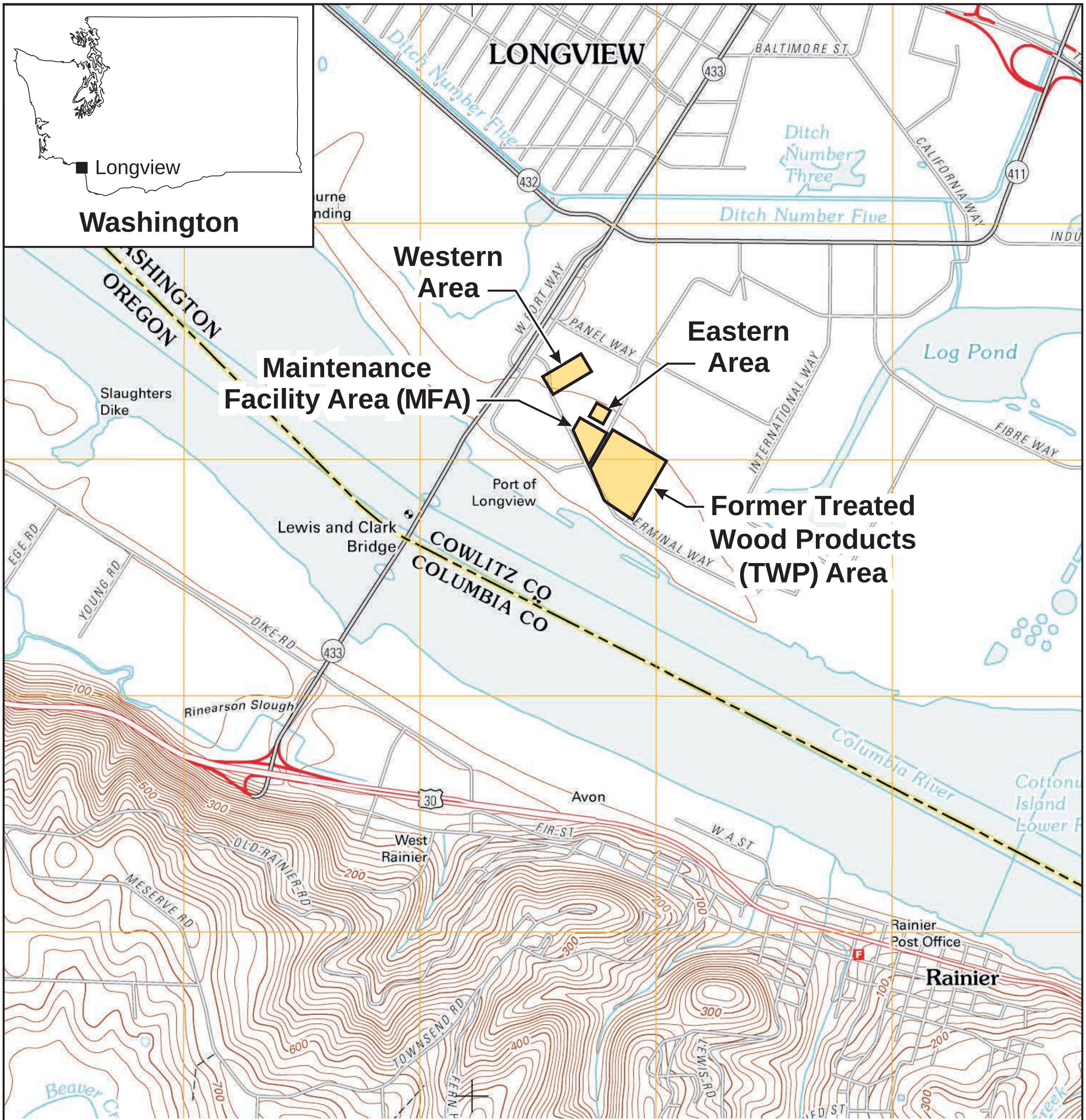

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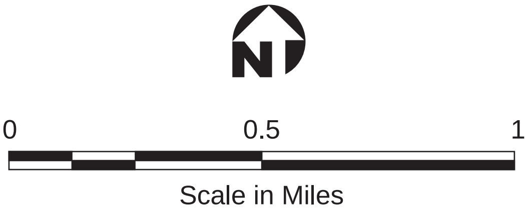


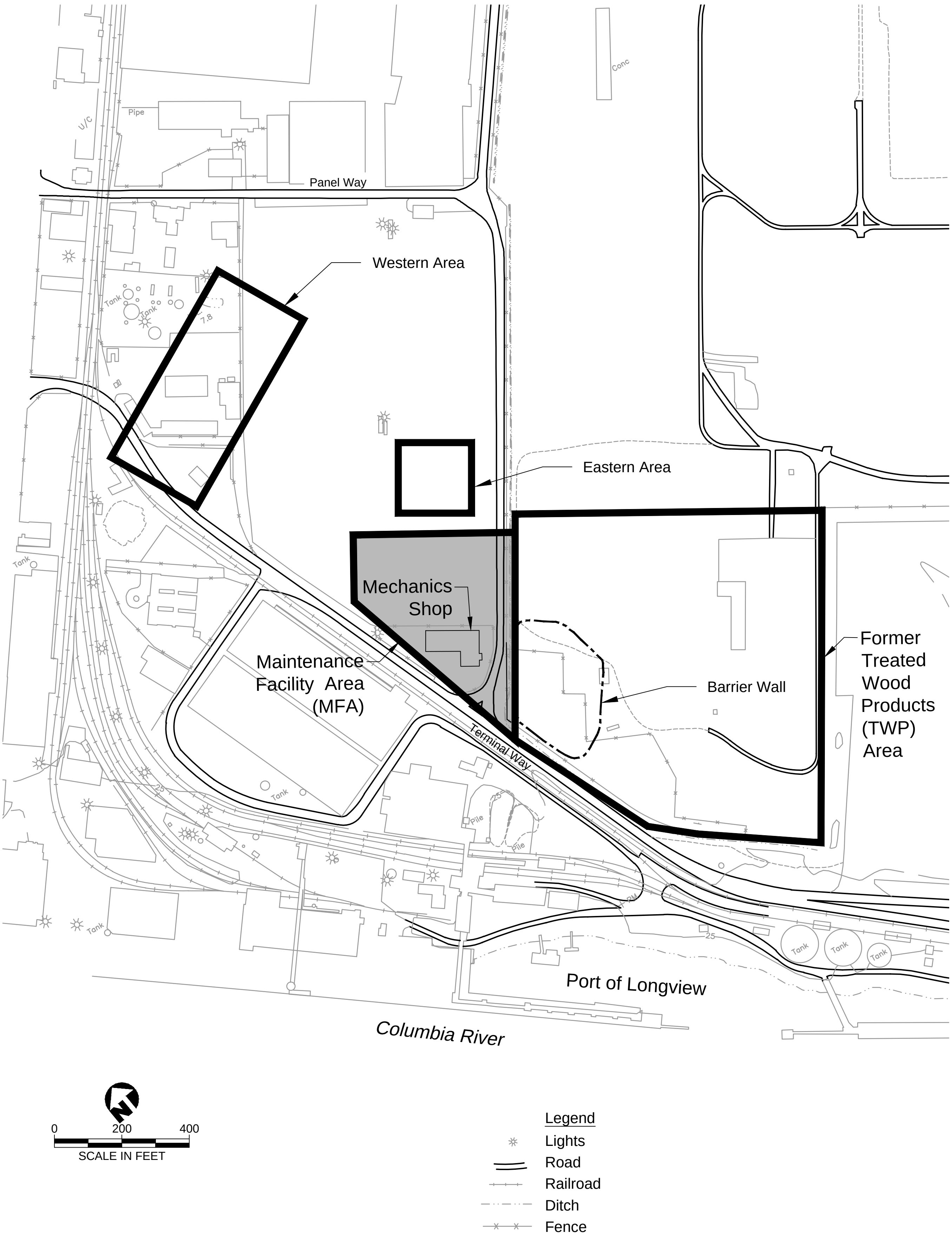
International Paper
Longview, WA

Project No.
60544916

AECOM

Former International Paper Longview Facility
Site Location Map

Figure
1



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International Paper Longview, WA	Project No. 60544916	Former International Paper Facility Site Plan	Figure 2
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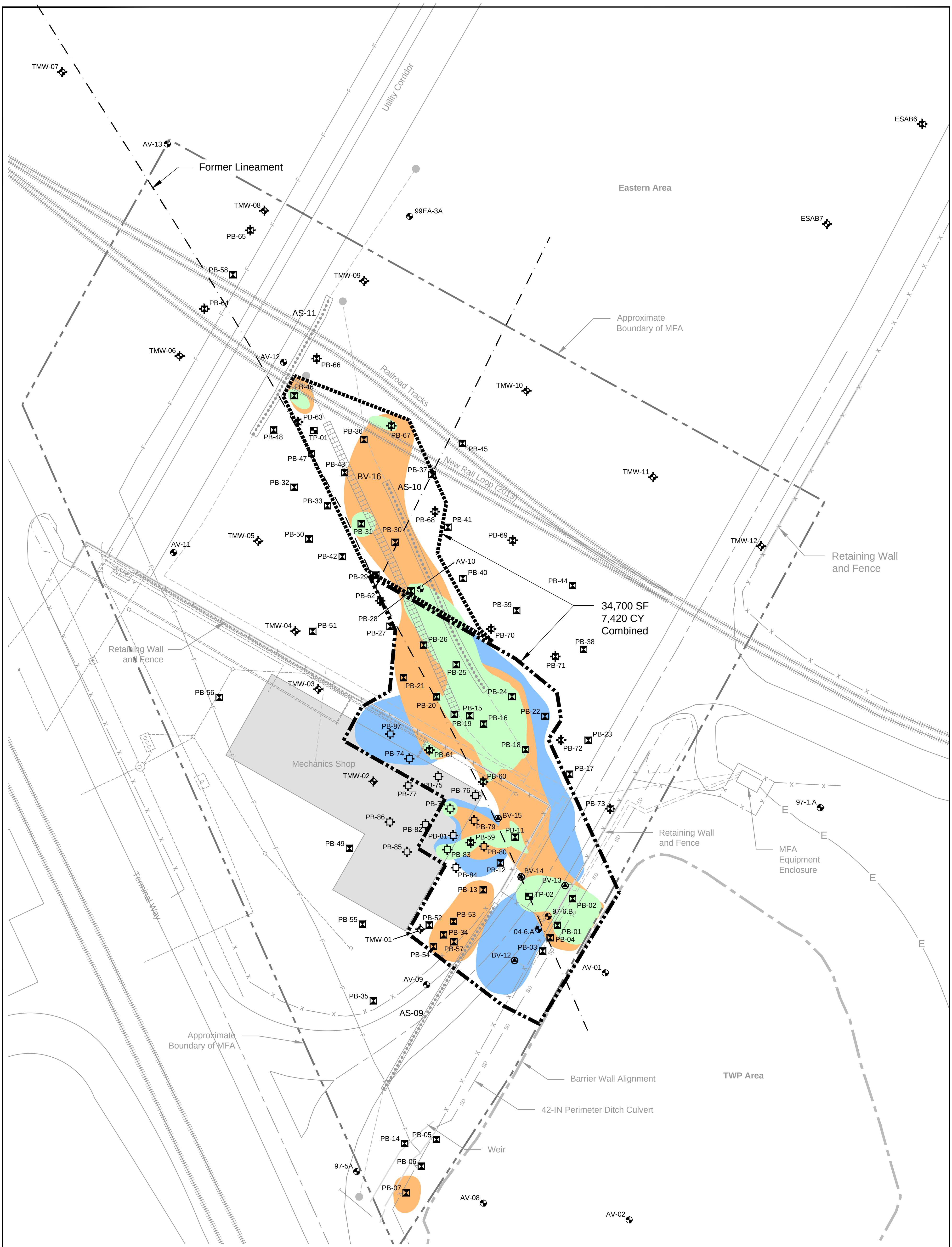
Aerial Source: 2010 Bing (Microsoft Corp)

International Paper Longview, WA	Project No. 60544916	Former International Paper Facility Current MFA Site Plan	Figure 3
AECOM			



Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- Groundwater Monitoring Well
- Vertical Bioventing Well
- ☒ Pre-2008 Geoprobe Soil Boring Location
- 2008 Groundwater Monitoring Well
- 2008 Geoprobe Soil Boring Location
- August 2011 Test Pit Location
- December 2011 Geoprobe Soil Boring Location
- Extent of DNAPL
- Extent of DRO in Soil > MTCA Method A
- Extent of Naphthalene in Soil > MTCA Method C Protection of Groundwater Soil Cleanup Level
- Estimated Limits of Solidification
- Estimated Limits of Excavation

Note:
Solidification will be completed 1 foot into the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the solidification depth will vary across the site. On average, the solidification depth will be 9 ft bgs.

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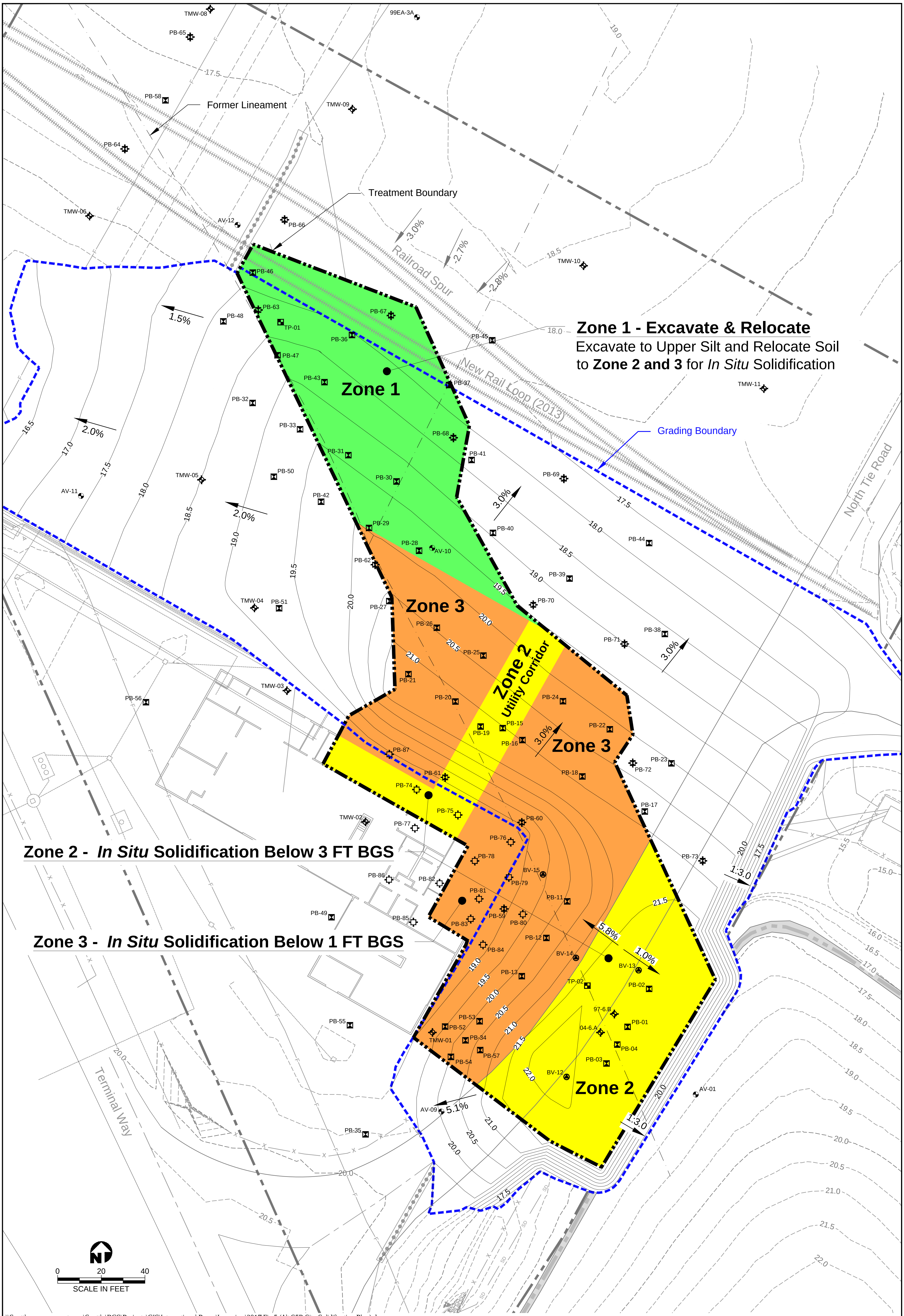
International Paper Longview, WA	Project No. 60544916

AECOM

Alternative S5B
Solidification Outside and Inside Building Footprint
with Relocation of Soil Near Railroad Tracks

Figure
4



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International Paper Longview, WA	Project No. 60544916	Alternative S5B Proposed Treatment Area Zones and Post Remediation Site Grades	Figure 5
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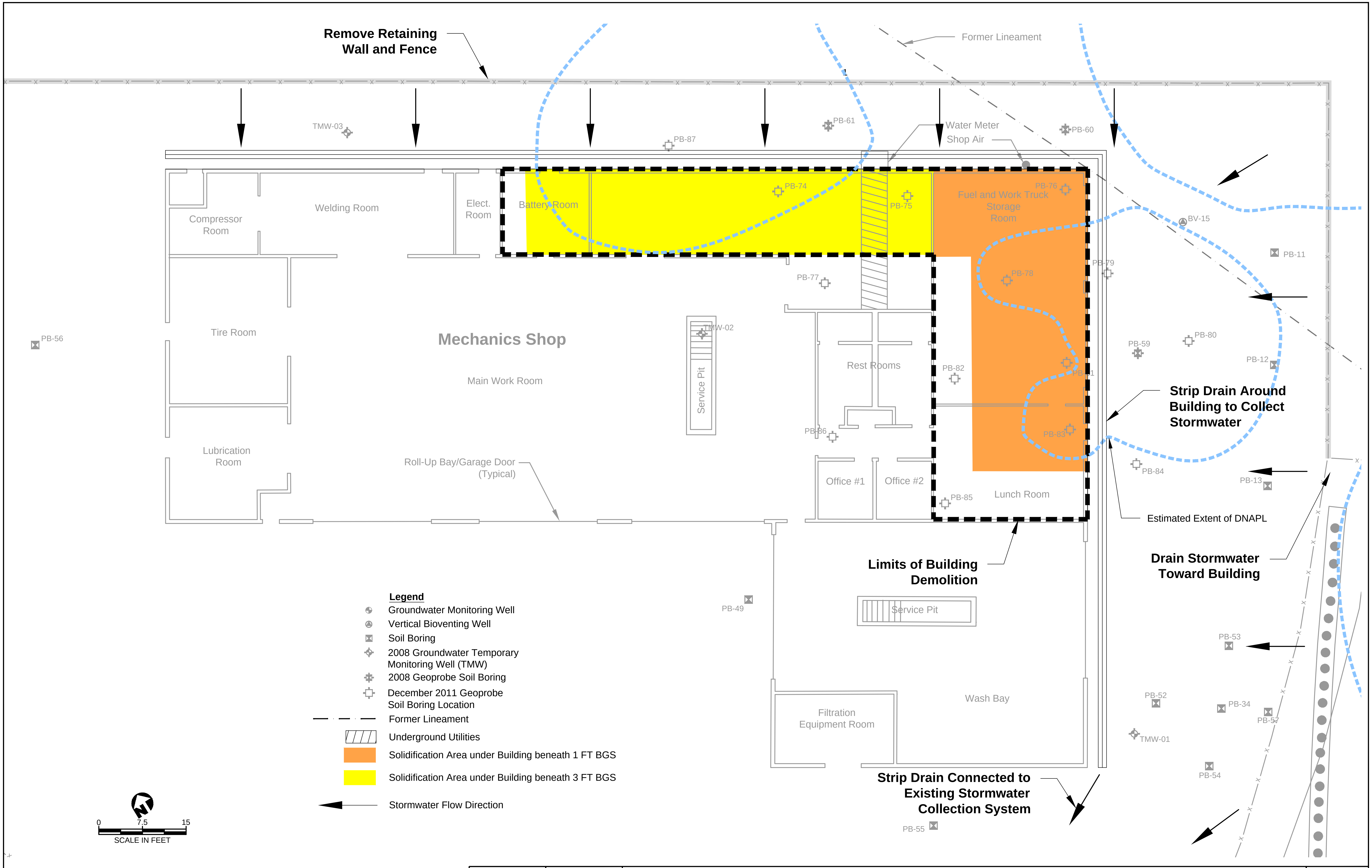

International Paper
Longview, WA

Project No.
60544916

AECOM

Alternative S5B
Conceptual Building Solidification Layout

Figure
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Tables

Table 1
Summary of Alternative S5B Issue Resolution (Originally Presented In Cleanup Action Alternative Technical Memorandum, May 4, 2015)

Date	Comment/Issue	Analysis	Resolution
9/8/14	Ecology – FS Section 5.2.1, page 5-2, second paragraph – Revise the first sentence to "Because subsurface contamination remains beneath the existing asphalt paved area, potential future construction projects have to follow existing institutional controls at the site." In addition, International Paper and the Port of Longview should meet to discuss institutional controls in place or needed to prevent current construction workers from being exposed to subsurface contamination.	International Paper and the Port of Longview have met to discuss potential future construction projects and institutional controls associated with cleanup action alternatives, and preferred Alternative S5B has been modified accordingly.	Text will be revised as stated in Ecology comment, and analysis has been performed regarding cleanup action alternative logistics with respect to potential future construction projects.
	Ecology – FS Section 6.4.2.3, **Area of Contamination (AOC) Policy**, etc., page 6-13 – In the fourth sentence revise to state "Consolidation or in-situ treatment..." In the fifth sentence, delete "as long as managed in land-based units."	Preferred Alternative S5B has been modified to incorporate Port of Longview requests for removal of impacted soil from the rail corridor.	Text will be revised as stated in Ecology comment, and analysis has been performed regarding cleanup action alternative logistics with respect to movement of impacted soil within the Area of Contamination.
	Ecology – FS Section 7.4.7 **Alternative S5B – Solidification Outside and Inside Building Footprint**, page 7-20, paragraph 2 – International Paper and the Port of Longview should meet and discuss what depth of subgrade material would be adequate for a workable layer under the maintenance building.	International Paper and the Port of Longview have met to discuss clean fill subgrade depth requirements, and preferred Alternative S5B has been modified accordingly.	Text will be revised to discuss modifications made to the preferred Alternative S5B to clarify subgrade depths.
	Ecology FS Section 9.1.6 – References to issues associated with volumetric expansion – described in Section 7.4.5 (page 7-16 and page 7-17) and Section 7.4.7 (pages 7-20 and 7-21) – should be included in the discussion of Alternative S5 (and other stabilization alternatives) in Section 9.1.6.	International Paper and the Port of Longview have met to discuss volumetric expansion issues and preferred Alternative S5B has been modified accordingly to incorporate treatment area regrading.	Text will be revised regarding cleanup action alternative logistics with respect to treatment area regrading and incorporation of zones with varying depths of clean fill.

Table 1 (continued)
Summary of Alternative S5B Issue Resolution (Originally Presented In Cleanup Action Alternative Technical Memorandum, May 4, 2015)

Date	Comment/Issue	Analysis	Resolution
12/10/14	Port of Longview – in meeting at Port of Longview's office, the Port of Longview expressed interest in evaluating site regrading as method for maintaining adequate depth of clean fill in which unrestricted work could be performed.	Initial solidification volume estimates were produced and incorporated into proposed post-construction site grade contours.	Alternative S5B was modified to incorporate site grade contours to discuss with the Port of Longview.
	Port of Longview – in meeting at Port of Longview's office, the Port of Longview expressed interest in evaluating movement of impacted soil within Area of Contamination to accommodate potential future dump pit construction near the rail loop. Proposed pit dimensions were 250- to 300-feet long, 40-feet deep, and 50-feet wide.	Three distinct zones were created within the treatment area to provide an area near the rail loop (Zone 1) where only clean fill would be remain after construction.	Alternative S5B was modified to incorporate a zone near the rail loop in which soil would be excavated and relocated further south within the Area of Contaminations to address Port potential future use requirements.
3/20/15	Port of Longview – during conference call between the Port of Longview and International Paper, the Port of Longview expressed interest in site grade contours and treatment zones incorporated into revised Alternative S5B.	A figure illustrating proposed post-construction grade contours and multiple treatment zones was discussed with the Port of Longview.	A meeting occurred March 27, 2014 at the AECOM Seattle office.
3/27/15	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a desire to increase the area of clean fill near the rail loop (Zone 1) to a distance of 80 feet from the existing rail loop.	An analysis was made regarding the increased volume of material that would need to be incorporated within post-construction grade contours.	Alternative S5B was modified to incorporate a larger zone near the rail loop (Zone 1) in which soil would be excavated and relocated further south within the Area of Contaminations to address Port potential future use requirements.
	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a desire to further evaluate solidification volumes to further refine grading contours. A need for directing stormwater in the vicinity of the Mechanics Shop toward an existing stormwater treatment system south of the Mechanics Shop was also expressed.	Modeling and contouring of upper and lower surfaces of the Upper Sand was performed to evaluate treatment volume estimates, and proposed post-construction site grade contours.	Alternative S5B was modified to incorporate site grade contours that meet both Port logistical requirements and stormwater control requirements.
	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a desire to create an additional treatment zone for potential future utility corridor usage. Proposed corridor dimensions were 3-feet deep and 20-feet wide.	An additional treatment zone was created using the proposed utility corridor dimensions and the resulting estimated volume was incorporated into proposed post-construction site grade contours.	Alternative S5B was modified to incorporate site grade contours that meet both Port logistical requirements and stormwater control requirements.

Table 1 (continued)
Summary of Alternative S5B Issue Resolution (Originally Presented In Cleanup Action Alternative Technical Memorandum, May 4, 2015)

Date	Comment/Issue	Analysis	Resolution
3/27/15 (continued)	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a willingness to evaluate trading shallower working depths in some portions of the treatment area to gain deeper working depths in other portions of the treatment area. A shallow working depth in which solidified material was located directly below the asphalt was proposed for all areas other than near the rail loop (Zone 1) and the utility corridor and road (Zone 2).	Three treatment zones were created with working depth of 1 foot bgs (Zone 3), a working depth of 3 feet bgs (the utility corridor and road, comprising Zone 2), and a working depth to the top of the Upper Silt (at approximately 8 feet bgs, in Zone 1). The resulting estimated volumes were incorporated into proposed post-construction site grade contours.	Alternative S5B was modified to incorporate these three treatment zones and site grade contours that meet both Port logistical requirements and stormwater control requirements.
	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a willingness to evaluate trading additional building demolition and general site solidification methods at a lower overall cost than the originally proposed more specialized interior solidification methods.	A cost-benefit evaluation was performed regarding solidification methods and associated demolition requirements.	Alternative S5B was modified to incorporate the use of general site solidification methods throughout the treatment area, with additional building demolition included.
	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a desire to further evaluate shallow soil data with regard to determining whether any shallow soil within the treatment area could be identified as less impacted and eliminated from treatment in order to minimize solidification volumes.	An evaluation of existing shallow soil data was performed.	A portion of Zone 1 near the rail loop is the only portion of the treatment area in which shallow soil data could be segregated from treatment, but this would likely result in less than a 70-cy (~3%) difference in total treatment volume. However, this will be further evaluated during pilot testing and design.
	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a desire to further evaluate placement of impacted soil from within the treatment area within the TWP Area to further reduce costs.	An evaluation of logistics and associated costs was performed regarding placement of impacted MFA soil within the TWP Area under the Area of Contamination policy.	A previous evaluation was revisited with the conclusion that placement of MFA soil within the TWP Area would result in higher costs than off-site disposal, making this option likely not warranted.
	Port of Longview – in meeting at AECOM Seattle office, the Port of Longview expressed a desire to evaluate costs associated with incorporating requested modifications to preferred Alternative S5B.	An evaluation of the cost estimate for preferred Alternative S5B was performed after modifications were incorporated.	Both additional costs and some cost savings were realized during the incorporation of modifications to preferred Alternative S5B, resulting in a total cost within approximately $10,000 of the original alternative cost ($3.4M).

Table 2
International Paper Company's Responses to the Port of Longview's Issues and Concerns Regarding the Maintenance Facility Area (MFA) Feasibility Study (FS) and International Paper Company's Preferred Alternative

General Issue/Concern	Specific Comment/Statement	Email Reference	International Paper Company Response
General	For several years, the Port of Longview (Port) has provided numerous comments on the Feasibility Study (FS) documents. While some of its comments have been incorporated in subsequent versions of the FS, many of these comments have yet to be addressed.	5	International Paper Company (International Paper) has made a considerable effort to incorporate the Port of Longview's concerns into the FS, specifically into Alternative S5B. International Paper met with the Port multiple times since 2013 to obtain input from the Port and revise Alternative S5B in a manner that minimizes impacts on Port operations. The Washington State Department of Ecology (Ecology) and International Paper have responded to the Port's comments and have incorporated revisions in the FS, where appropriate, in accordance with Model Toxics Control Act (MTCA) requirements. For further details, please see the responses to specific comments/statements below.
	As we've discussed with Ecology..., the Port cannot accept IP's proposal (and Ecology should not accept IP's proposal) for numerous reasons that have been listed out and described in multiple letters to Ecology and IP, including: (a) the amount of contaminated material at the Maintenance Facility Area (MFA) site will increase as part of the solidification process; that is, remarkably, the remedy will actually cause more contamination of the environment, (b) the alternative will leave a large mound of solidified material at the site that will negatively impact the current and future use of the MFA site, and (c) the costs for disposal of the contaminated material during future development are being placed on the Port.	3	The remedy will not cause more contamination of the environment, because no additional contamination will be released to the environment. Alternative S5B incorporates modifications to address current and future uses. See International Paper response above, as well responses to the following general issues/concerns: site grades and future maintenance and development costs.
Contaminated Material Volumes	Impacts of the expansion of soil treated by solidification and the resultant increased volume of contaminated materials, the decreased distance between the ground surface and contaminated materials, the increased risk to workers, and the increased disposal costs for the Port.	1	International Paper has clearly indicated that volumetric expansion will occur as part of the treatment process and the mixing of solidification additives (see Page 7-24 and 9-7 of the FS). However, the goal of remediation is to protect human health and the environment from harmful exposure to chemicals released to the environment. The preferred remedy achieves this protection by reducing the mobility of contamination through solidification, and preventing direct contact exposure through the remedy design (depth to solidified soils) and institutional controls. The increase in the volume of contaminated materials after treatment is only one consideration of many in the evaluation and selection of the preferred remedy. Please see responses to specific comments/statements listed under the following general issues/concerns: excavation worker risks and future maintenance and development costs. These responses discuss impacts to Port operations. Treatment residuals are discussed in MTCA Section 173-340-360 (3)(f)(ii) where permanence is defined as follows: "The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated." This citation does not specifically define residuals as a small fraction of waste generated by the treatment process. Therefore, the use of "treatment residuals" is appropriate.
	The 2016 version of the FS was edited to refer to the solidified contaminated soil as "treatment residuals" that will be left on site. The "residuals" terminology implies a situation where a small fraction of waste is generated by a treatment process (e.g., ash resulting from combustion) and undermines the Port's concern that the result of the solidification process is an increased mass and volume of contaminated media that requires the same considerations as the current contaminated soil from the standpoint of direct-contact exposure and waste handling and disposal.	1	
	IP has developed a feasibility study and a preferred alternative that involves solidifying all soils (whether contaminated or clean soil) at the MFA site by mixing it with a concrete-like mixture. It is undisputed that this alternative will increase the amount of contaminated material at the MFA site (including bringing contaminated material to places where the soils are currently clean), impact the current and future uses of the property, and put the cost and responsibility for future handling and disposal of the solidified material on the Port.	3	International Paper carefully reviewed site characterization data to delineate the horizontal and vertical extent of contamination. Based on the soil analytical data and field observations made during drilling, contamination is generally present at the site from 3 to 9 feet below ground surface (bgs). Therefore, this is the targeted zone for solidification. Clean soil has not been targeted for remediation. While it is possible that clean soil may be present in limited areas within the delineated horizontal and vertical extent of contamination, particularly in the shallow areas of the northwestern, downgradient portion of the site (Zone 1), the entire volume is targeted for solidification in the FS to be conservative. As discussed on Page 7-23 of the FS, further characterization of shallow soil in Zone 1 will be performed during the pilot test to identify soil with concentrations less the MTCA Method C cleanup levels. If shallow soil containing concentrations of chemicals of concern (COCs) below cleanup levels is identified, then this soil would be segregated for reuse at the site. This soil would not be solidified, and there would be a reduction in the mass/volume of solidified soil remaining at the site compared to the estimated quantities currently in the FS. Please also see the responses to the following general issues/concerns: excavation worker risks, site grades, and future maintenance and development costs.
	The Port had requested additional soil sampling be incorporated as a way to characterize soil that doesn't require solidification, including the extent of soil that can be cost-effectively disposed of off-site as a way to mitigate the expansion of soil selected for treatment due to high disposal costs (NAPL-impacted soil). In the revised FS, this sampling is only being used to characterize soil that can be used as backfill, rather than as a way to segregate soil for disposal to reduce the overall volume of contaminated soil on site. This is a small step, but is still not a commitment to include off-site disposal as an option during construction. This is how it is worded in Section 7.4.7 of the 2015/2016 FS: During the pilot test, further characterization of shallow soil in Zone 1 would be conducted to assess whether any soil below 3 feet bgs	1	As discussed above, International Paper included additional soil characterization to delineate soil that may not require solidification (soil containing chemicals at concentrations less than the MTCA Method C cleanup levels) in order to potentially reduce the volumetric expansion of soils at the site. This soil could potentially be cost effectively disposed of off-site. However, this soil can also be reused at the site, because MTCA Method C cleanup levels are the cleanup levels at this industrial site. Note that risks to excavation workers are acceptable, if concentrations are less than the MTCA Method C cleanup levels. Reusing soil at the site reduces the volume of fill materials that will need to be imported, thus there is no benefit to disposing this soil off site. Soils that do not contain NAPL, but do contain chemicals at concentrations greater than MTCA Method C cleanup levels must be disposed of as corrective action management unit (CAMU)-eligible waste at a Subtitle C landfill. While this cost is

International Paper Company's Responses to the Port of Longview's Issues and Concerns Regarding the Maintenance Facility Area (MFA) Feasibility Study (FS) and International Paper Company's Preferred Alternative

General Issue/Concern	Specific Comment/Statement	Email Reference	International Paper Company Response
	could be removed from *in situ* solidification treatment. Any soil identified as containing concentrations of COCs below cleanup levels could be placed above solidified soil within Zones 2 and 3 to provide additional depth in which the Port could work during potential future development or could be used as backfill in Zone 1.		less than the cost of disposal of soil containing NAPL, it is not cost-effective compared to *in situ* solidification as demonstrated by the disproportionate cost analysis (DCA). Please also see the responses to the following general issues/concerns: disproportionate costs analysis for soil and selection of soil remedy.
	The treatment of soil immediately below the paving base course down to the upper silt discounts the lower concentrations, or unknown concentrations, of contaminants in this shallow soil, which may be capable of off-site disposal at reasonable cost.	1	
	In the 2011 MFA FS, the alternative description, and cost estimate, for Alternative 55 – Solidification Outside Building Footprint indicated that overburden material would be transported off-site for disposal "to allow for bulking during solidification." In FS versions following the treatability testing, however, the disposal allowance to accommodate bulking or expansion resulting from the solidification treatment was eliminated. In the later versions of the MFA FS, alternatives that utilize solidification addressed the expected expansion associated with *in situ* solidification by proposing to alter the topography of the property. The alteration of the topography creates permanent sloped surfaces in a currently flat storage facility that may impact Port operations. Additionally, leaving the increased volume of contaminated material at shallow depths is expected to result in increased future costs to the Port during redevelopment projects that require excavation of shallow soil for utility corridors, future building foundations or material handling facilities within the footprint of the solidified contamination material left on site. In March 2015, the Port and IP met to discuss the potential for altering the proposed preferred Alternative S5B to reduce the future impact on Port operations and redevelopment costs. The result of this process is a revised preferred Alternative S5B presented in the Public Review Draft FS. This revised alternative incorporates excavation of less contaminated soil in the downgradient portion of the treatment area near the railroad tracks, which is the area most likely to be developed. This change addresses some of the Port's concerns about leaving contaminated soil in areas likely to be developed. However, in its revised preferred Alternative S5B1 IP merely moved the excavated soil subject to treatment from the downgradient portion of the treatment area to other, upgradient, portions of the treatment area. In some areas of the Port property, this process would result in the expanded volume of treated, but still contaminated soil being present immediately below the asphalt pavement surface. This process of removing soil from one area and adding it to another provides some relief in one area, but exacerbates these issues of topography and proximity of contaminated material to the ground surface in a large area near the location of the Maintenance Facility, including across an existing roadway.	5	The transportation and off-site disposal of overburden materials "to allow for bulking during solidification" was removed from the solidification alternatives in response to input from the Port requesting that 2 to 3 feet of clean fill material be retained at the site to allow for future shallow construction activities and utility work. Please also see the responses to the following general issues/concerns: excavation worker risks, site grades, and future maintenance and development costs.
Excavation Worker Risks	The treatment of this entire profile of soil (soil immediately below the paving base course down to the upper silt) creates a large volume of ISS-related expansion and mixes highly contaminated deeper soil with the marginally contaminated shallow soil immediately below the asphalt base material.	1	Please also see the responses to the increased volume of contaminated soil general issue/concern. As discussed above, all soil targeted for solidification exceeds MTCA Method C cleanup levels, and would not be considered "marginally contaminated" or not contaminated. Thorough mixing of solidification agents is required to meet the performance goals of this technology. Because concentrations of contaminants in solidified soil will exceed MTCA Method C cleanup levels, solidified soil must be handled similarly (same personal protective equipment, excavation procedures, and engineering controls) regardless of concentration. International Paper has made a considerable effort to incorporate the Port of Longview's concerns into Alternative S5B. International Paper met with the Port of Longview multiple times since 2013 to obtain input from the Port and revise Alternative S5B in a manner that minimizes impacts on Port operations. Initially, International Paper included 3 feet of clean fill over the solidified soil to address Port's concerns (see previous response). Following a meeting with the Port on March 27, 2015, Alternative S5B included the following revisions: • Excavating/relocating soil down to the top of the Upper Silt within 80 feet of the rail spur (Zone 1) to accommodate the potential future dump pit, and backfilling with soil that meets the MTCA Method C cleanup levels at a minimum • Maintaining a minimum of 3 feet of clean fill (base course)/asphalt above solidified soils in the building utility corridor and the North Tie Road (Zone 2) to accommodate utility work in those areas • Maintaining a minimum of 1 foot of clean fill (base course)/asphalt above the solidified soils in all other areas (Zone 3), where excavation work is currently not anticipated During the March 27, 2015 meeting, the Port expressed a willingness to evaluate trading shallower working depths in some portions of the treatment areas (Zone 3) to gain deeper working depths in other portions of the treatment
	IP's preferred Alternative S5B proposes to treat the entire soil profile with ISS, thereby creating an unnecessarily large volume of ISS-related expansion, and mix highly contaminated deeper soil with the less (or no) contaminated shallow soil immediately below the asphalt base material. Moreover, IP's preferred Alternative S5B results in contaminated media (ISS-treated soil) closer to surface level relative to current conditions resulting in increased likelihood of encountering contaminated media during future shallow construction activities (i.e., trenching, post -hole digging).	5	
	The changes that were made to Alternative S5B, based on the Port's concerns, led to exacerbated conditions with contaminated solidified soil immediately under pavement in some areas....	1	
	The ISS treatment results in contaminated media (ISS-treated soil) closer to surface level relative to current conditions resulting in increased likelihood of encountering contaminated media during shallow construction activities (i.e., trenching, post-hole digging).	1	
	As a result of reliance on ISS, the preferred soil cleanup alternative described in the MFA FS, "S5B - Solidification Outside and Inside Building", is expected to result in continued, and potentially increased, risks to Port personnel and construction/excavation workers and create significant impacts to current Port operations and the future redevelopment of Port property.	5	

Table 2 (continued)
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			area (Zones 1 and 2). This input was incorporated into the Alternative S5B, and the current Alternative S5B provides fill that meets the MTCA Method C cleanup levels in areas where the Port is most likely to excavate, thus minimizing potential direct contact exposure by excavation workers with the solidified soil. If excavation into solidified soils becomes necessary at some time in the future, personal protective equipment, excavation procedures, and engineering controls can be used to address health and safety concerns.
	The “combined Port alternative” does allow for some permanent impact, but not in areas where development around the Port’s rail infrastructure is planned and not in the near-surface soils where utilities are located and maintenance work is common.	3	Alternative S5B minimizes impacts to the Port in the area where utilities are located and where the Port has indicated redevelopment is likely to occur (adjacent to the rail infrastructure). See previous response.
Institutional Control Requirements	No changes were made (between the 2015 and 2016 FS documents) to address the Port's future redevelopment plans or the long-term impacts on the Port's business from the necessary deed restrictions due to leaving contamination in place.	1	As discussed in the previous two comments, International Paper believes that revised Alternative S5B presented in both the 2015 and 2016 FS documents, addressed the Port’s future redevelopment plans and the impacts on the Port’s operations. International Paper cannot predict what other future redevelopment activities may occur at the site, and it is unreasonable to expect International Paper to incorporate potential future development actions that may never occur into the remedial design.
	Soil with contaminant concentrations below Method C cleanup levels but above Method B cleanup levels would still be considered contaminated, requiring coverage by restrictive covenants, and replacing actual clean soil/base material with soil requiring coverage by a restrictive covenant would be considered unacceptable to the Port.	1	Ecology has indicated that the MFA will require institutional controls not only because of the presence of solidified soils, but because the cleanup will use MTCA Method C soil cleanup levels for protection of groundwater and establish a conditional point of compliance for groundwater. WAC 173-340- 440(4) outlines circumstances when institutional controls are required to continue protection of human health and the environment and the integrity of a remedial action. As discussed above, the Port provided input indicating their willingness to evaluate trading shallower working depths in some portions of the treatment areas (Zone 3) to gain deeper working depths in other portions of the treatment area (Zones 1 and 2). Therefore, solidified soil in Zone 3, where excavation activities are not anticipated, will be located at 1 foot bgs. In Zones 1 and 2, working depths of 8 feet and 3 feet, respectively, were included in the design. Based on these working depths, there should be limited impacts to the Port resulting from any deed restrictions associated with solidified soil in Zone 3. The horizontal footprint of the deed restrictions is identical in the Port Combined Alternative and Alternative S5B, because soil containing concentrations exceeding MTCA Method C values would remain at the site in the same area. Please also see the responses to the following general issues/concerns: contaminated material volumes and future maintenance and development costs.
	ISS is proposed within the entire footprint of MTCA Method C exceedances. This expands the footprint of the area of required deed restrictions, as Ecology has indicated that any ISS-treated soil requires coverage by deed restrictions.	1	
	IP's preferred Alternative S5B that mixes deeper highly contaminated soil with shallow soil that is expected to be less contaminated results in broad distribution of moderately contaminated solidified soil that requires coverage by deed restrictions. This essentially results in a larger volume of solidified soil after completion of the cleanup action relative to the original volume of soil exceeding cleanup levels, and because the requirement for deed restrictions follows the expanded volume of soil, the volume of soil constrained by deed restrictions would be larger than the volume requiring coverage prior to cleanup action. Off-site disposal of a moderate level of low concentration contaminated soil, prior to completing solidification, would reduce the volume of soil constrained by some deed restrictions. This action would preserve a buffer between the ground surface and the top of the deed restriction soil. This would allow shallow construction and maintenance work by Port personnel in this area without intercepting soil constrained by deed restrictions, reducing the restrictions and costs to the Port.	5	
Site Grades	The changes that were made to Alternative S5B, based on the Port's concerns, led to exacerbated conditions with …. an increased effect on topography of what is currently a flat storage area.	1	It is unclear how the changes to the site grades made to Alternative S5B will exacerbate conditions and interfere with Port operations. Furthermore, it is unclear why the Port is concerned about grade changes that extend beyond the contaminated footprint, as long as their equipment can still be operated at the site. Based on Port comments, the grades in Alternative S5B were modified from 3% to 2% grades (transverse direction) to accommodate Port equipment. On Page 7-25, the public review draft RI/FS report states that post-remediation site grades shall not exceed a 2% slope in the transverse direction or a 5% slope in the longitudinal direction (access road) along equipment transport routes and in equipment operational areas in order to allow the Port of Longview to transport and operate existing equipment. Please also see the responses to the contaminated material volumes general issue/concern.
	The treatment of this entire profile of soil creates a large volume of ISS-related expansion ... (that) results in the need to adjust grades within and beyond the solidification footprint due to the vertical expansion resulting in a broad sloped surface that is expected to interfere with Port operations.	1	
	IP's preferred Alternative S5B results in grade changes at the site that extend beyond the contaminated footprint. The vertical expansion of ISS-treated soil within the limits of contamination, and without consideration for disposal of lower concentration soil, results in the need to raise the surface elevation within the area of contamination by several feet. This requires adjusting the grade of the surrounding surface to match the grade within the ISS footprint, resulting in a broad, sloped surface, including impacts to the grade of the adjacent access road. Such grade changes will impact the Port's ability to operate in this area, including development of this parcel or the movement of heavy equipment across the site.	5	
Future Maintenance and Development Costs	Port costs associated with soil handling during future construction and maintenance projects is expected to increase relative to current conditions as a result of the larger volume created by the ISS process, and resulting higher elevation of contaminated soil relative to current conditions. Future projects in the vicinity of the MFA that involve earthwork, such as utility trenching and constructing material loading pits, would have higher construction costs due to the anticipated waste classification of the ISS-treated soil.	1	MTCA regulations pertain to the protection of human health and the environment and not the economics of potential future development projects. Despite this, International Paper has expended considerable effort in addressing future maintenance and development costs by revising Alternative S5B in a manner that minimizes the need for excavating solidified soil. Please see the response to excavation worker risks general issue/concern.

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	As a Washington public entity with a statutory mandate to provide economic development within its community, the Port needs this remediation to move forward, and it requires a remedy that will not prevent the Port's reasonable economic development opportunities as mandated by the legislature.	3	
	Increased Development Costs - The state of Washington has mandated through legislation that Ports, as a public entity, shall provide for economic development. The larger volume of contaminated media created by the ISS process proposed in IP's preferred Alternative S5B will incur higher construction costs due to the anticipated waste disposal classification of the ISS-treated soil. Further, it will complicate, and prolong development timelines, which adds an undue burden and additional cost to the Port, and thus the public, to fulfill their legislative mandate. These delays and costs are not exclusively for major redevelopment of underutilized Port property within the MFA area, but for normal minor construction activities such rail infrastructure improvements or near surface utility installation, as well as for general maintenance and repair of existing and future infrastructure. To further complicate these scenarios, it is anticipated that the Port will be required to include, and gain approval from, Ecology on any work that may impact the institutional controls that cover the ISS foot print.	5	
Contaminant Leaching	While the solidification process is considered an acceptable treatment method, which MTCA generally prefers relative to off-site disposal, the treatment is not a destructive process (the contaminants are still present and still pose risks to receptors following completion of treatment) and is not a process that has been demonstrated to completely achieve its primary goal (benefit) of preventing the leaching of contaminants to groundwater. Treatability testing indicated that solidification at the MFA site provides significant treatment toward the goal of reducing the leachability of contaminants from soil, but this reduction is not complete (less than 100%), and this process should be expected to result in low concentrations of contaminants in groundwater in contact with the solidified soil.	5	The goal of remediation is to protect human health and the environment from harmful exposure to chemicals released to the environment. This goal can be achieved using many different combinations of technologies including reuse or recycling; destruction or detoxification; immobilization or solidification; on-site or offsite disposal in an engineered, lined and monitored facility; on-site isolation or containment with attendant engineering controls; and institutional controls and monitoring. No treatment process is 100% effective in reducing the mobility, volume, or toxicity of a contaminant, regardless of whether the process destroys or immobilizes contamination. The treatment goal at this site is to reduce the leaching of contaminants to groundwater sufficiently to meet the MTCA Method B groundwater cleanup levels at the conditional point of compliance and the MTCA Standard Method C groundwater cleanup levels throughout the site. There is no expectation that a 100% reduction in leaching would occur. The protection of excavation workers from direct contact is achieved through the remedy design (providing sufficient working depths in areas where excavation is expected) and deed restrictions. Deed restrictions will be used to ensure that the proper personal protective equipment, excavation procedures, and engineering controls are used, if excavation into solidified soils becomes necessary at some time in the future.
Disproportionate Cost Analysis for Soil and Selection of Soil Remedy	The Port disagrees with the method used for the DCA which equated the quantity addressed through either solidification or off-site treatment/disposal to cost to determine the greatest benefit per unit cost. The Port believes that on-site solidification should not have the same benefit as off-site treatment/disposal because of the increased volume of contaminated media, the need for restrictive covenants on an increased volume of media, increased future construction and maintenance costs for the Port, and increased risks to construction and maintenance workers.	1	International Paper utilized standard methods to perform the DCA consistent with MTCA Section 173-340-360 and methods used in feasibility studies for other sites (e.g., BNSF Skykomish, Ecology site manager David South) that have been approved by Ecology. International Paper performed both a quantitative and qualitative protectiveness evaluation (Section 9.1.1 of the FS) and a qualitative evaluation of permanence, cost, effectiveness over the long term, management of short-term risks, technical and administrative implementability, and consideration of public concerns (Sections 9.1.2 and 9.1.7 of the FS) consistent with the requirements outlined in MTCA Section 173-340-360(3)(e)(ii) and (3)(f). As part of the DCA, International Paper does not just consider potential impacts and risks to the Port and Port personnel, but also considers potential impacts and risks to the environment and other parties affected by the implementation of any given alternative. Protectiveness is defined as follows: "Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and offsite risks resulting from implementing the alternative, and improvement of the overall environmental quality." Therefore, International Paper must consider both on-site and off-site impacts and risks. The benefits of solidification include: • The mobility of contaminants is permanently reduced in the solidified soil (leachability is reduced) • Short-term risks to remediation workers are lower for solidification than for excavation because less potential for exposure to contamination • No off-site short-term risks to the public and environment because off-site transportation and disposal of soil is not required The disadvantages of excavation include: • Off-site disposal relies on the engineering controls at the landfill to contain contaminants, and if the engineering controls fail, then contamination can be released to the environment (leachability only reduced for soils that are treated prior to disposal in an off-site landfill, which is not applicable to the Port Combined Alternative, because only soil with free product would require treatment prior to disposal and all soil
	Selection of Soil Cleanup Action Alternative Used Faulty Disproportionate Cost Analysis - Assigning equal weight for a soil technology (in-situ solidification) that results in contaminated soil requiring institutional controls remaining on site with a technology (excavation and off-site disposal) that results in contaminated soil being disposed of in permitted disposal facilities and replaced by clean backfill is inappropriate. Using this DCA method for two different technologies prohibits the consideration of the significant impacts associated with the solidification technology, relative to excavation and off-site disposal. The quantitation method used in the MFA FS DCA does not allow consideration of the increased volume of contaminated media and the increased potential for exposure to the contaminated media as a result of the expansion of the treated soil. This method significantly discounts the permanence criterion described in the MTCA guidance for performing a DCA, which evaluates the degree to which the alternative reduces the toxicity, mobility, and volume of hazardous substances.	5	

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			containing free product will remain on site) • Contaminated soil is moved from one location to another location, where deed restrictions are required to protect human health and the environment • Short-term risks to remediation workers are higher for excavation than solidification because of higher potential for exposure to contamination • Short-term risks to the public and the environment because of off-site transportation and disposal of contaminated soil The quantitative evaluation in Section 9.1.1.1 of the FS is specifically for the protectiveness criterion. The permanence criterion is evaluated qualitatively in Section 9.1.2. Note that the permanence criterion evaluates the degree to which the alternative reduces the toxicity, mobility, or volume of hazardous substances. Please see specific responses to comments regarding the permanence criterion below. See also previous response for a discussion of the reduction of leachability.
	The In-Situ Soil Solidification (ISS) process significantly increases the volume of contaminated media that will remain at the site, requires raising the elevation of site surfaces within and beyond the limits of contamination to a degree that is expected to interfere with Port operations, and makes negotiating institutional controls more complicated and difficult. These factors are not considered in the Disproportionate Cost Analysis (DCA) used in the FS to select a preferred alternative.	5	Port concerns with the ISS process were evaluated in Section 9.1.7 of the FS, and were therefore considered in qualitative portion of the DCA. The comment that ISS makes negotiating institutional controls more complicated and difficult was not provided until after the public review draft RI/FS report was published, and was therefore not addressed in the FS. Please also see the responses to the following general issues/concerns: contaminated material volumes and site grades.
	IP's FS and DCA do not meet MTCA requirements. The DCA and FS do not account for factors required by rule and fail to appropriately account for permanence in the DCA. Based on the current FS, Ecology cannot make the required "preliminary determination by [Ecology] that the proposed cleanup action will comply with WAC 173-340-360."	3	Permanence is defined in MTCA Section 173-340-360 (3)(f)(ii) as follows: "The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated." Permanence was evaluated in Section 9.1.2 of the FS in accordance with this definition of the criterion. The FS establishes the baseline alternative as Alternative S1 (see Section 7.4.1, 1st paragraph and Section 9.1.1.1, 1st full paragraph on Page 9-5). See the previous two responses to comments. International Paper has clearly indicated that volumetric expansion will occur as part of the treatment process (see Page 7-24 and 9-7 of the FS), and that while the volume (or mass) of contaminants is unchanged, the volume of treated soil will increase because of the addition of solidifying agents. (Note that the volume of treated soil in the Port Combined Alternative, which combines solidification and excavation, will also result in an increase in the volume of the soil treated by solidification, although to a lesser degree.) International Paper disagrees that the primary concern in a FS should be the volume of media (soil and groundwater) containing contaminants at concentrations above risk-based levels. In accordance with WAC 173-340-360(3)(f)(iv) Ecology generally ranks solidification's long-term effectiveness higher than off-site disposal. Off-site disposal is not a treatment technology, and does not result in any changes to soil characteristics. There is no reduction in toxicity or volume of hazardous substances. Mobility is only reduced due to the engineering controls at the landfill, and if the engineering controls fail, then contamination can be released to the environment. Therefore, the reduction in mobility is not as permanent as the reduction in mobility achieved through the solidification process, where the soil characteristics are modified. Therefore, it is not clear how the Port's Alternative, which combines solidification with excavation and off-site disposal greatly increases the permanence of the remedy compared to Alternative S5B, where all soil is solidified. The goal of remediation is to protect human health and the environment from harmful exposure to chemicals released to the environment. The solidification alternatives achieve this protection by reducing the mobility of contamination through solidification, and preventing direct contact exposure through the remedy design (depth to solidified soils) and deed restrictions/institutional controls. Deed restrictions are an effective, widely-used method to protect workers from direct contact exposure. Furthermore, the remedy (Alternative S5B) has been designed based on input from the Port to minimize the potential need for excavation of solidified soil in the future. Please also see the responses to the following general issues/concerns: Public concerns and excavation worker risks, and future maintenance and development costs.
	In selecting a remedial alternative, Ecology "…shall use permanent solutions to the maximum extent practicable." WAC 173-340-360(2)(b)(i). See also RCW 70.105D.030(1)(b). A DCA must analyze the permanence of alternative solutions by establishing a baseline solution that maximizes permanence and determining a preferred alternative based on the costs and benefits of alternatives compared to that baseline solution. But, The DCA performed by IP does not establish the required 'baseline,' and then magnifies this failure by minimizing the weight given to permanence in the cost-benefit analysis. This is contrary to the requirements and intent of WAC 173-340-360(3).	3	
	In multiple instances in Section 9, the 2016 version of the FS was edited to emphasize that the "volume of contaminants is unchanged by the solidification process". This statement de-emphasizes the primary issue for the Port, which is that the mass, volume, and vertical extent of contaminated media increases as a result of the solidification process. The volume of media (soil and groundwater) containing contaminants at concentrations above risk-based levels should be the primary concern in the RI/FS, particularly if the technology doesn't affect the mass of contaminants and the resulting media is considered contaminated media that requires coverage under restrictive covenants or requires disposal as contaminated or hazardous material.	1	
	The change of volume of contaminated media should be evaluated (in the DCA for reduction of toxicity, mobility, or volume).	1	
	The Port has suggested an alternative (the "combined Port alternative") that greatly increases the permanence of the remedy, provides a mechanism to create less contaminated-but-solidified materials, and takes into account the concerns of the public, while not significantly increasing costs. The "combined Port alternative" does allow for some permanent impact, but not in areas where development around the Port's rail infrastructure is planned and not in the near-surface soils where utilities are located and maintenance work is common.	3	
	The MFA Feasibility Study, July 2016, submitted by International Paper (IP) proposes a preferred alternative that lacks permanence due to the increased volume of contaminated media to be left behind for the Port to manage during future development and includes a disproportionate cost analysis (DCA) that does not address these anticipated future costs nor important public concerns.	5	

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	Section 9.1.2 of the 2016 FS describing the Permanence criterion states that "the volume of the treated soil will increase" when referring to the solidification alternative but the statement "There is no change to the volume of contaminants and impacted soil with this technology" is used when referring to off-site disposal. Different terminology is being used for essentially the same issue to prevent a direct comparison of the effect of each alternative.	1	These statements are correct. In order to evaluate the permanence of an alternative, the total volume/mass of hazardous materials and impacted material must be evaluated, not the volume/mass that remains at the site. During off-site disposal, the overall volume of contaminants and the volume of impacted soil do not change when the soil is moved from the site to an engineered, lined, and monitored facility. The on-site volume changes, but not the overall volume.
	The "Effectiveness over the Long Term" section is deficient because it ignores the Port's future development of the site. It simply uses the WAC designations to rank solidification over off-site disposal. It is clearly stated in the WAC that that list should only serve as a guide. Solidification is only effective long term if the material remains undisturbed. That is not the expectation here, so some adjustment to the list should be accounted for given the Port's stated plans regarding redevelopment of the site.	1	Future development plans are not ignored in the FS, although a more detailed discussion is provided in Section 9.1.6, not in Section 9.1.4. Section 9.1.6 states the following: "Solidified soil generated during hypothetical future excavations would require characterization and disposal at a facility approved to receive CAMU-eligible waste, because the solidified soil would contain a listed waste. Procedures for characterizing and disposing of any solidified soil excavated in the future would be written in to the institutional controls plan for the site. Similarly, worker notifications and health and safety precautions for performing excavation in the solidified soil would be provided in the institutional controls plan for the site." International Paper disagrees that an adjustment needs to be made to Ecology's list of the relative degree of long-term effectiveness. Solidification is effective long-term, regardless of whether it is or is not disturbed in the future. The solidification process permanently reduces the mobility of contamination. It is not a reversible process. Landfills can and do fail. Therefore, it is appropriate to rank disposal in an engineered, lined and monitored facility lower than solidification. Furthermore, whether unsolidified soil is excavated during remediation or solidified soil is excavated during potential future redevelopment, risks to workers would be similar and controlled through personal protective equipment, excavation procedures, and engineering controls. In fact, short-term risks for excavating immediately should be weighed against the much lower probability of excavation of solidified soil in the future.
Disproportionate Cost Analysis for Groundwater and Selection of Groundwater Remedy	The Port's comments continue to express concerns with IP's preferred alternative for groundwater that rejects the active groundwater treatment component that scored highest in the DCA. While the Port acknowledges that natural attenuation may be effective in reducing contaminant concentrations in groundwater to acceptable levels once source material is remediated, the appropriate action is to approve the active treatment component identified in the DCA and defer implementation.	5	Groundwater contamination is closely linked to contaminated soil, which acts as a source of the groundwater contamination. Because soil acts as a source, remediation of groundwater must be performed in conjunction with remediation of soil. Furthermore, when considering a mass balance for a site as a whole, the mass of chemicals dissolved in groundwater is usually very very low compared to that contained in the soil, because of the low solubility of the chemicals. Therefore, addressing soil contamination is often a more effective means of achieving site cleanup, including the remediation of groundwater. Although more aggressive groundwater cleanup actions are not disproportionately costly compared to Alternative GW4, they are not warranted given that COC concentrations in groundwater are currently near or below the anticipated cleanup levels beneath much of the MFA, the expected improvements in groundwater quality following soil solidification, and the low potential for migration of existing COCs in groundwater. Furthermore, a contingent remedy is by definition a remedy that is kept in reserve, to be implemented only if a less aggressive remedy is not successful. Therefore, MNA (Alternative GW4) would not be a contingent remedy. The Cleanup Action Plan will clearly set the criteria to be used for determining if and when implementation of the contingent remedy (Alternative GW2) is warranted. This strategy would provide assurance that groundwater at the Port property would be adequately treated, if conditions are unchanged after the soil remedy is implemented or chemical concentrations do not appear to be able to reach cleanup levels within a reasonable time frame.
	The most recent version (July 2016) of the MFA FS restructured the selection of the groundwater alternative to a small degree by including the treatment element of Alternative GW2 as a contingent element due to the uncertainties of the restoration timeframe of Alternative GW4. While this change provides some consideration for concerns that the Port has with choosing an alternative that relies solely on natural attenuation to achieve cleanup goals, the Port remains concerned about how and when that contingent element of the GW cleanup would be implemented. The Port feels that the groundwater alternative, Alternative GW2, involving active treatment, which was demonstrated to be the most practicable and effective alternative in the MFA FS should be selected as the preferred groundwater alternative and carried to the Cleanup Action Plan. The Port is willing to accept that the monitored natural attenuation groundwater alternative GW4 be carried as a contingency if conditions after completion of the soil cleanup action confirm that groundwater will meet cleanup goals through natural attenuation. An implementation plan can be developed in the Cleanup Action Plan that delays implementation of the active treatment alternative based on compliance monitoring conducted over a designated period following completion of the soil cleanup action. If post-construction compliance monitoring indicates that groundwater conditions are appropriate for the use of natural attenuation as the primary treatment method under MTCA, as described in WAC 173-340-370(7), the active treatment element of Alternative GW2 could be postponed or eliminated. A procedure for the postponement or elimination of the active treatment component of the chosen groundwater alternative could be developed in the Cleanup Action Plan and promulgated in the Consent Decree. This would provide an off-ramp for active treatment if it is determined to not be necessary following completion of the soil cleanup action. Selection of Alternative GW4, with this contingent implementation strategy, however, would provide greater assurance that groundwater at the Port property would be adequately treated if conditions are unchanged or do not appear to be able to reach cleanup levels within a reasonable time frame.	5	
	Review of the most recent annual monitoring report for the combined TWP/MFA areas provides an indication of likely trends for groundwater following completion of the MFA soil cleanup action. In recent years, concentrations of petroleum hydrocarbons, PAHs, and pentachlorophenol in Aquifer A groundwater have been increasing in wells within the footprint of the TWP cleanup action. Samples of Aquifer A groundwater collected from within the footprint of the TWP containment wall (well AV-02)	5	Post-remediation groundwater concentration trends in the MFA area are expected to be significantly different than pre-remediation groundwater trends, because leaching of contaminants will be significantly reduced through implementation of *in situ* solidification. Therefore, the most recent monitoring data is not expected to be an indication of concentration trends after the remedy has been implemented. Furthermore, the concentration trends within the TWP, including those at AV-02, are not relevant to the MFA area. The slurry wall was installed to

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International Paper Company's Responses to the Port of Longview's Issues and Concerns Regarding the Maintenance Facility Area (MFA) Feasibility Study (FS) and International Paper Company's Preferred Alternative

General Issue/Concern	Specific Comment/Statement	Email Reference	International Paper Company Response
	showed an increase of concentrations relative to previous annual sampling results and exceedances of MTCA Method B cleanup levels for diesel range hydrocarbons, naphthalene, and pentachlorophenol. This suggests that concentrations in Aquifer A are unstable and natural attenuation may not be adequate to permanently reduce concentrations to below cleanup levels.		contain the groundwater contamination within the TWP, and concentrations within the TWP are not currently expected to decrease. The general statement that Aquifer A groundwater in the vicinity of the MFA has shown unstable and increasing concentrations of contaminants of concern in recent years is not accurate. It is true that COC (diesel-range organics, oil-range organics, and TTEC) exceedances have been observed in samples collected from well AV-13 in recent years. However, similar concentrations have also been observed at AV-13 in prior years (2002 to 2007). In addition, AV-12, which is upgradient of AV-13, and AV-10 and 97-6.B, also located upgradient and within the area where DNAPL has been detected, also have not shown increasing trends of these chemicals. The remedy does not rely solely on natural attenuation to achieve groundwater cleanup goals, as this comment suggests. The primary goal of *in situ* solidification is to reduce the leaching of contaminants from contaminated soil to groundwater. As discussed in the previous response to comments, groundwater contamination is closely linked to contaminated soil, which acts as a source of the groundwater contamination. Because soil acts as a source, remediation of groundwater must be performed in conjunction with remediation of soil. Furthermore, when considering a mass balance for a site as a whole, the mass of chemicals dissolved in groundwater is usually very low compared to that contained in the soil, because of the low solubility of the chemicals. Therefore, addressing soil contamination is often a more effective means of achieving site cleanup, including the remediation of groundwater.
	Aquifer A groundwater in the vicinity of the MFA has shown unstable and increasing concentrations of contaminants of concern in recent years. During the September 2016 annual sampling event, the results for well AV-13, located downgradient from the MFA and screened within Aquifer A, indicate increased concentrations of MFA contaminants of concern over prior samples. The results of the September 2016 analyses for diesel and oil-range petroleum hydrocarbons were higher than previously observed at this well, dating back to 2002. In addition, the concentrations of carcinogenic PAHs were significantly higher during September 2016 relative to previous detected concentrations, resulting in several exceedances of cleanup levels, including exceedance of the cleanup level for the TTEC (total toxicity equivalent concentration) for cPAHs. These results indicate that conditions in Aquifer A are at a minimum unstable, if not potentially trending higher, and conflict with the analysis contained in the MFA FS, which concludes that current groundwater conditions at the site are stable and near or below cleanup levels and conducive to relying solely on natural attenuation to achieve cleanup goals.	5	
Public Concerns	The evaluation of "Consideration of Public Concern" continues to be deficient because the Port's long-term impact arguments are not mentioned (aside from the slope issue). The Port is a public agency that is authorized to represent the public in the economic development of its facilities for the benefit of the public. Therefore, all of the Port's concerns should be addressed in this section of the FS.	1	Consideration of public concerns is discussed in Section 9.1.7 of the FS based on the comments received from the Port. This section clearly describes the Port's preferences with regard to the alternatives included in the FS. Port concerns evaluated in Section 9.1.7 include impacts on the topography due to the increased volume of contaminated media and the potential removal of the clean gravel layer beneath the asphalt parking area. This criterion will be reevaluated after the public comment period.
	Regarding addressing Port concerns, the only substantive changes between the 2015 and 2016 document involved addressing the anticipated slope issues and crane movement.	1	
	In addition, IP discards the public concern factor required in the DCA by acting as though a public outreach plan and opportunity for comment is all that is required. But, the MTCA regulations require that public concern be a factor analyzed as part of the cost benefit analysis.	3	
	Here, the responsible party has refused to engage with the Port and wants to ignore the Port's concerns about the long-term impact on the Port's operations caused by IP's preferred alternative.	3	International Paper has made a considerable effort to incorporate the Port's concerns into Alternative S5B. International Paper met with the Port of Longview multiple times since 2013 to obtain input from the Port and revise Alternative S5B in a manner that minimizes impacts on Port operations. Please also see the responses to the following general issues/concerns: excavation worker risks, site grades, and future maintenance and development costs

Email References:

1 - September 27, 2016 email from Lisa Hendriksen to Ava Edmonson and Kaia Petersen, transmitting the Port of Longview's preferred alternative for the MFA site
2 - January 31, 2017 email from Lorna Gadwa to Lisa Hendriksen, transmitting the Department of Ecology's comments on the Port of Longview's September 27, 2016 submittal
3 - February 28, 2017 email from Kay Syravong to Sally Toteff and John Level, transmitting letter from Brien Flanagan regarding Ecology's January 31 comments
4 - March 7, 2017 email from John Level to Brien Flanagan in response to Brien's February 28 letter to Sally Toteff and John Level
5 - April 14, 2017 email from Lisa Hendriksen to Kaia Petersen, transmitting the Port of Longview's proposed alternative for remediation of the MFA site and response to comments in Ecology's January 31 letter
6 - May 2, 2017 email from Lorna Gadwa to Lisa Hendriksen, transmitting Department of Ecology's comments on cost estimates for shoring in the Port of Longview's proposed alternative for the MFA site
7 - May 25, 2017 memo and figures from Charles Hoffman to Kaia Petersen with cost estimates for shoring
8 - May 30, 2017 email from Ava Edmonson to Kaia Petersen, forwarding May 26 email from Lisa Hendriksen to Ava Edmonson with draft comment matrix with responses to Ecology's comment letter dated May 5

Table 3
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
GeoEngineers' March 10, 2016 Memorandum (Attached to September 27, 2016 Email from Lisa Hendriksen to Ava Edmonson and Kaia Petersen)		
1	This revised alternative combines the *In Situ* Soil Solidification (ISS) treatment process with a moderate level of off-site disposal of lower-concentration soil to the degree needed to balance the expansion of ISS-treated soil and allow areas of the Site to remain as close as possible to current elevations.	Approximately 50% of the soil is targeted for off-site disposal in the Port of Longview (Port) Combined Port Alternative, which is a significant volume. This increases the off-site impacts and the cost of the Combined Port Alternative compared to Alternative S5B.
2	Eliminate exposure by Port workers to solidified soil during projects requiring shallow earthwork (i.e., trenching, post-hole digging, etc.).	Although Alternative S5B does not eliminate exposure during shallow earthwork, it does provide 3 feet of clean fill above the solidified soil in areas where excavation is most likely to occur (Zone 2 – Utility Corridor and North Tie Road) according to input received from the Port during a meeting on March 27, 2015.
3	Reduce the footprint (vertical and lateral) of necessary deed restrictions that will affect future Port use of the Site.	The horizontal footprint of the deed restrictions is identical in the Combined Port Alternative and Alternative S5B, because soil containing concentrations exceeding Model Toxics Control Act (MTCA) Method C values would remain at the site in the same area.
4	It prevents a net increase in the volume of contaminated soil	Because approximately 50% of the targeted soil would be solidified, the Combined Port Alternative would still have a net increase in the volume of contaminated soil, although less than Alternative S5B, where 100% of the targeted soil would be solidified. In the Combined Port Alternative, the volume of solidified soil remaining at the site would be significantly less than Alternative S5B, because approximately 50% of the targeted soil would be disposed of off site.
5	It results in clean fill across the site to a depth of 5-6 feet, allowing most utilities to be trenched without potential exposure to contaminated soil and allowing this shallow soil to be excluded from deed restrictions.	Given that the Port has indicated there would be no significant changes to the site elevations with the Combined Port Alternative, it is unclear how clean fill of depths of 5 to 6 feet can be achieved at the site. The Combined Port Alternative assumes a 40% expansion during the ISS process. Therefore, the 4 feet of soil to be solidified would expand to 5.6 feet after ISS. Therefore, the solidified soil would be present from 3.4 feet to 9 feet below ground surface (bgs). In order to maintain site grades, the depth of clean fill would only be 3.4 feet above the solidified soil, not 5 or 6 feet.
6	The attached table presents a comparison of the proposed revised alternative to the current Alternatives S1 and S5B in the IP feasibility study (FS). This table also includes an evaluation of potential future costs associated with hypothetical Port projects and the respective disposal costs for the three alternatives. This analysis indicates that under Alternative S5B that relies solely on ISS, the potential future cost of disposing of solidified soil excavated to construct a potential dump pit project is approximately double the cost of incorporating a moderate level of excavation during cleanup, as included in the proposed alternative described in this memorandum ($1,250,000 versus $620,000).	Alternative S5B includes excavating/relocating soil down to the top of the Upper Silt within 80 feet of the rail spur (Zone 1) to accommodate the potential future dump pit, and backfilling with soil that meets the MTCA Method C cleanup levels at a minimum. Therefore, the costs for construction of the potential future dump pit would be identical for the Combined Port Alternative and Alternative S5B.

Table 3 (continued)
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#	Statement	International Paper Company Comments
Brien J. Flanagan's February 28, 2017 Letter (Attached to February 28, 2017 Email from Kay Syravong to Sally Toteff and John Level)		
7	The Port's idea is simple—solidification of only contaminated soil, containing contaminated-but-solidified soils to specified areas, sampling and reuse of "clean" overburden, and disposal of additional contaminated-but-solidified soils as corrective action management unit (CAMU) waste.	Alternative S5B only solidifies contaminated soil, and solidified soils would be present over the same horizontal footprint as the Combined Port Alternative, because soil from the vicinity of the MFA railroad tracks is excavated and consolidated with other soil at the site. Alternative S5B also reuses the clean overburden (asphalt base course), and includes sampling and analysis of shallow soil beneath the base course in the northwest part of the site during the pilot test to identify soils that contain concentrations of chemicals less than the cleanup levels and that could also be reused at the site.
Lisa Hendrickson's April 14, 2017 Letter (Attached to April 14, 2017 Email from Lisa Hendriksen to Kaia Petersen)		
8	The Port Alternative increases the permanence of the cleanup, allows for the continued and future use, maintenance and redevelopment of the site, and reduces potential future exposure by excavation workers. Additionally, the Port Alternative has the benefit of reducing public concerns and simplifying the ability to obtain approval of institutional controls from the landowner.	Permanence is defined in MTCA Section 173-340-360 (3)(f)(ii) as follows: "The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated." Off-site disposal is used for approximately 50% of the targeted soil in the Combined Port Alternative. Off-site disposal is not a treatment technology, and does not result in any changes to the soil characteristics. There is no reduction in toxicity or volume of hazardous substances. Mobility is only reduced because of the engineering controls at the landfill, and if the engineering controls fail, then contamination can be released to the environment. Therefore, the reduction in mobility is not as permanent as the reduction in mobility achieved through the ISS process, where the soil characteristics are modified. Therefore, it is not clear how the Port's Combined Alternative, which combines ISS with excavation and off-site disposal greatly increases the permanence of the remedy compared to Alternative S5B, where all soil is solidified. International Paper has made significant changes to Alternative S5B based on comments received from the Port to minimize impacts on future use, maintenance, and redevelopment (see International Paper Comments on Statement Nos. 2 and 6), and no significant differences between Alternative S5B and the Combined Port Alternative have been identified regarding institutional controls.
9	The Port Alternative substantially improves on IP's proposed S5B alternative because it is more permanent and allows for future use and redevelopment of the Port's property with reduced likelihood of worker exposure and less impact to the proposed remedial action during future development.	See International Paper Comments on Statement Nos. 2, 6, and 8.

Table 3 (continued)
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10	The Port Alternative, as proposed, would increase, not limit, the Port's flexibility for economic development within the Maintenance Facility Area (MFA) cleanup area, reduce the Port's future development costs by reducing the volume of contaminated media left in place as indicated by the ISS method, provide for a higher degree of protectiveness, meet the requirements of MTCA, and accommodate the concerns posed of Washington State Department of Ecology (Ecology) regarding off-site disposal of dense non-aqueous-phase liquid (DNAPL). The Port Alternative is similar to the original Alternative S5B presented by IP in the 2011 MFA FS, which relied primarily on ISS, but also incorporated a moderate level of off-site disposal to account for the expansion associated with the solidification.	MTCA regulations pertain to the protection of human health and the environment and not the economics of potential future development projects. Despite this, International Paper has expended considerable effort in addressing future maintenance and development costs by revising Alternative S5B in a manner that minimizes the need for excavating solidified soil. Protectiveness is defined as follows: "Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality." Because the evaluation of protectiveness must consider the overall environmental quality including off-site risks and impacts, it is unclear how the Port's Alternative provides a higher degree of protectiveness. See International Paper Comments on Statement Nos. 2 and 6.
11	The Port Alternative combines the ISS treatment process with a moderate level of off-site disposal of lower concentration or "clean" soil to the degree needed to balance the expansion of ISS-treated soil, allow areas of the MFA site to remain as close as possible to current elevations, and preserve a buffer of clean material under the asphalt paving that will reduce the restrictive measures during future construction activities.	See International Paper Comments on Statement Nos. 1, 2, and 6. The soil to be disposed of off site is not "clean". It would contain concentrations of chemicals above MTCA Method C cleanup levels, and would have to be disposed of as CAMU-eligible waste at a Subtitle C landfill. International Paper has agreed to ensure that Alternative S5B post-remediation site grades would not impact Port operations, based on comments received on the FS. The grades in Alternative S5B will not exceed 2% (transverse direction) or 5% (longitudinal direction) along equipment transport routes and in equipment operational areas in order to allow the Port of Longview to transport and operate existing equipment, as identified on page 7-25 in the public review draft RI/FS report.
12	Eliminate future exposure by Port personnel or construction workers to solidified soil during projects requiring shallow earthwork (i.e., trenching, post-hole digging, etc.).	See International Paper Comments on Statement No. 2.
13	Reduce the footprint (vertical and lateral) of necessary institutional controls that will affect future Port use of the Site by preserving a buffer of clean material under the ground surface and reducing the footprint of contaminated soil on the Site.	See International Paper Comments on Statement Nos. 2 and 3.
14	Reduce cleanup costs by utilizing ISS only for soil with highest contaminant levels and highest disposal costs.	Based on the updated costs for both Alternative S5B (Exhibit A) and the Combined Port Alternative (Exhibit B), the Combined Port Alternative would cost $1.5 million more than Alternative S5B.

Table 3 (continued)
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15	Reduce Port costs associated with soil handling during future construction projects and reduced potential for final conditions that may prohibit or significantly hinder the future redevelopment of Port property.	See International Paper Comments on Statement Nos. 2, 6, and 10.
16	The area of soil exceedances outside the footprint of Alternative S4, which would be excavated and disposed of off-site, is a small area to the northwest of the footprint of excavation under Alternative S4.	This area is 8,900 square feet, which is approximately 25% of the total area targeted for remediation.
17	Within the footprint of the solidification, soil below the asphalt paving structural base material would be excavated down to the expected upper surface of the soil to be solidified. On average, this is approximately 4 feet, considering an average 10-foot total depth to the top of the upper silt, but would be less in some areas.	Based on International Paper's understanding of the Combined Port Alternative, soil from 3 to 5 feet bgs within the footprint of the ISS would be excavated. Therefore, a 2 foot depth interval would be excavated. Furthermore, the average depth to the Upper Silt is 8 feet, not 10 feet, and ISS is planned from 5 to 9 feet bgs in the Combined Port Alternative.
18	It is assumed that some (15 percent) shallow soil within the cleanup area would be considered clean, containing contaminants of concern below MTCA Method B levels, particularly in downgradient areas of the MFA site. Pre-design characterization of lateral and vertical limits of contaminants to supplement the data collected in the RI would allow more accurate evaluation of potential disposal options and associated costs.	The site field screening and analytical data indicate that shallow contamination may be quite extensive, even in the northwestern, downgradient portion of the site. Therefore, for purposes of cost estimation, all of this soil was assumed to be contaminated for Alternative S5B, and the revised cost estimate International Paper prepared for the Combined Port Alternative also assumes all of the soil would be disposed of as CAMU-eligible waste in a Subtitle C landfill. Alternative S5B includes sampling and analysis of shallow soil beneath the base course in the northwestern part of the site during the pilot test to identify soils that contain concentrations of chemicals less than the cleanup levels and that could be reused at the site.
19	Protectiveness - The Port Alternative is expected to have a higher level of protectiveness than the preferred Alternative S5B in the MFA FS as the existing, and future, risks to the primary receptors at the MFA site, Port personnel and construction workers would be reduced. The reduced risk would be the result of the inclusion of off-site disposal of a moderate quantity of soil for the purpose of reducing the final volume of solidified soil and preserving a substantial clean buffer between the ground surface and the solidified soil. Excavation under the Port Alternative would be limited to soil with lower concentrations of contaminants, alleviating the risks associated with excavation, transport, and off-site disposal of nonaqueous-phase liquid (NAPL)-impacted soil.	This evaluation does not consider off-site impacts and risks and equates protectiveness to the on-site protectiveness. A complete evaluation of protectiveness must consider the overall protectiveness of the remedy including off-site impacts and risks. When evaluating the protectiveness of ISS and excavation, all of the benefits/advantages and the disadvantages of these remedies must be considered. The benefits of ISS include: · The mobility of contaminants is permanently reduced in the solidified soil (leachability is reduced) · Short-term risks to remediation workers are lower for ISS than for excavation because less potential for exposure to contamination · No off-site short-term risks to the public and environment because off-site transportation and disposal of soil is not required

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
		The disadvantages of excavation include: · Off-site disposal relies on the engineering controls at the landfill to contain contaminants, and if the engineering controls fail, then contamination can be released to the environment (leachability only reduced for soils that are treated prior to disposal in an off-site landfill, which is not applicable to the Combined Port Alternative, because only soil with free product would require treatment prior to disposal and all soil containing free product will remain on site) · Contaminated soil is moved from one location to another location, where deed restrictions are required to protect human health and the environment · Short-term risks to remediation workers are higher for excavation than ISS because of higher potential for exposure to contamination · Short-term risks to the public and the environment because of off-site transportation and disposal of contaminated soil Based on this evaluation, the Combined Port Alternative is not expected to have a higher level of protectiveness than Alternative S5B. See International Paper Comments on Statement Nos. 1, 2, 4, 6, and 10.
20	Permanence - Permanence is described in Washington Administrative Code (WAC) 173-340-360(3)(f)(ii) as the degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances. The Port Alternative achieves a higher level of permanence relative to the selected Alternative S5B as a result of the focused use of ISS on the most highly contaminated soil and using off-site disposal at a permitted landfill for lower level contaminated soil. Reducing the level of ISS mitigates the significant level of additional hazardous material generated in IP's preferred Alternative S5B by solidifying all soil in the cleanup area. This essentially results in a reduced net volume of hazardous material. In addition, the Port Alternative eliminates the mixing of shallow, low concentration soil with deeper, highly contaminated soil. The proposed ISS process in the IP's preferred Alternative S5B would be expected to result in higher contaminant concentrations in shallow soil relative to current conditions, which essentially increases the toxicity of the shallow soil. The MFA site is a heavy use area and is slated for redevelopment. By removing the shallow, lower concentration and lower toxicity soil prior to implementing ISS on the deeper soil, disposing of the shallow soil at a permitted off-site landfill in its low toxicity state, and using clean backfill within several feet of the ground surface reduces the overall toxicity of the remaining soils at the MFA site. Most importantly, however, it significantly reduces the toxicity of the shallow soil that Port personnel will most likely be exposed to during future maintenance or	See International Paper Comments on Statement Nos. 2, 4, 6, and 8. Concentrations of contaminants in solidified soil will exceed MTCA Method C cleanup levels. Therefore, solidified soil must be handled similarly (same personal protective equipment, excavation procedures, and engineering controls) regardless of concentration. This discussion is confusing the evaluation of permanence with the evaluation of protectiveness, which evaluates risks (both on-site and off-site risks) to human health and the environment. The evaluation of permanence includes the adequacy of the alternative in destroying the hazardous substances (which does not apply to either the Combined Port Alternative or Alternative S5B), the reduction or elimination of hazardous substance releases and sources of releases (which is related to mobility, which both alternatives address), the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated. Whether the soil is solidified on site or is transported and disposed of at a landfill, the toxicity of that soil remains the same, because chemicals of concern have not been destroyed. However, as discussed in the International Paper Comment on Statement No. 8, ISS permanently reduces the mobility of contaminants by changing the characteristics of the contaminated soil. With off-site disposal, mobility is only reduced because of the engineering controls at the landfill, and if the engineering controls fail, then contamination can be released to the

Table 3 (continued)
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	redevelopment activities.	environment. Therefore, landfill disposal is considered more reversible than ISS.
21	Long-Term Effectiveness - The Port Alternative will provide a more effective long-term certainty that the primary receptors, Port personnel and construction workers, will be protected from exposure to contaminated media remaining on site after the cleanup action. On its face, WAC 173-340-360(3)(f)(iv) lists ISS above off-site disposal in the description of long-term effectiveness. However, this narrow reading of the WAC does not consider that in this application ISS does not completely reduce on-site risks. IP's preferred Alternative S5B relies heavily on institutional controls, including land use restrictions designed to prevent exposure to shallow solidified soil that remains a direct-contact risk to Port personnel and construction workers. The Port Alternative alleviates this by combining ISS with the off-site disposal to allow a buffer between the ground surface and the deeper contaminated, solidified soil.	This evaluation does not consider the effectiveness of the off-site portion of the remedy, the risks associated with disposal of the contaminated soil in a landfill, and the need for long-term monitoring of the landfill. International Paper disagrees that an adjustment needs to be made to Ecology's list of the relative degree of long-term effectiveness. ISS is effective long-term, regardless of whether it is or is not disturbed in the future. The ISS process permanently reduces the mobility of contamination. It is not a reversible process. The engineering controls at landfills can fail, which can result in releases to the environment. Therefore, it is appropriate to rank disposal in an engineered, lined and monitored facility lower than ISS. Furthermore, whether unsolidified soil is excavated during remediation or solidified soil is excavated during potential future redevelopment, risks to workers would be similar and controlled through personal protective equipment, excavation procedures, and engineering controls.

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
22	Management of Short -Term Risks - The Port Alternative is expected to have similar short-term risks as IP's preferred Alternative S5B, and manages those risks similarly. The excavation of soil under the Port Alternative is mostly limited to shallow soil overlying NAPL-impacted deeper soil, except in downgradient portions of the site beyond the extent of NAPL impacts, where excavation would extend deeper. The limited scope of excavation in the Port Alternative addresses issues raised by Ecology about potential short-term impacts associated with attempting to excavate NAPL-impacted soil immediately above the upper silt unit.	This evaluation does not consider off-site impacts and risks and therefore ranks the Combined Port Alternative the same as Alternative S5B. ISS is ranked higher in the FS because: · Short-term risks to remediation workers are lower for ISS than for excavation because less potential for exposure to contamination · No off-site short-term risks to the public and environment because off-site transportation and disposal of soil is not required
23	Technical and Administrative Implementation - The Port Alternative has a similar level of technical and administrative implementation as IP's preferred Alternative S5B except that it avoids the complexities and uncertainties of the institutional controls. Excavation and off -site disposal of soil would utilize common remediation methods. The inclusion of a moderate level of off-site disposal allows the current grades across the site to be preserved, eliminating the need to expand the earthwork beyond the limits of the cleanup action to match the increased elevation within the cleanup area resulting from the ISS in IP's preferred Alternative S5B. The Port Alternative also avoids other issues associated with the significant grade changes included in IP's preferred Alternative 558, such as altering the existing storm water system.	International Paper agrees that the technical and administrative implementability of the Combined Port Alternative and Alternative S5B are similar. However, institutional controls are neither complex nor uncertain. Institutional controls are an effective, widely-used method to protect workers from direct contact exposure. It is unclear why expanding the earthwork beyond the limits of the cleanup action or the alteration of the existing storm water system are implementability issues.
24	Consideration of Public Concerns - IP's preferred Alternative S5B does not address public concerns in a satisfactory manner. Whereas, the Port Alternative addresses public concerns by reducing long-term impacts on property owned and operated by a public agency (the Port). The Port Alternative considers the future redevelopment of the Port property by limiting contaminated media left on site, reducing direct exposure to contaminated materials for routine construction activities, providing the Port flexibility for future economic development, and reduces the cost of future development.	Consideration of public concerns is discussed in Section 9.1.7 of the FS based on the comments received from the Port. This section clearly describes the Port's preferences with regard to the alternatives included in the FS. Port concerns evaluated in Section 9.1.7 include impacts on the topography due to the increased volume of contaminated media and the potential removal of the clean gravel layer beneath the asphalt parking area. This criterion will be reevaluated after the public comment period. International Paper has made a considerable effort to incorporate the Port's concerns into Alternative S5B to address impacts to Port operations and potential redevelopment plans, including future maintenance and development costs (see International Paper Comments on Statement Nos. 2 and 6).
25	When using the established disproportionate cost analysis (DCA) criteria in MTCA for selecting a cleanup action, as described in WAC 173-340- 360, the overall benefit of the Port Alternative is higher than IP's preferred Alternative S5B. By combining technologies and using ISS and off-site disposal where they make the most sense, the Port Alternative scores higher at a reasonable cost increase, relative to alternatives that are built around the primary use of a single technology.	International Paper disagrees with this statement. In the analysis provided for the Combined Port Alternative, off-site impacts and risks were not considered and the evaluation of permanence was not consistent with the definition of the criterion or the methodology outlined by Ecology.

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26	The Port Alternative, unlike IP's preferred Alternative S5B adequately considers the future risks to Port personnel by reducing the volume of contaminated media left on site, the effects of the selected alternative on current or future Port operations within the MFA site, and reduces the future costs to be incurred by the Port during redevelopment of the MFA site.	See International Paper Comment on Statement Nos. 2, 6, and 19.

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2	Eliminate exposure by Port workers to solidified soil during projects requiring shallow earthwork (i.e., trenching, post-hole digging, etc.).	Although Alternative S5B does not eliminate exposure during shallow earthwork, it does provide 3 feet of clean fill above the solidified soil in areas where excavation is most likely to occur (Zone 2 – Utility Corridor and North Tie Road) according to input received from the Port during a meeting on March 27, 2015.
3	Reduce the footprint (vertical and lateral) of necessary deed restrictions that will affect future Port use of the Site.	The horizontal footprint of the deed restrictions is identical in the Combined Port Alternative and Alternative S5B, because soil containing concentrations exceeding Model Toxics Control Act (MTCA) Method C values would remain at the site in the same area.
4	It prevents a net increase in the volume of contaminated soil	Because approximately 50% of the targeted soil would be solidified, the Combined Port Alternative would still have a net increase in the volume of contaminated soil, although less than Alternative S5B, where 100% of the targeted soil would be solidified. In the Combined Port Alternative, the volume of solidified soil remaining at the site would be significantly less than Alternative S5B, because approximately 50% of the targeted soil would be disposed of off site.
5	It results in clean fill across the site to a depth of 5-6 feet, allowing most utilities to be trenched without potential exposure to contaminated soil and allowing this shallow soil to be excluded from deed restrictions.	Given that the Port has indicated there would be no significant changes to the site elevations with the Combined Port Alternative, it is unclear how clean fill of depths of 5 to 6 feet can be achieved at the site. The Combined Port Alternative assumes a 40% expansion during the ISS process. Therefore, the 4 feet of soil to be solidified would expand to 5.6 feet after ISS. Therefore, the solidified soil would be present from 3.4 feet to 9 feet below ground surface (bgs). In order to maintain site grades, the depth of clean fill would only be 3.4 feet above the solidified soil, not 5 or 6 feet.

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6	The attached table presents a comparison of the proposed revised alternative to the current Alternatives S1 and S5B in the IP feasibility study (FS). This table also includes an evaluation of potential future costs associated with hypothetical Port projects and the respective disposal costs for the three alternatives. This analysis indicates that under Alternative S5B that relies solely on ISS, the potential future cost of disposing of solidified soil excavated to construct a potential dump pit project is approximately double the cost of incorporating a moderate level of excavation during cleanup, as included in the proposed alternative described in this memorandum ($1,250,000 versus $620,000).	Alternative S5B includes excavating/relocating soil down to the top of the Upper Silt within 80 feet of the rail spur (Zone 1) to accommodate the potential future dump pit, and backfilling with soil that meets the MTCA Method C cleanup levels at a minimum. Therefore, the costs for construction of the potential future dump pit would be identical for the Combined Port Alternative and Alternative S5B.
Brien J. Flanagan's February 28, 2017 Letter (Attached to February 28, 2017 Email from Kay Syravong to Sally Toteff and John Level)		
7	The Port's idea is simple—solidification of only contaminated soil, containing contaminated-but-solidified soils to specified areas, sampling and reuse of "clean" overburden, and disposal of additional contaminated-but-solidified soils as corrective action management unit (CAMU) waste.	Alternative S5B only solidifies contaminated soil, and solidified soils would be present over the same horizontal footprint as the Combined Port Alternative, because soil from the vicinity of the MFA railroad tracks is excavated and consolidated with other soil at the site. Alternative S5B also reuses the clean overburden (asphalt base course), and includes sampling and analysis of shallow soil beneath the base course in the northwest part of the site during the pilot test to identify soils that contain concentrations of chemicals less than the cleanup levels and that could also be reused at the site.
Lisa Hendrickson's April 14, 2017 Letter (Attached to April 14, 2017 Email from Lisa Hendriksen to Kaia Petersen)		
8	The Port Alternative increases the permanence of the cleanup, allows for the continued and future use, maintenance and redevelopment of the site, and reduces potential future exposure by excavation workers. Additionally, the Port Alternative has the benefit of reducing public concerns and simplifying the ability to obtain approval of institutional controls from the landowner.	Permanence is defined in MTCA Section 173-340-360 (3)(f)(ii) as follows: "The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated." Off-site disposal is used for approximately 50% of the targeted soil in the Combined Port Alternative. Off-site disposal is not a treatment technology, and does not result in any changes to the soil characteristics. There is no reduction in toxicity or volume of hazardous substances. Mobility is only reduced because of the engineering controls at the landfill, and if the engineering controls fail, then contamination can be released to the environment. Therefore, the reduction in mobility is not as permanent as the reduction in mobility achieved through the ISS process, where the soil characteristics are modified. Therefore, it is not clear how the Port's Combined Alternative, which combines ISS with excavation and off-site disposal greatly increases the permanence of the remedy compared to Alternative S5B, where all soil is solidified.

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
		International Paper has made significant changes to Alternative S5B based on comments received from the Port to minimize impacts on future use, maintenance, and redevelopment (see International Paper Comments on Statement Nos. 2 and 6), and no significant differences between Alternative S5B and the Combined Port Alternative have been identified regarding institutional controls.
9	The Port Alternative substantially improves on IP's proposed S5B alternative because it is more permanent and allows for future use and redevelopment of the Port's property with reduced likelihood of worker exposure and less impact to the proposed remedial action during future development.	See International Paper Comments on Statement Nos. 2, 6, and 8.
10	The Port Alternative, as proposed, would increase, not limit, the Port's flexibility for economic development within the Maintenance Facility Area (MFA) cleanup area, reduce the Port's future development costs by reducing the volume of contaminated media left in place as indicated by the ISS method, provide for a higher degree of protectiveness, meet the requirements of MTCA, and accommodate the concerns posed of Washington State Department of Ecology (Ecology) regarding off-site disposal of dense non-aqueous-phase liquid (DNAPL). The Port Alternative is similar to the original Alternative S5B presented by IP in the 2011 MFA FS, which relied primarily on ISS, but also incorporated a moderate level of off-site disposal to account for the expansion associated with the solidification.	MTCA regulations pertain to the protection of human health and the environment and not the economics of potential future development projects. Despite this, International Paper has expended considerable effort in addressing future maintenance and development costs by revising Alternative S5B in a manner that minimizes the need for excavating solidified soil. Protectiveness is defined as follows: "Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality." Because the evaluation of protectiveness must consider the overall environmental quality including off-site risks and impacts, it is unclear how the Port's Alternative provides a higher degree of protectiveness. See International Paper Comments on Statement Nos. 2 and 6.
11	The Port Alternative combines the ISS treatment process with a moderate level of off-site disposal of lower concentration or "clean" soil to the degree needed to balance the expansion of ISS-treated soil, allow areas of the MFA site to remain as close as possible to current elevations, and preserve a buffer of clean material under the asphalt paving that will reduce the restrictive measures during future construction activities.	See International Paper Comments on Statement Nos. 1, 2, and 6. The soil to be disposed of off site is not "clean". It would contain concentrations of chemicals above MTCA Method C cleanup levels, and would have to be disposed of as CAMU-eligible waste at a Subtitle C landfill. International Paper has agreed to ensure that Alternative S5B post-remediation site grades would not impact Port operations, based on comments received on the FS. The grades in Alternative S5B will not exceed 2% (transverse direction) or 5% (longitudinal direction) along equipment transport routes and in equipment operational areas in order to allow the Port of Longview to transport and operate existing equipment, as identified on page 7-25 in the public review draft RI/FS report.
12	Eliminate future exposure by Port personnel or construction workers to solidified soil during projects requiring shallow earthwork (i.e., trenching, post-hole digging, etc.).	See International Paper Comments on Statement No. 2.

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
13	Reduce the footprint (vertical and lateral) of necessary institutional controls that will affect future Port use of the Site by preserving a buffer of clean material under the ground surface and reducing the footprint of contaminated soil on the Site.	See International Paper Comments on Statement Nos. 2 and 3.
14	Reduce cleanup costs by utilizing ISS only for soil with highest contaminant levels and highest disposal costs.	Based on the updated costs for both Alternative S5B (Exhibit A) and the Combined Port Alternative (Exhibit B), the Combined Port Alternative would cost $1.5 million more than Alternative S5B.
15	Reduce Port costs associated with soil handling during future construction projects and reduced potential for final conditions that may prohibit or significantly hinder the future redevelopment of Port property.	See International Paper Comments on Statement Nos. 2, 6, and 10.
16	The area of soil exceedances outside the footprint of Alternative S4, which would be excavated and disposed of off-site, is a small area to the northwest of the footprint of excavation under Alternative S4.	This area is 8,900 square feet, which is approximately 25% of the total area targeted for remediation.
17	Within the footprint of the solidification, soil below the asphalt paving structural base material would be excavated down to the expected upper surface of the soil to be solidified. On average, this is approximately 4 feet, considering an average 10-foot total depth to the top of the upper silt, but would be less in some areas.	Based on International Paper's understanding of the Combined Port Alternative, soil from 3 to 5 feet bgs within the footprint of the ISS would be excavated. Therefore, a 2 foot depth interval would be excavated. Furthermore, the average depth to the Upper Silt is 8 feet, not 10 feet, and ISS is planned from 5 to 9 feet bgs in the Combined Port Alternative.
18	It is assumed that some (15 percent) shallow soil within the cleanup area would be considered clean, containing contaminants of concern below MTCA Method B levels, particularly in downgradient areas of the MFA site. Pre-design characterization of lateral and vertical limits of contaminants to supplement the data collected in the RI would allow more accurate evaluation of potential disposal options and associated costs.	The site field screening and analytical data indicate that shallow contamination may be quite extensive, even in the northwestern, downgradient portion of the site. Therefore, for purposes of cost estimation, all of this soil was assumed to be contaminated for Alternative S5B, and the revised cost estimate International Paper prepared for the Combined Port Alternative also assumes all of the soil would be disposed of as CAMU-eligible waste in a Subtitle C landfill. Alternative S5B includes sampling and analysis of shallow soil beneath the base course in the northwestern part of the site during the pilot test to identify soils that contain concentrations of chemicals less than the cleanup levels and that could be reused at the site.

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
19	Protectiveness - The Port Alternative is expected to have a higher level of protectiveness than the preferred Alternative S5B in the MFA FS as the existing, and future, risks to the primary receptors at the MFA site, Port personnel and construction workers would be reduced. The reduced risk would be the result of the inclusion of off-site disposal of a moderate quantity of soil for the purpose of reducing the final volume of solidified soil and preserving a substantial clean buffer between the ground surface and the solidified soil. Excavation under the Port Alternative would be limited to soil with lower concentrations of contaminants, alleviating the risks associated with excavation, transport, and off-site disposal of nonaqueous-phase liquid (NAPL)-impacted soil.	This evaluation does not consider off-site impacts and risks and equates protectiveness to the on-site protectiveness. A complete evaluation of protectiveness must consider the overall protectiveness of the remedy including off-site impacts and risks. When evaluating the protectiveness of ISS and excavation, all of the benefits/advantages and the disadvantages of these remedies must be considered. The benefits of ISS include: · The mobility of contaminants is permanently reduced in the solidified soil (leachability is reduced) · Short-term risks to remediation workers are lower for ISS than for excavation because less potential for exposure to contamination · No off-site short-term risks to the public and environment because off-site transportation and disposal of soil is not required The disadvantages of excavation include: · Off-site disposal relies on the engineering controls at the landfill to contain contaminants, and if the engineering controls fail, then contamination can be released to the environment (leachability only reduced for soils that are treated prior to disposal in an off-site landfill, which is not applicable to the Combined Port Alternative, because only soil with free product would require treatment prior to disposal and all soil containing free product will remain on site) · Contaminated soil is moved from one location to another location, where deed restrictions are required to protect human health and the environment · Short-term risks to remediation workers are higher for excavation than ISS because of higher potential for exposure to contamination · Short-term risks to the public and the environment because of off-site transportation and disposal of contaminated soil Based on this evaluation, the Combined Port Alternative is not expected to have a higher level of protectiveness than Alternative S5B. See International Paper Comments on Statement Nos. 1, 2, 4, 6, and 10.

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
20	Permanence - Permanence is described in Washington Administrative Code (WAC) 173-340-360(3)(f)(ii) as the degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances. The Port Alternative achieves a higher level of permanence relative to the selected Alternative S5B as a result of the focused use of ISS on the most highly contaminated soil and using off-site disposal at a permitted landfill for lower level contaminated soil. Reducing the level of ISS mitigates the significant level of additional hazardous material generated in IP's preferred Alternative S5B by solidifying all soil in the cleanup area. This essentially results in a reduced net volume of hazardous material. In addition, the Port Alternative eliminates the mixing of shallow, low concentration soil with deeper, highly contaminated soil. The proposed ISS process in the IP's preferred Alternative S5B would be expected to result in higher contaminant concentrations in shallow soil relative to current conditions, which essentially increases the toxicity of the shallow soil. The MFA site is a heavy use area and is slated for redevelopment. By removing the shallow, lower concentration and lower toxicity soil prior to implementing ISS on the deeper soil, disposing of the shallow soil at a permitted off-site landfill in its low toxicity state, and using clean backfill within several feet of the ground surface reduces the overall toxicity of the remaining soils at the MFA site. Most importantly, however, it significantly reduces the toxicity of the shallow soil that Port personnel will most likely be exposed to during future maintenance or redevelopment activities.	See International Paper Comments on Statement Nos. 2, 4, 6, and 8. Concentrations of contaminants in solidified soil will exceed MTCA Method C cleanup levels. Therefore, solidified soil must be handled similarly (same personal protective equipment, excavation procedures, and engineering controls) regardless of concentration. This discussion is confusing the evaluation of permanence with the evaluation of protectiveness, which evaluates risks (both on-site and off-site risks) to human health and the environment. The evaluation of permanence includes the adequacy of the alternative in destroying the hazardous substances (which does not apply to either the Combined Port Alternative or Alternative S5B), the reduction or elimination of hazardous substance releases and sources of releases (which is related to mobility, which both alternatives address), the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated. Whether the soil is solidified on site or is transported and disposed of at a landfill, the toxicity of that soil remains the same, because chemicals of concern have not been destroyed. However, as discussed in the International Paper Comment on Statement No. 8, ISS permanently reduces the mobility of contaminants by changing the characteristics of the contaminated soil. With off-site disposal, mobility is only reduced because of the engineering controls at the landfill, and if the engineering controls fail, then contamination can be released to the environment. Therefore, landfill disposal is considered more reversible than ISS.
21	Long-Term Effectiveness - The Port Alternative will provide a more effective long-term certainty that the primary receptors, Port personnel and construction workers, will be protected from exposure to contaminated media remaining on site after the cleanup action. On its face, WAC 173-340-360(3)(f)(iv) lists ISS above off-site disposal in the description of long-term effectiveness. However, this narrow reading of the WAC does not consider that in this application ISS does not completely reduce on-site risks. IP's preferred Alternative S5B relies heavily on institutional controls, including land use restrictions designed to prevent exposure to shallow solidified soil that remains a direct-contact risk to Port personnel and construction workers. The Port Alternative alleviates this by combining ISS with the off-site disposal to allow a buffer between the ground surface and the deeper contaminated, solidified soil.	This evaluation does not consider the effectiveness of the off-site portion of the remedy, the risks associated with disposal of the contaminated soil in a landfill, and the need for long-term monitoring of the landfill. International Paper disagrees that an adjustment needs to be made to Ecology's list of the relative degree of long-term effectiveness. ISS is effective long-term, regardless of whether it is or is not disturbed in the future. The ISS process permanently reduces the mobility of contamination. It is not a reversible process. The engineering controls at landfills can fail, which can result in releases to the environment. Therefore, it is appropriate to rank disposal in an engineered, lined and monitored facility lower than ISS. Furthermore, whether unsolidified soil is excavated during remediation or solidified soil is excavated during potential future redevelopment, risks to workers would be similar and controlled through personal protective equipment, excavation procedures, and engineering controls.

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
22	Management of Short -Term Risks - The Port Alternative is expected to have similar short-term risks as IP's preferred Alternative S5B, and manages those risks similarly. The excavation of soil under the Port Alternative is mostly limited to shallow soil overlying NAPL-impacted deeper soil, except in downgradient portions of the site beyond the extent of NAPL impacts, where excavation would extend deeper. The limited scope of excavation in the Port Alternative addresses issues raised by Ecology about potential short-term impacts associated with attempting to excavate NAPL-impacted soil immediately above the upper silt unit.	This evaluation does not consider off-site impacts and risks and therefore ranks the Combined Port Alternative the same as Alternative S5B. ISS is ranked higher in the FS because: · Short-term risks to remediation workers are lower for ISS than for excavation because less potential for exposure to contamination · No off-site short-term risks to the public and environment because off-site transportation and disposal of soil is not required
23	Technical and Administrative Implementation - The Port Alternative has a similar level of technical and administrative implementation as IP's preferred Alternative S5B except that it avoids the complexities and uncertainties of the institutional controls. Excavation and off -site disposal of soil would utilize common remediation methods. The inclusion of a moderate level of off-site disposal allows the current grades across the site to be preserved, eliminating the need to expand the earthwork beyond the limits of the cleanup action to match the increased elevation within the cleanup area resulting from the ISS in IP's preferred Alternative S5B. The Port Alternative also avoids other issues associated with the significant grade changes included in IP's preferred Alternative 558, such as altering the existing storm water system.	International Paper agrees that the technical and administrative implementability of the Combined Port Alternative and Alternative S5B are similar. However, institutional controls are neither complex nor uncertain. Institutional controls are an effective, widely-used method to protect workers from direct contact exposure. It is unclear why expanding the earthwork beyond the limits of the cleanup action or the alteration of the existing storm water system are implementability issues.
24	Consideration of Public Concerns - IP's preferred Alternative S5B does not address public concerns in a satisfactory manner. Whereas, the Port Alternative addresses public concerns by reducing long-term impacts on property owned and operated by a public agency (the Port). The Port Alternative considers the future redevelopment of the Port property by limiting contaminated media left on site, reducing direct exposure to contaminated materials for routine construction activities, providing the Port flexibility for future economic development, and reduces the cost of future development.	Consideration of public concerns is discussed in Section 9.1.7 of the FS based on the comments received from the Port. This section clearly describes the Port's preferences with regard to the alternatives included in the FS. Port concerns evaluated in Section 9.1.7 include impacts on the topography due to the increased volume of contaminated media and the potential removal of the clean gravel layer beneath the asphalt parking area. This criterion will be reevaluated after the public comment period. International Paper has made a considerable effort to incorporate the Port's concerns into Alternative S5B to address impacts to Port operations and potential redevelopment plans, including future maintenance and development costs (see International Paper Comments on Statement Nos. 2 and 6).
25	When using the established disproportionate cost analysis (DCA) criteria in MTCA for selecting a cleanup action, as described in WAC 173-340- 360, the overall benefit of the Port Alternative is higher than IP's preferred Alternative S5B. By combining technologies and using ISS and off-site disposal where they make the most sense, the Port Alternative scores higher at a reasonable cost increase, relative to alternatives that are built around the primary use of a single technology.	International Paper disagrees with this statement. In the analysis provided for the Combined Port Alternative, off-site impacts and risks were not considered and the evaluation of permanence was not consistent with the definition of the criterion or the methodology outlined by Ecology.

Table 3 (continued)
International Paper Company Comments on Combined Port Alternative

#	Statement	International Paper Company Comments
26	The Port Alternative, unlike IP's preferred Alternative S5B adequately considers the future risks to Port personnel by reducing the volume of contaminated media left on site, the effects of the selected alternative on current or future Port operations within the MFA site, and reduces the future costs to be incurred by the Port during redevelopment of the MFA site.	See International Paper Comment on Statement Nos. 2, 6, and 19.

Exhibit A

UPDATED ALTERNATIVE S5B DETAILED COST ESTIMATE

SOLIDIFICATION OUTSIDE AND INSIDE BUILDING FOOTPRINGT WITH RELOCATION OF SOIL NEAR RAILROAD TRACKS

SUMMARY: This alternative consists of in-place mechanical mixing of solidifying agents into soil using large diameter augers and relocation of soil near railroad tracks using standard construction equipment. The alternative includes:

- Treatment area of 34,700 SF
- Average depth for solidification area is 9 ft bgs
- Average depth for excavation area is 8 ft bgs
- Treatment volume of 7,420 CY of soil (including soil from Zone 1) would be treated using solidifying agents
- Excavated volume of 1,650 CY of soil will be relocated from Zone 1 and combined with the other soils to be solidified
- Demolition of 2,500 SF of existing building
- No off-site disposal of excess stabilized soil required for this alternative

SPECIFIC COST ASSUMPTIONS

The cost estimate assumes the following phases and activities:

Pre-Design Activities/Design

1. Pre-construction site survey and utility locate within the work area
2. Zone 1 soil characterization
3. Contractor procurement and preparation of remedy design, work plans, and permits
4. Pilot test to assess strength, leachability, and cure time of target soils

Implementation

1. Construction crew and equipment mobilization/demobilization
2. General site preparation work, including establishing a laydown area for contractor equipment and supplies and relocation of the Port’s maintenance operations.
3. Installation of temporary erosion and sediment controls
4. Performance of excavation and shoring activities (freeze wall)
5. Stockpile sampling activities
6. Performance of soil mixing and construction quality assurance activities
7. Analysis of quality assurance samples from solidified soil to ensure design specifications are met
8. Backfilling, compaction, and grading solidified soil
9. Load-out and transport of non-hazardous material (asphalt recycling)
10. General site restoration work
11. Construction oversight for duration of construction

Monitoring and Operation & Maintenance

1. Annual institutional controls inspections and reporting
2. Annual monitoring and sampling of leachate (groundwater sampling)
3. Periodic asphalt repairs
4. Periodic institutional controls plan update

Closeout

1. Confirmation soil sampling
2. Preparation of completion report and closeout submittals (e.g., as-built drawings) after completion of construction

CHANGES FROM ORIGINAL COST ESTIMATE

The following updates were incorporated in to the updated Alternative S5B cost estimate that were not included in the original estimate

1. 450 ft of freeze wall shoring around Zone 1 was incorporated into the estimate to account for excavation in Zone 1. The purpose of the freeze wall is to stabilize excavation sidewalls. All excavations greater than 4 ft bgs need to incorporate shoring into their design.
2. Zone 1 soil characterization costs included. The purpose of the soil characterization is to evaluate whether the soil volume moved to Zone 3 for ISS can be reduced.
3. Water management costs were incorporated to account for excavation in Zone 1.

UPDATED ALTERNATIVE S5B
SOLIDIFICATION OUTSIDE AND INSIDE BUILDING FOOTPRINT WITH RELOCATION OF SOIL NEAR RAILROAD TRACKS

Client	International Pape		**Estimator**	Melanie Young, AECOM	
Location	Longview, Washingto		**Report Date**	12/18/2015	
Project	MFA Area Remediatio		**Last Updated**	12/2/2015	
Document	RI/FS Cost Estimate		**Source of Costs**	Engineers Estimat	
Soil Removal	NO		**Groundwater Treatment**	No	
Soil Treatment Area	34,700	SF (32,600 outside and 2,100 inside building	**GW Treatment Area**	NA	
Treatment Perimeter	1,110	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	0	CY	**Treatment Depth**	8 and 9	FT bgs

Alternative	1	5,300 CY of soil will be solidified over 23,700 SF area outside building footpri
Specific		1,650 CY of soil will be relocated from 8,900 SF area 80 ft from the edge of rail and combined with other soils to be solidifi
Assumptions	2	470 CY of soil will be solidified from a 2,100 SF area under the Mechanics Sho
	3	Some of the Port's maintenance operations will be temporarily mov
	4	The portion of the building with lower ceiling height will be removed and reconstructed following solidificat
	5	3,900 CY of clean overburden materials will be excavated prior to treatme
	6	Zone of solidification will be 6 feet thick (3 to 9 feet bgs) and the zone of excavation will be 5 feet thick (3 to 8 feet b
	7	Volumetric Expansion of the 7,420 CY of solidified soil will be 35% and will result in an additional 2,600 CY of material on
	8	The total volume of solidified soil on site to remain on site is estimated to be 10,020 C
	9	Existing utilities will need to be removed and replaced following treatment activiti
	10	Approximately 3 to 4 months will be needed to perform the wor
	11	2 weeks will be needed for mob / demo
	12	6 to 8 weeks will be needed for the solidification / stabilization tas
	13	Site will be restored to existing conditions following remediation, but with new higher grades and no retaining w
	14	No solidification spoils or overburden soil will be disposed of off-site. All material is planned for re-us
	15	Shoring is not necessary adjacent to the slurry wall or maintenance shop if auger mixing ISS equipment is used for I
	16	Water is readily available on sit

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$2,258,258	1	Mobilization / Demobilization	1	LS	$225,000	$225,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	350	CY	$300	$105,000
	4	Temporary relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	6	Decommission Groundwater Monitoring & Bioventing Wells	40	EA	$920	$36,800
	7	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	8	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	9	Demo Retaining Wall	220	LF	$75	$16,500
	10	Demo Portion of Building with Lower Roof Height	2,500	SF	$25	$62,500
	11	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	12	Remove 42-inch HDPE Culvert and Replace after Solidification	125	LF	$150	$18,750
	13	Freeze Wall Shoring for Excavation Perimeter - 450 LF, 21 ft deep	9,450	SF	$31	$292,950
	14	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$27	$105,300
	15	Stormwater Handling and Environmental Protection	1	LS	$11,000	$11,000
	16	Excavate Soil from 3 to 8 feet bgs within 80 feet of Railroad Tracks	1,650	CY	$14	$23,100
	17	Relocate and Backfill Soil from Near the Railroad Tracks	1,650	CY	$9	$14,850
	18	Solidification Materials (8% NewCem Slag Cement)	890	TN	$130	$115,752
	19	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	223	TN	$230	$51,198
	20	Solidification Materials (0.5% Caustic Soda)	56	TN	$1,275	$70,954
	21	Solidification Labor and Equipment Outside Building Footrprint	6,950	CY	$60	$417,000
	22	Solidification Labor and Equipment Under Mechanics Shop	470	CY	$60	$28,200
	23	Geotextile Fabric Marker Layer Over Solidified Soil	2,867	SY	$1.75	$5,017
	24	Import of Clean Backfill for Transition Grades	1,700	CY	$20	$34,000
	25	Additional Import of Backfill Material to Replace Relocated Soil	1,600	CY	$20	$32,000
	26	Backfill and Compaction of Overburden Soil Stockpiles on Site	3,900	CY	$11	$42,900
	27	Backfill and Compaction of area near railroad tracks and transitional material	3,300	CY	$9	$29,700
	28	Asphalt Paving of Excavation, Solidification, and Transition Areas	32,600	SF	$4	$130,400
	29	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	30	Reconstruct Lower Roof Height Portion of Maintenance Building	2,500	SF	$50	$125,000
	31	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	32	Monitoring Well Installation	10	EA	$5,400	$54,000
	33	Contractor Reporting and Closeout Submittals	200	HR	$90	$18,000
Contaminated Waste Disposal and Transportation						
$24,368	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	0	TN	$115	$0
	6	Transportation Costs to Subtitle C Landfill	0	TN	$55	$0
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	0	TN	$30	$0
	8	Transportation Costs to Subtitle D Landfill	0	TN	$25	$0
	9	Contaminated Water Treatment and Disposal	50,000	GAL	$0.20	$10,000
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$2,282,627**
Contractor Contingency (%)			**20**	%	$2,282,627	$456,525
Total Contractor Costs						**$2,739,000**

UPDATED ALTERNAT SOLIDIFICATION OUTSIDE AND INSIDE BUILDING FOOTPRINT WITH RELOCATION OF SOIL NEAR RAILROAD TRACKS

(CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC	2	%	$2,739,000	$54,780
	2	Regulatory Review, Coordination, and Meetings (% DCC	2	%	$2,739,000	$54,780
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	7	%	$2,739,000	$191,730
	5	Planning for temporary relocation of Port maintenance op	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$2,739,000	$136,950
	8	Confirmational Sample Collection and Reportin	1	LS	$33,000	$33,000
	9	Zone 1 Soil Characterizatior	1	LS	$25,000	$25,000
	10	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$645,840**
Engineering Contingency (%)			**10**	%	$645,840	$64,584
Total Engineering Costs						**$710,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LONG-TERM MONITORING COSTS						
Annual O&M Cost (Institutional Controls Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordinatior	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling of Leachate)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordinatior	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years till project completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$3,449,000	**$3,449,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$4,098,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$219,000	**$4,317,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$103,500	**$4,421,000**
TOTAL PRESENT-WORTH COST				**$4,400,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CBR: California bearing ratio
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch

IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
RCRA: Resource Conservation and Recovery Act
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

Exhibit B

PORT COMBINED ALTERNATIVE DETAILED COST ESTIMATE

EXCAVATION AND SOLIDIFICATION OUTSIDE AND INSIDE BUILDING FOOTPRINGT

SUMMARY: This alternative consists of excavating soils for off-site disposal, in-place mechanical mixing of solidifying agents into soil using standard construction equipment, and relocation of soil near railroad tracks using standard construction equipment. The alternative includes:

- Treatment area of 34,700 SF (Note that the Port Combined Alternative uses various areas in their cost spreadsheet)
- Average depth for solidification area is 9 ft bgs
- Average depth for excavation area is 8 ft bgs
- Treatment volume of 3,921 CY of soil would be treated using solidifying agents
- Excavated volume of 3,604 CY of soil will be disposed of off-site at a Subtitle C landfill
- Demolition of 3,000 SF of existing building
- Assumed 40% expansion rate of solidified soils

SPECIFIC COST ASSUMPTIONS

The cost estimate assumes the following phases and activities:

Pre-Design Activities/Design

1. Pre-construction site survey and utility locate within the work area
2. Contractor procurement and preparation of remedy design, work plans, and permits
3. Pilot test to assess strength, leachability, and cure time of target soils

Implementation

1. Construction crew and equipment mobilization/demobilization
2. General site preparation work, including establishing a laydown area for contractor equipment and supplies and relocation of the Port's maintenance operations.
3. Installation of temporary erosion and sediment controls
4. Performance of excavation activities
5. Stockpile sampling activities
6. Performance of soil mixing and construction quality assurance activities
7. Analysis of quality assurance samples from solidified soil to ensure design specifications are met
8. Backfilling, compaction and grading solidified soil
9. Load-out and transport of CAMU-eligible material to a Subtitle C landfill (85% off all soil)
10. Load-out and transport of non-hazardous material to a Subtitle D landfill (15% off all soil)
11. Load-out and transport of non-hazardous material (asphalt recycling)
12. General site restoration work
13. Construction oversight for duration of construction

Monitoring and Operation & Maintenance

1. Annual institutional controls inspections and reporting
2. Annual monitoring and sampling of leachate (groundwater sampling)
3. Periodic asphalt repairs
4. Periodic institutional controls plan update

Closeout

1. Confirmation soil sampling
2. Preparation of completion report and closeout submittals (e.g., as-built drawings) after completion of construction

PORT COMBINED ALTERNATIVE
EXCAVATION AND SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT

Client	International Paper		**Estimator**	Port of Longview	
Location	Longview, Washington		**Report Date**	4/4/2017	
Project	MFA Remediation		**Last Updated**	4/4/2017	
Document	RI/FS Cost Estimate		**Source of Costs**	Port of Longview and Alternatives S1/S5	
Soil Removal	YES		**Groundwater Treatment**	No	
Soil Treatment Area	34,700	SF	**GW Treatment Area**	NA	
Treatment Perimeter	1,110	LF	**GW Treatment Method**	NA	
Soil Disposal Volume	3,604	CY	**Treatment Depth**	8 and 9	FT bgs

Alternative Specific Assumptions

1. 3,689 CY of soil will be solidified over 24,900 SF area outside builiding footpring
2. 222 CY of soil will be solidified over 1,500 SF area under mechanics shop
3. Some of the Port's maintenance operations will be temporarily moved
4. In the the solidification area, zone of solidification will be 5 to 9 FT bgs and zone of excavation will be 3 to 5 FT bgs
5. In the excavation area, zone of excavation will be 3 to 8 FT bgs
6. 3,900 CY of clean overburden materials will be excavated prior to treatment
7. Existing utilities will need to be removed and replaced following treatment activities
8. Site will be restored to existing conditions following remediation, although grades may be modified
9. No solidification spoils or overburden soil will be disposed of off-site. All material is planned for re-use
10. Water is readily available on site

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,622,632	1	Mobilization / Demobilization	1	LS	$67,000	$67,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	350	CY	$300	$105,000
	4	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Port's Maintenance Building (east corner)	3,000	SF	$25	$75,000
	6	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	7	Decommission Groundwater Monitoring & Biovent Wells	40	EA	$920	$36,800
	8	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	9	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	10	Demo Retaining Wall	220	LF	$75	$16,500
	11	Install Freeze Wall Shoring for Building (200 LF)	0	SF	$34	$0
	12	Install Freeze Wall Shoring for Excavation Perimeter (720 LF)	0	SF	$31	$0
	13	Install Sheet Pile Wall Shoring along Slurry Wall (100 LF	1,200	SF	$45	$54,000
	14	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	15	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	16	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$27	$105,300
	17	Excavation and Stockpiling of Contaminated Soil	3,604	CY	$14	$50,452
	18	Loading of Contaminated Soil	5,406	TN	$6	$32,433
	19	Import of Clean Fill to the Site	2,039	CY	$20	$40,786
	20	Storm Water Handling and Environmental Protection	1	LS	$11,000	$11,000
	21	Backfill and Compaction of Excavation	7,504	CY	$9	$67,533
	22	Solidification Materials (8% NewCem Slag Cement)	469	TN	$130	$61,012
	23	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	117	TN	$230	$26,986
	24	Solidification Materials (0.5% Caustic Soda)	29	TN	$1,275	$37,399
	25	Solidification Labor and Equipment Outside Building Footprint	3,689	CY	$60	$221,340
	26	Solidification Labor and Equipment Under Mechanics Shop	222	CY	$60	$13,320
	27	Geotextile Fabric Marker Layer over Solidified Soil	2,933	SY	$1.75	$5,133
	28	Asphalt Paving of Excavation, Solidification, and Transition Areas	32,600	SF	$4	$130,400
	29	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	30	Rebuild Retaining Wall	160	LF	$150	$24,000
	31	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	32	Reconstruct Maintenance Building (east corner)	3,000	SF	$50	$150,000
	33	Monitoring Well Installation	10	EA	$5,400	$54,000
	34	Contractor Reporting and Closeout Submittals	290	HR	$90	$26,100
Contaminated Waste Disposal and Transportation						
$840,067	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	4,595	TN	$115	$528,393
	6	Transportation Costs to Subtitle C Landfill	4,595	TN	$55	$252,710
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	811	TN	$30	$24,325
	8	Transportation Costs to Subtitle D Landfill	811	TN	$25	$20,271
	9	Contaminated Water Treatment and Disposal	0	GAL	$0.20	$0
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$2,462,699**
Contractor Contingency (%)			**20**	%	$2,462,699	$492,540
Total Contractor Costs						**$2,960,000**

PORT COMBINED A EXCAVATION AND SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$2,960,000	$59,200
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$2,960,000	$59,200
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	5	%	$2,960,000	$148,000
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$2,960,000	$148,000
	8	Confirmational Sample Collection and Reporting	1	LS	$33,000	$33,000
	9	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$597,000**
Engineering Contingency (%)			**10**	%	$597,000	$59,700
Total Engineering Costs						**$657,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical Performance of Solidified Soil)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$3,620,000	**$3,620,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$4,270,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$237,000	**$4,507,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$109,000	**$4,616,000**
TOTAL PRESENT-WORTH COST				**$4,600,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
RCRA: Resource Conservation and Recovery Act
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

UPDATED PORT COMBINED ALTERNATIVE DETAILED COST ESTIMATE

EXCAVATION AND SOLIDIFICATION OUTSIDE AND INSIDE BUILDING FOOTPRINGT

SUMMARY: This alternative consists of excavating soils for off-site disposal, in-place mechanical mixing of solidifying agents into soil using large diameter augers, and relocation of soil near railroad tracks using standard construction equipment. The alternative includes:

- Treatment area of 34,700 SF
- Average depth for solidification area is 9 ft bgs
- Average depth for excavation area is 8 ft bgs
- Treatment volume of 3,822 CY of soil would be treated using solidifying agents
- Excavated volume of 3,560 CY of soil will be disposed of off-site at a Subtitle C landfill
- Demolition of 2,500 SF of existing building
- Assumed 35% expansion rate of solidified soils

SPECIFIC COST ASSUMPTIONS

The cost estimate assumes the following phases and activities:

Pre-Design Activities/Design

1. Pre-construction site survey and utility locate within the work area
2. Zone 1 soil characterization
3. Contractor procurement and preparation of remedy design, work plans, and permits
4. Pilot test to assess strength, leachability, and cure time of target soils

Implementation

1. Construction crew and equipment mobilization/demobilization
2. General site preparation work, including establishing a laydown area for contractor equipment and supplies and relocation of the Ports maintenance operations.
3. Installation of temporary erosion and sediment controls
4. Performance of excavation and shoring activities (freeze wall installed around all excavation and ISS areas except for a sheet pile wall that would be installed along the TWP slurry wall)
5. Stockpile sampling activities
6. Performance of soil mixing and construction quality assurance activities
7. Analysis of quality assurance samples from solidified soil to ensure design specifications are met
8. Backfilling, compaction and grading solidified soil
9. Load-out and transport of CAMU-eligible material to a Subtitle C landfill
10. Load-out and transport of non-hazardous material (asphalt recycling)
11. General site restoration work
12. Construction oversight for duration of construction

Monitoring and Operation & Maintenance

1. Annual institutional controls inspections and reporting
2. Annual monitoring and sampling of leachate (groundwater sampling)
3. Periodic asphalt repairs
4. Periodic institutional controls plan update

Closeout

1. Confirmation soil sampling
2. Preparation of completion report and closeout submittals (e.g., as-built drawings) after completion of construction

CHANGES FROM ORIGINAL COST ESTIMATE

The following updates were incorporated in to the updated Port Combined Alternative cost estimate that were not included in the original estimate

1. Increased mobilization/demobilization costs from $67,000 to $225,000 to match Alternative S5B. It was assumed that the same solidification equipment (large-diameter augers) would be used for the Port Combined Alternative as Alternative S5B in order to perform an apples-to-apples comparison.
2. Freeze wall shoring was incorporated into the estimate at a total length of 970 LF. The purpose of the freeze wall is to stabilize excavation sidewalls. All excavations greater than 4 ft bgs need to incorporate shoring into their design. Freeze wall depth is assumed to be 2.6 times the depth of the excavation (5 and 8 feet, respectively). Therefore, 600 LF would be constructed at a depth of 13 feet where ISS is completed and 370 LF would be constructed to a depth of 21 feet in excavation only areas.
3. The sheet pile wall depth was increased along the TWP slurry wall from 12 ft to 16 ft bgs. Sheet pile depth is assumed to be 3 times the depth of the excavation (5 feet), plus one foot for the distance the sheet pile wall extends above the ground surface.
4. Decreased demolition area of maintenance building from 3,000 SF to 2,500 SF to match other alternatives including Alternative S5B.
5. Area excavated and treated outside the building footprint lowered from 24,900 SF to 23,700 SF. Area excavated and treated under building footprint increased from 1,500 SF to 2,100 SF. These changes were made to match other alternatives including Alternative S5B. This impacts multiple task numbers in the cost estimate.
6. Geotextile fabric layer decreased from 2,933 SY to 2,867 SY to match Alternative S5B.
7. Assumed 35% soil expansion instead of the 40% assumed by the Port. Previous testing at the site indicates 35% soil expansion, and this value matches what was used for other alternatives including Alternative S5B.
8. Zone 1 soil characterization costs included. The purpose of the soil characterization is to attempt to reduce soil volume disposed of off-site in a Subtitle C landfill.

9. Assumed all contaminated soil that is excavated will be disposed of at a Subtitle C landfill. If the Port is planning to segregate and stockpile the soil, then costs for this would need to be included in the estimate prior to assuming some soil can be disposed of off-site at a Subtitle D landfill (or reused on site as backfill).
10. Changed unit cost from $14/CY to $28/CY for excavation and stockpiling of contaminated soil to match Alternative S1 (Line Item # 16). This higher cost incorporates moving soil and stockpiling the excavated soil.
11. Changed unit costs from $9/CY to $11/CY for backfill and compaction of overburden soil to match Alternative S5B estimate (Line Item # 26, updated S5B cost estimate).
12. Rebuilding retaining wall was raised from 160 LF to 220 LF to match the length removed.
13. Water management costs included.
14. Engineering Design percentage increased from 5% to 7% to match Alternative S5B.

UPDATED PORT COMBINED ALTERNATIVE
EXCAVATION AND SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT

Client	International Paper		**Estimator**	Port of Longview		
Location	Longview, Washington		**Report Date**	4/4/2017		
Project	MFA Remediation		**Last Updated**	4/4/2017		
Document	RI/FS Cost Estimate		**Source of Costs**	Port of Longview and Alternatives S1		
Soil Removal	YES		**Groundwater Treatment**	No		
Soil Treatment Area	34,700	SF	**GW Treatment Area**	NA		
Treatment Perimeter	1,110	LF	**GW Treatment Method**	NA		
Soil Disposal Volume	3,560	CY	**Treatment Depth**	8 and 9	FT bgs	

Alternative Specific Assumptions

1 3,511 CY of soil will be solidified over 23,700 SF area outside builiding footpring
2 311 CY of soil will be solidified over 2,100 SF area under mechanics shop
3 Some of the Port's maintenance operations will be temporarily moved
4 In the the solidification area, zone of solidification will be 5 to 9 FT bgs and zone of excavation will be 3 to 5 FT bgs
5 In the excavation area, zone of excavation will be 3 to 8 FT bgs
6 3,900 CY of clean overburden materials will be excavated prior to treatment
7 Existing utilities will need to be removed and replaced following treatment activities
8 Site will be restored to existing conditions following remediation, although grades may be modified
9 No solidification spoils or overburden soil will be disposed of off site. All material is planned for re-use.
10 Volumetric expansion of the 3,822 CY in a 25,800 SF area will be 35% and will result in an additional 1,300 CY of solidified material on site
11 Water is readily available on site
12 970 LF of freeze wall and 100 LF of sheet pile shoring will be required

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$2,296,258	1	Mobilization / Demobilization	1	LS	$225,000	$225,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	350	CY	$300	$105,000
	4	Temporary Relocation of Port Maintenance Operations	1	LS	$30,000	$30,000
	5	Demo Port's Maintenance Building (east corner)	2,500	SF	$25	$62,500
	6	Demo Horizontal Bioventing Wells & Connection Piping	800	LF	$37	$29,600
	7	Decommission Groundwater Monitoring & Biovent Wells	40	EA	$920	$36,800
	8	Specialty Subcontractors (surveyor, utility locates)	1	LS	$8,000	$8,000
	9	Demo Underground Utilities and Fencing	1	LS	$28,000	$28,000
	10	Demo Retaining Wall	220	LF	$75	$16,500
	11	Freeze Wall shoring for solidification area (SE) - 600 LF, 13 ft deep	7,800	SF	$31	$241,800
	12	Freeze Wall shoring for excavation area (NW) - 370 LF, 21 ft deep	7,770	SF	$31	$240,870
	13	Sheet Pile Wall Shoring along Slurry Wall - 100 LF, 16 ft deep	1,600	SF	$45	$72,000
	14	Remove Surface Asphalt in Storage Yard and Road	32,600	SF	$0.88	$28,688
	15	Remove 42-IN HDPE Culvert and Replace after Excavation	125	LF	$150	$18,750
	16	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$27	$105,300
	17	Excavation and Stockpiling of Contaminated Soil	3,560	CY	$28	$99,680
	18	Loading of Contaminated Soil	5,340	TN	$6	$32,040
	19	Import of Clean Fill to the Site	2,220	CY	$20	$44,400
	20	Storm Water Handling and Environmental Protection	1	LS	$11,000	$11,000
	21	Backfill and Compaction of Overburden Soil Stockpiles on Site	3,900	CY	$11	$42,900
	22	Backfill and Compaction of Excavation	3,560	CY	$9	$32,040
	23	Solidification Materials (8% NewCem Slag Cement)	459	TN	$130	$59,625
	24	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	115	TN	$230	$26,373
	25	Solidification Materials (0.5% Caustic Soda)	29	TN	$1,275	$36,549
	26	Solidification Labor and Equipment Outside Building Footprint	3,511	CY	$60	$210,667
	27	Solidification Labor and Equipment Under Mechanics Shop	311	CY	$60	$18,660
	28	Geotextile Fabric Marker Layer over Solidified Soil	2,867	SY	$1.75	$5,017
	29	Asphalt Paving of Excavation, Solidification, and Transition Areas	32,600	SF	$4	$130,400
	30	Rebuild Access Road (150 LF)	3,750	SF	$6	$22,500
	31	Rebuild Retaining Wall	220	LF	$150	$33,000
	32	Replace Connection Piping for Bioventing System	600	LF	$40	$24,000
	33	Reconstruct Maintenance Building (east corner)	2,500	SF	$50	$125,000
	34	Monitoring Well Installation	10	EA	$5,400	$54,000
	35	Contractor Reporting and Closeout Submittals	200	HR	$90	$18,000
Contaminated Waste Disposal and Transportation						
$932,168	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	5,340	TN	$115	$614,100
	6	Transportation Costs to Subtitle C Landfill	5,340	TN	$55	$293,700
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	0	TN	$30	$0
	8	Transportation Costs to Subtitle D Landfill	0	TN	$25	$0
	9	Contaminated Water Treatment and Disposal	50,000	GAL	$0.20	$10,000
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$8	$6,761
	11	Transportation Costs to Asphalt Recycler	845	TN	$9	$7,607
Subtotal Contractor Costs						**$3,228,427**
Contractor Contingency (%)			**20**	%	$3,228,427	$645,685
Total Contractor Costs						**$3,870,000**

UPDATED PORT CCEXCAVATION AND SOLIDIFICATION OUTSIDE BUILDING FOOTPRINT (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$3,870,000	$77,400
	2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$3,870,000	$77,400
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	4	Engineering Design (% DCC)	7	%	$3,870,000	$270,900
	5	Planning for temporary relocation of Port maintenance ops	100	HR	$135	$13,500
	6	Bid & RFI Support	60	HR	$135	$8,100
	7	Construction Oversight and QA (% DCC)	5	%	$3,870,000	$193,500
	8	Confirmational Sample Collection and Reporting	1	LS	$33,000	$33,000
	9	Zone 1 Soil Characterization	1	LS	$25,000	$25,000
	10	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$826,800**
Engineering Contingency (%)			**10**	%	$826,800	$82,680
Total Engineering Costs						**$909,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LTM COSTS						
Annual O&M Cost (ICs Maintenance and Asphalt Inspection/Repair as Needed)			***30***	***Years of Annual O&M***		
$15,036	1	Project Management & Coordination	16	HR	$135	$2,160
	2	Annual Inspection and Reporting	32	HR	$110	$3,520
	3	Update ICs Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						**$15,036**
O&M Contingency			25	%	$15,036	$3,759
Total Annual O&M Cost						**$18,800**
Annual LTM Cost (Monitoring and Sampling of Leachate)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mobilization/Demobilization for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Subtotal Annual LTM Cost						**$26,330**
LTM Contingency			25	%	$26,330	$6,583
Total Annual LTM Cost						**$32,900**
Total Annual O&M and LTM Cost						**$51,700**
Total O&M and LTM Cost		***Years Until Project Completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***3%***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$4,780,000	**$4,780,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$5,430,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$310,000	**$5,740,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$143,000	**$5,883,000**
TOTAL PRESENT-WORTH COST				**$5,900,000**

ACRONYMS AND ABBREVIATIONS:

bgs: below ground surface
CAMU: Corrective Action Management Unit
CY: cubic yard
DCC: direct capital costs
DNAPL: dense, non-aqueous phase liquid
DRO: diesel range organics
DY: Day
EA: each
FT: feet
GAL: gallon
HDPE: high density polyethylene
HR: hour
IC: institutional control
IN: inch
LF: linear feet
LS: lump sum
LTM: long-term monitoring
MFA: maintenance facility area
NA: not applicable
NAPL: non-aqueous phase liquid
O&M: operating and maintenance
RCRA: Resource Conservation and Recovery Act
RI/FS: remedial investigation and feasibility study
TN: ton
SVOCs: semi volatile organics compounds
WK: week

Exhibit C

Table 1
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	January 31, 2017 Washington State Department of Ecology (Ecology) Comment	April 14, 2017 Port of Longview (Port) Response	Current International Paper Company (International Paper) Response
1	Page 1, third paragraph, first bullet - "The factors associated with Alternative S5B that are expected to impact the Port Include: *in situ* solidification (ISS) is proposed within the entire foot print of Model Toxics Control Act (MTCA) Method C exceedances. This expands the foot print of the area of required deed restrictions, as Ecology has indicated that any ISS-treated soil requires coverage by deed restrictions" The Maintenance Facility Area (MFA) will require institutional controls not only because of the presence of in-situ solidification and stabilization-treated soils, but because the cleanup will use Model Toxics Control Act (MTCA) Method C soil cleanup levels for protection of groundwater and establish a conditional point of compliance for groundwater. Washington Administrative Code (WAC) 173-340-440(4) outlines circumstances when institutional controls are required to continue protection of human health and the environment and the integrity of a remedial action. Ecology will work with the Port to complete the restrictive covenant(s) necessary for the Site.	The Port understands that the overall site will require the establishment of restrictive covenant(s) governing activities that may impact the overall cleanup action. Relying upon solidification in areas of lower contaminant concentrations where excavation and off-site disposal can be implemented cost effectively, however, results in a wider footprint, and shallower depth, of contaminated soil (including solidified soil) that poses a direct-contact exposure risk to Port and construction workers and will require coverage by institutional controls such as health and safety considerations during construction, following completion of the cleanup action.	International Paper has made a considerable effort to incorporate the Port's concerns into Alternative S5B. International Paper met with the Port multiple times since 2013 to obtain input from the Port and revise Alternative S5B in a manner that minimizes impacts on Port operations. Revisions included: • Excavating/relocating soil down to the top of the Upper Silt within 80 feet of the rail spur (Zone 1) to accommodate the potential future dump pit, and backfilling with soil that meets the MTCA Method C cleanup levels at a minimum • Maintaining a minimum of 3 feet of clean fill (base course)/asphalt above solidified soils in the building utility corridor and the North Tie Road (Zone 2) to accommodate utility work in those areas • Maintaining a minimum of 1 foot of clean fill (base course)/asphalt above the solidified soils in all other areas (Zone 3), where excavation work is currently not anticipated During the March 27, 2015 meeting with the Port, the Port proposed trading shallower working depths in some portions of the treatment areas (Zone 3) to gain deeper working depths in other portions of the treatment area (Zones 1 and 2). International Paper incorporated this modification into Alternative S5B, and the current Alternative S5B provides fill that meets the MTCA Method C cleanup levels in areas where the Port is most likely to excavate, thus minimizing potential direct contact exposure by excavation workers with the solidified soil. If excavation into solidified soils becomes necessary at some time in the future, personal protective equipment, excavation procedures, and engineering controls can be used to address health and safety concerns.
2	Page 2, Port Concerns with Preferred Alternative S5B, first paragraph, first bullet - *"The issues stated above regarding IP's proposed preferred alternative, S5B - Solidification Outside and Inside Building, are*	The Port understands that multiple levels of institutional controls and restrictive covenants are expected to be required as a result of the proposed preferred cleanup action alternative. As a result of the vertical expansion of the	As discussed in Comment #1, the Port indicated their willingness to evaluate trading shallower working depths in some portions of the treatment areas (Zone 3) to gain deeper working depths in other portions of the treatment area (Zones 1 and 2). Therefore, a minimum of 1 foot of

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	January 31, 2017 Washington State Department of Ecology (Ecology) Comment	April 14, 2017 Port of Longview (Port) Response	Current International Paper Company (International Paper) Response
	expected to create several short-term and long-term concerns for Port operations, Including the following: The presence of solidified soil triggers the need for deed restrictions on the site. The Port is willing to accommodate this to a degree, but the solidification progress increases the volume of soil requiring coverage by the restrictions." Ecology agrees that solidification increases the volume of treated soils, but the need for an environmental covenant Is not triggered only by the presence of treated soils. As noted in Comment 1, institutional controls are required when MTCA Method C cleanup levels are used and when a conditional point of compliance is established.	solidification-treated soil, including the displacement of currently clean soil and pavement base material with contaminated, solidified soil, however, the vertical footprint of contaminated material in scenarios is increased. This increased volume of contaminated material and requisite elevation changes, results in areas where health and safety, material handling, and disposal restrictions will be in place for soil immediately below the ground surface that would otherwise not be required if the current clean buffer between the ground surface and the top of soil exceeding cleanup levels were to be preserved. Utilizing solidification for the deeper, highly contaminated soil and dense non-aqueous phase liquid (DNAPL), combined with limited off-site disposal of shallow clean and lower concentration soils would reduce the need for restrictions to be placed on the exposure, handling, and disposal of soil encountered during future shallow maintenance and/or construction activities in this area.	clean fill/asphalt is included in Zone 3, and a minimum of 3 feet of clean fill/asphalt is included in Zone 2. Furthermore, approximately 50% of the soil is targeted for off-site disposal in the Port's Combined Alternative, which is a significant volume rather than a "limited" volume as described. See International Paper Response to Comment #1.
3	Page 2, Port Concerns with Preferred Alternative S5B, first paragraph, second bullet - "The ISS process significantly increases the volume of contaminated media remaining at the site, and requires raising the elevation of site surfaces within and beyond the limits of contamination to a degree that is expected to interfere with Port operations." On June 30, 2016, Ecology sent the Port an email and a review about the use of heavy equipment at the Port. The Port had submitted information on January 6, March 11, and April 4. In the summary included in the email, Ecology concluded: • The Port will be able to move its crane along the proposed grade of 5 percent for the North Tie Road.	These considerations achieve some mitigation for the impact of the proposed preferred cleanup action alternative on current activities and use of current equipment at the Port. This, however, does not alleviate the Port's concerns that the increased volume of contaminated material and the creation of a mound of solidified contamination material places undue restrictions on the Port's ability to redevelop the property and/or to use different equipment at the property going forward.	Based on Port comments, the grades in Alternative S5B were modified to accommodate Port equipment. On Page 7-25, the Public Review Draft Remedial Investigation (RI)/Feasibility Study (FS) Report states that post-remediation site grades shall not exceed a 2% slope in the transverse direction or a 5% slope in the longitudinal direction along equipment transport routes and in equipment operational areas in order to allow the Port to transport and operate existing equipment. International Paper cannot predict future redevelopment activities at the site and what equipment may be required, and it is unreasonable to expect that information be incorporated into the remedial design. See International Paper Response to Comment #1.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	January 31, 2017 Washington State Department of Ecology (Ecology) Comment	April 14, 2017 Port of Longview (Port) Response	Current International Paper Company (International Paper) Response
	• Based upon the information provided by the Port, the proposed cross-slope of 3 percent north of the Mechanics Shop is too steep for the use of certain heavy equipment and will have to be adjusted to 2 percent for the Port to drive its crane across that area of the MFA. • The slope of 33 percent mentioned by the Port in its January 6 email is 10 to 30 feet from North Tie Road and is located in the TWP Area, where heavy vehicles should not be operated because of the potential to damage existing remedial underground containment structures (the underground slurry wall and the liner covering the Treated Wood Products [TWP] Area). • Slopes of 6 and 10 percent on the north and east sides of the Mechanics Shop would direct stormwater towards the shop. However, International Paper is proposing to install a strip drain that will collect and convey stormwater to the Port's existing stormwater collection system. If the Port has a need to operate the crane next to the Mechanics Shop, then these slopes will require adjustment. See June 30, 2016 email. In response to this analysis, Ecology added language to Section 7.4.7 of the draft feasibility study stating that final post-remediation site grades in the MFA shall allow the Longview to transport and operate existing equipment.		
4	Page 3, Port-Proposed Alternative to Preferred Alternative S5B, first paragraph, seventh bullet - "The general approach of this Port-proposed revised alternative S5B is as follows: Reduce the foot print (vertical and lateral) of necessary deed restrictions that will affect future Port Use of the Site."	See previous responses to comments regarding institutional controls. The Port believes, based on previous conversations with Ecology, that soils (both lateral and vertical) with lower concentrations of site contaminants would not be subject to some of the same restrictions associated with institutional controls if excavation, off-site disposal, and backfill with	It is unclear how the Port Combined Alternative will reduce the lateral footprint required for institutional controls compared to Alternative S5B, because contaminated soils in the Port Combined Alternative will remain within the same footprint as Alternative S5B. See International Paper Responses to Comments #1 and 2 regarding the vertical extent of contaminated materials and International Paper's

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	January 31, 2017 Washington State Department of Ecology (Ecology) Comment	April 14, 2017 Port of Longview (Port) Response	Current International Paper Company (International Paper) Response
	See previous comments on circumstances where institutional controls are required.	clean material would be utilized. This is particularly true in areas where several feet of clean fill currently exists under the ground surface and will be displaced by contaminated, solidified soil if Ecology accepts IP's preferred alternative.	strategy for addressing the Port's concern.
5	Page 4, Cost Analysis of Port-Proposed Alternative to IP Preferred Alternative S5B, first paragraph, first bullet - *"Based on the scope of the alternative described above, the primary cost assumptions are as follows: Solidification of approximately 3 to 4 feet of soil directly above the upper silt. This layer allows a factor of safety that all NAPL impacted soil is treated."* Alternative S5B includes the top foot of the Upper Silt in the treatment volume, addressing contaminated soil found in the Upper Silt and limiting potential breaches of the Upper Silt. The Combined Port Alternative should include the same level of treatment.	The costs for the Port Alternative will be revised to reflect this assumption.	International Paper agrees with Ecology's comment and the Port response.
6	Page 4, Cost Analysis of Port-Proposed Alternative to IP Preferred Alternative S5B, first paragraph, fourth and fifth bullets - • "All excavated soil exceeds MTCA Method B levels, but is eligible for a contained-in determination and disposal as non-hazardous material at a Subtitle C facility or as corrective action management unit (CAMU)-eligible waste. • All excavated soil is assumed to exceed Method C limits, requiring CAMU-eligible disposal at $160/ton (IP FS cost). This is a conservative assumption, as it is expected that some soil immediately below the base material likely does not exceed Method C limits and can be disposed of at a Subtitle D facility for $52/ton (IP FS cost) after a	The February 23, 2010 letter, and supporting tables, clearly presents that soil with concentrations between Method B and Method C levels would be considered "Contained-In Subtitle C" soil, to be disposed of as non-hazardous waste in a Subtitle C facility, which conflicts with this comment. See "Contained-In Subtitle C" tab of Excel spreadsheet. Section 1 of the letter is titled "Offsite disposal using contained-in determinations", and includes the following language: "For soils with contamination above MTCA Method B cleanup levels and below Method C cleanup levels or 10 times the Universal Treatment Standard (UTS) value for the F034-regulated hazardous constituents (whichever is higher), the soil can be disposed of as non-hazardous waste in a hazardous waste facility permitted under Resource Conservation	International Paper agrees with Ecology's comment regarding disposition of excavated soils.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	January 31, 2017 Washington State Department of Ecology (Ecology) Comment	April 14, 2017 Port of Longview (Port) Response	Current International Paper Company (International Paper) Response
	contained-in determination. You can see below how the percentage that does not exceed Method C impacts the cost." Ecology's "contained-in" policy allows disposal of soils with contamination less than Method B levels in a Subtitle D facility. This policy was outlined in an email from Ecology sent to International Paper on February 23, 2010 and forwarded to the Port of Longview on July 29, 2010. See also Ecology's website concerning contained-in determinations. Ecology's 2010 email states that soils with contamination greater than MTCA Method B levels and less than MTCA Method C levels may be disposed of as non-hazardous waste at a Subtitle C facility.	and Recovery Act (RCRA) Subtitle C." Regardless of whether the contained-in language provided by Ecology is accurate, the disposition is the same; soil exceeding Method B levels, but below Method C levels, are assumed to be disposed of as non-hazardous waste at a Subtitle C facility, as indicated in the comment. The description of soil that can be disposed of at a Subtitle D facility in this text makes the statement *"does not exceed Method C limits"* in error; this statement was intended to refer to soil that does not exceed Method B, which can be disposed of at a Subtitle D facility after a contained-in determination.	
7	Page 5, first paragraph – *"Additional cost savings may be realized based on the actual disposal and/or reuse options for excavated soil. Some excavated soil likely meets MTCA Method C, allowing reuse as fill rather than disposal as CAMU-eligible waste ($160/ton). If not used as fill and disposed at Subtitle D facility with a contained-in determination, significant savings can also be achieved; approximately $215,000 for each 25% excavated soil that can be disposed of as Subtitle D waste, versus CAMU-eligible waste."* As stated previously, Ecology's "contained-in" policy allows disposal of soils with contamination less than Method B levels in a Subtitle D facility. As outlined in Ecology's February 23, 2010 email, soils with contamination more than MTCA Method B levels and less than MTCA Method C levels may be disposed of as nonhazardous waste at a Subtitle C facility. Soils with contamination greater than MTCA Method C levels may be disposed of as CAMU-eligible at a Subtitle C facility. If excavated soil with contamination greater than MTCA Method B levels and less than MTCA	This is correct and will be revised in the alternative description. This was intended to say that some excavated soil meets MTCA Method B, allowing reuse or inexpensive disposal at a Subtitle D facility with a contained-in determination. The soil referred to in this statement represents shallow soil with lower contaminant concentrations that could be disposed of inexpensively to mitigate the effect of expansion of the solidification process, and provide clean fill to a reasonable depth below the current ground surface.	Although disposal cost savings can be realized if concentrations are below MTCA Method C or MTCA Method B, additional associated costs for soil segregation, stockpiling, and analytical testing would be incurred and therefore should also be included in the cost estimate. However, this assumption is different than the conservative assumption used in International Paper's FS for all alternatives, which assumed that all soil in the treatment interval would be either treated or excavated and disposed of off site. See International Paper Response to Comment #2 on Attachment 4 (Table 4 below).

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	January 31, 2017 Washington State Department of Ecology (Ecology) Comment	April 14, 2017 Port of Longview (Port) Response	Current International Paper Company (International Paper) Response
	Method C levels is reused as fill, institutional controls will be required (see WAC I73-340-440(4)(b).		

Table 2
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 2

#	Ecology Comment/Issue	Port of Longview Response	International Paper Company Response
General Comment	The cost for the Port Combined Alternative should be revised to reflect Ecology's comments on the costs included Attachment 3 (Combined Port Alternative-All Disposal as CAMU) and Attachment 4 (Combined Port Alternative-2/3 Disposal as CAMU).	The recommended revisions to the costs for the Port Alternative will be incorporated into a revised comparison of the costs of the proposed preferred cleanup action alternative in the current Feasibility Study and a single Port Alternative.	International Paper agrees with Ecology’s comment and the Port response.

Table 3
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Ecology Comment/Issue	Port of Longview Response	International Paper Company (International Paper) Response
General Comment	Review of cost estimates for the "Combined Port Alternative - All Disposal as CAMU" shows that costs for many tasks are the same or proportionally the same (because of less excavation and treatment) as costs proposed by International Paper for Alternative SI and Alternative S5B. However, some of the cost estimates (especially quantities) are significantly different from those proposed by International Paper. Explanations for some of the differences (shoring, management of contaminated groundwater) are provided, but other differences are not acknowledged or explained (stormwater management, asphalt recycling, confirmational testing). The lower amount of direct costs has impacts on some indirect costs that are calculated as percentages of direct costs.	Additional description will be provided for the differences between cost assumptions for the original FS alternative costs and the Port Alternative. The intent of this analysis is not to provide revised cost analyses, but to assemble a combined alternative that utilizes the elements of multiple alternatives in the FS and present costs for that alternative that are based on the assumptions used in the FS alternatives to allow the alternatives to be effectively compared.	International Paper agrees with Ecology's comment. The Port's cost estimate for the combined alternative does not replicate many of the assumptions in the FS. In order to perform an "apples-to-apples" comparison, International Paper has revised the most recent version of the Port's cost estimate for the Port Combined Alternative using all of the assumptions in the FS (see Exhibit B).
1	Remedial Action Construction Tasks # 11 [Install Freeze Wall Shoring for building (200 LF)] and # 12 [Install Freeze Wall/Shoring for excavation perimeter (720 LF)] - A comment box states that the freeze wall could be eliminated because of the shallower depth of excavation. According to the description of the Combined Port Alternative in Attachment 1, excavation would be less deep only in areas over DNAPL-contaminated soils. Areas without DNAPL levels of contamination would be excavated down to the Upper Silt. The amount of shoring and the type of shoring may be changed from the task in Alternative S1 (Comprehensive Excavation), but the need for shoring to protect workers during construction and ensure effective remedy construction is not eliminated. Cost estimates should be provided for Tasks # 11 and # 12.	In Section 7.4.1 of the July 2016 FS text, the assumptions for Alternative S1 indicate that shoring would consist of "Installing a shoring system adjacent to and inside the Mechanics Shop building and adjacent to the TWP barrier wall to support the building foundation and barrier wall during excavation " and that shoring is assumed to be a freeze wall. The location of this shoring is shown on Figure 7-1 of the FS. It isn't clear to the Port why the 720 linear feet (LF) of additional freeze wall shoring is required and assume this is included in error as it differs from what is presented in the text and figures. Freeze wall shoring for the excavation perimeter would be excessively expensive for moderate-depth (10 to 15 feet bgs [below ground surface]) excavation without adjacent structures to protect. For the Port's alternative, the sheet-pile shoring to protect the TWP slurry wall is retained from the FS Alternative S1 as a conservative measure assuming shallow excavation would be performed prior to solidification. This shoring is actually not	The language in Section 7.4.1 and the length of shoring shown on Figure 7-1 are errors that have been corrected in this memorandum submittal. Shoring assumed for Alternative S1 includes a combination of freeze wall and sheet pile which surrounds the entire perimeter of the excavation area (1,020 LF) as included in the costs for Alternative S1 (see Tasks #10, 11, and 12 of the Alternative S1 cost estimate). For purposes of producing the excavation cost estimates, the primary shoring system (920 LF of 1,020 LF) was conservatively assumed to be a freeze wall that would be keyed into the Upper Silt. The freeze wall is believed to provide the following advantages over other shoring systems: • Eliminating perched water infiltration into the excavation from the sidewalls, thus minimizing the collection, treatment, and disposal of an undetermined volume of construction dewatering effluent containing a listed waste • Providing structural support of the Mechanics Shop building foundation during excavation, with

Table 3 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Ecology Comment/Issue	Port of Longview Response	International Paper Company (International Paper) Response
		included in FS Alternative S5B, and may not be required if excavation depths remain relatively shallow. In the down gradient portion of the cleanup area, FS Alternative S5B proposes to excavate soil down to the upper silt and relocated it to another portion of the Site. This excavation is assumed to not require shoring, based on the cost estimate, and the Port Alternative made the same assumption.	minimal vibration during shoring installation As discussed in the public review draft RI/FS report, the shoring system utilized at the site would be selected by the contractor implementing the cleanup action based on a cost/benefit analysis. Installation of a sheet pile wall is assumed to cost more than a freeze wall and would also have additional costs related to contaminated water management. Furthermore, installation of a sheet pile wall will penetrate the Upper Silt, which could lead to migration of contaminants into Aquifer A. There is no ability to seal around the sheet piling during installation or its removal once construction has been completed. Installation of a freeze wall uses traditional drilling techniques to install coolant pipes which can be sealed during installation and upon removal with bentonite chips or grout, similar to procedures used during advancement and decommissioning of soil borings. Shoring was not included in S5B for the perimeter of the solidification area, because only the top 3 feet (overburden) will be excavated and because solidification would be completed in an alternating pattern using large-diameter augers to protect the Mechanics Shop building and the TWP area slurry wall from damage. In the Port Combined Alternative, soils will be excavated to 5 feet bgs for reuse/off-site disposal (this depth of excavation would require shoring), and solidification would be performed from 5 to 9 feet bgs using more readily available earthwork equipment (vs specialty augers) as indicated in Line #1 of the Port Combined Alternative Cost Estimate. This method of solidification is assumed to not provide the structural support required for the Mechanics Shop building and the TWP slurry wall. Because of these factors, shoring will be required for the entire perimeter of the excavation/solidification area in the Port Combined Alternative. A generally accepted conservative rule of thumb to estimate depth of a cantilevered sheet pile wall is 3 times the retained

Table 3 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Ecology Comment/Issue	Port of Longview Response	International Paper Company (International Paper) Response
			height (i.e. 1/3 above and 2/3 below). Therefore, if sheet pile is used, the total depth of shoring is estimated to be 28 feet (3 times the solidification depth of 9 feet plus one additional foot to account for the top of the wall being 1 foot above the ground surface) in the solidification area in the southeastern part of the site, and 25 feet in the excavation area in the northwestern part of the site. However, in order to perform an “apples-to-apples” comparison of costs, International Paper revised the cost estimate for the Port Combined Alternative assuming that freeze wall shoring would be used for the excavation perimeter, except adjacent to the TWP slurry wall where sheet pile wall shoring is assumed (see Exhibit B). In addition, International Paper assumed that large-diameter augers would be used for solidification in the Port Combined Alternative, again to perform and “apples-to-apples” comparison. Using these two assumptions to update the costs for the Port Combined Alternative, the total depth of shoring is estimated to be 13 feet in the solidification area in the southeastern part of the site, 21 feet in the excavation area in the northwestern part of the site (Zone 1), and 16 feet adjacent to the TWP slurry wall. Depth for freeze wall shoring is assumed to be 2.6 times the retained height based on discussions with a vendor. When Alternative S5B was revised based on input received from the Port during the March 27, 2015 meeting, shoring in the northwestern, downgradient portion of the site (Zone 1) was inadvertently left out of the cost estimate. Additional costs for further characterization of shallow soil in Zone 1 to assess whether any soil below 3 feet bgs could be removed from *in situ* solidification treatment was also inadvertently left out of the cost estimate for Alternative S5B. Therefore, the cost estimate for Alternative S5B has been revised to include additional costs for shoring and site characterization, and the updated cost estimate is included in Exhibit A. As

Table 3 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Ecology Comment/Issue	Port of Longview Response	International Paper Company (International Paper) Response
			discussed above, International Paper also revised the cost estimate for the Port Combined Alternative to include the costs for shoring in the northwestern, downgradient area of the site, where soil will be excavated to the Upper Silt (see Exhibit B and Response to General Comment #1).
2	Remedial Action Construction Tasks # 19 [Import of clean fill to site] - The calculation of 2,393 CY of clean fill assumes 40% expansion of solidified soil. Alternative Specific Assumption number 7 for Alternative S5B assumes the volumetric expansion of solidified soilwill be 35%. An explanation should be provided for the difference assumed In volumetric expansion for the Combined Port Alternative.	The increased expansion value is based on the 2012 Treatability Study Report. Volumetric expansion ranged from 26 to 48 percent for the optimization test samples (Section 3.4.3). The lab report for the treatability testing (Appendix G) indicated that the expansion would be dependent on reagent addition rates. The solidification process in the Port Alternative would be focused on the deeper, more heavily impacted soil and would not rely on dilution of this soil by shallow, less contaminated soil. Therefore, the treatment process may require additional additives to account for the higher contaminant concentration. Volumetric expansion would increase if additional additives are required, and therefore is assumed to be on the higher end of the range observed during treatability testing. The samples used for treatability testing were consolidated samples representative of the entire soil column, rather than being representative of the deeper, highly contaminated soil.	No bench-scale testing has been performed specifically for deeper soils that contain non-aqueous phase liquid (NAPL). Therefore, it is not known whether additional additives would be required if only the deeper, more-impacted, soils are solidified. If increased volumetric expansion is assumed because additional reagents are required, then costs for the added reagent mass should be included for the Port Combined Alternative. Conversely, additional expansion of solidified soils would decrease the volume of import material needed for backfill, and corresponding adjustments to cost estimates should also reflect this.
3	Remedial Action Construction Task #20 [Contaminated water handling and Environmental Protection] - The shallower depth of excavation for the Combined Port Alternative would decrease the amount of contaminated water to be managed compared to Alternative S1, but would not totally eliminate the generation of contaminated groundwater. An estimate should be provided in the Combined Port Alternative for this task.	The areas proposed for excavation down to the upper silt in the Port Alternative are expected to be excavated using similar methods as that in the FS Alternative S5B for excavating soil near railroad tracks (Appendix J, Alternative S5B, Line15). Despite the excavation, handling, and relocating of soil included in FS Alternative S5B, the cost estimate does not include contaminated water handling. Therefore, to be consistent, the Port Alternative has not included this potential cost as	When Alternative S5B was revised based on input received from the Port during the March 27, 2015 meeting to incorporate relocation of soil from Zone 1, contaminated water treatment and disposal in the northwestern, downgradient portion of the site was inadvertently left out of the cost estimate. Therefore, the cost estimate for Alternative S5B has been revised to include this, and the updated cost estimate is included in Exhibit A. International Paper also revised the cost estimate for the Port Combined Alternative to

Table 3 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Ecology Comment/Issue	Port of Longview Response	International Paper Company (International Paper) Response
		well.	include these costs (see Exhibit B).
4	The Combined Port Alternative does not include costs for stormwater handling and environmental protection. These activities were included in Alternative S5B as Remedial Action Construction as Task # 14 for a cost of $11,000. This task should be added to the Combined Port Alternative and an estimate should be provided.	This was an oversight in the combination of S1 and S5B and will be added to the Port Alternative to be consistent.	International Paper agrees with Ecology's comment and the Port response.
5	Remedial Action Construction Task #29 [Rebuild Access Road (150 LF)] - The Port's estimated cost for this task is $18,750. However, the unit cost in the December 2015 Feasibility Study to rebuild the access road is $6 per square foot, for a total cost of $22,500. An explanation should be provided for the difference in cost for the Combined Port Alternative.	The unit cost will be revised in the Port Alternative. This unit cost in the FS increased for this item since the Port Alternative cost estimate was originally developed	International Paper agrees with Ecology's comment and the Port response.
6	Contaminated Waste Disposal and Transportation Task #9 [Contaminated water treatment and disposal] - The shallow depth of excavation for the Combined Port Alternative would decrease the amount of contaminated water to be managed, but would not totally eliminate the generation of contaminated groundwater and its need for transport and disposal. A cost estimate should be provided in the Combined Port Alternative for this task.	Similar to the response to comment 3, the down gradient excavation, handling,and relocation proposed in FS Alternative S5B is similar to the excavation, handling, and disposal included in the Port Alternative and both are assumed to not generate contaminated water for disposal.	See Response to Comment #3 regarding addition of contaminated water treatment and disposal.
7	Contaminated Waste Disposal and Transportation Tasks # 10 [Non- Hazardous Material Disposal Costs (Asphalt Recycling)] and #11 [Transportation Costs to Asphalt Recycler] -The quantity of asphalt (320 tons) managed under the Combined Port Alternative is significantly less than the quantity managed under Alternative S1 and Alternative S5B (845 tons) in the December 2015 Feasibility Study. Especially since, under Task # 14 [Remove surface asphalt in storage yard and road] of Remedial	For consistency, the Port Alternative will be revised to match the FS Alternative SI.	International Paper agrees with Ecology's comment and the Port response.

Table 3 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Ecology Comment/Issue	Port of Longview Response	International Paper Company (International Paper) Response
	Action Construction, the Combined Port Alternative shows a similar quantity of surface asphalt removed (32,200 square feet) to the quantities given for Alternative SI and Alternative SSB (32,600 square feet). An explanation should be provided for the difference in quantities used to calculate disposal and transportation costs for asphalt recycling in the Combined Port Alternative.		
8	Engineering Costs (Capital Indirect) Task #8 [Confirmational Sample Collection and Reporting] - The cost for this task in Combined Port Alternative is $15,000. This is half the cost of this task in Alternative S1 ($30,000) and Alternative S5B ($33,000). An explanation should be provided for the difference in cost for the Combined Port Alternative.	The $15,000 used for the Port Alternative was based on the cost listed for a previous version of Alternative S1. This cost will be revised to reflect the updated FS.	International Paper agrees with Ecology's comment and the Port response.

Table 4
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 4

#	Washington State Department of Ecology (Ecology) Comment/Issue	Port of Longview (Port) Response	International Paper Company (International Paper) Response
1	See Ecology's comments on Attachment 3 (Combined Port Alternative - All Disposal as CAMU) including, but not limited to, shoring, handling and disposal of contaminated water, stormwater, transportation and recycling/disposal of asphalt, and confirmational sampling.	See Port's response to comments on Attachment 3. These comments will be incorporated into a single Port Alternative.	See International Paper's Responses on Attachment 3 (Table 3).
2	Contaminated Waste Disposal and Transportation Tasks #7 [Non-Hazardous Material Disposal Costs (Subtitle D)] and #8 [Transportation Costs to Subtitle D Landfill] - Because of incorrect assumptions outlined in Attachment 1 on the use of contained-in determinations, the amounts and disposal options for materials managed at Subtitle D Landfill should be reviewed and revised to reflect Ecology's comments.	The description of likely waste disposal methods will be revised to clarify waste disposal assumptions. However, the assumption is that a small portion of shallow soil within the lateral limits of the cleanup action may meet MTCA Method B cleanup levels and be eligible for Subtitle D disposal using contained-in determinations.	Segregating soil located at depths greater than 3 feet bgs into three categories (soil meeting MTCA Method B cleanup levels, soil meeting MTCA Method C cleanup levels, and soil not meeting MTCA Method C cleanup levels) will result in higher material handling, stockpiling, and analytical testing costs. Soil that meets the MTCA Method B and MTCA Method C cleanup levels is already assumed to be reused at the site. Therefore, it is unclear why costs are included for disposal at a Subtitle D landfill. In order to provide an "apples-to-apples" comparison of the Port Combined Alternative to Alternative S5B (and S1), the Port Combined Alternative cost estimate was revised assuming all excavated soil would be disposed of as CAMU-eligible waste at a Subtitle C landfill.

Exhibit D

Table 1
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13			
1	No quantities are estimated for Task 11 [*Install Freeze Wall Shoring for building (200 linear feet {LF})*]. The notes and assumptions for Task 11 state that the freeze wall is eliminated due to the shallow depth of the excavation and ability to demolish part of the building.	This is correct and intentional; no freeze wall shoring is assumed for the excavation at the building. This line will be deleted to avoid confusion. The use of freeze wall shoring in Alternative S1 through S4 in the *Public Review Draft Maintenance Facility Area (MFA) remedial investigation (RI)/feasibility study (FS)* is described in Section 7.4.1 as having the advantage of eliminating perched water infiltration and providing structural support. Because of the shallow nature of the excavation (approximately 5 feet below ground surface) in the vicinity of the Mechanics Shop in the Port's proposed alternative, freeze wall shoring would not be considered necessary or cost effective. For such a shallow excavation, a low-cost shoring method such as slide rail shoring, H-beam and lagging, or even shallow sheet pile can be used at a cost that would be incidental to the overall excavation and disposal cost (roughly $40,000 for 200 linear feet at $20 per square foot for a 5-foot excavation). In addition, excavation to such a shallow depth is frequently conducted without shoring, by excavating sidewalls at a safe slope. The scope of excavation, and lack of shoring, in the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS* indicates that IP expects to be able to excavate to a depth of 3 feet within the demolished footprint of the Mechanics Shop without the use of expensive shoring methods such as freeze walls, presumably using methods similar to those described above that would be incidental to the excavation cost. As a conservative measure, a separate line for shallow sheet-pile shoring will be added to account for the 2-feet of additional excavation adjacent to the intact portion of the Mechanics Shop below the	Shoring was not included in Alternative S5B for the perimeter of the solidification area, because only the top 3 feet (overburden) will be excavated and because solidification would be completed in an alternating pattern using large-diameter augers to protect the Mechanics Shop building and the TWP area slurry wall from damage. In the Combined Port Alternative, soils will be excavated to 5 feet below ground surface (bgs) for reuse/off-site disposal (this depth of excavation would require shoring in accordance with Washington Administrative Code (WAC) 296-155-657), and solidification would be performed from 5 to 9 feet bgs using more readily available earthwork equipment (vs specialty augers) as indicated in Line #1 of the Combined Port Alternative Cost Estimate. This method of solidification is assumed to not provide the structural support required for the Mechanics Shop building and the Treated Wood Products (TWP) area slurry wall. Because of these factors, shoring will be required for the entire perimeter of the excavation/solidification area in the Combined Port Alternative. If the Port proposes to use a sheet pile wall and bucket mixing of solidification materials, the total depth of shoring is estimated to be 28 feet in the solidification area in the southeastern part of the site, and 25 feet in the excavation area in the northwestern part of the site. To perform an "apples-to-apples" comparison of costs, International Paper revised the cost estimate for the Combined Port Alternative assuming that freeze wall shoring would be used for the excavation perimeter in the southeastern, upgradient area of the site, except adjacent to the TWP slurry wall where sheet pile wall shoring is assumed (see Exhibit B). In addition, solidification using large-diameter augers was also assumed. Using these assumptions, the total depth of shoring is estimated to be 13 feet in the solidification area in the southeastern part of the site,

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
		assumed scope of excavation.	and 21 feet in the excavation area in the northwestern part of the site (Zone 1). Depth for freeze wall shoring is assumed to be 2.6 times the retained height based on discussions with a vendor. The depth of cantilevered sheet pile wall shoring along the TWP slurry is assumed to be 3 times the retained height (i.e. 1/3 above and 2/3 below), which is a generally accepted conservative rule of thumb. One additional foot has been added to the total depth to account for the top of the wall being 1 foot above the ground surface.
2	No quantities are estimated for Task 12 [*Install Freeze Wall Shoring for excavation perimeter (720 LF)*]. The notes and assumptions for Task 12 state that the freeze wall is eliminated consistent with MFA FS Alternative S5B.[1] *Footnote 1 – Excavation in MFA FS Alternative S5B is mostly limited to removing the structural base under asphalt paving.*	This is correct and intentional; no freeze wall shoring is assumed for the excavation perimeter. This line will be deleted to avoid confusion. Similar to the response above, the elimination of freeze wall shoring for the excavation perimeter is based on the proposed depth of the excavation, which would not require such a complex and expensive shoring method, and the space available to complete the shallow excavation using limited shoring or by excavating sidewalls to stable slopes to significantly reduce the cost of safely excavating the soil. In downgradient areas beyond the limits of non-aqueous phase liquid (NAPL) where solidification is eliminated and soil is proposed to be excavated down to the upper silt and disposed of off-site, the depth of excavation remains relatively shallow. This deeper excavation is capable of being completed safely with low-cost shoring methods or by excavating sidewalls at a safe slope, and the Port's alternative assumes that this can be achieved at a cost that is incidental to the excavation cost, and does not require a separate line in the cost estimate. This assumption is consistent with the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* The assertion in Footnote 1 for this comment, which seems to be the basis for most of Ecology's comments, is incorrect. Section 7.4.7 of the *Public*	When Alternative S5B was revised based on input received from the Port during the March 27, 2015 meeting, shoring in the northwestern, downgradient portion of the site was inadvertently left out. Therefore, the cost estimate for Alternative S5B has been revised to include these costs, and the updated costs are included in Exhibit A. The shoring for the Zone 1 excavation area is assumed to be completed using a freeze wall which is 21 feet deep (i.e. 2.6 times the excavation depth of 8 feet). For comparison purposes, International Paper revised the cost estimate for the Combined Port Alternative to include the costs for shoring in the northwestern, downgradient area of the site, where soil will be excavated to the Upper Silt (see Exhibit B). Please also see International Paper Response to Comment #1.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
		Review Draft MFA RI/FS describes the revised version of Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks. In Section 7.4.7 of the *Public Review Draft MFA RI/FS*, the description of the three zones delineated for Alternative S5B clearly indicates that for Zone 1 "*Soil that contains COCs at concentrations exceeding the preliminary cleanup levels in this zone would be excavated to the top of the Upper Silt instead of being solidified in place.*" The area proposed for excavation down to the upper silt is also clearly shown on Figure 7-9 of the *Public Review Draft MFA RI/FS*. The scope and methods assumed for the excavation component of Alternative S5B would be generally the same as the scope of excavation in the Port's proposed alternative, and the assumptions made for this excavation scope in the cost estimate for Alternative S5B are the same as those in the Port's cost estimate. Accordingly, the Port is concerned that Ecology is seeking additional information from the Port while not asking the same from International Paper (IP).	
3	The estimated quantity of Task 13 [*Install Sheet Pile Wall Shoring along slurry wall (100 LF)*] has been reduced from 2,500 square feet (SF) to 1,200 SF with the note that square footage is reduced to account for shallow excavation. "This is likely conservative as excavation in this area would be expected to be shallow and not requiring significant shoring."	This is correct. The depth of excavation in this location is assumed to be roughly half or less relative to the excavation proposed for Alternative S1 in the *Public Review Draft MFA RI/FS*, thus the assumption of 1,200 square feet versus the 2,500 square feet in Alternative S1. However, the unit cost for this sheet pile was preserved, when a lighter weight and lower cost sheet pile, or alternative shoring method, could be used. The costs assumed are considered conservative, due to the unit cost assumed, and the assumption that excavation in this area may be shallower than other areas due to more extensive contamination and more extensive solidification, which is assumed to not require shoring.	For consistency with shoring assumptions for other alternatives, International Paper revised the cost estimate for the Combined Port Alternative to include 100 linear feet of shoring 16 feet deep along the TWP slurry wall. This depth assumes 3 times the excavation depth of 5 feet, and includes an additional foot above the ground surface. Please also see International Paper Response to Comment #1.
4	Under Task 17 [*Excavation and Stockpiling of Contaminated Soil*], it states "Assume excavation from	This is correct. However, the upper 3 feet is excavated as well, but for comparison purposes this	International Paper agrees with Ecology's comment and the Port response. However, International Paper

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
	3 feet to 8 feet below ground surface in northern area without solidification" and "from 3 feet to 5 feet below ground surface in areas where solidification is used."	interval was separated out in a similar manner, using the same unit cost, as the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* Thus, within the footprint of solidification, the pre-solidification excavation is assumed to extend to 5 feet below ground surface. In excavation areas outside the solidification footprint, the excavation is assumed to extend to 8 feet below ground surface.	has adjusted the unit cost for excavation in the Combined Port Alternative from $14/CY to $28/CY to be consistent with Alternative S1. This higher cost incorporates moving and stockpiling the excavated soil.
5	On page 3 of the Memo from Chris Bailey entitled "Revised Port Cleanup Action Alternative for consideration in Public Review Draft Feasibility Study for the MFA Cleanup Action," it states soil below the asphalt paving structural base would be excavated down to the expected upper surface of soil to be solidified, on average approximately 4 feet.	The values represented in this statement were changed to match the updated depths used in the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* This note will be corrected to match the updated assumptions in the cost estimate and state "On average, this is approximately 2 feet, considering an average 9-foot total depth to the top of the upper silt".	There appears to be some inconsistencies in the depth intervals cited both in the Port response and the GeoEngineers memo. The average depth to the Upper Silt is 8 feet, not 9 feet (see Port Response) or 10 feet (see 2nd bullet under "Cost Analysis of Combined Port Alternative to International Paper's Preferred Alternative S5B"). The Combined Port Alternative indicates that soil from 5 feet bgs to 9 feet bgs would be solidified assuming that the depth interval of solidification would be 4 feet, including the upper 1 foot of the Upper Silt and 3 feet of fill directly above the Upper Silt (Page 3 of the cited GeoEngineers Memo). Because the asphalt surface and the base course below the asphalt is approximately 3 feet thick, the remaining 2 feet of soil from 3 to 5 feet bgs would be excavated and disposed of off site as indicated in the Port's response. Furthermore, the following statements are made on the top of Page 3 in the GeoEngineers memo regarding the Combined Port Alternative: • "It prevents the need to alter final elevations and slopes across the site due to vertical expansion of a large solidification volume; and, • It results in clean fill across the site to a depth of 5 to 6 feet..." It is unclear how these two statements can be achieved simultaneously. The Combined Port Alternative assumes a 40% expansion during the solidification process. Therefore, the 4 feet of soil to

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
			be solidified would expand to 5.6 feet after solidification. Therefore, the solidified soil would be present from 3.4 feet to 9 feet bgs. In order to maintain site grades, the depth of clean fill would only be 3.4 feet above the solidified soil, not 5 or 6 feet.
6	Also on page 3 of the Memo from Chris Bailey, it states that solidification will occur in approximately 4 feet of soil.	This is correct. This represents an updated solidification thickness relative to the previous version of the Port alternative that includes the upper 1-foot of the upper silt. Previous versions of the FS, upon which the earlier Port alternative was based, did not include solidification of the upper 1-foot of the upper silt.	International Paper has no additional comments on the Port's response beyond those previously presented above.
7	Page 3 of the Chris Bailey memo has the following statement, "Outside the footprint of the solidification (limited area in the northwest portion of the MFA site outside the lateral limits of NAPL), soil will be excavated down to the upper silt." According to a cross-section the depth of this excavation would be 6 to 7 feet below ground surface. The Port's cost estimate for this area, like the other areas proposed for excavation, does not include shoring.	As described above in the response to the second comment, the scope of excavation in the downgradient portion of the cleanup area, beyond the footprint of solidification, is similar to the excavation proposed in Alternative S5B of the *Public Review Draft MFA RI/FS*, as presented in section 7.4.7 and on Figure 7-9 of that document. For comparison, the Port assumed similar methods and unit costs for the downgradient excavation as assumed by IP for equivalent excavation in the cost estimate for Alternative S5B. The majority of the excavation included in the Port's alternative is relatively shallow and is assumed to be capable of being safely completed using minimal shoring or sloped sidewalls with minimal additional cost beyond the excavation unit cost, as appears to be the assumption for excavation of similar scale included in Alternative S5B of the *Public Review Draft MFA RI/FS*. Accordingly, the Port is concerned that Ecology is seeking additional information from the Port while not asking the same from International Paper (IP). Having different information requirements regarding costs would make it hard to have an apples to apples comparison for purposes of decision making.	See International Paper Response to Comments #1 and 2.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
Review of Remedial Action Construction Capital Costs – Tasks 11, 12, and 13			
1, 2	WAC 296-155-657 (Requirements for protective systems) outlines requirements for protection of employees in excavations. Unless excavations are less than four feet in depth and examination by a competent person provides no indication of a potential cave-in, each employee in an excavation must be protected according to the requirements in -657(2) or (3). WAC 296-155-657(1)(c) states that protective systems "must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system."	The assumption made for the Port alternative is that specific excavation methods, including shoring, would be determined during the design and contracting phases of the cleanup action. These requirements should be action-specific applicable, relevant, and appropriate requirements (ARARs) and should be listed in Table 6-3 of the *Public Review Draft MFA RI/FS.* We assume the same assumption was made in the *Public Review Draft MFA RI/FS* and therefore, that is why Ecology did not include these same comments regarding IP's preferred alternative. Cleanup action design is expected to specify applicable specifications and regulatory requirements for construction methods when the construction methods are not specified. Construction methods would be required to meet State requirements for excavation methods, as well as other construction methods used to complete the cleanup action. This appears to be the assumption of IP as well for preparation of the *Public Review Draft MFA RI/FS*. As stated in Section 7.4.1 of the *Public Review Draft MFA RI/FS*, "Any shoring system utilized at the site would be selected by the contractor implementing the cleanup action".	See International Paper Response to Comments #1 and 2 under "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13". For purposes of producing the excavation cost estimates for Alternative S1, the shoring system was conservatively assumed to be a freeze wall that would be keyed into the Upper Silt. The freeze wall is believed to provide the following advantages over other shoring systems: • Eliminating perched water infiltration into the excavation from the sidewalls, thus minimizing the collection, treatment, and disposal of an undetermined volume of construction dewatering effluent containing a listed waste • Providing structural support of the Mechanics Shop building foundation during excavation, with minimal vibration during shoring installation As discussed in the public review draft RI/FS report, the shoring system utilized at the site would be selected by the contractor implementing the cleanup action based on a cost/benefit analysis. Installation of a sheet pile wall is assumed to cost more than a freeze wall and would also have additional costs related to contaminated water management. Furthermore, installation of a sheet pile wall will penetrate the Upper Silt, which could lead to migration of contaminants into Aquifer A. There is no ability to seal around the sheet piling during installation or its removal once construction has been completed. Installation of a freeze wall uses traditional drilling techniques to install coolant pipes which can be sealed during installation and upon removal with bentonite chips or grout, similar to procedures used during advancement and decommissioning of soil borings. Note that health and safety requirements, such as

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
			those in WAC 296-155-657 are not required to be identified as ARARs in an FS, but must be met during implementation of the remedy.
3	Under the Port's Proposed Alternative, the depth of excavation under Tasks 11, 12, and 13 has the potential to exceed four feet. The Port's proposal needs to be evaluated by a licensed geotechnical engineer to propose and, if the proposal is implemented, design shoring in compliance with WAC 296-155-657. Cost estimates for shoring or other protective systems need to be included in the Port's Proposed Alternative.	Once again, Ecology is asking the Port to undertake additional analysis that was not asked of IP. The expected scope of work associated with this comment goes well beyond that expected for alternatives presented by IP in the *Public Review Draft MFA RI/FS.* The MFA RI/FS does not include an engineered design for excavation or shoring, specifying that "Any shoring system utilized at the site would be selected by the contractor implementing the cleanup action", as described above. This is common practice for feasibility-level analysis of cleanup action alternatives, particularly for incidental elements to the cleanup action construction such as shoring. As described above in the response to bullets 1 and 2 of Ecology's Comments, the specific excavation and shoring methods expected to be used during construction would be either specified during cleanup action design or the technical and regulatory requirements of the methods would be specified in the cleanup action design. The analysis requested in this comment would eventually happen, but not until the design phase of cleanup action planning.	See International Paper Response to Comments #1 and 2 under "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13" and International Paper Response to Comments #1 and 2 under "Review of Remedial Action Construction Capital Costs – Tasks 11, 12, and 13". Although it is common practice not to specify the exact methods of implementing the selected remedy, all costs should be accounted for in cost estimate, especially costs as significant as shoring. Conservative assumptions for shoring have been included in all of the cleanup action alternatives where appropriate and the cost estimate for Alternative S5B has been revised to correct an oversight (see Exhibit A). To fairly compare the Combined Port Alternative, it should also include a comparable level of shoring in its cost estimate.
4	In areas of solidification, even if the depth of excavation is less than four feet, the integrity of the soils at the bottom of the excavation is compromised by the use of earthwork equipment to solidify these soil to a depth of additional four feet.	It isn't clear exactly what the focus is of this comment. The conditions described (pre- excavating surface soil prior to solidification) are commonly present during solidification projects where clean surface soil is present above the contaminated soil targeted for solidification. In addition, the shallow thickness of solidification included in the Port's alternative allows the use of smaller mixing equipment, reducing the disturbance generated by the rig operating the mixing equipment, if operated on the exposed soil surface. The condition described in the comment is similar to	See International Paper Response to Comments #1 and 2 under "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13". The third paragraph of Section 7.4.7 is discussing excavation in Zone 1 (the northwestern, downgradient area of the site). The soil from Zone 1 will be relocated to Zones 2 and 3 for solidification. Soils below 3 feet bgs may be tested to determine whether a portion of this soil is below cleanup levels and can be reused at the site. Regardless of contaminant concentrations, soil will be excavated to approximately 8 feet bgs. As described in previous

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
		the condition expected to be present during the solidification process proposed in Alternative S5B in the *Public Review Draft MFA RI/FS.* In Alternative S5B, and other alternatives in the RI/FS that incorporate soil solidification, approximately 3 feet of clean overburden (asphalt base material) are proposed to be excavated, exposing native soil to be solidified. In addition, in the third paragraph of Section 7.4.7 of the *Public Review Draft MFA RI/FS,* IP indicates that excavation of additional soil below the initial 3 feet is a possibility and does not indicate that this would be create implementability issues with the subsequent solidification; "During the pilot test, further characterization of shallow soil in Zone 1 would be conducted to assess whether any soil below 3 feet bgs could be removed from *in situ* solidification treatment." The Port is again concerned that Ecology's review of and comments concerning its alternative are inconsistent with Ecology's review of IP's preferred alternative. In order to have a fair comparison of alternatives, the same level of analysis should be accorded to each alternative. Regardless, this issue is one that is expected to be addressed during the design and contracting phases of the cleanup action, with the expectation that contractors will propose multiple methods to achieve the cleanup action goals while minimizing short-term risks.	International Paper responses, shoring in Zone 1 of the site was inadvertently left out of costs for Alternative S5B. Therefore, the cost estimate for Alternative S5B has been revised to include shoring costs, and the updated cost estimate is included in Exhibit A. International Paper also revised the cost estimate for the Combined Port Alternative to include the costs for shoring in the northwestern, downgradient area of the site, where soil will be excavated to the Upper Silt, and in the area to be excavated/solidified (see Exhibit B).
5	The use of less shoring next to the slurry wall is of special concern. Materials in the slurry wall are less stable and the lack of protective systems could impact the remedial action used in the Treated Wood Products Area.	This comment is addressed in the response to bullet 3 under the "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13". Further analysis of the need for shoring along the slurry wall will be conducted during design, after additional sampling is completed to determine the depth of excavation and the top of soil requiring solidification, as the shoring method is tied directly to the depth of excavation. The soil alternatives in the *Public Review Draft MFA RI/FS* assume a 25-foot deep sheet-pile wall along the slurry wall for alternatives involving excavation down to the upper silt (S1 through S4),	Note that shoring for Alternatives S1 through S4 assumes use of a freeze wall around the majority of the excavation areas and a sheet pile wall adjacent to the TWP slurry wall. At a minimum, the Port's proposed alternative should include a 16 feet deep sheet pile wall (3 times the excavation depth of 5 feet plus 1 foot above the ground surface) in the southeastern, upgradient part of the site. If solidification mixing is completed with traditional buckets (as described in the Port's proposed alternative) additional shoring depth would be necessary. Alternative S5B does not include shoring

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
		but include no shoring for alternatives involving solidification in this area that include excavation of overburden to a depth of 3 feet prior to solidification (S5 and variations). The Port alternative assumes excavation of only an additional 2-feet of soil relative to the solidification alternatives in the *Public Review Draft MFA RI/FS*, but for cost estimate purposes the Port alternative includes a 12-foot deep sheet-pile wall. As stated above, this element would be further evaluated during design, but the assumed cost is conservative, particularly when compared to the scope of the solidification alternatives in the *Public Review Draft MFA RI/FS.*	along the TWP slurry wall or the Mechanics Shop because specialty augers are assumed to be used to complete solidification. See International Paper Response to Comment #1 under "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13".
6	Ecology requests the Port revise the cost estimates to Tasks 11, 12, and 13 to reflect Ecology's concerns about protecting employees during excavation and solidification activities in the MFA and maintaining the integrity of the slurry wall.	As indicated in the responses above, the current scope of exaction protection in the Port's alternative closely matches the assumptions presented in Alternative S5B in the *Public Review Draft MFA RI/FS.* In particular, the Port's alternative currently matches the assumptions used in Alternative S5B for excavation down to the upper silt in the downgradient portion of the site beyond the limits of solidification in the Port's alternative (generally equivalent to the area of excavation and relocation of soil in the vicinity of the rail line in Alternative S5B). Because of this, adding shoring costs (Task/Item 12 of the Port alternative cost estimate) for this area of excavation, or other areas of similar excavation scope in the Port alternative, is not warranted. The costs included in the Port alternative for shoring along the slurry wall of the TWP site (Task/Line 13 of the Port alternative cost estimate) are already considered relatively conservative. This shoring, or the lack of shoring, will be further evaluated during design after additional data is collected to evaluate the depth of excavation. A significant shoring cost ($54,000 for 100 linear feet of shoring) is included in the Port's alternative to address this location. This is a conservative assumption considering the assumed excavation depth is only 2- feet deeper than the excavation depth proposed to be completed without	See International Paper Response to Comments #1 and 2 under "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13" and International Paper Response to Comments #5 under "Review of Remedial Action Construction Capital Costs – Tasks 11, 12, and 13".

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	May 2, 2017 Washington State Department of Ecology (Ecology) Comment	May 26, 2017 Port of Longview (Port) Response	Current International Paper Company Response
		any shoring under Alternative S5B in the *Public Review Draft MFA RI/FS.* The excavation of soil in the demolished footprint of the Mechanics Shop is proposed to be only 2 feet deeper under the Port alternative than as proposed in Alternative S5B in the *Public Review Draft MFA RI/FS*, which assumes this excavation can be completed without substantial shoring. The additional shoring required for the Port alternative is expected to be minimal, but an additional line will be added to the cost estimate representing the use of shallow sheet pile to achieve a 5-foot excavation cut along the portion of the excavation adjacent to the intact portion of the Mechanics Shop. These explanations for, and changes to, the costs for Lines 11, 12, and 13 should alleviate Ecology's concerns that the methods proposed in the Port's alternative consider construction worker safety at the same level that is considered in IP's alternatives as presented in the *Public Review Draft MFA RI/FS.* Further analysis and design of protection methods would be expected during the design and contracting phases of the cleanup action.	

PORT OF
LONGVIEW
EST. 1921

July 13, 2017

BY FIRST-CLASS MAIL AND ELECTRONIC MAIL

Ms. Maia Bellon
Director
Washington Department of Ecology
Post Office Box 47600
Olympia, Washington 98504-7600

Subject: Port of Longview Maintenance Facility Area
Facility Site ID # 1080
Cleanup Site ID # 3685
Agreed Order DEHS-S437 and Consent Order 97-2-01088-9

Dear Ms. Bellon:

I am writing to express the Port of Longview's continued frustration with the handling of the above-referenced matter by the Washington Department of Ecology ("Ecology") and to request a meeting with you and senior Ecology staff to discuss how to resolve the Port's concerns about the direction of the future cleanup of Port property by International Paper Company ("IP"). The proposed remedial action will occur on Port property in the area designated as the Maintenance Facility Area ("MFA Site").

For more than ten years, the Port has been attempting to work with Ecology and IP to complete the investigation and cleanup of the MFA Site, which was contaminated by IP's historical wood treating operations on neighboring property. There is no dispute that IP is responsible for the investigation and cleanup of the MFA Site. What has been at issue at the MFA Site is whether IP should be allowed to consolidate soils with lower concentrations with soils with higher concentrations and solidify it on-site, thereby leaving behind a significantly increased volume of contaminated material that will directly impact the future redevelopment of the Port's property. The Port has objected to this cleanup approach ever since it learned that IP intended to leave a significant volume of solidified contaminated media on the Port property. The Port's objections have not come without solutions. In fact, the Port has proposed an alternative cleanup strategy that will achieve Ecology's cleanup goals at no additional cost to IP. The latest development has the Port concerned that without engagement at the highest levels of Ecology, a cleanup may be approved that will have a significant, detrimental, long-term economic impact on the Port.

On May 2, 2017, Ecology's project manager, Kaia Peterson, sent the Port Ecology's comments on the Port's cleanup alternative (see Attachment A). Ms. Peterson also requested that the Port revise its cost estimate for shoring. In response, on May 26, 2017, the Port submitted a response to comments that included numerous questions regarding Ecology's statements in Ms. Peterson's May 2, 2017 letter and an update of the Port's cost estimate concerning shoring (see Attachment B). The focus of the Port's comments was to seek clarification of what Ecology was asking of the Port and why Ecology requested shoring cost data when the same requests had not been made to IP even though the Port's cleanup alternative had nearly identical excavation requirements.

In fact, prior to submitting its comments on May 26, 2017, the Port's Director of Planning and Environmental Services, Lisa Hendriksen, was contacted by Ava Edmonson about setting up a call after Ecology had reviewed the Port's comments so that we could discuss the any misunderstanding about the nature of Ecology's May 2, 2017 comments and the disparate treatment between the Port's cleanup alternative and IP's cleanup alternative. Dates were proposed by the Port, however, Ms. Hendriksen was told that Ecology wanted to review the Port's response to comments before meeting with us to discuss the path forward.

To our surprise, on June 5, 2017, Ecology contacted the Port and told us that it was not willing to conference with the Port to discuss the May 2, 2017 comments or the Port's May 26, 2017 response to comments, but that Ecology was proceeding with sending the Port's cleanup alternative to IP for its comments. In addition, despite the fact that the Port provided cost information concerning potential shoring during excavation of contaminated soil, Ecology had its engineer produce a memorandum that outlined the cost for shoring of the excavation area (see Attachment C); which was prepared and vetted in Ecology prior to the date we were to submit our comments. This memorandum prepared by Charles Hoffman makes numerous assumptions that result in a shoring cost estimate in excess of $1 million.

The Port had its consultant, GeoEngineers, review this memorandum and they conclude that the Hoffman memorandum is premature and fails to accurately estimate the type or scope of shoring that may be required if the Port's cleanup alternative is accepted as the preferred alternative (see Attachment D). More importantly, the GeoEngineers memorandum points out that the Port's cleanup alternative has nearly identical excavation requirements as the IP's preferred cleanup alternative, yet Ecology has not requested similar shoring cost information from IP. This is a concrete example of how Ecology staff has not treated the Port's alternative in the same way that it has the IP alternative.

While the Port wanted to share these concerns with Ecology staff, we were told both verbally and via email that Ecology did not want the Port to respond to the Hoffman memo or engage is any further discussions with Ecology about these issues until the matter went out for public comment. By suggesting that the Port's cleanup alternative is expected to have in excess of $1 million in shoring costs, Ecology is creating an uneven playing field for the upcoming public review and comment period. At a minimum, the public should be provided consistent information for both proposals so that Ecology and the public are comparing apples to apples. Here, Ecology has put the Port proposal at a disadvantage in the review and comment process. This leads the Port to believe that Ecology is biased towards the IP cleanup alternative that will leave a significant volume of contaminated media for the Port to address when it redevelops its property. Requiring the Port to have to spend public money in the future to deal with environmental contamination left behind by IP is not good public policy.

For these reasons, the Port requests an immediate meeting with you and senior Ecology staff to address the disparate treatment that the Port has experienced at the MFA Site and to outline a process and plan going forward that achieves the necessary environmental remediation in a fair and cost-effective manner. Please contact me at your earliest convenience to set up a meeting to discuss these issues.

Best Regards,

Norm Krehbiel

Norm Krehbiel
Chief Executive Officer
Port of Longview

Attachments

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call (877) 833-6341

May 2, 2017

Lisa Hendriksen
Director of Planning & Environmental Services
Port of Longview
PO Box 1258
10 Port Way
Longview, WA 98632

Dear Lisa:

The Department of Ecology (Ecology) has reviewed cost estimate in the Port of Longview's submittal of April 14, 2017.

Enclosed are Ecology's comments on Tasks 11, 12, and 13 of the Port's cost estimate. Ecology requests the Port revise the cost estimates for shoring in Tasks 11, 12, and 13 to reflect Ecology's concerns about protecting employees during excavation and solidification activities in the MFA and maintaining the integrity of the slurry wall.

If the Port is unable or unwilling to provide a revised cost estimate for these tasks, Ecology will develop cost estimates before sending the Port's submittal to International Paper for review.

Ava Edmonson will contact you about setting up a conference call to discuss Ecology's comments.

Sincerely,

Kaia Petersen

Kaia Petersen
Department of Ecology
Hazardous Waste and Toxics Reduction
Southwest Regional Office

Enclosure

cc: Norm Krehbiel, Port of Longview
Brien Flanagan, Schwabe, Williamson & Wyatt
Steve Hill, Miller Nash
Chris Bailey, GeoEngineers
Connie Sue Martin, Schwabe, Williamson & Wyatt
John Level, Attorney General's Office
Darin Rice, Department of Ecology
Sally Toteff, Department of Ecology
Ava Edmonson, Department of Ecology
Charles Hoffman, Department of Ecology

Table 1 **Proposed Port of Longview Version of MFA FS Preferred Alternative Cost Estimate, Port of Longview Maintenance Facility Area, Longview, WA**

Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13:

- No quantities are estimated for Task 11 [*Install Freeze Wall Shoring for building (200 LF)*]. The notes and assumptions for Task 11 state that the freeze wall is eliminated due to the shallow depth of the excavation and ability to demolish part of the building.
- No quantities are estimated for Task 12 [*Install Freeze Wall Shoring for excavation perimeter (720 LF)*]. The notes and assumptions for Task 12 state that the freeze wall is eliminated consistent with MFA FS Alternative S5B.[1]
- The estimated quantity of Task 13 [*Install Sheet Pile Wall Shoring along slurry wall (100 LF)*] has been reduced from 2,500 SF to 1,200 SF with the note that square footage is reduced to account for shallow excavation. "This is likely conservative as excavation in this area would be expected to be shallow and not requiring significant shoring."
- Under Task 17 [*Excavation and Stockpiling of Contaminated Soil*], it states "Assume excavation from 3 feet to 8 feet below ground surface in northern area without solidification" and "from 3 feet to 5 feet below ground surface in areas where solidification is used."
- On page 3 of the Memo from Chris Bailey entitled "Revised Port Cleanup Action Alternative for consideration in Public Review Draft Feasibility Study for the MFA Cleanup Action," it states soil below the asphalt paving structural base would be excavated down to the expected upper surface of soil to be solidified, on average approximately 4 feet.
- Also on page 3 of the Memo from Chris Bailey, it states that solidification will occur in approximately 4 feet of soil.
- Page 3 of the Chris Bailey memo has the following statement, "Outside the footprint of the solidification (limited area in the northwest portion of the MFA site outside the lateral limits of NAPL), soil will be excavated down to the upper silt." According to a cross-section the depth of this excavation would be 6 to 7 feet below ground surface. The Port's cost estimate for this area, like the other areas proposed for excavation, does not include shoring.

Review of Remedial Action Construction Capital Costs – Tasks 11, 12, and 13

- WAC 296-155-657 (Requirements for protective systems) outlines requirements for protection of employees in excavations. Unless excavations are less than four feet in depth and examination by a competent person provides no indication of a potential cave-in, each employee in an excavation must be protected according to the requirements in -657(2) or (3).

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[1] Excavation in MFA FS Alternative S5B is mostly limited to removing the structural base under asphalt paving.

- WAC 296-155-657(1)(c) states that protective systems "must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system."

Under the Port's Proposed Alternative, the depth of excavation under Tasks 11, 12, and 13 has the potential to exceed four feet. The Port's proposal needs to be evaluated by a licensed geotechnical engineer to propose and, if the proposal is implemented, design shoring in compliance with WAC 296-155-657. Cost estimates for shoring or other protective systems need to be included in the Port's Proposed Alternative.

In areas of solidification, even if the depth of excavation is less than four feet, the integrity of the soils at the bottom of the excavation is compromised by the use of earthwork equipment to solidify these soil to a depth of additional four feet.

The use of less shoring next to the slurry wall is of special concern. Materials in the slurry wall are less stable and the lack of protective systems could impact the remedial action used in the Treated Wood Products (TWP) Area.

Ecology requests the Port revise the cost estimates to Tasks 11, 12, and 13 to reflect Ecology's concerns about protecting employees during excavation and solidification activities in the MFA and maintaining the integrity of the slurry wall.

Attachment B-1

From: Lisa Hendriksen
To: Edmonson, Ava (ECY)
Bcc: Flanagan, Brien J.; Hill, Steven F.; Christopher L Bailey; Martin, Connie Sue
Subject: POL: IPCo site
Date: Friday, May 12, 2017 3:37:19 PM
Attachments: image001.png

Hi Ava

I look forward to talking with you next Thursday the 18th. I have had a conversation with my team, and we have some clarification questions regarding the letter dated May 2, 2017. We are concerned that what is being asked of the Port in the letter is not consistent with what has been provided in the IPCo Public RI/FS document. This may not be the case, but that is how we are interpreting the comments.

I would like to take you up on the offer to have a conference call with your team and the Port's team to make sure we are understanding what is being asked in the letter so we can provide what Ecology needs in our response.

We have the following times available, if they are not workable on your end, please provide alternated dates and times.

May 22nd	2-4pm
May 23rd	1:30-3pm
May 24th	3-5pm

Thanks

LISA HENDRIKSEN, DIRECTOR OF PLANNING & ENVIRONMENTAL SERVICES
10 PORT WAY, LONGVIEW, WA 98632
P. 360-425-3305 D. 360-703-0207
WWW.PORTOFLONGVIEW.COM | WASHINGTON'S WORKING PORT VIDEO

From:	Lisa Hendriksen
To:	Edmonson, Ava (ECY)
Subject:	POL_IPCo
Date:	Friday, May 26, 2017 1:14:14 PM
Attachments:	image001.png -5.26.17- DRAFT Response to Ecology comments -5-5-17 POL Alternative revisions.pdf

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Greetings Ava

Please find attached a draft comment matrix that outlines the Port's responses to Ecology's comment letter dated May 5, 2017. The Port team developed responses based on what we believe Ecology was seeking clarity on, however, there were a few comments that we felt were unclear as to what the underlying questions was.

Additionally, there were comments posed by Ecology regarding construction techniques for the Port alternative that were not detailed as such in the IPCo Final RI/FS. In the RI/FS, these issues were deferred by stating they would be developed during the construction phase or by the contractor, which we believe is appropriate. The Port is interested in discussing the reasoning behind why Ecology would like the Port to provide this information, especially where similar information was not required of IPCo in its evaluation of alternatives.

Please let us know when you have reviewed our comments and provide some dates/times that we can either have a conference call or in-person meeting to further discuss the Port's comments and our concerns about ensuring a fair comparison with the IPCo FS.

Have a wonderful holiday weekend.

LISA HENDRIKSEN, DIRECTOR OF PLANNING & ENVIRONMENTAL SERVICES
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Table 1
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13		
1	No quantities are estimated for Task 11 [*Install Freeze Wall Shoring for building (200 LF)*]. The notes and assumptions for Task 11 state that the freeze wall is eliminated due to the shallow depth of the excavation and ability to demolish part of the building.	This is correct and intentional; no freeze wall shoring is assumed for the excavation at the building. This line will be deleted to avoid confusion. The use of freeze wall shoring in Alternative S1 through S4 in the *Public Review Draft MFA RI/FS* is described in Section 7.4.1 as having the advantage of eliminating perched water infiltration and providing structural support. Because of the shallow nature of the excavation (approximately 5 feet below ground surface) in the vicinity of the Mechanics Shop in the Port's proposed alternative, freeze wall shoring would not be considered necessary or cost effective. For such a shallow excavation, a low-cost shoring method such as slide rail shoring, H-beam and lagging, or even shallow sheet pile can be used at a cost that would be incidental to the overall excavation and disposal cost (roughly $40,000 for 200 linear feet at $20 per square foot for a 5-foot excavation). In addition, excavation to such a shallow depth is frequently conducted without shoring, by excavating sidewalls at a safe slope. The scope of excavation, and lack of shoring, in the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS* indicates that IP expects to be able to excavate to a depth of 3 feet within the demolished footprint of the Mechanics Shop without the use of expensive shoring methods such as freeze walls, presumably using methods similar to those described above that would be incidental to the excavation cost. As a conservative measure, a separate line for shallow sheet-pile shoring will be added to account for the 2-feet of additional excavation adjacent to the intact portion of the Mechanics Shop below the assumed scope of excavation.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
2	No quantities are estimated for Task 12 [*Install Freeze Wall Shoring for excavation perimeter (720 LF)*]. The notes and assumptions for Task 12 state that the freeze wall is eliminated consistent with MFA FS Alternative SSB.[1] *Footnote 1 – Excavation in MFA FS Alternative S5B is mostly limited to removing the structural base under asphalt paving.*	This is correct and intentional; no freeze wall shoring is assumed for the excavation perimeter. This line will be deleted to avoid confusion. Similar to the response above, the elimination of freeze wall shoring for the excavation perimeter is based on the proposed depth of the excavation, which would not require such a complex and expensive shoring method, and the space available to complete the shallow excavation using limited shoring or by excavating sidewalls to stable slopes to significantly reduce the cost of safely excavating the soil. In downgradient areas beyond the limits of NAPL where solidification is eliminated and soil is proposed to be excavated down to the upper silt and disposed of off-site, the depth of excavation remains relatively shallow. This deeper excavation is capable of being completed safely with low-cost shoring methods or by excavating sidewalls at a safe slope, and the Port's alternative assumes that this can be achieved at a cost that is incidental to the excavation cost, and does not require a separate line in the cost estimate. This assumption is consistent with the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* The assertion in Footnote 1 for this comment, which seems to be the basis for most of Ecology's comments, is incorrect. Section 7.4.7 of the *Public Review Draft MFA RI/FS* describes the revised version of Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks. In Section 7.4.7 of the *Public Review Draft MFA RI/FS*, the description of the three zones delineated for Alternative S5B clearly indicates that for Zone 1 "*Soil that contains COCs at concentrations exceeding the preliminary cleanup levels in this zone would be excavated to the top of the Upper Silt instead of being solidified in place.*" The area proposed for excavation down to the upper silt is also clearly shown on Figure 7-9 of the *Public Review Draft MFA RI/FS*. The scope and methods assumed for the excavation component of Alternative S5B would be generally the same as the scope of excavation in the Port's proposed alternative, and the assumptions made for this excavation scope in the cost estimate for Alternative S5B are the same as those in the Port's cost estimate. Accordingly, the Port is concerned that Ecology is seeking additional information from the Port while not asking the same from International Paper (IP).

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
3	The estimated quantity of Task 13 [*Install Sheet Pile Wall Shoring along slurry wall (100 LF)*] has been reduced from 2,500 SF to 1,200 SF with the note that square footage is reduced to account for shallow excavation. "This is likely conservative as excavation in this area would be expected to be shallow and not requiring significant shoring."	This is correct. The depth of excavation in this location is assumed to be roughly half or less relative to the excavation proposed for Alternative S1 in the *Public Review Draft MFA RI/FS*, thus the assumption of 1,200 square feet versus the 2,500 square feet in Alternative S1. However, the unit cost for this sheet pile was preserved, when a lighter weight and lower cost sheet pile, or alternative shoring method, could be used. The costs assumed are considered conservative, due to the unit cost assumed, and the assumption that excavation in this area may be shallower than other areas due to more extensive contamination and more extensive solidification, which is assumed to not require shoring.
4	Under Task 17 [*Excavation and Stockpiling of Contaminated Soil*], it states "Assume excavation from 3 feet to 8 feet below ground surface in northern area without solidification" and "from 3 feet to 5 feet below ground surface in areas where solidification is used."	This is correct. However, the upper 3 feet is excavated as well, but for comparison purposes this interval was separated out in a similar manner, using the same unit cost, as the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS*. Thus, within the footprint of solidification, the pre-solidification excavation is assumed to extend to 5 feet below ground surface. In excavation areas outside the solidification footprint, the excavation is assumed to extend to 8 feet below ground surface.
5	On page 3 of the Memo from Chris Bailey entitled "Revised Port Cleanup Action Alternative for consideration in Public Review Draft Feasibility Study for the MFA Cleanup Action," it states soil below the asphalt paving structural base would be excavated down to the expected upper surface of soil to be solidified, on average approximately 4 feet.	The values represented in this statement were changed to match the updated depths used in the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* This note will be corrected to match the updated assumptions in the cost estimate and state "On average, this is approximately 2 feet, considering an average 9-foot total depth to the top of the upper silt".
6	Also on page 3 of the Memo from Chris Bailey, it states that solidification will occur in approximately 4 feet of soil.	This is correct. This represents an updated solidification thickness relative to the previous version of the Port alternative, that includes the upper 1-foot of the upper silt. Previous versions of the FS, upon which the earlier Port alternative was based, did not include solidification of the upper 1-foot of the upper silt.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
7	Page 3 of the Chris Bailey memo has the following statement, "Outside the footprint of the solidification (limited area in the northwest portion of the MFA site outside the lateral limits of NAPL), soil will be excavated down to the upper silt." According to a cross-section the depth of this excavation would be 6 to 7 feet below ground surface. The Port's cost estimate for this area, like the other areas proposed for excavation, does not include shoring.	As described above in the response to the second comment, the scope of excavation in the downgradient portion of the cleanup area, beyond the footprint of solidification, is similar to the excavation proposed in Alternative S5B of the *Public Review Draft MFA RI/FS*, as presented in section 7.4.7 and on Figure 7-9 of that document. For comparison, the Port assumed similar methods and unit costs for the downgradient excavation as assumed by IP for equivalent excavation in the cost estimate for Alternative S5B. The majority of the excavation included in the Port's alternative is relatively shallow and is assumed to be capable of being safely completed using minimal shoring or sloped sidewalls with minimal additional cost beyond the excavation unit cost, as appears to be the assumption for excavation of similar scale included in Alternative S5B of the *Public Review Draft MFA RI/FS*. Accordingly, the Port is concerned that Ecology is seeking additional information from the Port while not asking the same from International Paper (IP). Having different information requirements regarding costs would make it hard to have an apples to apples comparison for purposes of decision making.
Review of Remedial Action Construction Capital Costs – Tasks 11, 12, and 13		
1, 2	WAC 296-155-657 (Requirements for protective systems) outlines requirements for protection of employees in excavations. Unless excavations are less than four feet in depth and examination by a competent person provides no indication of a potential cave-in, each employee in an excavation must be protected according to the requirements in -657(2) or (3). WAC 296-155-657(1)(c) states that protective systems "must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system."	The assumption made for the Port alternative is that specific excavation methods, including shoring, would be determined during the design and contracting phases of the cleanup action. These requirements should be action-specific ARARs and should be listed in Table 6-3 of the *Public Review Draft MFA RI/FS*. We assume the same assumption was made in the *Public Review Draft MFA RI/FS* and therefore, that is why Ecology did not include these same comments regarding IP's preferred alternative. Cleanup action design is expected to specify applicable specifications and regulatory requirements for construction methods when the construction methods are not specified. Construction methods would be required to meet State requirements for excavation methods, as well as other construction methods used to complete the cleanup action. This appears to be the assumption of IP as well for preparation of the *Public Review Draft MFA RI/FS*. As stated in Section 7.4.1 of the *Public Review Draft MFA RI/FS*, "Any shoring system utilized at the site would be selected by the contractor implementing the cleanup action".

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
3	Under the Port's Proposed Alternative, the depth of excavation under Tasks 11, 12, and 13 has the potential to exceed four feet. The Port's proposal needs to be evaluated by a licensed geotechnical engineer to propose and, if the proposal is implemented, design shoring in compliance with WAC 296-155-657. Cost estimates for shoring or other protective systems need to be included in the Port's Proposed Alternative.	Once again, Ecology is asking the Port to undertake additional analysis that was not asked of IP. The expected scope of work associated with this comment goes well beyond that expected for alternatives presented by IP in the *Public Review Draft MFA RI/FS.* The MFA RI/FS does not include an engineered design for excavation or shoring, specifying that "Any shoring system utilized at the site would be selected by the contractor implementing the cleanup action", as described above. This is common practice for feasibility-level analysis of cleanup action alternatives, particularly for incidental elements to the cleanup action construction such as shoring. As described above in the response to bullets 1 and 2 of Ecology's Comments, the specific excavation and shoring methods expected to be used during construction would be either specified during cleanup action design or the technical and regulatory requirements of the methods would be specified in the cleanup action design. The analysis requested in this comment would eventually happen, but not until the design phase of cleanup action planning.
4	In areas of solidification, even if the depth of excavation is less than four feet, the integrity of the soils at the bottom of the excavation is compromised by the use of earthwork equipment to solidify these soil to a depth of additional four feet.	It isn't clear exactly what the focus is of this comment. The conditions described (pre-excavating surface soil prior to solidification) are commonly present during solidification projects where clean surface soil is present above the contaminated soil targeted for solidification. In addition, the shallow thickness of solidification included in the Port's alternative allows the use of smaller mixing equipment, reducing the disturbance generated by the rig operating the mixing equipment, if operated on the exposed soil surface. The condition described in the comment is similar to the condition expected to be present during the solidification process proposed in Alternative S5B in the *Public Review Draft MFA RI/FS.* In Alternative S5B, and other alternatives in the RI/FS that incorporate soil solidification, approximately 3 feet of clean overburden (asphalt base material) are proposed to be excavated, exposing native soil to be solidified. In addition, in the third paragraph of Section 7.4.7 of the *Public Review Draft MFA RI/FS,* IP indicates that excavation of additional soil below the initial 3 feet is a possibility and does not indicate that this would be create implementability issues with the subsequent solidification; "During the pilot test, further characterization of shallow soil in Zone 1 would be conducted to assess whether any soil below 3 feet bgs could be removed from in situ solidification treatment." The Port is again concerned that Ecology's review of and comments concerning its alternative are inconsistent with Ecology's review of IP's preferred alternative. In order to have a fair comparison of alternatives, the same level of analysis should be accorded to each alternative. Regardless, this issue is one that is expected to be addressed during the design and contracting phases of the cleanup action, with the expectation that contractors will propose multiple methods to achieve the cleanup action goals while minimizing short-term risks.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
5	The use of less shoring next to the slurry wall is of special concern. Materials in the slurry wall are less stable and the lack of protective systems could impact the remedial action used in the Treated Wood Products (TWP) Area.	This comment is addressed in the response to bullet 3 under the "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13". Further analysis of the need for shoring along the slurry wall will be conducted during design, after additional sampling is completed to determine the depth of excavation and the top of soil requiring solidification, as the shoring method is tied directly to the depth of excavation. The soil alternatives in the *Public Review Draft MFA RI/FS* assume a 25-foot deep sheet-pile wall along the slurry wall for alternatives involving excavation down to the upper silt (S1 through S4), but include no shoring for alternatives involving solidification in this area that include excavation of overburden to a depth of 3 feet prior to solidification (S5 and variations). The Port alternative assumes excavation of only an additional 2-feet of soil relative to the solidification alternatives in the *Public Review Draft MFA RI/FS*, but for cost estimate purposes the Port alternative includes a 12-foot deep sheet-pile wall. As stated above, this element would be further evaluated during design, but the assumed cost is conservative, particularly when compared to the scope of the solidification alternatives in the *Public Review Draft MFA RI/FS*.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
6	Ecology requests the Port revise the cost estimates to Tasks 11, 12, and 13 to reflect Ecology's concerns about protecting employees during excavation and solidification activities in the MFA and maintaining the integrity of the slurry wall.	As indicated in the responses above, the current scope of exaction protection in the Port's alternative closely matches the assumptions presented in Alternative S5B in the *Public Review Draft MFA RI/FS.* In particular, the Port's alternative currently matches the assumptions used in Alternative S5B for excavation down to the upper silt in the downgradient portion of the site beyond the limits of solidification in the Port's alternative (generally equivalent to the area of excavation and relocation of soil in the vicinity of the rail line in Alternative S5B). Because of this, adding shoring costs (Task/Item 12 of the Port alternative cost estimate) for this area of excavation, or other areas of similar excavation scope in the Port alternative, is not warranted. The costs included in the Port alternative for shoring along the slurry wall of the TWP site (Task/Line 13 of the Port alternative cost estimate) are already considered relatively conservative. This shoring, or the lack of shoring, will be further evaluated during design after additional data is collected to evaluate the depth of excavation. A significant shoring cost ($54,000 for 100 linear feet of shoring) is included in the Port's alternative to address this location. This is a conservative assumption considering the assumed excavation depth is only 2-feet deeper than the excavation depth proposed to be completed without any shoring under Alternative S5B in the *Public Review Draft MFA RI/FS.* The excavation of soil in the demolished footprint of the Mechanics Shop is proposed to be only 2 feet deeper under the Port alternative than as proposed in Alternative S5B in the *Public Review Draft MFA RI/FS*, which assumes this excavation can be completed without substantial shoring. The additional shoring required for the Port alternative is expected to be minimal, but an additional line will be added to the cost estimate representing the use of shallow sheet pile to achieve a 5-foot excavation cut along the portion of the excavation adjacent to the intact portion of the Mechanics Shop. These explanations for, and changes to, the costs for Lines 11, 12, and 13 should alleviate Ecology's concerns that the methods proposed in the Port's alternative consider construction worker safety at the same level that is considered in IP's alternatives as presented in the *Public Review Draft MFA RI/FS.* Further analysis and design of protection methods would be expected during the design and contracting phases of the cleanup action.

From:	Petersen, Kaia (ECY)
To:	Lisa Hendriksen; Norm Krehbiel; Chris L. Bailey (cbailey@geoengineers.com); Steven F. Hill (Steve.Hill@MillerNash.com); Brien J. Flanagan - SCHWABE, WILLIAMSON & WYATT (BFlanagan@SCHWABE.com); Connie Sue Martin (CSMartin@SCHWABE.com)
Cc:	Level, John (ATG); Rice, Darin (ECY); Toteff, Sally (ECY); Edmonson, Ava (ECY); Hoffman, Charles (ECY); Graber, Kerry (ECY)
Subject:	FW: Opportunity to comment on the Port of Longview''s preferred alternative for the Maintenance Facility Area
Date:	Monday, June 05, 2017 1:06:08 PM
Attachments:	International Paper Longview Site.msg FW POL IPCo.msg POL Response to Ecology Letter .msg RE MFA alternative proposal.msg

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Lisa and Norm – Here is the first of two emails that we sent to International Paper.

We are not asking for comments from the Port of Longview at this time. The Port, and International Paper, will have additional opportunity to comment on the Port's alternative and the July 12, 2016 Feasibility Study Report during the public comment period planned for July.

If you have any questions, please call me.

Kaia Petersen

From: Petersen, Kaia (ECY)
Sent: Monday, June 05, 2017 12:58 PM
To: Philip Slowiak (philip.slowiak@ipaper.com) <philip.slowiak@ipaper.com>; Paul Kalina (paul.kalina@aecom.com) <paul.kalina@aecom.com>; Cermak, John F. <jcermak@bakerlaw.com>; Steven J. Ginski (Steve.Ginski@ipaper.com) <Steve.Ginski@ipaper.com>
Cc: Level, John (ATG) <JohnL3@ATG.WA.GOV>; Rice, Darin (ECY) <dric461@ECY.WA.GOV>; Toteff, Sally (ECY) <STOT461@ECY.WA.GOV>; Edmonson, Ava (ECY) <AEDM461@ECY.WA.GOV>; Hoffman, Charles (ECY) <chof461@ECY.WA.GOV>; Graber, Kerry (ECY) <KGRA461@ECY.WA.GOV>
Subject: FW: Opportunity to comment on the Port of Longview's preferred alternative for the Maintenance Facility Area

Apologies. Size of emails still too large. This is the first of two emails.

Kaia

From: Petersen, Kaia (ECY)
Sent: Monday, June 05, 2017 12:54 PM
To: 'philip.slowiak@ipaper.com' <philip.slowiak@ipaper.com>; 'paul.kalina@aecom.com' <paul.kalina@aecom.com>; 'jcermak@bakerlaw.com' <jcermak@bakerlaw.com>; 'Steve.Ginski@ipaper.com' <Steve.Ginski@ipaper.com>
Cc: Level, John (ATG) <JohnL3@ATG.WA.GOV>; Rice, Darin (ECY) <dric461@ECY.WA.GOV>; Toteff, Sally (ECY) <STOT461@ECY.WA.GOV>; Edmonson, Ava (ECY) <AEDM461@ECY.WA.GOV>; Hoffman, Charles (ECY) <chof461@ECY:WA.GOV>; Graber, Kerry (ECY) <KGRA461@ECY.WA.GOV>
Subject: FW: Opportunity to comment on the Port of Longview's preferred alternative for the

Maintenance Facility Area

First of two emails. Resending because of size of emails.

Kaia

From: Petersen, Kaia (ECY)
Sent: Monday, June 05, 2017 12:35 PM
To: Philip Slowiak (philip.slowiak@ipaper.com) <philip.slowiak@ipaper.com>; Paul Kalina (paul.kalina@aecom.com) <paul.kalina@aecom.com>; Cermak, John F. <jcermak@bakerlaw.com>; Steven J. Ginski (Steve.Ginski@ipaper.com) <Steve.Ginski@ipaper.com>
Cc: Level, John (ATG) <JohnL3@ATG.WA.GOV>; Rice, Darin (ECY) <dric461@ECY.WA.GOV>; Toteff, Sally (ECY) <STOT461@ECY.WA.GOV>; Edmonson, Ava (ECY) <AEDM461@ECY.WA.GOV>; Hoffman, Charles (ECY) <chof461@ECY.WA.GOV>; Graber, Kerry (ECY) <KGRA461@ECY.WA.GOV>
Subject: Opportunity to comment on the Port of Longview's preferred alternative for the Maintenance Facility Area

Phil - The purpose of this email is to provide International Paper an opportunity to comment on the Port of Longview's preferred alternative for remediation of the Maintenance Facility Area.

International Paper, and the Port of Longview, will have additional opportunity to comment on the Port's alternative and the July 12, 2016 Feasibility Study Report during the public comment period planned for July.

Attached to this email are copies of a number of emails, including:

- September 27, 2016 from Lisa Hendriksen to Ava Edmonson and me, transmitting the Port of Longview's preferred alternative for the MFA site
- January 31, 2017 email from Lorna Gadwa to Lisa Hendriksen, transmitting the Department of Ecology's comments on the Port of Longview's September 27, 2016 submittal
- February 28, 2017 email from Kay Syravong to Sally Toteff and John Level, transmitting letter from Brien Flanagan regarding Ecology's January 31 comments
- March 7, 2017 email from John Level to Brien Flanagan in response to Brien's February 28 letter to Sally Toteff and John
- April 14, 2017 email from Lisa Hendriksen to me, transmitting the Port of Longview's proposed alternative for remediation of the MFA site and response to comments in Ecology's January 31 letter
- May 2, 2017 email from Lorna Gadwa to Lisa Hendriksen, transmitting Department of Ecology's comments on cost estimates for shoring in the Port of Longview's proposed alternative for the MFA site
- May 25, 2017 memo and figures from Charles Hoffman to me with cost estimates for shoring
- May 30, 2017 email from Ava Edmonson to me, forwarding May 26 email from Lisa Hendriksen to Ava with draft comment matrix with responses to Ecology's comment letter dated May 5

The May 25 memo prepared by Charles Hoffman is conservative and may change based on input from International Paper and additional evaluation by Charles. He is out of the office until June 13.

We would like International Paper to focus their review on the documents dated January 31, April 14, May 2, and May 30.

We are asking for International Paper's comments by June 26, 2017.

If you have any questions about this email, please contact me.

Kaia Petersen
Department of Ecology
Hazardous Waste and Toxics Reduction
Southwest Reginal Office
360/407-6359

Attachment C-2

From: Petersen, Kaia (ECY)
To: Lisa Hendriksen; Norm Krehbiel; Chris L. Bailey (cbailey@geoengineers.com); Steven F. Hill (Steve.Hill@MillerNash.com); Brien J. Flanagan - SCHWABE, WILLIAMSON & WYATT (BFlanagan@SCHWABE.com); Connie Sue Martin (CSMartin@SCHWABE.com)
Cc: Level, John (ATG); Rice, Darin (ECY); Toteff, Sally (ECY); Edmonson, Ava (ECY); Hoffman, Charles (ECY); Graber, Kerry (ECY)
Subject: FW: Opportunity to comment on the Port of Longview"s preferred alternative for the Maintenance Facility Area
Date: Monday, June 05, 2017 1:08:08 PM
Attachments: Port of Longview Combined Port Alternative Clean-up 20160927 Review.msg
Port of Longview TPH TWP Sites IWOV-PDX.FID3928929.msg
Memo Chuck Hoffman shoring cost estimate 2017 05 25.pdf
Figures Chuck Hoffman shoring cost estimate 2017 05 25.pdf
Port of Longview Cost Estimate Review 20170502.msg

Lisa and Norm – Here is the second of two emails that we sent to International Paper.

We are not asking for comments from the Port of Longview at this time. The Port, and International Paper, will have additional opportunity to comment on the Port's alternative and the July 12, 2016 Feasibility Study Report during the public comment period planned for July.

If you have any questions, please call me.

Kaia Petersen

From: Petersen, Kaia (ECY)
Sent: Monday, June 05, 2017 1:00 PM
To: Philip Slowiak (philip.slowiak@ipaper.com) <philip.slowiak@ipaper.com>; Paul Kalina (paul.kalina@aecom.com) <paul.kalina@aecom.com>; Cermak, John F. <jcermak@bakerlaw.com>; Steven J. Ginski (Steve.Ginski@ipaper.com) <Steve.Ginski@ipaper.com>
Cc: Level, John (ATG) <JohnL3@ATG.WA.GOV>; Rice, Darin (ECY) <dric461@ECY.WA.GOV>; Toteff, Sally (ECY) <STOT461@ECY.WA.GOV>; Edmonson, Ava (ECY) <AEDM461@ECY.WA.GOV>; Hoffman, Charles (ECY) <chof461@ECY.WA.GOV>; Graber, Kerry (ECY) <KGRA461@ECY.WA.GOV>
Subject: FW: Opportunity to comment on the Port of Longview's preferred alternative for the Maintenance Facility Area

Second of two emails. Resending because of size of emails.

Kaia

From: Petersen, Kaia (ECY)
Sent: Monday, June 05, 2017 12:35 PM
To: Philip Slowiak (philip.slowiak@ipaper.com) <philip.slowiak@ipaper.com>; Paul Kalina (paul.kalina@aecom.com) <paul.kalina@aecom.com>; Cermak, John F. <jcermak@bakerlaw.com>; Steven J. Ginski (Steve.Ginski@ipaper.com) <Steve.Ginski@ipaper.com>
Cc: Level, John (ATG) <JohnL3@ATG.WA.GOV>; Rice, Darin (ECY) <dric461@ECY.WA.GOV>; Toteff, Sally (ECY) <STOT461@ECY.WA.GOV>; Edmonson, Ava (ECY) <AEDM461@ECY.WA.GOV>; Hoffman, Charles (ECY) <chof461@ECY.WA.GOV>; Graber, Kerry (ECY) <KGRA461@ECY.WA.GOV>
Subject: Opportunity to comment on the Port of Longview's preferred alternative for the

Maintenance Facility Area

Phil - The purpose of this email is to provide International Paper an opportunity to comment on the Port of Longview's preferred alternative for remediation of the Maintenance Facility Area.

International Paper, and the Port of Longview, will have additional opportunity to comment on the Port's alternative and the July 12, 2016 Feasibility Study Report during the public comment period planned for July.

Attached to this email are copies of a number of emails, including:

- September 27, 2016 from Lisa Hendriksen to Ava Edmonson and me, transmitting the Port of Longview's preferred alternative for the MFA site
- January 31, 2017 email from Lorna Gadwa to Lisa Hendriksen, transmitting the Department of Ecology's comments on the Port of Longview's September 27, 2016 submittal
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- May 25, 2017 memo and figures from Charles Hoffman to me with cost estimates for shoring
- May 30, 2017 email from Ava Edmonson to me, forwarding May 26 email from Lisa Hendriksen to Ava with draft comment matrix with responses to Ecology's comment letter dated May 5

The May 25 memo prepared by Charles Hoffman is conservative and may change based on input from International Paper and additional evaluation by Charles. He is out of the office until June 13.

We would like International Paper to focus their review on the documents dated January 31, April 14, May 2, and May 30.

We are asking for International Paper's comments by June 26, 2017.

If you have any questions about this email, please contact me.

Kaia Petersen
Department of Ecology
Hazardous Waste and Toxics Reduction
Southwest Reginal Office
360/407-6359

Attachment C-3

MEMORANDUM

TO: Kaia Petersen, International Paper Site Manager

FROM: Charles Hoffman, P.E. CH

SUBJECT: Shoring Cost Estimate for Excavation/Solidification of Contaminated Soils, Port of Longview's Proposal

DATE: May 25, 2017

The Port of Longview's (Port) proposal combines cleanup alternatives presented in the draft Feasibility Study submitted by International Paper. The Port's proposal is described in an April 14, 2017, memorandum from Chris Bailey, GeoEngineers, to the Port. This proposal consists of excavation and in situ stabilization/solidification (ISS) of contaminated soils and includes an estimate of construction costs.

State regulation, WAC 296-155-657, requires systems, such as shoring or sloping, to protect construction workers from cave-in of sidewalls when an excavation is greater than 4 feet deep. The proposal from the Port includes excavation of soils at depths greater than 4 feet below ground surface. However, the proposal does not include protective measures to prevent cave-in in the areas of excavation except for 120 linear feet of sheet pile shoring adjacent to an existing slurry wall.

If the Port's proposal is chosen as the cleanup alternative for implementation, then, prior to construction, the Port will be required to submit a geotechnical report by a licensed professional engineer that examines the need for, and recommends, protective measures related to excavation.

Based on my understanding of the cleanup work proposed in GeoEngineers' memorandum to the Port and using geologic cross sections (Figures 3-2 to 3-5), by AECOM (International Paper's consultant), I estimated a cost for a sheet pile shoring system. I separated the proposal into two areas, the north area proposed for excavation and offsite disposal (shown in light purple in the Port's drawing) and the south area that includes excavation and ISS.

The site soils consist of gravel fill, sand, and silt. For the north area, I assumed a sheet pile depth below the dredge line (bottom of the excavation) of two times the depth of the excavation ("Steel Sheet Piling Design Manual", United States Steel, July 1984). Using information in the GeoEngineers' memorandum, I assumed an average excavated depth of 6.5 feet. This results in a sheet pile vertical length of 19.5 feet. The perimeter length for the north area excavation is approximately 370 feet and the total area of the sheet pile wall would be approximately 7200 square feet.

The Port's proposal for the south area is to excavate to a depth of approximately 4 feet below ground surface and then stabilize and solidify the next 4 feet of soils with cement and bentonite clay using "readily available earthwork equipment". (See Table 1, Item No. 1 of Geoengineer's memorandum.) I assume that "readily available earthwork equipment" refers to an excavator rather than an auger system often used for ISS. If an excavator is used for mixing the contaminated soils and the additives, then the soil will be destabilized below the depth of initial excavation, at least temporarily.

If an auger system was used for ISS, the proposed depth of the excavation may not require protective measures to prevent cave-in. However, with the assumption that an excavator would be used for mixing, then a protective measure could be required to stabilize the sidewalls of the excavated area. The depth of soil disturbance (excavation and mixing) is about 8 feet. For this estimation, I assumed the sheet pile would extend 8 feet below the lower elevation of the work for total vertical length of 16 feet. From the drawing I measured the perimeter of the south work area to be 725 feet. This does not include 40 feet that separates the north and south areas and the sheet pile wall adjacent to the slurry wall that is included in GeoEngineers' proposal. Using a sheet pile height of 16 feet, the surface area of a sheet pile wall for the south area is 11,600 square feet.

GeoEngineer's used a unit cost of $45 per square foot (Table 1, Item No.13) for the sheet pile wall adjacent to the slurry wall. Using the same sheet pile unit cost, the total construction cost for the additional sheet pile wall is presented in the following table:

	Perimeter Length (ft)	**Sheet Pile Vertical Length (ft)**	**Sheet Pile Area (ft^2)**	**Sheet Pile Estimated Cost ($45/$ft^2$)**
North Area	370	19.5	7,200	325,000
South Area	725	16.0	11,600	522,000
			Estimated Construction Cost	$847,000
			Contingency, Engineering, etc. (25 percent)	$212,000
			Sales Tax (8 percent)	$68,000
			Estimated Total Cost	**$1,127,000**

Again, this cost estimate is based on limited information and I had to make assumptions for the overall height of the sheet pile shoring system. A geotechnical engineer will consider additional protective measure alternatives, such as sloping, to evaluate compliance with WAC 296-155-657 and will provide a more accurate cost estimate of the method chosen to protect workers in and around the excavated areas.

Attachment D

GEOENGINEERS

MEMORANDUM

PLAZA 600 BUILDING, 600 STEWART STREET, SUITE 1700, SEATTLE, WA 98101, TELEPHONE: (206) 728-2674, FAX: (206) 728-2732 www.geoengineers.com

TO: Port of Longview

FROM: Chris Bailey, P.E.

DATE: June 15, 2017

FILE: File 242-010-03

SUBJECT: Review of May 25, 2017 Ecology Shoring Evaluation

GeoEngineers has prepared this memorandum in response to the May 25, 2017 internal Ecology document from Charles Hoffman to Kaia Peterson titled "Shoring Cost Estimate for Excavation/Solidification of Contaminated Soils, Port of Longview's Proposal" that was provided to the Port of Longview and International Paper by Ecology on June 5, 2017. The document prepared by Mr. Hoffman appears to be in response to a request by Kaia Peterson to evaluate the cost of shoring for the Port's proposed preferred cleanup action alternative that was most recently provided to Ecology in an April 14, 2017 letter from the Port. This memorandum is not intended to be a comprehensive critique of Mr. Hoffman's shoring analysis, but rather to provide a basis for why the analysis is premature at this stage in the cleanup action planning process and should not be included with the package being assembled for public review.

Several factors support this conclusion:

- Mr. Hoffman, admittedly, had limited understanding of the project and the details of the preferred alternatives presented by IP and the Port to complete an accurate estimate of the necessary scope and cost of shoring or other methods to complete safe excavation. This is generally stated at the end of his May 25, 2017 memorandum. In addition, comments provided in a letter dated May 2, 2017 from Ecology to the Port regarding the need for inclusion of a shoring analysis in the Port's alternative documentation included statements that indicated a lack of understanding of the preferred alternative presented by IP in the FS and how the Port's alternative compares to that alternative. In the May 2, 2017 letter, the statement is made that "*Excavation in MFA FS Alternative S5B is mostly limited to removing the structural base under asphalt paving*", which incorrectly disregards a significant change made to Alternative S5B in the most recent versions of the FS. The revised FS adds a substantial excavation scope to Alternative S5B that is equivalent to the excavation proposed in the Port's alternative. The attached marked-up version of Figure 7-8 from the July 2016 FS highlights the footprint of excavation that is assumed to be completed to the same scale using the same methods in the two alternatives, with only the disposition of excavated soil being different.

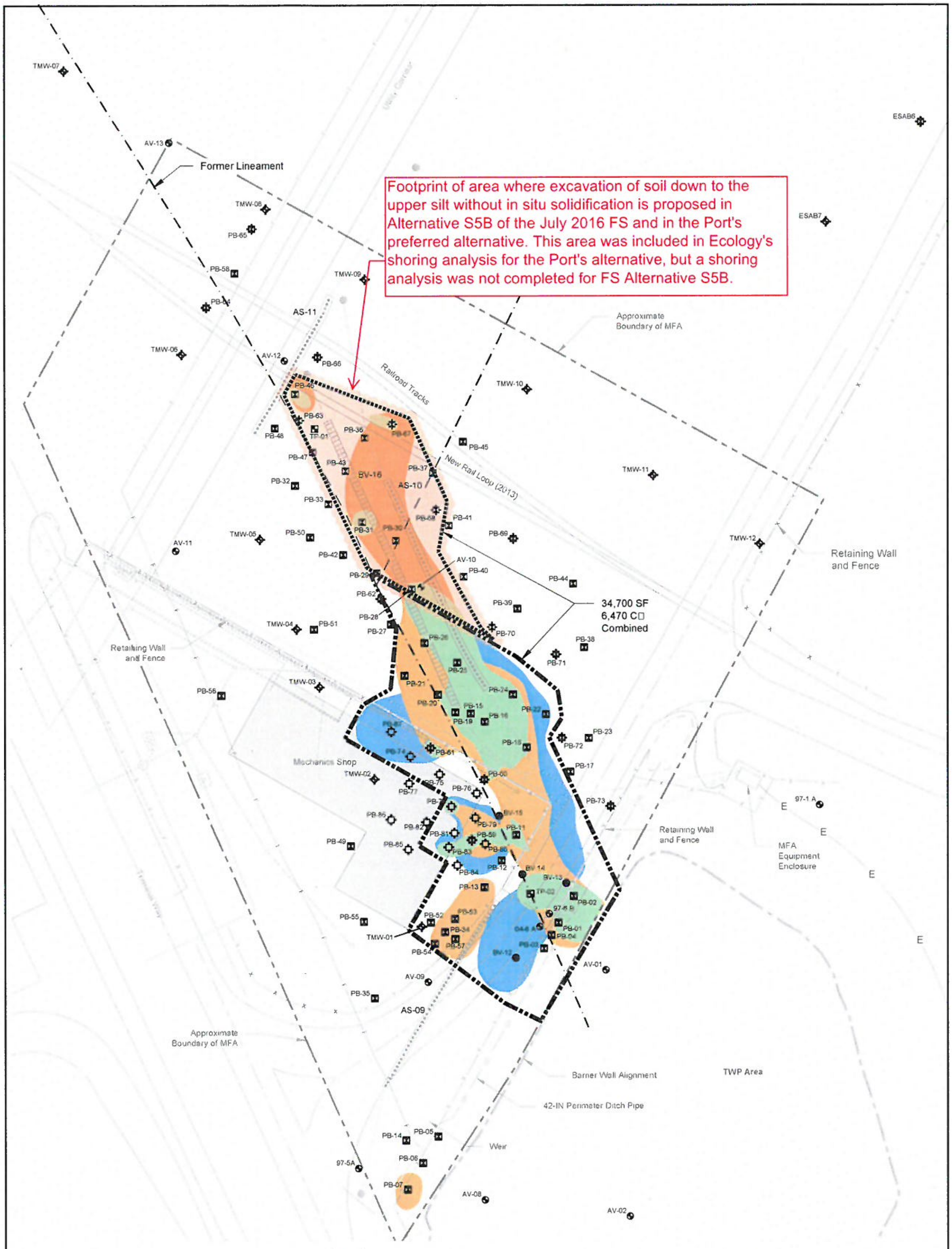
- The purpose of Ecology's request to complete a shoring analysis and cost estimate for the Port alternative is unclear. The Port alternative utilizes the same assumptions and cost estimates as IP. Ecology did not request a comparable analysis for equivalent elements in IP's preferred alternative presented in the FS. As stated above, the attached figure shows the similarity between excavation scope of the Port's alternative in the large area where in situ solidification is not proposed to be completed. In order to prepare an alternative that can be compared apples to apples with the preferred Alternative S5B from the FS, the scope and cost estimate for most individual items were used from

Alternative S5B and this includes the scope and assumed methods of the excavation. Neither the alternative description nor the cost estimate for Alternative S5B explicitly include shoring for the excavation. The Port confirmed in a phone call with Kaia Peterson on June 5, 2017 that Ecology has not requested IP to amend the FS to include the shoring analysis that they requested from the Port for what is intended to be identical excavation scope and methods. The two alternatives should be compared on the same basis to evaluate the relative differences.

- The level of analysis for shoring (or other incidental elements of an alternative) requested of the Port by Ecology is unusual for feasibility study-level cost estimating (and likely explains why Ecology never requested this information from IP). GeoEngineers is unaware of similar occurrences in which Ecology has performed an independent engineering analysis of an incidental component of an alternative being evaluated in a feasibility study or where Ecology has provided specific engineering recommendations. Even more unusual is the requirement to perform the analysis for the Port's alternative, without requiring equivalent analysis for similar elements of the alternatives presented by IP in the actual FS. The Port's alternative was only intended to be developed and costed at the same level of completeness and accuracy as the alternatives in the FS. GeoEngineers assumed throughout this process that the absence of discussion of shoring in the description of Alternative S5B and the absence of a shoring cost line item in the cost estimate sheet for Alternative S5B in Appendix J of the July 2016 FS indicates that shoring for the excavation scope of Alternative S5B is considered incidental to the excavation unit cost and that the shallow depth of excavation is expected to be completed with low-cost shoring methods or by sloping the sidewalls at a safe angle. In the FS, IP indicates that selection of shoring methods would be made during later phases of cleanup action design and contracting. Mr. Hoffman, in his May 25, 2017 memorandum, makes a similar assertion that a geotechnical engineer will evaluate other methods, including sidewall sloping, to meet worker safety requirements. GeoEngineers has also responded, in a memorandum submitted by the Port to Ecology on May 26, 2017, that the means and methods of performing excavation, as well as solidification, to complete the Port's alternative would be evaluated by a geotechnical engineer to develop the most cost effective way to complete the cleanup in a manner that complies with all applicable rules. For these reasons, it is unclear why Ecology chose to have its engineer do a detailed analysis and cost estimate for the most conservative shoring methodology. By doing so, Ecology has created an uneven playing field for evaluating the two proposed preferred cleanup alternatives.

The shoring analysis completed by Ecology for the Port's alternative should be set aside and not be included in the elements published for public review with the forthcoming public review draft FS so that the Port's preferred alternative can be equally and fairly evaluated relative to the IP alternatives. From our perspective, the analysis and cost estimate are based on Ecology's limited understanding of the Port's alternative and how the Port's alternative was developed based on assumptions used by IP to develop alternatives in the FS. The resulting shoring cost is exorbitant and assumes the use of the most conservative shoring methods without consideration for the shallow excavation depth and the likely use of less expensive excavation methods. Finally, the context of the original analysis request and the memorandum documenting Ecology's completion of the analysis gives the unfamiliar reader the impression that the factors considered in the shoring analysis, and associated additional costs, are exclusive to the Port's alternative, whereas they would have to be identically applicable to similar elements of Alternative S5B selected as the preferred alternative in the FS. This is an incorrect and misleading conclusion, which undermines the purpose of the Port developing a parallel preferred alternative intended to be compared side by side with Alternative S5B.

We sincerely appreciate the opportunity to provide these services to the Port of Longview. Please contact us with any questions.



Footprint of area where excavation of soil down to the upper silt without in situ solidification is proposed in Alternative S5B of the July 2016 FS and in the Port's preferred alternative. This area was included in Ecology's shoring analysis for the Port's alternative, but a shoring analysis was not completed for FS Alternative S5B.

Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- ● Horizontal Well Termination Vault
- ● Groundwater Monitoring Well
- ● Vertical Bioventing Well
- ▣ Pre-2008 Geoprobe Soil Boring Location
- ◆ 2008 Groundwater Monitoring Well
- ✣ 2008 Geoprobe Soil Boring Location
- ▣ August 2011 Test Pit Location
- ✣ December 2011 Geoprobe Soil Boring Location
- 🟦 Extent of DNAPL
- 🟩 Extent of DRO in Soil □ MTCA Method A
- 🟧 Extent of Naphthalene in Soil □ MTCA Method C Protection of Groundwater Soil Cleanup Level
- ▬ ▪ ▪ ▬ Estimated Limits of Solidification
- ▪▪▪▪▪▪▪▪ Estimated Limits of Excavation

Note□
Solidification will be completed 1 foot into the Upper Silt layer. Because the depth of the Upper Silt layer varies across the site, the solidification depth will vary across the site. On average, the solidification depth will be 9 ft bgs.

0 30 60
SCALE IN FEET

J:\GIS\Projects\International Paper\Longview\2015\MFA RIFS\Fig 7-8 □Alt S5B Site Plan□.dwg
Mod: 10/07/2015, 11:39 | Plotted: 10/07/2015, 11:12 | JOHN_KNOBBS

International Paper Longview, WA	Project No. 60395232	Alternative S5B Solidification Outside and Inside Building Footprint with Relocation of Soil Near Railroad Tracks	Figure 7-8
AECOM			

Table 1
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13		
1	No quantities are estimated for Task 11 [*Install Freeze Wall Shoring for building (200 LF)*]. The notes and assumptions for Task 11 state that the freeze wall is eliminated due to the shallow depth of the excavation and ability to demolish part of the building.	This is correct and intentional; no freeze wall shoring is assumed for the excavation at the building. This line will be deleted to avoid confusion. The use of freeze wall shoring in Alternative S1 through S4 in the *Public Review Draft MFA RI/FS* is described in Section 7.4.1 as having the advantage of eliminating perched water infiltration and providing structural support. Because of the shallow nature of the excavation (approximately 5 feet below ground surface) in the vicinity of the Mechanics Shop in the Port's proposed alternative, freeze wall shoring would not be considered necessary or cost effective. For such a shallow excavation, a low-cost shoring method such as slide rail shoring, H-beam and lagging, or even shallow sheet pile can be used at a cost that would be incidental to the overall excavation and disposal cost (roughly $40,000 for 200 linear feet at $20 per square foot for a 5-foot excavation). In addition, excavation to such a shallow depth is frequently conducted without shoring, by excavating sidewalls at a safe slope. The scope of excavation, and lack of shoring, in the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS* indicates that IP expects to be able to excavate to a depth of 3 feet within the demolished footprint of the Mechanics Shop without the use of expensive shoring methods such as freeze walls, presumably using methods similar to those described above that would be incidental to the excavation cost. As a conservative measure, a separate line for shallow sheet-pile shoring will be added to account for the 2-feet of additional excavation adjacent to the intact portion of the Mechanics Shop below the assumed scope of excavation.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
2	No quantities are estimated for Task 12 [*Install Freeze Wall Shoring for excavation perimeter (720 LF)*]. The notes and assumptions for Task 12 state that the freeze wall is eliminated consistent with MFA FS Alternative SSB.[1] *Footnote 1 – Excavation in MFA FS Alternative S5B is mostly limited to removing the structural base under asphalt paving.*	This is correct and intentional; no freeze wall shoring is assumed for the excavation perimeter. This line will be deleted to avoid confusion. Similar to the response above, the elimination of freeze wall shoring for the excavation perimeter is based on the proposed depth of the excavation, which would not require such a complex and expensive shoring method, and the space available to complete the shallow excavation using limited shoring or by excavating sidewalls to stable slopes to significantly reduce the cost of safely excavating the soil. In downgradient areas beyond the limits of NAPL where solidification is eliminated and soil is proposed to be excavated down to the upper silt and disposed of off-site, the depth of excavation remains relatively shallow. This deeper excavation is capable of being completed safely with low-cost shoring methods or by excavating sidewalls at a safe slope, and the Port's alternative assumes that this can be achieved at a cost that is incidental to the excavation cost, and does not require a separate line in the cost estimate. This assumption is consistent with the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* The assertion in Footnote 1 for this comment, which seems to be the basis for most of Ecology's comments, is incorrect. Section 7.4.7 of the *Public Review Draft MFA RI/FS* describes the revised version of Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil near Railroad Tracks. In Section 7.4.7 of the *Public Review Draft MFA RI/FS*, the description of the three zones delineated for Alternative S5B clearly indicates that for Zone 1 "*Soil that contains COCs at concentrations exceeding the preliminary cleanup levels in this zone would be excavated to the top of the Upper Silt instead of being solidified in place.*" The area proposed for excavation down to the upper silt is also clearly shown on Figure 7-9 of the *Public Review Draft MFA RI/FS*. The scope and methods assumed for the excavation component of Alternative S5B would be generally the same as the scope of excavation in the Port's proposed alternative, and the assumptions made for this excavation scope in the cost estimate for Alternative S5B are the same as those in the Port's cost estimate. Accordingly, the Port is concerned that Ecology is seeking additional information from the Port while not asking the same from International Paper (IP).

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
3	The estimated quantity of Task 13 [*Install Sheet Pile Wall Shoring along slurry wall (100 LF)*] has been reduced from 2,500 SF to 1,200 SF with the note that square footage is reduced to account for shallow excavation. "This is likely conservative as excavation in this area would be expected to be shallow and not requiring significant shoring."	This is correct. The depth of excavation in this location is assumed to be roughly half or less relative to the excavation proposed for Alternative S1 in the *Public Review Draft MFA RI/FS*, thus the assumption of 1,200 square feet versus the 2,500 square feet in Alternative S1. However, the unit cost for this sheet pile was preserved, when a lighter weight and lower cost sheet pile, or alternative shoring method, could be used. The costs assumed are considered conservative, due to the unit cost assumed, and the assumption that excavation in this area may be shallower than other areas due to more extensive contamination and more extensive solidification, which is assumed to not require shoring.
4	Under Task 17 [*Excavation and Stockpiling of Contaminated Soil*], it states "Assume excavation from 3 feet to 8 feet below ground surface in northern area without solidification" and "from 3 feet to 5 feet below ground surface in areas where solidification is used."	This is correct. However, the upper 3 feet is excavated as well, but for comparison purposes this interval was separated out in a similar manner, using the same unit cost, as the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* Thus, within the footprint of solidification, the pre-solidification excavation is assumed to extend to 5 feet below ground surface. In excavation areas outside the solidification footprint, the excavation is assumed to extend to 8 feet below ground surface.
5	On page 3 of the Memo from Chris Bailey entitled "Revised Port Cleanup Action Alternative for consideration in Public Review Draft Feasibility Study for the MFA Cleanup Action," it states soil below the asphalt paving structural base would be excavated down to the expected upper surface of soil to be solidified, on average approximately 4 feet.	The values represented in this statement were changed to match the updated depths used in the cost estimate for Alternative S5B in the *Public Review Draft MFA RI/FS.* This note will be corrected to match the updated assumptions in the cost estimate and state "On average, this is approximately 2 feet, considering an average 9-foot total depth to the top of the upper silt".
6	Also on page 3 of the Memo from Chris Bailey, it states that solidification will occur in approximately 4 feet of soil.	This is correct. This represents an updated solidification thickness relative to the previous version of the Port alternative, that includes the upper 1-foot of the upper silt. Previous versions of the FS, upon which the earlier Port alternative was based, did not include solidification of the upper 1-foot of the upper silt.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
7	Page 3 of the Chris Bailey memo has the following statement, "Outside the footprint of the solidification (limited area in the northwest portion of the MFA site outside the lateral limits of NAPL), soil will be excavated down to the upper silt." According to a cross-section the depth of this excavation would be 6 to 7 feet below ground surface. The Port's cost estimate for this area, like the other areas proposed for excavation, does not include shoring.	As described above in the response to the second comment, the scope of excavation in the downgradient portion of the cleanup area, beyond the footprint of solidification, is similar to the excavation proposed in Alternative S5B of the *Public Review Draft MFA RI/FS*, as presented in section 7.4.7 and on Figure 7-9 of that document. For comparison, the Port assumed similar methods and unit costs for the downgradient excavation as assumed by IP for equivalent excavation in the cost estimate for Alternative S5B. The majority of the excavation included in the Port's alternative is relatively shallow and is assumed to be capable of being safely completed using minimal shoring or sloped sidewalls with minimal additional cost beyond the excavation unit cost, as appears to be the assumption for excavation of similar scale included in Alternative S5B of the *Public Review Draft MFA RI/FS*. Accordingly, the Port is concerned that Ecology is seeking additional information from the Port while not asking the same from International Paper (IP). Having different information requirements regarding costs would make it hard to have an apples to apples comparison for purposes of decision making.
Review of Remedial Action Construction Capital Costs – Tasks 11, 12, and 13		
1, 2	WAC 296-155-657 (Requirements for protective systems) outlines requirements for protection of employees in excavations. Unless excavations are less than four feet in depth and examination by a competent person provides no indication of a potential cave-in, each employee in an excavation must be protected according to the requirements in -657(2) or (3). WAC 296-155-657(1)(c) states that protective systems "must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system."	The assumption made for the Port alternative is that specific excavation methods, including shoring, would be determined during the design and contracting phases of the cleanup action. These requirements should be action-specific ARARs and should be listed in Table 6-3 of the *Public Review Draft MFA RI/FS*. We assume the same assumption was made in the *Public Review Draft MFA RI/FS* and therefore, that is why Ecology did not include these same comments regarding IP's preferred alternative. Cleanup action design is expected to specify applicable specifications and regulatory requirements for construction methods when the construction methods are not specified. Construction methods would be required to meet State requirements for excavation methods, as well as other construction methods used to complete the cleanup action. This appears to be the assumption of IP as well for preparation of the *Public Review Draft MFA RI/FS*. As stated in Section 7.4.1 of the *Public Review Draft MFA RI/FS*, "Any shoring system utilized at the site would be selected by the contractor implementing the cleanup action".

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
3	Under the Port's Proposed Alternative, the depth of excavation under Tasks 11, 12, and 13 has the potential to exceed four feet. The Port's proposal needs to be evaluated by a licensed geotechnical engineer to propose and, if the proposal is implemented, design shoring in compliance with WAC 296-155-657. Cost estimates for shoring or other protective systems need to be included in the Port's Proposed Alternative.	Once again, Ecology is asking the Port to undertake additional analysis that was not asked of IP. The expected scope of work associated with this comment goes well beyond that expected for alternatives presented by IP in the *Public Review Draft MFA RI/FS.* The MFA RI/FS does not include an engineered design for excavation or shoring, specifying that "Any shoring system utilized at the site would be selected by the contractor implementing the cleanup action", as described above. This is common practice for feasibility-level analysis of cleanup action alternatives, particularly for incidental elements to the cleanup action construction such as shoring. As described above in the response to bullets 1 and 2 of Ecology's Comments, the specific excavation and shoring methods expected to be used during construction would be either specified during cleanup action design or the technical and regulatory requirements of the methods would be specified in the cleanup action design. The analysis requested in this comment would eventually happen, but not until the design phase of cleanup action planning.
4	In areas of solidification, even if the depth of excavation is less than four feet, the integrity of the soils at the bottom of the excavation is compromised by the use of earthwork equipment to solidify these soil to a depth of additional four feet.	It isn't clear exactly what the focus is of this comment. The conditions described (pre-excavating surface soil prior to solidification) are commonly present during solidification projects where clean surface soil is present above the contaminated soil targeted for solidification. In addition, the shallow thickness of solidification included in the Port's alternative allows the use of smaller mixing equipment, reducing the disturbance generated by the rig operating the mixing equipment, if operated on the exposed soil surface. The condition described in the comment is similar to the condition expected to be present during the solidification process proposed in Alternative S5B in the *Public Review Draft MFA RI/FS.* In Alternative S5B, and other alternatives in the RI/FS that incorporate soil solidification, approximately 3 feet of clean overburden (asphalt base material) are proposed to be excavated, exposing native soil to be solidified. In addition, in the third paragraph of Section 7.4.7 of the *Public Review Draft MFA RI/FS,* IP indicates that excavation of additional soil below the initial 3 feet is a possibility and does not indicate that this would be create implementability issues with the subsequent solidification; "During the pilot test, further characterization of shallow soil in Zone 1 would be conducted to assess whether any soil below 3 feet bgs could be removed from in situ solidification treatment." The Port is again concerned that Ecology's review of and comments concerning its alternative are inconsistent with Ecology's review of IP's preferred alternative. In order to have a fair comparison of alternatives, the same level of analysis should be accorded to each alternative. Regardless, this issue is one that is expected to be addressed during the design and contracting phases of the cleanup action, with the expectation that contractors will propose multiple methods to achieve the cleanup action goals while minimizing short-term risks.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
5	The use of less shoring next to the slurry wall is of special concern. Materials in the slurry wall are less stable and the lack of protective systems could impact the remedial action used in the Treated Wood Products (TWP) Area.	This comment is addressed in the response to bullet 3 under the "Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13". Further analysis of the need for shoring along the slurry wall will be conducted during design, after additional sampling is completed to determine the depth of excavation and the top of soil requiring solidification, as the shoring method is tied directly to the depth of excavation. The soil alternatives in the *Public Review Draft MFA RI/FS* assume a 25-foot deep sheet-pile wall along the slurry wall for alternatives involving excavation down to the upper silt (S1 through S4), but include no shoring for alternatives involving solidification in this area that include excavation of overburden to a depth of 3 feet prior to solidification (S5 and variations). The Port alternative assumes excavation of only an additional 2-feet of soil relative to the solidification alternatives in the *Public Review Draft MFA RI/FS*, but for cost estimate purposes the Port alternative includes a 12-foot deep sheet-pile wall. As stated above, this element would be further evaluated during design, but the assumed cost is conservative, particularly when compared to the scope of the solidification alternatives in the *Public Review Draft MFA RI/FS.*

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Cost Estimate dated April 14, 2017

#	Comment/Issue	Response
6	Ecology requests the Port revise the cost estimates to Tasks 11, 12, and 13 to reflect Ecology's concerns about protecting employees during excavation and solidification activities in the MFA and maintaining the integrity of the slurry wall.	As indicated in the responses above, the current scope of exaction protection in the Port's alternative closely matches the assumptions presented in Alternative S5B in the *Public Review Draft MFA RI/FS.* In particular, the Port's alternative currently matches the assumptions used in Alternative S5B for excavation down to the upper silt in the downgradient portion of the site beyond the limits of solidification in the Port's alternative (generally equivalent to the area of excavation and relocation of soil in the vicinity of the rail line in Alternative S5B). Because of this, adding shoring costs (Task/Item 12 of the Port alternative cost estimate) for this area of excavation, or other areas of similar excavation scope in the Port alternative, is not warranted. The costs included in the Port alternative for shoring along the slurry wall of the TWP site (Task/Line 13 of the Port alternative cost estimate) are already considered relatively conservative. This shoring, or the lack of shoring, will be further evaluated during design after additional data is collected to evaluate the depth of excavation. A significant shoring cost ($54,000 for 100 linear feet of shoring) is included in the Port's alternative to address this location. This is a conservative assumption considering the assumed excavation depth is only 2-feet deeper than the excavation depth proposed to be completed without any shoring under Alternative S5B in the *Public Review Draft MFA RI/FS.* The excavation of soil in the demolished footprint of the Mechanics Shop is proposed to be only 2 feet deeper under the Port alternative than as proposed in Alternative S5B in the *Public Review Draft MFA RI/FS*, which assumes this excavation can be completed without substantial shoring. The additional shoring required for the Port alternative is expected to be minimal, but an additional line will be added to the cost estimate representing the use of shallow sheet pile to achieve a 5-foot excavation cut along the portion of the excavation adjacent to the intact portion of the Mechanics Shop. These explanations for, and changes to, the costs for Lines 11, 12, and 13 should alleviate Ecology's concerns that the methods proposed in the Port's alternative consider construction worker safety at the same level that is considered in IP's alternatives as presented in the *Public Review Draft MFA RI/FS.* Further analysis and design of protection methods would be expected during the design and contracting phases of the cleanup action.

From: Petersen, Kaia (ECY)
To: Valdez-Kogle, Bridgette (ECY)
Subject: FW: POL_IPCo
Date: Wednesday, August 16, 2017 3:49:00 PM
Attachments: image001.png
-5.26.17- DRAFT Response to Ecology comments -5-5-17 POL Alternative revisions.pdf

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From: Edmonson, Ava (ECY)
Sent: Tuesday, May 30, 2017 11:03 AM
To: Graber, Kerry (ECY) <KGRA461@ECY.WA.GOV>; Petersen, Kaia (ECY) <kpet461@ECY.WA.GOV>; Hoffman, Charles (ECY) <chof461@ECY.WA.GOV>
Subject: FW: POL_IPCo

From: Lisa Hendriksen [mailto:Lhendriksen@portoflongview.com]
Sent: Friday, May 26, 2017 1:14 PM
To: Edmonson, Ava (ECY) <AEDM461@ECY.WA.GOV>
Subject: POL_IPCo

Greetings Ava

Please find attached a draft comment matrix that outlines the Port's responses to Ecology's comment letter dated May 5, 2017. The Port team developed responses based on what we believe Ecology was seeking clarity on, however, there were a few comments that we felt were unclear as to what the underlying questions was.

Additionally, there were comments posed by Ecology regarding construction techniques for the Port alternative that were not detailed as such in the IPCo Final RI/FS. In the RI/FS, these issues were deferred by stating they would be developed during the construction phase or by the contractor, which we believe is appropriate. The Port is interested in discussing the reasoning behind why Ecology would like the Port to provide this information, especially where similar information was not required of IPCo in its evaluation of alternatives.

Please let us know when you have reviewed our comments and provide some dates/times that we can either have a conference call or in-person meeting to further discuss the Port's comments and our concerns about ensuring a fair comparison with the IPCo FS.

Have a wonderful holiday weekend.

LISA HENDRIKSEN, DIRECTOR OF PLANNING & ENVIRONMENTAL SERVICES
10 PORT WAY, LONGVIEW, WA 98632
P. 360-425-3305 D. 360-703-0207
WWW.PORTOFLONGVIEW.COM | WASHINGTON'S WORKING PORT VIDEO

MEMORANDUM

TO: Kaia Petersen, International Paper Site Manager

FROM: Charles Hoffman, P.E.

SUBJECT: Shoring Cost Estimate for Excavation/Solidification of Contaminated Soils, Port of Longview's Proposal

DATE: May 25, 2017

The Port of Longview's (Port) proposal combines cleanup alternatives presented in the draft Feasibility Study submitted by International Paper. The Port's proposal is described in an April 14, 2017, memorandum from Chris Bailey, GeoEngineers, to the Port. This proposal consists of excavation and in situ stabilization/solidification (ISS) of contaminated soils and includes an estimate of construction costs.

State regulation, WAC 296-155-657, requires systems, such as shoring or sloping, to protect construction workers from cave-in of sidewalls when an excavation is greater than 4 feet deep. The proposal from the Port includes excavation of soils at depths greater than 4 feet below ground surface. However, the proposal does not include protective measures to prevent cave-in in the areas of excavation except for 120 linear feet of sheet pile shoring adjacent to an existing slurry wall.

If the Port's proposal is chosen as the cleanup alternative for implementation, then, prior to construction, the Port will be required to submit a geotechnical report by a licensed professional engineer that examines the need for, and recommends, protective measures related to excavation.

Based on my understanding of the cleanup work proposed in GeoEngineers' memorandum to the Port and using geologic cross sections (Figures 3-2 to 3-5), by AECOM (International Paper's consultant), I estimated a cost for a sheet pile shoring system. I separated the proposal into two areas, the north area proposed for excavation and offsite disposal (shown in light purple in the Port's drawing) and the south area that includes excavation and ISS.

The site soils consist of gravel fill, sand, and silt. For the north area, I assumed a sheet pile depth below the dredge line (bottom of the excavation) of two times the depth of the excavation ("Steel Sheet Piling Design Manual", United States Steel, July 1984). Using information in the GeoEngineers' memorandum, I assumed an average excavated depth of 6.5 feet. This results in a sheet pile vertical length of 19.5 feet. The perimeter length for the north area excavation is approximately 370 feet and the total area of the sheet pile wall would be approximately 7200 square feet.

The Port's proposal for the south area is to excavate to a depth of approximately 4 feet below ground surface and then stabilize and solidify the next 4 feet of soils with cement and bentonite clay using "readily available earthwork equipment". (See Table 1, Item No. 1 of Geoengineer's memorandum.) I assume that "readily available earthwork equipment" refers to an excavator rather than an auger system often used for ISS. If an excavator is used for mixing the contaminated soils and the additives, then the soil will be destabilized below the depth of initial excavation, at least temporarily.

If an auger system was used for ISS, the proposed depth of the excavation may not require protective measures to prevent cave-in. However, with the assumption that an excavator would be used for mixing, then a protective measure could be required to stabilize the sidewalls of the excavated area. The depth of soil disturbance (excavation and mixing) is about 8 feet. For this estimation, I assumed the sheet pile would extend 8 feet below the lower elevation of the work for total vertical length of 16 feet. From the drawing I measured the perimeter of the south work area to be 725 feet. This does not include 40 feet that separates the north and south areas and the sheet pile wall adjacent to the slurry wall that is included in GeoEngineers' proposal. Using a sheet pile height of 16 feet, the surface area of a sheet pile wall for the south area is 11,600 square feet.

GeoEngineer's used a unit cost of $45 per square foot (Table 1, Item No.13) for the sheet pile wall adjacent to the slurry wall. Using the same sheet pile unit cost, the total construction cost for the additional sheet pile wall is presented in the following table:

	Perimeter Length (ft)	**Sheet Pile Vertical Length (ft)**	**Sheet Pile Area (ft^2)**	**Sheet Pile Estimated Cost ($\$45/ft^2$)**
North Area	370	19.5	7,200	325,000
South Area	725	16.0	11,600	522,000
			Estimated Construction Cost	$847,000
			Contingency, Engineering, etc. (25 percent)	$212,000
			Sales Tax (8 percent)	$68,000
			Estimated Total Cost	**$1,127,000**

Again, this cost estimate is based on limited information and I had to make assumptions for the overall height of the sheet pile shoring system. A geotechnical engineer will consider additional protective measure alternatives, such as sloping, to evaluate compliance with WAC 296-155-657 and will provide a more accurate cost estimate of the method chosen to protect workers in and around the excavated areas.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call (877) 833-8641

May 2, 2017

Lisa Hendriksen
Director of Planning & Environmental Services
Port of Longview
PO Box 1258
10 Port Way
Longview, WA 98632

Dear Lisa:

The Department of Ecology (Ecology) has reviewed cost estimate in the Port of Longview's submittal of April 14, 2017.

Enclosed are Ecology's comments on Tasks 11, 12, and 13 of the Port's cost estimate. Ecology requests the Port revise the cost estimates for shoring in Tasks 11, 12, and 13 to reflect Ecology's concerns about protecting employees during excavation and solidification activities in the MFA and maintaining the integrity of the slurry wall.

If the Port is unable or unwilling to provide a revised cost estimate for these tasks, Ecology will develop cost estimates before sending the Port's submittal to International Paper for review.

Ava Edmonson will contact you about setting up a conference call to discuss Ecology's comments.

Sincerely,

Kaia Petersen

Kaia Petersen
Department of Ecology
Hazardous Waste and Toxics Reduction
Southwest Regional Office

Enclosure
cc: Norm Krehbiel, Port of Longview
Brien Flanagan, Schwabe, Williamson & Wyatt
Steve Hill, Miller Nash
Chris Bailey, GeoEngineers
Connie Sue Martin, Schwabe, Williamson & Wyatt
John Level, Attorney General's Office
Darin Rice, Department of Ecology
Sally Toteff, Department of Ecology
Ava Edmonson, Department of Ecology
Charles Hoffman, Department of Ecology

Table 1 **Proposed Port of Longview Version of MFA FS Preferred Alternative Cost Estimate, Port of Longview Maintenance Facility Area, Longview, WA**

Notes on Remedial Action Construction Capital Costs – Tasks 11, 12, and 13:

- No quantities are estimated for Task 11 [*Install Freeze Wall Shoring for building (200 LF)*]. The notes and assumptions for Task 11 state that the freeze wall is eliminated due to the shallow depth of the excavation and ability to demolish part of the building.
- No quantities are estimated for Task 12 [*Install Freeze Wall Shoring for excavation perimeter (720 LF)*]. The notes and assumptions for Task 12 state that the freeze wall is eliminated consistent with MFA FS Alternative S5B.[1]
- The estimated quantity of Task 13 [*Install Sheet Pile Wall Shoring along slurry wall (100 LF)*] has been reduced from 2,500 SF to 1,200 SF with the note that square footage is reduced to account for shallow excavation. "This is likely conservative as excavation in this area would be expected to be shallow and not requiring significant shoring."
- Under Task 17 [*Excavation and Stockpiling of Contaminated Soil*], it states "Assume excavation from 3 feet to 8 feet below ground surface in northern area without solidification" and "from 3 feet to 5 feet below ground surface in areas where solidification is used."
- On page 3 of the Memo from Chris Bailey entitled "Revised Port Cleanup Action Alternative for consideration in Public Review Draft Feasibility Study for the MFA Cleanup Action," it states soil below the asphalt paving structural base would be excavated down to the expected upper surface of soil to be solidified, on average approximately 4 feet.
- Also on page 3 of the Memo from Chris Bailey, it states that solidification will occur in approximately 4 feet of soil.
- Page 3 of the Chris Bailey memo has the following statement, "Outside the footprint of the solidification (limited area in the northwest portion of the MFA site outside the lateral limits of NAPL), soil will be excavated down to the upper silt." According to a cross-section the depth of this excavation would be 6 to 7 feet below ground surface. The Port's cost estimate for this area, like the other areas proposed for excavation, does not include shoring.

Review of Remedial Action Construction Capital Costs – Tasks 11, 12, and 13

- WAC 296-155-657 (Requirements for protective systems) outlines requirements for protection of employees in excavations. Unless excavations are less than four feet in depth and examination by a competent person provides no indication of a potential cave-in, each employee in an excavation must be protected according to the requirements in -657(2) or (3).

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[1] Excavation in MFA FS Alternative S5B is mostly limited to removing the structural base under asphalt paving.

- WAC 296-155-657(1)(c) states that protective systems "must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system."

Under the Port's Proposed Alternative, the depth of excavation under Tasks 11, 12, and 13 has the potential to exceed four feet. The Port's proposal needs to be evaluated by a licensed geotechnical engineer to propose and, if the proposal is implemented, design shoring in compliance with WAC 296-155-657. Cost estimates for shoring or other protective systems need to be included in the Port's Proposed Alternative.

In areas of solidification, even if the depth of excavation is less than four feet, the integrity of the soils at the bottom of the excavation is compromised by the use of earthwork equipment to solidify these soil to a depth of additional four feet.

The use of less shoring next to the slurry wall is of special concern. Materials in the slurry wall are less stable and the lack of protective systems could impact the remedial action used in the Treated Wood Products (TWP) Area.

Ecology requests the Port revise the cost estimates to Tasks 11, 12, and 13 to reflect Ecology's concerns about protecting employees during excavation and solidification activities in the MFA and maintaining the integrity of the slurry wall.

PORT OF
LONGVIEW
EST. 1921

April 14, 2017

Kaia Petersen
Department of Ecology
Hazardous Waste and Toxics Reduction
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

RE: Port of Longview's Proposed Alternative for Remediation of MFA Site and Response to Comments included in January 31, 2017 letter from K. Petersen.

Dear Ms. Petersen:

The Port of Longview (Port) appreciates your January 31, 2017 comments on the Port's proposed alternative (Port Alternative) remediation for the Maintenance Facility Area (MFA). As we noted in our letter of February 28, 2017 to Mr. Level and Ms. Toteff, we believe your comments indicate a misunderstanding of some aspects of the Port's alternatives, and our submission here will hopefully correct that misunderstanding and respond to your comments.

As the property owner, the Port is interested in a long-term solution at the MFA site. The MFA Feasibility Study, July 2016, submitted by International Paper (IP) proposes a preferred alternative that lacks permanence due to the increased volume of contaminated media to be left behind for the Port to manage during future development and includes a disproportionate cost analysis (DCA) that does not address these anticipated future costs nor important public concerns. Such impacts are contrary to MTCA and to the Port's mandate to develop and manage its property for the increased economic activity of its community.

Utilizing treatment options provided by IP, the Port Alternative increases the permanence of the cleanup, allows for the continued and future use, maintenance and redevelopment of the site, and reduces potential future exposure by excavation workers. Additionally, the Port Alternative has the benefit of reducing public concerns and simplifying the ability to obtain approval of institutional controls from the landowner.

In addition to the soil alternative, the Port's comments continue to express concerns with IP's preferred alternative for groundwater that rejects the active groundwater treatment component that scored highest in the DCA. While the Port acknowledges that natural attenuation may be effective in reducing contaminant concentrations in groundwater to acceptable levels once source material is remediated, the appropriate action is to approve the active treatment component identified in the DCA and defer implementation.

To respond to Ecology's comments and provide context and information to clarify the rationale and benefits of the Port alternative, the Port is enclosing the following documents:

- **"Summary of past comments on MFA Feasibility Study"**

  For several years, the Port has provided numerous comments on the FS documents. While some of its comments have been incorporated in subsequent versions of the FS, many of these comments have yet to be addressed. This summary focuses on the Port's outstanding comments, which have yet to be addressed in the FS process.

  As an attachment to this summary, the Port has provided a comment matrix, *Tables 1-4 in Response to Ecology's Comments about the Port's Alternative*, which provide specific responses to each of Ecology's comments on the Port Alternative identified in your January 31, 2017 letter.

- **"Revised Port Cleanup Action Alternative for consideration in Public Review Draft Feasibility Study for the MFA Cleanup Action."**

  This memorandum, prepared by GeoEngineers to the Port, provides further details about the Port Alternative and clarifies the elements of the proposal. The Port Alternative substantially improves on IP's proposed S5B alternative because it is more permanent and allows for future use and redevelopment of the Port's property with reduced likelihood of worker exposure and less impact to the proposed remedial action during future development.

  As an attachment to this Port Cleanup Action Alternative is the *Port Alternative Figure*, and the *Port Alternative Costs*.

The Port has developed an option that is cost-effective and utilizes the same technologies as the IP FS, but results in a safer, long-term solution. It also accommodates future use and redevelopment of the MFA site.

Please contact me with any questions.

Sincerely,

Lisa A Hendriksen

Enclosures

Cc via email:

Sally Toteff, Ecology, SWRO Regional Director
Darin Rice, Ecology, HWTR Program Manager
Ava Edmondson, Ecology, HWTR SWRO Section Manager
John Level, Ecology, Assistant Attorney General
Norm Krehbiel, CEO Port of Longview
Steve F. Hill, Miller Nash Graham Dunn
Brien Flanagan, Schwabe, Williamson, Wyatt
Connie Sue Martin, Schwabe, Williamson, Wyatt
Chris Bailey, GeoEngieers

GEOENGINEERS

MEMORANDUM

PLAZA 600 BUILDING, 600 STEWART STREET, SUITE 1700, SEATTLE, WA 98101, TELEPHONE: (206) 728-2674, FAX: (206) 728-2732 www.geoengineers.com

TO:	Port of Longview
FROM:	Chris Bailey, P.E.
DATE:	April 14, 2017
FILE:	File 242-010-03
SUBJECT:	Revised Port Cleanup Action Alternative for consideration in Public Review Draft Feasibility Study for the MFA Cleanup Action

This memorandum was prepared to present to the Department of Ecology (Ecology) a proposed Cleanup Action Alternative for the Maintenance Facility Area (MFA) at the Port of Longview (Port) prepared by the Port (Port Alternative). This memorandum explains how the Port Alternative meets essential MTCA requirements while increasing the permanence of the remedy and allowing the Port more flexibility in its future use and redevelopment of the MFA site. It explains how the Port Alternative addresses the Port's concerns with the preferred cleanup action alternative in the Public Review Draft MFA RI/FS submitted by International Paper (IP), to the Washington Department of Ecology (Ecology) in July 2016 (MFA FS).

The MFA FS, prepared by AECOM, evaluates a range of alternatives to address soil and groundwater contamination, including contamination by non-aqueous phase liquid (NAPL), associated with former IP operations. The range of alternatives being evaluated in the MFA FS include alternatives that use removal and disposal of contaminated media, however, the preferred alternative solely relies upon in-situ solidification (ISS) of contaminated soil. As a result of reliance on ISS, the preferred soil cleanup alternative described in the MFA FS, "S5B – Solidification Outside and Inside Building", is expected to result in continued, and potentially increased, risks to Port personnel and construction/excavation workers and create significant impacts to current Port operations and the future redevelopment of Port property.

The Port has consistently stated that it cannot accept the preferred alternative "S5B – Solidification Outside and Inside Building", proposed by IP in the MFA FS. Therefore, the Port has developed the Port Alternative that utilizes the same technologies analyzed in the MFA FS but in a different configuration. The Port Alternative was initially presented to Ecology on September 27, 2016, and is further clarified here. The Port chose to assemble an alternative that closely matches the selected soil alternatives in the MFA FS, but limits short-term and long-term impacts to Port operations and future construction costs.

Port Alternative to IP's Preferred Alternative S5B

IPs Alternative S5B will impact the Port's current and future economic opportunities and therefore, the Port asked GeoEngineers to develop a revised version of Alternative S5B. The Port Alternative, as proposed, would increase, not limit, the Port's flexibility for economic development within the MFA cleanup area, reduce the Port's future development costs by reducing the volume of contaminated media left in place as indicated by the ISS method, provide for a higher degree of protectiveness, meet the requirements of MTCA, and accommodate the concerns posed of Ecology regarding off-site disposal of DNAPL. The Port Alternative is similar to the original Alternative S5 presented by IP in the 2011 MFA FS, which relied primarily on ISS, but also incorporated a moderate level of off-site disposal to account for the expansion associated with the solidification.

The Port Alternative combines the ISS treatment process with a moderate level of off-site disposal of lower-concentration or "clean" soil to the degree needed to balance the expansion of ISS-treated soil, allow areas of the MFA site to remain as close as possible to current elevations, and preserve a buffer of clean material under the asphalt paving that will reduce the restrictive measures during future construction activities. The general layout of the proposed Port Alternative is presented in the attached figure. The general approach of the Port Alternative is as follows:

- Reduce the volume of contaminated soil remaining on site by removing and disposing of contaminated soils where perceived threat to groundwater from excavation is minimal (e.g., areas without DNAPL).
- Reduce the footprint and thickness of solidified soil remaining on site by limiting ISS treatment to the soil layers where contamination is present at concentrations requiring higher cost off-site disposal and/or treatment methods (e.g., areas with DNAPL).
- Eliminate future exposure by Port personnel or construction workers to solidified soil during projects requiring shallow earthwork (i.e., trenching, post-hole digging, etc.).
- Eliminate modified final elevation and slopes within MFA site.
- Reduce Port costs associated with soil handling during future construction projects and reduced potential for final conditions that may prohibit or significantly hinder the future redevelopment of Port property.
- Reduce cleanup costs by utilizing ISS only for soil with highest contaminant levels and highest disposal costs.
- Reduce the footprint (vertical and lateral) of necessary institutional controls that will affect future Port use of the Site by preserving a buffer of clean material under the ground surface and reducing the footprint of contaminated soil on the Site.

For comparison purposes, the Port Alternative was built on the assumptions and unit costs used in the MFA FS. A combination of two existing alternatives in the MFA FS was used to develop an alternative that achieves the approach described above. Using elements of alternatives S1 (comprehensive excavation) and S5B (solidification outside and under the Mechanic Shop), a revised version of alternative S5B was developed. The Port Alternative would still rely heavily on the in-situ treatment approach in IP's preferred alternative (S5B), while utilizing excavation and off-site disposal from Alternative S1 in the MFA FS to minimize vertical expansion of the zone of contaminated soil, and eliminate the resulting grade changes associated with the IP preferred alternative.

The basic principle of this combined alternative is to use ISS for NAPL-impacted soil within the footprint of observed NAPL, but only within the expected vertical profile of the NAPL to reduce the final volume of solidified soil. Contaminated soil that doesn't have NAPL and has lower concentrations would be excavated and disposed of off-site. The attached figure shows the respective areas of treatment and excavation with off-site disposal. This combination addresses several of the Port's concerns with the current solidification preferred alternative:

- It prevents mixing the most highly contaminated deeper soil with cleaner shallow soil immediately below the asphalt base material;

- It prevents a net increase in the overall volume of contaminated material left on site following cleanup action;

- It prevents the need to alter final elevations and slopes across the site due to vertical expansion of a large solidification volume; and,

- It results in clean fill across the site to a depth of 5-6 feet, allowing most utilities to be trenched, and maintenance of existing or future infrastructure, without potential exposure to contaminated soil and allowing this clean shallow soil to be excluded from deed restrictions.

The Port Alternative was laid out using graphics from the MFA FS and combining the elements of several of the alternatives presented therein. The footprint of the solidification element of the Port Alternative was developed based on the footprint of Alternative S4-Excavation Outside Building Footprint from the MFA FS, which is excavation of only the soil within the NAPL footprint, inside and outside the building. The area of soil exceedances outside the footprint of Alternative S4, which would be excavated and disposed of off-site, is a small area to the northwest of the footprint of excavation under Alternative S4. The attached figure presents the layout of the components of the Port Alternative, including areas of proposed ISS and excavation with off-site disposal.

Cost Analysis of Port Alternative to IP's Preferred Alternative S5B

The cost of the Port Alternative was evaluated using assumptions from the MFA FS, including capital unit costs, indirect costs, and long-term monitoring costs. The attached Table 1 is the cost estimate table for the Port Alternative, built around the structure of the cost tables in the MFA FS. The assumptions for each cost item are listed in the table. Based on the scope of the alternative described above, the primary cost assumptions are as follows:

- Solidification of approximately 4 feet of soil, including the upper 1-foot of the upper silt and 3 feet of fill unit soil directly above the upper silt. This treatment thickness allows a factor of safety that all of the NAPL-impacted soil is treated.

- Within the footprint of the solidification, soil below the asphalt paving structural base material would be excavated down to the expected upper surface of the soil to be solidified. On average, this is approximately 4 feet, considering an average 10-foot total depth to the top of the upper silt, but would be less in some areas.

- Outside the footprint of the solidification (limited area in the northwest portion of the MFA site outside the lateral limits of NAPL), soil will be excavated down to the upper silt.

- Most (85 percent) excavated soil is assumed to exceed MTCA Method C levels, requiring disposal as CAMU-eligible waste.

- It is assumed that some (15 percent) shallow soil within the cleanup area would be considered clean, containing contaminants of concern below MTCA Method B levels, particularly in downgradient areas of the MFA site. Pre-design characterization of lateral and vertical limits of contaminants to supplement the data collected in the RI would allow more accurate evaluation of potential disposal options and associated costs.

- For cost estimating purposes, 85 percent of excavated soil is assumed to exceed Method C limits, requiring

CAMU-eligible disposal at $160/ton (unit cost from the MFA FS). The remaining 15% is assumed to be clean shallow soil that meets Method B limits, allowing less expensive disposal methods, or potential reuse. As described in the bullet above, it is likely that some shallow soil does not exceed Method B limits and can be disposed of at a Subtitle D facility for $52/ton (unit cost from the MFA FS) after a contained-in determination. You can see below how the percentage that does not exceed Method B impacts the cost.

Based on these assumptions, the total cost for the Port Alternative is estimated at $4.6 million. Significant additional cost savings may be realized based on the actual disposal and/or reuse options for excavated soil. Some excavated soil likely falls between MTCA Method B and C limits, allowing disposal as non-hazardous waste at a Subtitle C facility, or to be used as fill on site in locations or depths where land use restrictions would not inhibit Port operations as soil exceeding Method B limits would require coverage by institutional controls. Excavated soil that meets Method B limits may be reused as unrestricted fill or disposed at a Subtitle D facility with a contained-in determination at a significantly reduced cost relative to being disposed as CAMU-eligible waste.

For comparison, the cost for IP's preferred Alternative S5B is $3,900,000 and the cost for alternative S1 (excavation and disposal) is $6,400,000. Accordingly, the Port Alternative has a delta of $700,000 over the current alternative S5B while still falling significantly below the cost of Alternative S1.

Benefits of Port Alternative to IP's Preferred Alternative S5B

The changes made to IP's preferred Alternative S5B to develop the Port Alternative results in a higher level of overall benefit as measured by the MTCA disproportionate cost analysis (DCA) evaluation criteria specified in WAC 173-340-360(3)(f). The DCA used in the MFA FS to select the preferred alternative dismissed the established MTCA method and used a method that equates the overall benefit of an alternative to the volume of soil remediated by either excavation with off-site disposal or ISS, providing equal weight to both methods.

The Port has repeatedly commented that this DCA methodology is faulty as it provides equal weight to two completely different technologies with significantly different on-site results. This method ignores the short-term and long-term impacts to the Port property discounts the future risks to Port personnel and construction workers as a result of the shallow depth to solidified soil, and disregards the significant net increase of the volume of contaminated media as a result of the solidification process. While the solidification process is considered an acceptable treatment method, which MTCA generally prefers relative to off-site disposal, the treatment is not a destructive process (the contaminants are still present and still pose risks to receptors following completion of treatment) and is not a process that has been demonstrated to completely achieve its primary goal of preventing the leaching of contaminants to groundwater. Treatability testing indicated that solidification at the MFA site provides significant treatment toward the goal of reducing the leachability of contaminants from soil, but this reduction is not complete, and this process should be expected to result in low concentrations of contaminants in groundwater in contact with the solidified soil.

The soil treated by ISS still presents a direct-contact risk and requires coverage by restrictive covenants to prevent exposure by Port personnel or future construction workers. The expected reduction of leachability, the primary benefit of the solidification process, was demonstrated during treatability testing to be less than 100 percent. Due to these factors, the Port continues to assert that the DCA method equating off-site disposal of soil at a permitted landfill to ISS, and discounting the several other factors spelled out in MTCA, is faulty.

The Port Alternative combined two MFA FS alternatives (S1 and S5B) to develop an alternative that meets the MTCA DCA evaluation criteria to a higher degree than the alternatives in the MFA FS that rely primarily on only one technology. The DCA evaluation criteria outlined in WAC 173-340-360(3)(f) and how each criterion is addressed by the Port Alternative is described below:

- Protectiveness – The Port Alternative is expected to have a higher level of protectiveness than the preferred Alternative S5B in the MFA FS as the existing, and future, risks to the primary receptors at the MFA site, Port personnel and construction workers would be reduced. The reduced risk would be the result of the inclusion of off-site disposal of a moderate quantity of soil for the purpose of reducing the final volume of solidified soil and preserving a substantial clean buffer between the ground surface and the solidified soil. Excavation under the Port Alternative would be limited to soil with lower concentrations of contaminants, alleviating the risks associated with excavation, transport, and off-site disposal of NAPL-impacted soil.

- Permanence – Permanence is described in WAC 173-340-360(3)(f)(ii) as the degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances. The Port Alternative achieves a higher level of permanence relative to the selected Alternative S5B as a result of the focused use of ISS on the most highly contaminated soil and using off-site disposal at a permitted landfill for lower level contaminated soil. Reducing the level of ISS mitigates the significant level of additional hazardous material generated in IP's preferred Alternative S5B by solidifying all soil in the cleanup area. This essentially results in a reduced net volume of hazardous material. In addition, the Port Alternative eliminates the mixing of shallow, low concentration soil with deeper, highly contaminated soil. The proposed ISS process in the IP's preferred Alternative S5B would be expected to result in higher contaminant concentrations in shallow soil relative to current conditions, which essentially increases the toxicity of the shallow soil. The MFA site is a heavy use area and is slated for redevelopment. By removing the shallow, lower concentration and lower toxicity soil prior to implementing ISS on the deeper soil, disposing of the shallow soil at a permitted off-site landfill in its low toxicity state, and using clean backfill within several feet of the ground surface reduces the overall toxicity of the remaining soils at the MFA site. Most importantly, however, it significantly reduces the toxicity of the shallow soil that Port personnel will most likely be exposed to during future maintenance or redevelopment activities.

- Long-Term Effectiveness – The Port Alternative will provide a more effective long-term certainty that the primary receptors, Port personnel and construction workers, will be protected from exposure to contaminated media remaining on site after the cleanup action. On its face, WAC 173-340-360(3)(f)(iv) lists ISS above off-site disposal in the description of long-term effectiveness. However, this narrow reading of the WAC does not consider that in this application ISS does not completely reduce on-site risks. IP's preferred Alternative S5B relies heavily on institutional controls, including land use restrictions designed to prevent exposure to shallow solidified soil that remains a direct-contact risk to Port personnel and construction workers. The Port Alternative alleviates this by combining ISS with the off-site disposal to allow a buffer between the ground surface and the deeper contaminated, solidified soil.

- Management of Short-Term Risks – The Port Alternative is expected to have similar short-term risks as IP's preferred Alternative S5B, and manages those risks similarly. The excavation of soil under the Port Alternative is mostly limited to shallow soil overlying NAPL-impacted deeper soil, except in downgradient portions of the site beyond the extent of NAPL impacts, where excavation would extend deeper. The limited scope of excavation in the Port Alternative addresses issues raised by Ecology about potential short-term impacts associated with attempting to excavate NAPL-impacted soil immediately above the upper silt unit.

- Technical and Administrative Implementation – The Port Alternative has a similar level of technical and administrative implementation as IP's preferred Alternative S5B except that it avoids the complexities and uncertainties of the institutional controls. Excavation and off-site disposal of soil would utilize common remediation methods. The inclusion of a moderate level of off-site disposal allows the current grades across the site to be preserved, eliminating the need to expand the earthwork beyond the limits of the cleanup action to match the increased elevation within the cleanup area resulting from the ISS in IP's preferred Alternative S5B. The Port Alternative also avoids other issues associated with the significant grade changes included in IP's preferred Alternative S5B, such as altering the existing storm water system

- Consideration of Public Concerns – IP's preferred Alternative S5B does not address public concerns in a satisfactory manner. Whereas, the Port Alternative addresses public concerns by reducing long-term impacts on property owned and operated by a public agency (the Port). The Port Alternative considers the future redevelopment of the Port property by limiting contaminated media left on site, reducing direct exposure to contaminated materials for routine construction activities, providing the Port flexibility for future economic development, and reduces the cost of future development.

When using the established DCA criteria in MTCA for selecting a cleanup action, as described in WAC 173-340-360, the overall benefit of the Port Alternative is higher than IP's preferred Alternative S5B . By combining technologies and using ISS and off-site disposal where they make the most sense, the Port Alternative scores higher at a reasonable cost increase, relative to alternatives that are built around the primary use of a single technology.

Selection of a Groundwater Cleanup Action Alternative

The Port also has concerns with the selection process for alternatives treating contaminated groundwater at the MFA site. IP's Alternative GW2 involving active treatment of groundwater using chemical oxidation was determined in the FS to be the alternative that is "permanent to the maximum extent practicable". In the MFS FS, however, the groundwater alternative selected as the preferred alternative was Alternative GW4, which utilizes monitored natural attention. The Port has previously commented that current conditions do not appear conducive to natural attenuation and therefore, it is premature to select an alternative that relies solely on natural attenuation.

The most recent version (July 2016) of the MFA FS restructured the selection of the groundwater alternative to a small degree by including the treatment element of Alternative GW2 as a contingent element due to the uncertainties of the restoration timeframe of Alternative GW4. While this change provides some consideration for concerns that the Port has with choosing an alternative that relies solely on natural attenuation to achieve cleanup goals, the Port remains concerned about how and when that contingent element of the GW cleanup would be implemented. The Port feels that the groundwater alternative, Alternative GW2, involving active treatment, which was demonstrated to be the most practicable and effective alternative in the MFA FS should be selected as the preferred groundwater alternative and carried to the Cleanup Action Plan. The Port is willing to accept that the monitored natural attenuation groundwater alternative GW4 be carried as a contingency if conditions after completion of the soil cleanup action confirm that groundwater will meet cleanup goals through natural attenuation.

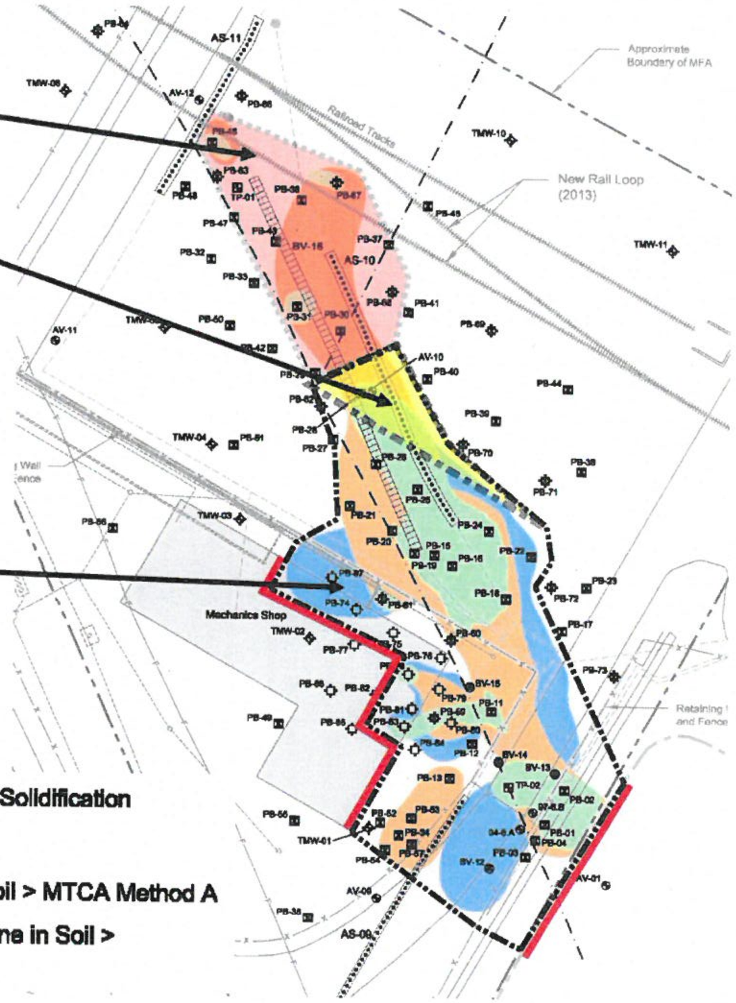
An implementation plan can be developed in the Cleanup Action Plan that delays implementation of the active treatment alternative based on compliance monitoring conducted over a designated period following completion of the soil cleanup action. If post-construction compliance monitoring indicates that groundwater conditions are appropriate for the use of natural attenuation as the primary treatment method under MTCA, as described in WAC 173-340-370(7), the active treatment element of Alternative GW2 could be postponed or eliminated. A procedure for the postponement or elimination of the active treatment component of the chosen groundwater alternative could be developed in the Cleanup Action Plan and promulgated in the Consent Decree. This would provide an off-ramp for active treatment if it is determined to not be necessary following completion of the soil cleanup action. Selection of Alternative GW4, with this contingent implementation strategy, however, would provide greater assurance that groundwater at the Port property would be adequately treated if conditions are unchanged or do not appear to be able to reach cleanup levels within a reasonable timeframe.

Summary

The Port Alternative, unlike IP's preferred Alternative S5B adequately considers the future risks to Port personnel by reducing the volume of contaminated media left on site, the effects of the selected alternative on current or future Port operations within the MFA site, an reduces the future costs to be incurred by the Port during redevelopment of the MFA site. The Port Alternative described in this memorandum utilizes technologies analyzed in the MFA FS to develop a permanent cleanup action that results in reduced short-term and long-term impacts to Port operations and lowers future redevelopment costs.

We sincerely appreciate the opportunity to provide these services to the Port of Longview. Please contact us with any questions.

Port-Proposed Compromise Alternative



Area of Excavation and Disposal Only

Potential area of excavation of NAPL-impacted soil and consolidation with other NAPL soils for solidification to limit solidified soil from within potential footprint of rail spur dump pits

Area of excavation and disposal of shallow soil overlying NAPL-impacted soil with solidification of 3-foot interval of NAPL-impacted soil above upper silt.

▬ ▪ ▪ ▬ Estimated Limits of Solidification

● Extent of DNAPL

● Extent of DRO in Soil > MTCA Method A

● Extent of Naphthalene in Soil > MTCA Method C

PORT OF LONGVIEW

Table 1

Proposed Port of Longview Version of MFA FS Preferred Alternative Cost Estimate

Port of Longview Maintenance Facility Area
Longview, WA

Item No.	Item Description	Estimated Quantity^1	Unit	Unit Cost^2	Estimated Cost	Notes/Assumptions
DIRECT CAPITAL COSTS						
Remedial Action Construction Capital Costs						
1	Mobilization / demobilization	1	LS	$ 67,000	$ 67,000	Assume mobilization in the range of MFA FS Alt S1 rather than Alt S5B, due to smaller footprint and thinner profile of solidification, allowing solidification to be performed with more readily available earthwork equipment.
2	Contractor Work Plans	240	HR	$ 90	$ 21,600	Use the cost assumed for MFA FS Alt S1 and S5B.
3	Solidification Pilot Testing	350.0	CY	$ 300	$ 105,000	Use the cost assumed for MFA FS S5B.
4	Temporary relocation of Port maintenance operations	1	LS	$ 30,000	$ 30,000	Use the cost assumed for MFA FS Alt S1 and S5B.
5	Demo Port's Maintenance Building (east corner)	3,000	SF	$ 25	$ 75,000	Use the cost assumed for MFA FS Alt S1.
6	Demo Horizontal bioventing wells & connection piping	800	LF	$ 37	$ 29,600	Use the cost assumed for MFA FS Alt S1 and S5B.
7	Decommission groundwater monitoring & biovent wells	40	EA	$ 920	$ 36,800	Use the cost assumed for MFA FS S5B.
8	Specialty Subcontractors (surveyor, utility locate)	1	LS	$ 8,000	$ 8,000	Use the cost assumed for MFA FS Alt S1 and S5B.
9	Demo underground utilities and fencing	1	LS	$ 28,000	$ 28,000	Use the cost assumed for MFA FS Alt S1 and S5B.
10	Demo retaining wall	220	LF	$ 75	$ 16,500	Use the cost assumed for MFA FS S5B.
11	Install Freeze Wall Shoring for building (200 LF)	0	SF	$ 34	$ -	Eliminate Freeze Wall due to shallow depth of excavation and ability to demolish part of building
12	Install Freeze Wall Shoring for excavation perimeter (720 LF)	0	SF	$ 31	$ -	Eliminate Freeze Wall consistent with MFA FS Alt S5B.
13	Install Sheet Pile Wall Shoring along slurry wall (100 LF)	1,200	SF	$ 45	$ 54,000	Use the unit cost assumed for MFA FS Alt S1, but reduce the square footage to account for shallow excavation. This is likely conservative as excavation in this area would be expected to be shallow and not requiring significant shoring.
14	Remove surface asphalt in storage yard and road	32,600	SF	$ 0.88	$ 28,688	Use the cost assumed for MFA FS Alt S1 and S5B.
15	Remove 42-inch HDPE culvert and replace after excavation	125	LF	$ 150	$ 18,750	Use the cost assumed for MFA FS Alt S1 and S5B.
16	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$ 27	$ 105,300	Use the cost assumed for MFA FS Alt S1 and S5B.
17	Excavation and Stockpiling of Contaminated Soil	3,604	CY	$ 14	$ 50,452	Use unit cost assumed for excavation under MFA FA Alt S5B due to shallow and lower-concentration excavation scope relative to that in Alt S1. Assume excavation from 3 feet to 8 feet below ground surface in northern area without solidification (8900 SF) and from 3 feet to 5 feet below ground surface in areas where solidification is used (26,400 SF).
18	Loading of Contaminated Soil	5,406	TN	$ 6	$ 32,433	Use the unit cost assumed for MFA FS Alt S1. Assume conversion factor of 1.5 tons per cubic yard, as used in the MFA FS.
19	Import of clean fill to the site	2,039	CY	$ 20	$ 40,785	Unit cost from MFA FS Alt S1. Contaminated excavation volume minus 40% of volume of solidified soil to account for reduced need for backfill as a result of expansion of solidified soil. Higher expansion percentage due to higher level of contamination in solidified soil relative to MFA FS Alt S5B (less dilution of deeper soil with cleaner shallow soil)
20	Stormwater handling and Environmental Protection	1	LS	$ 11,000	$ 11,000	Use the cost assumed for MFA FS S5B.
21	Backfill and Compaction of Excavation	7,504	CY	$ 9	$ 67,533	Use the cost assumed for MFA FS Alt S1.
22	Solidification Materials (8% NewCem Slag Cement)	469	TN	$ 130	$ 61,013	Solidification of 3-foot zone directly above upper silt and upper 1-foot of upper silt. Use unit costs and treatment ratios from MFA FS S5B.
23	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	117	TN	$ 230	$ 26,987	
24	Solidification Materials (0.5% Caustic Soda)	29	TN	$ 1,275	$ 37,400	
25	Solidification Labor and Equipment Outside Building Footprint	3,689	CY	$ 60	$ 221,333	Use unit costs from MFA FS S5B. 24900SF x 4ft thickness / 27 = 3689CY

Item No.	Item Description	Estimated Quantity^1	Unit	Unit Cost^2	Estimated Cost	Notes/Assumptions
26	Solidification labor and Equipment Under Mechanics Shop	222	CY	$ 60	$ 13,333	Use unit costs from MFA FS S5B. 1500SF x 4 ft thickness / 27 = 222CY
27	Geotextile fabric marker layer over solidified soil	2,933	SY	$ 2	$ 5,133	Use unit costs from MFA FS S5B.
28	Asphalt paving of site	32,600	SF	$ 4	$ 130,400	Use the cost assumed for MFA FS Alt S1 and S5B.
29	Rebuild Access Road (150 LF)	3,750	SF	$ 6	$ 22,500	Use the cost assumed for MFA FS Alt S1 and S5B.
30	Rebuild retaining wall	160	LF	$ 150	$ 24,000	Use the cost assumed for MFA FS Alt S1.
31	Replace connection piping for bioventing system	600	LF	$ 40	$ 24,000	Use the cost assumed for MFA FS Alt S1 and S5B.
32	Reconstruct maintenance building (east corner)	3,000	SF	$ 50	$ 150,000	Use the cost assumed for MFA FS Alt S1.
33	Monitoring Well Installation	10	EA	$ 5,400	$ 54,000	Use the cost assumed for MFA FS Alt S1 and S5B.
34	Contractor Reporting and Closeout Submittals	290	HR	$ 90	$ 26,100	Use the cost assumed for MFA FS Alt S1.
Contaminated Waste Disposal and Transportation Capital Costs						
1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$ 255	$ -	Soil containing NAPL would be solidified under the Port's alternative
2	Transportation Costs to RCRA Stabilization Facility	0	TN	$ 55	$ -	
3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$ 10	$ -	
4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$ 250	$ -	
5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	4,595	TN	$ 115	$ 528,393	Assume 85% of excavated soil exceeds MTCA Method C cleanup levels and requires CAMU-Eligible disposal. The remaining 15% is assumed to be below MTCA Method B cleanup levels and can be used as fill or disposed of at a Subtitle D facility under a contained-in determination.
6	Transportation Costs to Subtitle C Landfill	4,595	TN	$ 55	$ 252,710	
7	Non-Hazardous Material Disposal Costs (Subtitle D)	811	TN	$ 30	$ 24,325	Assume 15% of excavated soil meets MTCA Method B cleanup levels and can be used as fill or disposed of at a Subtitle D facility under a contained-in determination. Assume this soil is disposed off-site rather than reused on site to accommodate expansion of underlying solidified soil.
8	Transportation Costs to Subtitle D Landfill	811	TN	$ 25	$ 20,271	
9	Contaminated water treatment and disposal	0	GAL	$ 0.20	$ -	Eliminated consistent with MFA FS Alt S5B.
10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	845	TN	$ 8	$ 6,760	Use the cost assumed for MFA FS Alt S1 and S5B.
11	Transportation Costs to Asphalt Recycler	845	TN	$ 9	$ 7,605	
			Subtotal Direct Capital Costs		$ 2,462,705	
	Contingency (Concept Design Level)	20	%		$ 492,541	
			Total Direct Capital Cost^4:		$ 2,960,000	
INDIRECT CAPITAL COSTS						
1	General Coordination, Meetings, and Planning (% DCC)	2	%	$ 2,960,000	$ 59,200	Percentages consistent with MFA FS Alt S5B
2	Regulatory Review, Coordination, and Meetings (% DCC)	2	%	$ 2,960,000	$ 59,200	
3	Pilot Test Sampling, CBR, and Reporting	1	LS	$ 75,000	$ 75,000	Use the cost assumed for MFA FS S5B.
4	Engineering Design (% DCC)	5	%	$ 2,960,000	$ 148,000	Use average of percentages used in the MFA FS Alt S1 (3%) and Alt S5B (7%).
5	Planning for temporary relocation of Port Maintenance Ops	100	HR	$ 135	$ 13,500	Use the cost assumed for MFA FS Alt S1 and S5B.
6	Bid & RFI Support	60	HR	$ 135	$ 8,100	Use the cost assumed for MFA FS Alt S1 and S5B.
7	Construction Oversight and QA (% DCC)	5	%	$ 2,960,000	$ 148,000	Use the percentage assumed for MFA FS Alt S1 and S5B.
8	Confirmational Sample Collection and Reporting	1	LS	$ 33,000	$ 33,000	Use the cost assumed for MFA FS S5B.
9	Closure Documentation & Reporting	1	LS	$ 53,000	$ 53,000	Use the cost assumed for MFA FS Alt S1 and S5B.
			Subtotal Indirect Capital Costs		$ 597,000	
	Contingency (Concept Design Level)	10	%		$ 59,700	Percentages consistent with MFA FS Alt S1 and Alt S5B
			Total Indirect Capital Cost:		$ 657,000	
	TOTAL CAPITAL COSTS (DIRECT AND INDIRECT)				$ 3,620,000	
O&M COSTS						
Annual O&M Cost (Institutional Controls Maintenance and Asphalt Inspection/Repair as Needed) (30 Years)						
1	Project Management and Coordiation	16	Hr	$ 135	$ 2,160	Use O&M costs consistent with both MFA FS Alternatives S1 and S5B.
2	Annual Inspection and Reporting	32	Hr	$ 110	$ 3,520	
3	Update Ics Plan (once every 5 years)	1	LS	$ 750	$ 750	
4	Prorated Cost for Asphalt Repairs	1	LS	$ 8,606	$ 8,606	
			Subtotal Annual O&M Costs		$ 15,036	

Item No.	Item Description	Estimated Quantity^1	Unit	Unit Cost^2	Estimated Cost	Notes/Assumptions
	Contingency (Concept Design Level)	25		%	$ 3,759	Percentages consistent with MFA FS Alt S1 and Alt S5B
				Total Annual O&M Cost:	$ 18,800	
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical performance of solidified soil) (10 Years)						
1	Project Management & Coordination	24	HR	$ 135	$ 3,240	Use LTM costs consistent with both MFA FS Alternatives S1 and S5B.
2	Mob/Demob for Sampling (semi-annual)	2	EA	$ 1,800	$ 3,600	
3	Pickup Truck Rental	6	DY	$ 65	$ 390	
4	Sampling Labor and Supplies	20	EA	$ 400	$ 8,000	
5	Analytical Testing (DRO and SVOCs)	20	EA	$ 380	$ 7,600	
6	Annual Reporting	1	LS	$ 3,500	$ 3,500	
				Subtotal Annual LTM Costs	$ 26,330	
	Contingency (Concept Design Level)	25		%	$ 6,583	Percentages consistent with MFA FS Alt S1 and Alt S5B
				Total Annual LTM Cost:	$ 33,000	
	TOTAL O&M and MONITORING COSTS (UNDISCOUNTED)				$ 894,000	30 years of O&M and 10 years of long term monitoring.
	TOTAL O&M and MONITORING COSTS (NET PRESENT VALUE)				$ 649,000	Assuming a discount rate of 3% consistent with MFA FS alternatives
ALTERNATIVE COST SUMMARY						
	TOTAL CAPITAL COSTS (DIRECT AND INDIRECT)		–	–	$ 3,620,000	
	TOTAL O&M COSTS (NET PRESENT VALUE)		–	–	$ 649,000	
	WASHINGTON STATE SALES TAX (PERCENT OF DIRECT CAPITAL COSTS)		8	%	$ 236,800	
	AGENCY OVERSIGHT (PERCENT OF TOTAL CAPITAL COSTS)		3	%	$ 108,600	
				Total Remedial Alternative Cost:	$ 4,600,000	Accuracy of the total remedial alternative cost is considered -30 to +50 % based on EPA's Guide to Developing and Documenting Cost Estimates During the Feasibility Study.

Notes:

% = percent

LS = lump sum

SY = square yard

LF = linear foot

CY = cubic yard

O&M = operation and maintenance

S/S = Solidification/Stabilization

IHS = indicator hazardous substance

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PLAZA 600 BUILDING, 600 STEWART STREET, SUITE 1700, SEATTLE, WA 98101, TELEPHONE: (206) 728-2674, FAX: (206) 728-2732 www.geoengineers.com

MEMORANDUM

TO: Port of Longview

FROM: Chris Bailey, P.E.

DATE: April 14, 2017

FILE: File 242-010-03

SUBJECT: Summary of past comments on MFA Feasibility Study

This memorandum is prepared in response to Ecology's request for a summary of comments on the Public Review Draft Feasibility Study for the Port of Longview MFA, prepared by AECOM and International Paper (IP), July 2016 (MFA FS). As far back as 2007, the Port of Longview (Port) has provided Ecology with comments on multiple drafts of IP's Remedial Investigation (RI) and Feasibility Study (FS) documents, as well as other documents supporting the RI/FS process. The Port has provided numerous comments on the RI/FS documents and it acknowledges that many of the comments have been addressed in subsequent revised versions of the FS documents. However, many of the Port's most important comments have not been addressed. It is these comments that are the focus of this memorandum.

Port Concerns with Selected Cleanup Action Alternatives

The comments presented below specifically focus on the design and selection of IP's preferred Alternative (S5B) in the MFA FS, for both soil and groundwater. The selection process utilized by IP results in a proposed cleanup action that is low cost for IP but results in significant restrictions and future costs, interruptions, and lost economic opportunities for the Port of Longview's Port District. The proposed cleanup action alternatives selected in the MFA FS are expected to create several short-term and long-term concerns for Port operations, including the following:

1. Increased Volume of Contaminated Media
    a. The In-Situ Soil Solidification (ISS) process significantly increases the volume of contaminated media that will remain at the site, requires raising the elevation of site surfaces within and beyond the limits of contamination to a degree that is expected to interfere with Port operations, and makes negotiating institutional controls more complicated and difficult. These factors are not considered in the Disproportionate Cost Analysis (DCA) used in the FS to select a preferred alternative. Pilot testing of the proposed ISS technology included in several alternatives in the MFA FS indicated that ISS would result in a significant expansion of contaminated material, ranging from 26 to 48 percent, of the contaminated-but-solidified media at the MFA site. The alternatives that utilize ISS being evaluated by IP for the cleanup action at the MFA site rely solely on ISS and utilize ISS across the entire cross section of soil above the upper silt unit. IP's preferred Alternative S5B removed provisions for disposal of less contaminated soil considered in previous versions of the MFA FS.

    b. ISS is proposed across the entire depth of soil above the upper silt, and including the upper 1-foot of the upper silt. The shallow soils likely contain lower concentrations of contaminants than the deeper soils. These shallow soils are likely capable of off-site disposal at a relatively low cost. IP's preferred Alternative S5B proposes to treat the entire soil profile with ISS, thereby creating an unnecessarily large volume of ISS-related expansion, and mix highly contaminated deeper soil with the less (or no) contaminated shallow soil immediately below the asphalt base material. Moreover, IP's preferred Alternative S5B results in contaminated media (ISS-treated soil) closer to surface level relative to current conditions resulting in increased likelihood of encountering contaminated media during future shallow construction activities (i.e., trenching, post-hole digging).

2. Grade Changes Impacts
    a. IP's preferred Alternative S5B results in grade changes at the site that extend beyond the contaminated footprint. The vertical expansion of ISS-treated soil within the limits of contamination, and without consideration for disposal of lower concentration soil, results in the need to raise the surface elevation within the area of contamination by several feet. This requires adjusting the grade of the surrounding surface to match the grade within the ISS footprint, resulting in a broad, sloped surface, including impacts to the grade of the adjacent access road. Such grade changes will impact the Port's ability to operate in this area, including development of this parcel or the movement of heavy equipment across the site.
3. Burdensome Deed Restrictions
    a. Under IP's preferred Alternative S5B, the presence of solidified soil triggers the need for additional deed restrictions at the site to address the continued direct-contact risk associated with the solidified soil. While the ISS process reduces leachability, Ecology has indicated that it is still considered contaminated soil, despite having been treated. This results in a mixture that remains a risk for direct-contact exposure to Port personnel and construction workers. The mixing process proposed in IP's preferred Alternative S5B that mixes deeper highly contaminated soil with shallow soil that is expected to be less contaminated results in broad distribution of moderately contaminated solidified soil that requires coverage by deed restrictions. This essentially results in a larger volume of solidified soil after completion of the cleanup action relative to the original volume of soil exceeding cleanup levels, and because the requirement for deed restrictions follows the expanded volume of soil, the volume of soil constrained by deed restrictions would be larger than the volume requiring coverage prior to cleanup action. Off-site disposal of a moderate level of low-concentration contaminated soil, prior to completing solidification, would reduce the volume of soil constrained by some deed restrictions. This action would preserve a buffer between the ground surface and the top of the deed restriction soil. This would allow shallow construction and maintenance work by Port personnel in this area without intercepting soil constrained by deed restrictions, reducing the restrictions and costs to the Port.
4. Increased Development Costs
    a. The state of Washington has mandated through legislation that Ports, as a public entity, shall provide for economic development. The larger volume of contaminated media created by the ISS process proposed in IP's preferred Alternative S5B will incur higher construction costs due to the anticipated waste disposal classification of the ISS-treated soil. Further, it will complicate, and prolong development timelines, which adds an undue burden and additional cost to the Port, and thus the public, to fulfill their legislative mandate. These delays and costs are not exclusively for major redevelopment of underutilized Port property within the MFA area, but for normal minor construction activities such rail infrastructure improvements or near surface utility installation, as well as for general maintenance and repair of existing and future infrastructure. To further complicate these scenarios, it is anticipated that the Port will be required to include, and gain

approval from, Ecology on any work that may impact the institutional controls that cover the ISS foot print.

The comments identified herein recognize the aspects of IP's preferred Alternative S5B that the Port feels will have long-term effects on their ability to use and/or develop the MFA property. Specifically, the Port has the following concerns:

1. The preferred soil cleanup alternative was selected through a faulty disproportionate cost analysis methodology;
2. The preferred soil cleanup alternative negatively alters existing conditions and impacts future use and redevelopment of Port property;
3. The preferred groundwater remedy conflicts with the disproportionate cost analysis and relies primarily on natural attenuation without first demonstrating that cleanup levels can be reached within a reasonable timeframe.

Selection of Soil Cleanup Action Alternative Used Faulty Disproportionate Cost Analysis

The Port has commented several times on the methodology used to select the soil alternative in the FS, focusing on the DCA process originally used in the 2011 FS. In the 2011 FS, IP introduced the concept of quantifying the benefit of each alternative and normalizing the quantified benefit to develop a "benefit per unit cost" factor that allows easy comparison of alternatives. In a June 7, 2011 comment memo provided to Ecology, GeoEngineers made the following comment:

> *"In Section 9.1.1.1, the FS presents the concept of using the volume of soil treated or removed as a surrogate for "benefit" for performing the DCA. Using this factor as the only measure of benefit results in an oversimplification of the overall benefit for each Alternative that is typically determined by performing a comparative analysis of each of the DCA evaluation criteria. This evaluation method may be appropriate for comparing a limited set of alternatives that address a uniform contaminant distribution by removing varying percentages of contaminant mass."*

As indicated in the above comment, and similar comments made on subsequent FS documents, IP's quantitative method is flawed because it is based on providing equal benefit to multiple soil technologies based on the volume of soil for which the technology is applied, primarily in situ solidification and excavation with off-site disposal. We understand that this methodology was based on the DCA method developed for the Cleanup Action Plan for the BNSF Former Maintenance and Fueling Station in Skykomish, Washington (Ecology 2007) where several alternatives were evaluated that used the same general soil technology (excavation and off-site disposal) applied to varying degrees. This DCA methodology was appropriate for the Skykomish Cleanup Action Plan because it involved evaluating the cost/benefit ratio for several alternatives that applied the same technology over varying scales. Here, however, the soil technologies are substantively different (in-situ stabilization versus excavation and removal).

Assigning equal weight for a soil technology (in-situ solidification) that results in contaminated soil requiring institutional controls remaining on site with a technology (excavation and off-site disposal) that results in contaminated soil being disposed of in permitted disposal facilities and replaced by clean backfill is inappropriate. Using this DCA method for two different technologies prohibits the consideration of the significant impacts associated with the solidification technology, relative to excavation and off-site disposal. The quantitation method used in the MFA FS DCA does not allow consideration of the increased volume of contaminated media and the increased potential for exposure to the contaminated media as a result of the expansion of the treated soil. This method significantly discounts the permanence criterion described in the MTCA guidance for performing a DCA, which evaluates the degree to which the alternative reduces the toxicity, mobility, and volume of hazardous substances.

Selection of Soil Cleanup Action Alternative that negatively impacts future Port operations and development opportunities

In comments provided to Ecology on the June 2011 In-Situ Soil Stabilization Treatability Testing Work Plan, the Port indicated that the expansion of soil resulting from solidification treatment should be evaluated to determine the increased volume of material that would result from this technology under known conditions at the MFA. IP incorporated this parameter in the treatability testing, which determined that the expansion of soil resulting from the solidification treatment ranged from 26 to 48 percent, by volume, for the range of potential solidification mixes. In the 2011 MFA FS, the alternative description, and cost estimate, for Alternative S5 – Solidification Outside Building Footprint indicated that overburden material would be transported off-site for disposal "to allow for bulking during solidification." In FS versions following the treatability testing, however, the disposal allowance to accommodate bulking or expansion resulting from the solidification treatment was eliminated. In the later versions of the MFA FS, alternatives that utilize solidification addressed the expected expansion associated with in situ solidification by proposing to alter the topography of the property.

The Port has repeatedly commented on the assumption in the FS that the alternatives utilizing solidification need to address the impacts of altering the topography of the Port property including any limitations on current or future Port operations and impacts on the future redevelopment of Port property. The Port has repeatedly suggested that these alternatives should incorporate a moderate amount of off-site disposal to avoid a net increase in the volume of contaminated material that could negatively affect the topography of the Port property.

In October 2013, the Port made the following comment on the September 20, 2013 technical memorandum titled "Cleanup Action Alternative Conceptual Technical Memorandum," prepared by AECOM (URS at the time):

> *"In the 2011 RI/FS, alternative S5 included consideration for disposal of shallow clean fill in the event of significant expansion. The revised alternative S5, and other alternatives involving in situ stabilization should include considerations for characterizing shallow soil (immediately below the structural pavement base material and geotextile) to allow excavation and disposal of clean or marginally contaminated soil to focus the stabilization treatment on the most highly contaminated soil that is most expensive to dispose while providing adequate vertical space for expansion of the treated soil without significantly impacting the overall topography of the MFA or prohibiting future development of the property."*

The primary concerns driving the Port's resistance to the solidification alternatives is the permanent alteration of the topography of the Port property and the increased volume of treated, but still contaminated, material at shallow depths across the treatment area. The alteration of the topography creates permanent sloped surfaces in a currently flat storage facility that may impact Port operations. Additionally, leaving the increased volume of contaminated material at shallow depths is expected to result in increased future costs to the Port during redevelopment projects that require excavation of shallow soil for utility corridors, future building foundations or material handling facilities within the footprint of the solidified contamination material left on site.

In March 2015, the Port and IP met to discuss the potential for altering the proposed preferred Alternative S5B to reduce the future impact on Port operations and redevelopment costs. The result of this process is a revised preferred Alternative S5B presented in the Public Review Draft FS. This revised alternative incorporates excavation of less contaminated soil in the downgradient portion of the treatment area near the railroad tracks, which is the area most likely to be developed. This change addresses some of the Port's concerns about leaving contaminated soil in areas likely to be developed. However, in its revised preferred Alternative S5B, IP merely moved the excavated soil subject to treatment from the downgradient portion of the treatment area to other, upgradient, portions of the treatment area. In some areas of the Port property, this process would result in the expanded volume of treated, but still contaminated soil being present immediately below the asphalt pavement surface. This process of removing soil from one area and adding it to another provides some relief in one area, but exacerbates these issues of topography and proximity of contaminated material to the ground surface in a large area near the location of the Maintenance Facility, including across an existing roadway.

As described in repeated comments from the Port, these issues would be mitigated to a degree that the Port would be comfortable with if a moderate level of off-site disposal of lesser contaminated soil would be incorporated into the solidification alternatives. This would allow the solidification process to be focused on the most contaminated soil at deeper intervals, resulting in a limited net increase of contaminated material left on site following completion of the cleanup action.

Selection of the Preferred Groundwater Alternative is flawed

The Port has also repeatedly commented on the methodology that IP has used to select the preferred cleanup action alternative for groundwater at the MFA Site. In the FS documents dating back to 2011, the analysis of groundwater alternatives determined that an alternative that relies on active treatment of groundwater is not disproportionately costly relative to the one alternative analyzed, Alternative GW4 – Monitored Natural Attenuation, that does not utilize an active treatment method. Alternative GW2 – Chemical Oxidation with Monitored Natural Attenuation, an active treatment alternative, was determined to have a higher degree of protectiveness, permanence, and long-term effectiveness than Alternative GW4. The increased cost of Alternative GW2 relative to GW4 was determined in the FS to not be disproportionate to the increased benefit of GW2 over that of GW4. This determination would normally result in Alternative GW2 being selected as the alternative that uses permanent solutions to the maximum extent practicable, as outlined in MTCA. However, in each of the MFA FS versions dating back to 2011, the results of the DCA were dismissed and Alternative GW4 was selected as the preferred alternative based on expected high short-term impacts (which is already considered in the DCA under the criterion "management of short-term risks") and the expectation that the conditions following completion of the soil cleanup action would be conducive to natural attenuation.

The Port remains concerned that this selection method is inappropriate and inconsistent with MTCA as it over-emphasizes short-term impacts, which are already considered in the DCA, and selects natural attenuation and a conditional point of compliance without demonstrating that natural attenuation is already occurring and can be expected to meet cleanup levels within a reasonable timeframe. It also assumes that meeting cleanup levels without a conditional point of compliance is not practicable, as demonstrated by a DCA. The DCA in the MFA FS demonstrates that active treatment within the property is practicable, and therefore should be a component of the chosen alternative for groundwater.

The most recent version (July 2016) of the MFA FS restructured the selection of the groundwater alternative to a small degree by including the treatment element of Alternative GW2 as a contingency due to the uncertainties of the restoration timeframe of Alternative GW4. While this change provides some consideration for concerns that the Port has with choosing an alternative that completely relies on natural attenuation to achieve cleanup goals, it is uncertain how the implementation of the contingency action would be specified in the Cleanup Action Plan and how performance criteria would be used to trigger the requirement to implement active treatment.

Review of the most recent annual monitoring report for the combined TWP/MFA areas provides an indication of likely trends for groundwater following completion of the MFA soil cleanup action. In recent years, concentrations of petroleum hydrocarbons, PAHs, and pentachlorophenol in Aquifer A groundwater have been increasing in wells within the footprint of the TWP cleanup action. Samples of Aquifer A groundwater collected from within the footprint of the TWP containment wall (well AV-02) showed an increase of concentrations relative to previous annual sampling results and exceedances of MTCA Method B cleanup levels for diesel range hydrocarbons, naphthalene, and pentachlorophenol. This suggests that concentrations in Aquifer A are unstable and natural attenuation may not be adequate to permanently reduce concentrations to below cleanup levels.

In addition to the concentration trends observed within the TWP during annual monitoring, Aquifer A groundwater in the vicinity of the MFA has shown unstable and increasing concentrations of contaminants of concern in recent years. During the September 2016 annual sampling event, the results for well AV-13, located downgradient from the MFA and screened within Aquifer A, indicate increased concentrations of MFA contaminants of concern over prior samples. The results of the September 2016 analyses for diesel and oil-range petroleum hydrocarbons were higher than previously observed at this well, dating back to 2002. In addition, the concentrations of carcinogenic PAHs were significantly higher during September 2016 relative to previous detected concentrations, resulting in several exceedances of cleanup levels, including exceedance of the cleanup level for the TTEC (total toxicity equivalent concentration) for cPAHs. These results indicate that conditions in Aquifer A are at a minimum unstable, if not potentially trending higher, and conflict with the analysis contained in the MFA FS, which concludes that current groundwater conditions at the site are stable and near or below cleanup levels and conducive to relying solely on natural attenuation to achieve cleanup goals.

Based on to these recent results, selection of the groundwater alternative for the MFA FS should be based on the DCA performed in the FS and the selected alternative should include active groundwater treatment.

Summary

Over several versions of feasibility studies prepared by IP for the MFA, GeoEngineers and the Port have submitted numerous comments on the methodologies used to select cleanup action alternatives for the MFA with the goal of selecting a cost-effective cleanup action that can be implemented without impacts to the Port's current or future operations, and without adding significant future costs associated with the Port's redevelopment of the MFA site. Some of the Port's comments have been addressed in revisions to the FS, resulting in revisions to the proposed preferred alternatives. IP's preferred Alternative S5B, however, is still expected to increase the volume of contaminated soil/solidified material and result in contaminated material being present at shallow depths in some areas of the site. Additionally, IP's preferred Alternative S5B would significantly impact current Port operations by creating elevated and sloped surfaces in areas where the Port relies on a flat surface for storage and transport of materials. The resulting shallow depth of contaminated soil is expected to create additional costs for the Port in the event that the Port constructs additional facilities in this area that require removing soil for construction of utility corridors or building foundations. Under IP's preferred Alternative S5B, the burden for disposing of the increased volume of contaminated material created in the solidification process falls on the Port. Unfortunately, IP's preferred Alternative S5B continues to include components that put an unacceptable burden on the Port for long-term management and future costs associated with an increased volume of contaminated material on site.

We sincerely appreciate the opportunity to provide these services to the Port of Longview. Please contact us with any questions.

Table 1
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	Comment/Issue	Response
1	Page 1,third paragraph,first bullet - *"The factors associated with Alternative S5B that are expected to Impact the Port Include: ISS [in situ solidification] is proposed within the entire foot print of MTCA Method C exceedances. This expands the foot print of the area of required deed restrictions, as Ecology has indicated that any ISS-treated soil requires coverage by deed restrictions"* The Maintenance Facility Area will require institutional controls not only because of the presence of in-situ solidification and stabilization - treated soils, but because the cleanup will use MTCA Method C soil cleanup levels for protection of groundwater and establish a conditional point of compliance for groundwater. WAC 173-340-440(4} outlines circumstances when institutional controls are required to continue protection of human health and the environment and the integrity of a remedial action. Ecology Will work with the Port to complete the restrictive covenant(s) necessary for the Site.	The Port understands that the overall site will require the establishment of restrictive covenant(s) governing activities that may impact the overall cleanup action. Relying upon solidification in areas of lower contaminant concentrations where excavation and off-site disposal can be implemented cost effectively, however, results in a wider footprint, and shallower depth, of contaminated soil (including solidified soil) that poses a direct-contact exposure risk to Port and construction workers and will require coverage by institutional controls such as health and safety considerations during construction, following completion of the cleanup action.
2	Page 2, Port Concerns with Preferred Alternative S5B, first paragraph, first bullet - *"The issues stated above regarding IP's proposed preferred alternative, S5B - Solidification Outside and Inside Building, are expected to create several short-term and long-term concerns for Port operations, Including the following: The presence of solidified soil triggers the need for deed restrictions on the site. The Port is willing to accommodate this to a degree, but the solidification progress increases the volume of soil requiring coverage by the restrictions."* Ecology agrees that solidification increases the volume of treated soils, but the need for an environmental covenant Is not triggered only by the presence of treated soils. As noted in Comment 1, institutional controls are required when MTCA Method C cleanup levels are used and when a conditional point of compliance is established.	The Port understands that multiple levels of institutional controls and restrictive covenants are expected to be required as a result of the proposed preferred cleanup action alternative. As a result of the vertical expansion of the solidification-treated soil, including the displacement of currently clean soil and pavement base material with contaminated, solidified soil, however, the vertical footprint of contaminated material in scenarios is increased. This increased volume of contaminated material and requisite elevation changes, results in areas where health and safety, material handling, and disposal restrictions will be in place for soil immediately below the ground surface that would otherwise not be required if the current clean buffer between the ground surface and the top of soil exceeding cleanup levels were to be preserved. Utilizing solidification for the deeper, highly contaminated soil and DNAPL, combined with limited off-site disposal of shallow clean and lower concentration soils would reduce the need for restrictions to be placed on the exposure, handling, and disposal of soil encountered during future shallow maintenance and/or construction activities in this area.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	Comment/Issue	Response
3	Page 2, Port Concerns with Preferred Alternative SSB, first paragraph, second bullet - *"The /SS process significantly increases the volume of contaminated media remaining at the site, and requires raising the elevation of site surfaces within and beyond the limits of contamination to a degree that is expected to interfere with Port operations. "* On June 30, 2016, Ecology sent the Port an email and a review about the use of heavy equipment at the Port. The Port had submitted information on January 6, March 11, and April 4. In the summary included in the email, Ecology concluded: • The Port will be able to move its crane along the proposed grade of 5 percent for the North Tie Road. • Based upon the information provided by the Port, the proposed cross-slope of 3 percent north of the Mechanics Shop is too steep for the use of certain heavy equipment and will have to be adjusted to 2 percent for the Port to drive its crane across that area of the MFA. • The slope of 33 percent mentioned by the Port in its January 6 email is 10 to 30 feet from North Tie Road and is located in the TWP Area, where heavy vehicles should not be operated because of the potential to damage existing remedial underground containment structures (the underground slurry wall and the liner covering the TWP Area). • Slopes of 6 and 10 percent on the north and east sides of the Mechanics Shop would direct stormwater towards the shop. However, International Paper is proposing to install a strip drain that will collect and convey stormwater to the Port's existing stormwater collection system. If the Port has a need to operate the crane next to the Mechanics Shop, then these slopes will require adjustment. See June 30, 2016 email. In response to this analysis, Ecology added language to Section 7.4.7 of the draft feasibility study stating that final post-remediation site grades in the MFA shall allow the Longview to transport and operate existing equipment.	These considerations achieve some mitigation for the impact of the proposed preferred cleanup action alternative on current activities and use of current equipment at the Port. This, however, does not alleviate the Port's concerns that the increased volume of contaminated material and the creation of a mound of solidified contamination material places undue restrictions on the Port's ability to redevelop the property and/or to use different equipment at the property going forward.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	Comment/Issue	Response
4	Page 3, Port-Proposed Alternative to Preferred Alternative SSB, first paragraph, seventh bullet - *"The general approach of this Port-proposed revised alternative S5B is as follows: Reduce the footprint (vertical and lateral) of necessary deed restrictions that will affect future Port Use of the Site."* See previous comments on circumstances where institutional controls are required.	See previous responses to comments regarding institutional controls. The Port believes, based on previous conversations with Ecology, that soils (both lateral and vertical) with lower concentrations of site contaminants would not be subject to some of the same restrictions associated with institutional controls if excavation, off-site disposal, and backfill with clean material would be utilized. This is particularly true in areas where several feet of clean fill currently exists under the ground surface and will be displaced by contaminated, solidified soil if Ecology accepts IP's preferred alternative.
5	Page 4, Cost Analysis of Port-Proposed Alternative to IP Preferred Alternative S5B, first paragraph, first bullet - *"Based on the scope of the alternative described above, the primary cost assumptions are as follows: Solidification of approximately 3 to 4 feet of soil directly above the upper silt. This layer allows a factor of safety that all NAPL impacted soil is treated."* Alternative S5B includes the top foot of the Upper Silt in the treatment volume, addressing contaminated soil found in the Upper Silt and limiting potential breaches of the Upper Silt. The Combined Port Alternative should include the same level of treatment.	The costs for the Port Alternative will be revised to reflect this assumption.

Table 1 (continued)

Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	Comment/Issue	Response
6	Page 4, Cost Analysis of Port-Proposed Alternative to IP Preferred Alternative S5B, first paragraph, fourth and fifth bullets - • *"All excavated soil exceeds MTCA Method B levels, but is eligible for a contained-in determination and disposal as non-hazardous material at a Subtitle C facility or as CAMU-eligible waste.* • *All excavated soil is assumed to exceed Method C limits, requiring CAMU-eligible disposal at $160/ton (IP FS cost). This is a conservative assumption, as it is expected that some soil immediately below the base material likely does not exceed Method C limits and can be disposed of at a Subtitle D facility for $52/ton (IP FS cost) after a contained-in determination. You can see below how the percentage that does not exceed Method C impacts the cost."* Ecology's "contained-in" policy allows disposal of soils with contamination less than Method B levels in a Subtitle D facility. This policy was outlined in an email from Ecology sent to International Paper on February 23, 2010 and forwarded to the Port of Longview on July 29, 2010. See also Ecology's website concerning contained-in determinations. Ecology's 2010 email states that soils with contamination greater than MTCA Method B levels and less than MTCA Method C levels may be disposed of as non-hazardous waste at a Subtitle C facility.	The February 23, 2010 letter, and supporting tables, clearly presents that soil with concentrations between Method B and Method C levels would be considered "Contained-In Subtitle C" soil, to be disposed of as non-hazardous waste in a Subtitle C facility, which conflicts with this comment. *See* "Contained-In Subtitle C" tab of Excel spreadsheet. Section 1 of the letter is titled "Offsite disposal using contained-in determinations", and includes the following language: "For soils with contamination above MTCA Method B cleanup levels and below Method C cleanup levels or 10 times the Universal Treatment Standard (UTS) value for the F034-regulated hazardous constituents (which ever is higher), the soil can be disposed of as non-hazardous waste in a hazardous waste facility permitted under RCRA Subtitle C." Regardless of whether the contained-in language provided by Ecology is accurate, the disposition is the same; soil exceeding Method B levels, but below Method C levels, are assumed to be disposed of as non-hazardous waste at a Subtitle C facility, as indicated in the comment. The description of soil that can be disposed of at a Subtitle D facility in this text makes the statement "*does not exceed Method C limits*" in error; this statement was intended to refer to soil that does not exceed Method B, which can be disposed of at a Subtitle D facility after a contained-in determination.

Table 1 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 1

#	Comment/Issue	Response
7	Page 5, first paragraph – *"Additional cost savings may be realized based on the actual disposal and/or reuse options for excavated soil. Some excavated soil likely meets MTCA Method C, allowing reuse as fill rather than disposal as CAMU-eligible waste ($160/ton). If not used as fill and disposed at Subtitle D facility with a contained-in determination, significant savings can also be achieved; approximately $215,000 for each 25% excavated soil that can be disposed of as Subtitle D waste, versus CAMU-eligible waste."* As stated previously, Ecology's "contained-in" policy allows disposal of soils with contamination less than Method B levels in a Subtitle D facility. As outlined in Ecology's February 23, 2010 email, soils with contamination more than MTCA Method B levels and less than MTCA Method C levels may be disposed of as nonhazardous waste at a Subtitle C facility. Soils with contamination greater than MTCA Method C levels may be disposed of as CAMU-eligible at a Subtitle C facility. If excavated soil with contamination greater than MTCA Method B levels and less than MTCA Method C levels is reused as fill, institutional controls will be required (see WAC 173-340-440(4)(b).	This is correct and will be revised in the alternative description. This was intended to say that some excavated soil meets MTCA Method B, allowing reuse or inexpensive disposal at a Subtitle D facility with a contained-in determination. The soil referred to in this statement represents shallow soil with lower contaminant concentrations that could be disposed of inexpensively to mitigate the effect of expansion of the solidification process, and provide clean fill to a reasonable depth below the current ground surface.

Table 2
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 2

#	Comment/Issue	Response
General Comment	The cost for the Port Combined Alternative should be revised to reflect Ecology's comments on the costs included Attachment 3 (Combined Port Alternative -All Disposal as CAMU) and Attachment 4 (Combined Port Alternative -2/3 Disposal as CAMU).	The recommended revisions to the costs for the Port Alternative will be incorporated into a revised comparison of the costs of the proposed preferred cleanup action alternative in the current Feasibility Study and a single Port Alternative.

Table 3
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Comment/Issue	Response
General Comment	Review of cost estimates for the "Combined Port Alternative - All Disposal as CAMU" shows that costs for many tasks are the same or proportionally the same (because of less excavation and treatment) as costs proposed by International Paper for Alternative S1 and Alternative S5B. However, some of the cost estimates (especially quantities) are significantly different from those proposed by International Paper. Explanations for some of the differences (shoring, management of contaminated groundwater) are provided, but other differences are not acknowledged or explained (stormwater management, asphalt recycling, confirmational testing). The lower amount of direct costs has impacts on some indirect costs that are calculated as percentages of direct costs.	Additional description will be provided for the differences between cost assumptions for the original FS alternative costs and the Port Alternative. The intent of this analysis is not to provide revised cost analyses, but to assemble a combined alternative that utilizes the elements of multiple alternatives in the FS and present costs for that alternative that are based on the assumptions used in the FS alternatives to allow the alternatives to be effectively compared.
1	Remedial Action Construction Tasks #11[Install Freeze Wall Shoring for building (200 LF)] and #12 [Install Freeze Wall/ Shoring for excavation perimeter (720 LF)] - A comment box states that the freeze wall could be eliminated because of the shallower depth of excavation. According to the description of the Combined Port Alternative in Attachment 1, excavation would be less deep only in areas over DNAPL-contaminated soils. Areas without DNAPL levels of contamination would be excavated down to the Upper Silt. The amount of shoring and the type of shoring may be changed from the task in Alternative S1(Comprehensive Excavation), but the need for shoring to protect workers during construction and ensure effective remedy construction is not eliminated. Cost estimates should be provided for Tasks #11 and #12.	In Section 7.4.1 of the July 2016 FS text, the assumptions for Alternative S1 indicate that shoring would consist of "Installing a shoring system adjacent to and inside the Mechanics Shop building and adjacent to the TWP barrier wall to support the building foundation and barrier wall during excavation" and that shoring is assumed to be a freeze wall. The location of this shoring is shown on Figure 7-1 of the FS. It isn't clear to the Port why the 720 LF of additional freeze wall shoring is required and assume this is included in error as it differs from what is presented in the text and figures. Freeze wall shoring for the excavation perimeter would be excessively expensive for moderate-depth (10 to 15 feet below ground surface) excavation without adjacent structures to protect. For the Port's alternative, the sheet-pile shoring to protect the TWP slurry wall is retained from the FS Alternative S1 as a conservative measure assuming shallow excavation would be performed prior to solidification. This shoring is actually not included in FS Alternative S5B, and may not be required if excavation depths remain relatively shallow. In the downgradient portion of the cleanup area, FS Alternative S5B proposes to excavate soil down to the upper silt and relocated it to another portion of the Site. This excavation is assumed to not require shoring, based on the cost estimate, and the Port Alternative made the same assumption.

Table 3 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Comment/Issue	Response
2	Remedial Action Construction Tasks #19 [Import of clean fill to site] -The calculation of 2,393 CY of clean fill assumes 40% expansion of solidified soil. Alternative Specific Assumption number 7 for Alternative SSB assumes the volumetric expansion of solidified soil will be 35%. An explanation should be provided for the difference assumed In volumetric expansion for the Combined Port Alternative.	The increased expansion value is based on the 2012 Treatability Study Report. Volumetric expansion ranged from 26 to 48 percent for the optimization test samples (Section 3.4.3). The lab report for the treatability testing (Appendix G) indicated that the expansion would be dependent on reagent addition rates. The solidification process in the Port Alternative would be focused on the deeper, more heavily impacted soil and would not rely on dilution of this soil by shallow, less contaminated soil. Therefore, the treatment process may require additional additives to account for the higher contaminant concentration. Volumetric expansion would increase if additional additives are required, and therefore is assumedto be on the higher end of the range observed during treatability testing. The samples used for treatability testing were consolidated samples representative of the entire soil column, rather than being representative of the deeper, highly contaminated soil.
3	Remedial Action Construction Task #20 [Contaminated water handling and Environmental Protection] - The shallower depth of excavation for the Combined Port Alternative would decrease the amount of contaminated water to be managed compared to Alternative S1, but would not totally eliminate the generation of contaminated groundwater. An estimate should be provided in the Combined Port Alternative for this task.	The areas proposed for excavation down to the upper silt in the Port Alternative are expected to be excavated using similar methods as that in the FS Alternative S5B for excavating soil near railroad tracks (Appendix J, Alternative S5B, Line 15). Despite the excavation, handling, and relocating of soil included in FS Alternative S5B, the cost estimate does not include contaminated water handling. Therefore, to be consistent, the Port Alternative has not included this potential cost as well.
4	The Combined Port Alternative does not include costs for stormwater handling and environmental protection. These activities were included in Alternative S5B as Remedial Action Construction as Task #14 for a cost of $11,000. This task should be added to the Combined Port Alternative and an estimate should be provided.	This was an oversight in the combination of S1 and S5B and will be added to the Port Alternative to be consistent.

Table 3 (continued)

Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Comment/Issue	Response
5	Remedial Action Construction Task #29 [Rebuild Access Road (150 LF)] - The Port's estimated cost for this task is $18,750. However, the unit cost in the December 2015 Feasibility Study to rebuild the access road is $6 per square foot, for a total cost of $22,500. An explanation should be provided for the difference in cost for the Combined Port Alternative.	The unit cost will be revised in the Port Alternative. This unit cost in the FS increased for this item since the Port Alternative cost estimate was originally developed.
6	Contaminated Waste Disposal and Transportation Task #9 [Contaminated water treatment and disposal] - The shallow depth of excavation for the Combined Port Alternative would decrease the amount of contaminated water to be managed, but would not totally eliminate the generation of contaminated groundwater and its need for transport and disposal. A cost estimate should be provided in the Combined Port Alternative for this task.	Similar to the response to comment 3, the downgradient excavation, handling, and relocation proposed in FS Alternative S5B is similar to the excavation, handling, and disposal included in the Port Alternative and both are assumed to not generate contaminated water for disposal.
7	Contaminated Waste Disposal and Transportation Tasks #10 [Non-Hazardous Material Disposal Costs (Asphalt Recycling)] and #11 [Transportation Costs to Asphalt Recycler] -The quantity of asphalt (320 tons) managed under the Combined Port Alternative is significantly less than the quantity managed under Alternative S1 and Alternative SSB (845 tons) in the December 2015 Feasibility Study. Especially since, under Task #14 [Remove surface asphalt in storage yard and road] of Remedial Action Construction, the Combined Port Alternative shows a similar quantity of surface asphalt removed (32,200 square feet) to the quantities given for Alternative S1 and Alternative SSB (32,600 square feet). An explanation should be provided for the difference in quantities used to calculate disposal and transportation costs for asphalt recycling in the Combined Port Alternative.	For consistency, the Port Alternative will be revised to match the FS Alternative S1.

Table 3 (continued)
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 3

#	Comment/Issue	Response
8	Engineering Costs (Capital Indirect) Task #8 [Confirmational Sample Collection and Reporting] -The cost for this task in Combined Port Alternative is $15,000. This is half the cost of this task in Alternative S1 ($30,000) and Alternative SSB ($33,000). An explanation should be provided for the difference in cost for the Combined Port Alternative.	The $15,000 used for the Port Alternative was based on the cost listed for a previous version of Alternative S1. This cost will be revised to reflect the updated FS.

Table 4
Responses to Ecology Comments on Port of Longview Alternative Submittal dated September 27, 2016, Attachment 4

#	Comment/Issue	Response
1	See Ecology's comments on Attachment 3 (Combined Port Alternative -All Disposal as CAMU) including, but not limited to, shoring, handling and disposal of contaminated water, stormwater, transportation and recycling/disposal of asphalt, and confirmational sampling.	See Port's response to comments on Attachment 3. These comments will be incorporated into a single Port Alternative.
2	Contaminated Waste Disposal and Transportation Tasks #7 [Non-Hazardous Material Disposal Costs (Subtitle D)] and #8 [Transportation Costs to Subtitle D Landfill] - Because of incorrect assumptions outlined in Attachment 1 on the use of contained-in determinations, the amounts and disposal options for materials managed at Subtitle D Landfill should be reviewed and revised to reflect Ecology's comments.	The description of likely waste disposal methods will be revised to clarify waste disposal assumptions. However, the assumption is that a small portion of shallow soil within the lateral limits of the cleanup action may meet MTCA Method B cleanup levels and be eligible for Subtitle D disposal using contained-in determinations.

Bob Ferguson
ATTORNEY GENERAL OF WASHINGTON
Ecology Division
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PO Box 40117 • Olympia WA 98504-0117 • (360) 586-6770

March 7, 2017

Brien J. Flanagan
Schwabe Williamson & Wyatt
1211 SW 5th, Suite 1900
Portland, OR 97204

RE: ***Port's Response to Ecology's January 31, 2017, Letter to Lisa Hendriksen; International Paper Longview Site***

Dear Brien,

This letter is in response to your February 28, 2017, letter addressed to Sally Toteff, the Department of Ecology's Southwest Region Director, and John Level with the Attorney General's Office, relating to proposed cleanup options and the draft Feasibility Study for the Maintenance Facility Area (MFA) of the International Paper Longview Site.

For some time now, Ecology has engaged with the Port of Longview and International Paper in an effort to obtain input and create a draft Feasibility Study that all parties agree with. Ecology concurs with moving forward with the Feasibility Study and this letter outlines next steps to do this.

To move the process forward, Ecology plans to begin the public notice for the draft Feasibility Study by the end of May 2017. However, before issuing the draft Feasibility Study, Ecology requests a response from the Port to Ecology's January 31, 2017, letter and comments regarding additional information on the Port's combined alternative. The Port's response is sought by April 7, 2017. Ecology also invites other comments the Port may have regarding International Paper's preferred alternative. If Ecology does not receive comments from the Port by this date the Port would have an opportunity to comment when the draft Feasibility Study is issued for public review. After April 7, Ecology expects to provide the Port's additional cleanup alternative to International Paper and ask for their comments. This parallels how the Port was afforded an opportunity to provide comments on International Paper's draft Feasibility Study.

The draft Feasibility Study for the MFA that will be released for public comment will include:

- International Paper's draft Feasibility Study (dated July 12, 2016).
- The Port's comments on International Paper's draft Feasibility Study.
- The Port's cleanup alternative for the MFA.
- International Paper's comments on the Port's cleanup alternative.
- Ecology's comments on both proposals.

The draft Feasibility Study will provide cleanup alternatives that the local community, interested tribes, the Port, and International Paper may wish to comment on. The draft Feasibility Study is not a decision document. Once the public review of the draft Feasibility Study is completed, Ecology will consider all comments, conduct additional evaluation as needed, and then issue a final Feasibility Study. Next, a draft Cleanup Action Plan will be drafted—this will also have a public comment period. Unlike the Feasibility Study, the Cleanup Action Plan is a decision document as it describes a preferred cleanup alternative and how the alternative will be implemented. The final Cleanup Action Plan will be an exhibit to a legal document, e.g., consent decree, which will require the implementation of the Cleanup Action Plan and include a schedule to accomplish the Plan's remedial actions.

If you have questions about the information requested in our January 31, 2017 letter, please contact me or have Ms. Hendriksen contact Ms. Kaia Petersen at (360) 407-6359. Ecology looks forward to working with the Port, International Paper, and the public to move the MFA forward in the cleanup process.

Sincerely,

JOHN A. LEVEL
Assistant Attorney General
(360) 586-6753

JAL:tlt
Enclosures
By email
cc: Sally Toteff, Ecology, SWRO Regional Director
Darin Rice, Ecology, HWTR Program Manager
Ava Edmonson, Ecology, HWTR SWRO Section Manager
Kaia Petersen, Ecology, HWTR SWRO Project Coordinator
Lisa Hendriksen, Port of Longview
Norm Krehbiel, Port of Longview
Chris Bailey, GeoEngineers
Steven F. Hill, Miller Nash

Richard Mitchell, Miller Nash
Connie Sue Martin, Schwabe Williamson & Wyatt
John Cermak, Baker Hostetler
Steve Ginski, International Paper
Phil Slowiak, International Paper
Paul Kalina, AECOM

Schwabe
WILLIAMSON & WYATT®

February 28, 2017

Brien J. Flanagan
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VIA EMAIL

John Level
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1125 Washington Street SE
PO Box 40100
Olympia, WA 98504-0100

Sally Toteff
SWRO Regional Director
Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

RE: Response to January 31, 2017 Department of Ecology Letter to Lisa Hendriksen
Port of Longview | TPH & TWP Sites
Our File No.: 068433-198751

Dear Sally and John:

The Port of Longview is in receipt of the Department of Ecology's January 31, 2017 letter which provides what Ecology contends is a response and comments to the Port's "combined Port alternative." After months of awaiting a response, and being repeatedly told that a response was imminent, we were surprised and disappointed that Ecology has retreated from its commitment made to us in our August 17, 2016 meeting to mediate the dispute between the Port and International Paper ("IP") as to the preferred alternative for remediation of the MFA site at the Port. Additionally, Ecology's letter mistakes the two cost estimate examples we provided on September 27, 2016 with the "combined Port alternative" as two separate alternative proposals, which they are not. Because Ecology's response does not include a path toward resolution with IP and because the response indicates a fundamental misunderstanding of the "combined Port alternative," I am writing to you directly to express frustration with Ecology and seek a meeting with Ecology to discuss moving forward.

This letter sets out some of our concerns and recommendations for moving forward. Because the Port values a strong relationship with its government partners, such as Ecology, we suggest a meeting immediately to discuss the status of the FS, the requirements under MTCA, and next steps for achieving resolution.

MFA Site and FS Proposal

The issues here are simple. IP's historical operations contaminated the Port of Longview's maintenance facility area (MFA site). This fact is not in dispute. The Port of Longview did not know of the contamination when it acquired the MFA site and did not cause the contamination. I do not believe that information is in dispute either.

As the responsible party, IP has been working on a remedial investigation and feasibility study at the property. During the fifteen plus years that IP has been working on the RI/FS, and through various machinations and redos, IP has developed a feasibility study and a preferred alternative that involves solidifying all soils (whether contaminated or clean soil) at the MFA site by mixing it with a concrete-like mixture. It is undisputed that this alternative will increase the amount of contaminated material at the MFA site (including bringing contaminated material to places where the soils are currently clean), impact the current and future uses of the property, and put the cost and responsibility for future handling and disposal of the solidified material on the Port. Not surprisingly, the Port is not willing to accept this.

IP's preferred alternative has been criticized by the Port since it was first presented in around 2011. As we've discussed with Ecology since then, the Port cannot accept IP's proposal (and Ecology should not accept IP's proposal) for numerous reasons that have been listed out and described in multiple letters to Ecology and IP, including: (a) the amount of contaminated material at the MFA site will increase as part of the solidification process; that is, remarkably, the remedy will actually cause *more* contamination of the environment, (b) the alternative will leave a large mound of solidified material at the site that will negatively impact the current and future use of the MFA site, and (c) the costs for disposal of the contaminated material during future development are being placed on the Port.[1] These concerns strike directly at MTCA regulations for implementing an FS and conducting a disproportionate cost analysis (DCA).

In selecting a remedial alternative, Ecology "…shall use permanent solutions to the maximum extent practicable." WAC 173-340-360(2)(b)(i). *See also* RCW 70.105D.030(1)(b). A DCA must analyze the permanence of alternative solutions by establishing a baseline solution that *maximizes permanence* and determining a preferred alternative based on the costs and benefits of alternatives compared to that baseline solution. But, The DCA performed by IP does not establish the required 'baseline,' and then magnifies this failure by minimizing the weight given to permanence in the cost-benefit analysis. This is contrary to the requirements and intent of WAC 173-340-360(3).

In addition, IP discards the public concern factor required in the DCA by acting as though a public outreach plan and opportunity for comment is all that is required. But, the MTCA regulations require that public concern be a factor analyzed as part of the cost benefit analysis. WAC 173-340-360(3)(f)(vii) (public concerns to be evaluated as part of DCA).

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[1] The concerns were also set forth in Attachment 1 to the Port's September 27 submittal to Ecology.

Here, IP's FS and DCA do not meet MTCA requirements. The DCA and FS do not account for factors required by rule and fail to appropriately account for permanence in the DCA. Based on the current FS, Ecology cannot make the required "preliminary determination by [Ecology] that the proposed cleanup action will comply with WAC 173-340-360." WAC 173-340-380.

Importantly, "[T]he department has the discretion to favor or disfavor qualitative benefits and use that information in selecting a cleanup action." WAC 173-340-360(3)(e)(ii)(C). The Department's determination to favor qualitative benefits and alternate remedies is supported by MTCA and the courts. *Dep't of Ecology v. Tiger Oil Corp.*, 166 Wn. App. 720, 753-4, 271 P.3d 331 (2012).

The Port has suggested an alternative (the "combined Port alternative") that greatly increases the permanence of the remedy, provides a mechanism to *create less* contaminated-but-solidified materials, and takes into account the concerns of the public, while not significantly increasing costs.[2] The "combined Port alternative" does allow for some permanent impact, but *not* in areas where development around the Port's rail infrastructure is planned and *not* in the near-surface soils where utilities are located and maintenance work is common.

Ecology has oddly misconstrued the Port's alternative, which, as we've made clear, is a "single Port alternative." The Port's idea is simple—solidification of only contaminated soil, containing contaminated-but-solidified soils to specified areas, sampling and reuse of "clean" overburden, and disposal of additional contaminated-but-solidified soils as CAMU waste. This alternative combines the cost saving elements of IP's solidifacting alternative (S5B) and the permanence of the disposal alternative (S1). The costs of this "combined Port alternative" will depend, in part, on the volume of solidified soils to be disposed of as CAMU-eligible waste. That volume will only be known once the near-surface soils are sampled to confirm the extent of contamination. The Port's September submission included two cost estimates that provided a reasonably likely and conservative/worst case estimate.[3] The cost proposals illustrate that the "combined Port alternative" is unlikely to have a significant cost impact, and is significantly less than the excavation and disposal alternative (S1) which is the most permanent solution. This "combined Port alternative" strikes the proper balance between cost and permanence and appropriately accounts for public concerns as is required under WAC 173-340-360(3)

Ecology Must Commit to Moving the FS Process Forward

At our August meeting, Ecology committed to working with both IP and the Port to get to resolution at the MFA area. Specifically, Ecology committed to reviewing the "combined Port alternative" to assess whether it was an acceptable alternative that was protective of human

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[2] The Port has repeatedly stated that it could cover additional costs over and above the costs in IP's preferred alternative created by shifting to the Port's preferred alternative.

[3] The Port's memo ("POL Memo - 9.26.16") explicitly sets out that this is a "single" alternative and explains in clear and concise language that the cost estimates present two cost scenarios based on the amount of confirmed contaminated material to be disposed of as CAMU-eligible waste. If the Port's memo was not available to Ecology, a phone call to the Port would have quickly cleared up any confusion.

health and the environment and Ecology committed to working with the Port and IP to negotiate a resolution of the DCA and selection of a preferred alternative that will work for the Port, IP and Ecology. However, Ecology, in its response, indicates that it will have no involvement in facilitating a resolution. But, Ecology is the regulatory agency here. Ecology is responsible for making a decision under MTCA. See e.g., WAC 173-340-360." WAC 173-340-380.

Here, the responsible party has refused to engage with the Port and wants to ignore the Port's concerns about the long-term impact on the Port's operations caused by IP's preferred alternative. The Port has repeatedly set forth the reasons why this alternative is not acceptable to the Port and does not meet MTCA requirements. The Port, as the public landowner and a concerned entity, has submitted comments expressing its concerns. Nevertheless, Ecology fails to intervene and require IP to implement a remedy that is protective of the environment, meets MTCA standards, and meets the reasonable requirements of the public landowner, the Port of Longview. Ecology has the authority and responsibility to usher forward a resolution that comports with MTCA and Ecology's responsibilities to the State.

As a Washington public entity with a statutory mandate to provide economic development within its community, the Port needs this remediation to move forward, and it requires a remedy that will not prevent the Port's reasonable economic development opportunities as mandated by the legislature. Ecology's failure to lead is disappointing. The Port of Longview requires resolution of the contamination caused by IP. A resolution that makes the Port's property unusable and transfers the costs of removal to the Port is unacceptable to the Port and should be unacceptable to Ecology.

Sally and John, I fear that Ecology's retreat from its commitments and failure to discuss these issues with the Port has damaged the trust the Port has in this process. I request a meeting immediately to discuss our path forward.

Best regards,

SCHWABE, WILLIAMSON & WYATT, P.C.

Brien J. Flanagan
BF:nkl

cc: Norman G. Krehbiel, P.E.
Connie Sue Manos Martin
Steven F. Hill
Christopher L. Bailey
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January 31, 2017

Ms. Lisa Hendriksen
Director of Planning & Environmental Services
Port of Longview
10 Port Way
Longview, WA 98632

Dear Ms. Hendriksen:

The Department of Ecology (Ecology) has reviewed the Port of Longview's submittal of September 27, 2016. The submittal outlined the Combined Port Alternative for cleanup of the Maintenance Facility Area (MFA).

Ecology based its review of the Combined Port Alternative on the requirements in the Model Toxics Control Act Regulation (MTCA), Chapter 173-340 WAC. Consistent with MTCA's regulations, Ecology will require institutional controls for the MFA to protect human health and the environment and to protect the integrity of the final cleanup remedy. Institutional controls are required because the cleanup of the MFA will use MTCA Method C soil cleanup levels for protection of groundwater and establish a conditional point of compliance for groundwater.

The Port submitted two versions of the Combined Port Alternative – one version where all of soils excavated would be disposed offsite as CAMU (corrective action management unit) - eligible waste at a Subtitle C hazardous waste landfill and a second version where two-thirds of excavated soils would be disposed as CAMU-eligible waste.

Ecology has determined that the *Combined Port Alternative – All Disposal as CAMU* is protective of human health and the environment. To include in the feasibility study for the MFA, the Port would need to address Ecology's comments on the *All Disposal as CAMU* version and its cost estimates. In addition, the *All Disposal as CAMU* version, along with the other alternatives proposed in the July 2016 feasibility study for the MFA, would need to be evaluated under the criteria for disproportionate cost analysis in WAC 173-340-360(3). A determination of whether the *All Disposal as CAMU* version provides for a reasonable restoration time frame in under the factors in -360(4) is also necessary.

Ecology also reviewed the *Combined Port Alternative – 2/3 Disposal as CAMU*. Ecology has concerns with this version because of the discussion of contained-in determinations in

Attachment 1 to the Port's submittal. This discussion is inconsistent with Ecology's policy and guidance on disposal options for contaminated soil that Ecology provided to the Port in July 2010. Ecology's "contained-in" policy allows disposal in a Subtitle D solid waste facility of soils with contamination less than Method B cleanup levels.

At this time, Ecology encourages the Port and International Paper to conduct mediation to resolve issues concerning remedy selection in the MFA. The Port and International Paper will need to arrange for a mediator, schedule the mediation, and determine how to share mediation costs. Ecology will not be a party to the mediation. If needed, Ecology could provide technical assistance to the mediator. Ecology hopes the Port and International Paper will be able to conduct mediation in March/April 2017. Ecology would like to hear back from the Port by February 28th on progress with scheduling mediation with International Paper.

Enclosed are Ecology's comments on Attachments 1 through 5 of the Port's submittal including comments on the cost estimate for the *Combined Port Alternative – All Disposal as CAMU.*

If you have any questions, please contact me.

Kaia Petersen

Kaia Petersen

Department of Ecology
Hazardous Waste and Toxics Reduction
Southwest Regional Office

Enclosure(s): Comments on POL proposed alternative 20170130
IP Soil Disposition Tech Memo – Ecology Response 20100223
MFA Office Soil Disposition 20100223
Tom Eaton Contained-In Policy Memo 1993

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Sally Toteff, SWRO Regional Director, Department of Ecology
John Level, Attorney General's Office

Comments on attachments to email dated September 27, 2016, from Lisa Hendriksen (Port of Longview) to Kaia Petersen (Department of Ecology)

Ecology comments on **Attachment 1:** Memo from Chris Bailey to Lisa Hendriksen, regarding Development of additional alternative for MFA cleanup action, dated March 10, 2016

1. Page 1, third paragraph, first bullet –
   "The factors associated with Alternative S5B that are expected to impact the Port include:
   - *ISS [in situ solidification] is proposed within the entire footprint of MTCA Method C exceedances. This expands the footprint of the area of required deed restrictions, as Ecology as indicated that any ISS-treated soil requires coverage by deed restrictions."*

The Maintenance Facility Area will require institutional controls not only because of the presence of in-situ solidification and stabilization - treated soils, but because the cleanup will use MTCA Method C soil cleanup levels for protection of groundwater and establish a conditional point of compliance for groundwater. WAC 173-340-440(4) outlines circumstances when institutional controls are required to continue protection of human health and the environment and the integrity of a remedial action.[1] Ecology will work with the Port to complete the restrictive covenant(s) necessary for the Site.

2. Page 2, **Port Concerns with Preferred Alternative S5B**, first paragraph, first bullet –
   "The issues stated above regarding IP's proposed preferred alternative, S5B – Solidification Outside and Inside Building, are expected to create several short-term and long-term concerns for Port operations, including the following:
   - *The presence of solidified soil triggers the need for deed restrictions on the site. The Port is willing to accommodate this to a degree, but the solidification progress increases the volume of soil requiring coverage by the restrictions."*

Ecology agrees that solidification increases the volume of treated soils, but the need for an environmental covenant is not triggered only by the presence of treated soils. As noted in Comment 1, institutional controls are required when MTCA Method C cleanup levels are used and when a conditional point of compliance is established.

3. Page 2, **Port Concerns with Preferred Alternative S5B**, first paragraph, second bullet –
   - *"The ISS process significantly increases the volume of contaminated media remaining at the site, and requires raising the elevation of site surfaces within and beyond the limits of contamination to a degree that is expected to interfere with Port operations."*

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[1] *WAC 173-340-440* ***Institutional controls.***

(4) ***Circumstances required.*** *Institutional controls shall be required to assure both the continued protection of human health and the environment and the integrity of an interim action or cleanup action in the following circumstances:*

. . .

(b) The cleanup level is established using Method C;

. . .

(e) A conditional point of compliance is established as the basis for measuring compliance at the site;

Comments on attachments to email dated September 27, 2016, from Lisa Hendriksen (Port of Longview) to Kaia Petersen (Department of Ecology)

On June 30, 2016, Ecology sent the Port an email and a review about the use of heavy equipment at the Port. The Port had submitted information on January 6, March 11, and April 4. In the summary included in the email, Ecology concluded:

- The Port will be able to move its crane along the proposed grade of 5 percent for the North Tie Road.
- Based upon the information provided by the Port, the proposed cross-slope of 3 percent north of the Mechanics Shop is too steep for the use of certain heavy equipment and will have to be adjusted to 2 percent for the Port to drive its crane across that area of the MFA.
- The slope of 33 percent mentioned by the Port in its January 6 email is 10 to 30 feet from North Tie Road and is located in the TWP Area, where heavy vehicles should not be operated because of the potential to damage existing remedial underground containment structures (the underground slurry wall and the liner covering the TWP Area).
- Slopes of 6 and 10 percent on the north and east sides of the Mechanics Shop would direct stormwater towards the shop. However, International Paper is proposing to install a strip drain that will collect and convey stormwater to the Port's existing stormwater collection system. If the Port has a need to operate the crane next to the Mechanics Shop, then these slopes will require adjustment.

See June 30, 2016 email. In response to this analysis, Ecology added language to Section 7.4.7 of the draft feasibility study stating that final post-remediation site grades in the MFA shall allow the Longview to transport and operate existing equipment.

4. Page 3, **Port-Proposed Alternative to Preferred Alternative S5B**, first paragraph, seventh bullet – *"The general approach of this Port-proposed revised alternative S5B is as follows:*
    - *Reduce the footprint (vertical and lateral) of necessary deed restrictions that will affect future Port Use of the Site."*

See previous comments on circumstances where institutional controls are required.

5. Page 4, **Cost Analysis of Port-Proposed Alternative to IP Preferred Alternative S5B**, first paragraph, first bullet –
   "Based on the scope of the alternative described above, the primary cost assumptions are as follows:
    - *Solidification of approximately 3 to 4 feet of soil directly above the upper silt. This layer allows a factor of safety that all NAPL impacted soil is treated."*

Alternative S5B includes the top foot of the Upper Silt in the treatment volume, addressing contaminated soil found in the Upper Silt and limiting potential breaches of the Upper Silt. The Combined Port Alternative should include the same level of treatment.

6. Page 4, **Cost Analysis of Port-Proposed Alternative to IP Preferred Alternative S5B**, first paragraph, fourth and fifth bullets –
    - *"All excavated soil exceeds MTCA Method B levels, but is eligible for a contained-in determination and disposal as non-hazardous material at a Subtitle C facility or as CAMU-eligible waste.*
    - *All excavated soil is assumed to exceed Method C limits, requiring CAMU-eligible disposal at $160/ton (IP FS cost). This is a conservative assumption, as it is expected that some soil immediately below the base material likely does not exceed Method C limits and can be disposed of at a Subtitle D facility for $52/ton (IP FS cost) after a contained-in determination. You can see below how the percentage that does not exceed Method C impacts the cost."*

Ecology's "contained-in" policy allows disposal of soils with contamination <u>less than Method B levels</u> in a Subtitle D facility. This policy was outlined in an email from Ecology sent to International Paper on February 23, 2010 and forwarded to the Port of Longview on July 29, 2010. *See also* Ecology's website concerning contained-in determinations.[2] Ecology's 2010 email states that soils with contamination greater than MTCA Method B levels and less than MTCA Method C levels may be disposed of as non-hazardous waste at a Subtitle C facility.

7. Page 5, first paragraph – *"Additional cost savings may be realized based on the actual disposal and/or reuse options for excavated soil. Some excavated soil likely meets MTCA Method C, allowing reuse as fill rather than disposal as CAMU-eligible waste ($160/ton). If not used as fill and disposed at Subtitle D facility with a contained-in determination, significant savings can also be achieved; approximately $215,000 for each 25% excavated soil that can be disposed of as Subtitle D waste, versus CAMU-eligible waste."*

As stated previously, Ecology's "contained-in" policy allows disposal of soils with contamination <u>less than Method B levels</u> in a Subtitle D facility. As outlined in Ecology's February 23, 2010 email, soils with contamination <u>more than MTCA Method B levels and less than MTCA Method C levels</u> may be disposed of as nonhazardous waste at a Subtitle C facility. Soils with contamination <u>greater than MTCA Method C levels</u> may be disposed of as CAMU-eligible at a Subtitle C facility.

If excavated soil with contamination greater than MTCA Method B levels and less than MTCA Method C levels is reused as fill, institutional controls will be required (*see* WAC 173-340-440(4)(b).

Ecology comment on **Attachment 2**: Comparison of Alternatives

The cost for the Port Combined Alternative should be revised to reflect Ecology's comments on the costs included **Attachment 3** (Combined Port Alternative – All Disposal as CAMU) and **Attachment 4** (Combined Port Alternative – 2/3 Disposal as CAMU).

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[2] http://www.ecy.wa.gov/programs/hwtr/determinations/index.html

Field

Ecology comments on **Attachment 3**: Combined Port Alternative – All Disposal as CAMU

Review of cost estimates for the "Combined Port Alternative – All Disposal as CAMU" shows that costs for many tasks are the same or proportionally the same (because of less excavation and treatment) as costs proposed by International Paper for Alternative S1 and Alternative S5B.

However, some of the cost estimates (especially quantities) are significantly different from those proposed by International Paper. Explanations for some of the differences (shoring, management of contaminated groundwater) are provided, but other differences are not acknowledged or explained (stormwater management, asphalt recycling, confirmational testing). The lower amount of direct costs has impacts on some indirect costs that are calculated as percentages of direct costs.

1. Remedial Action Construction Tasks #11 [***Install Freeze Wall Shoring for building (200 LF)***] and #12 [***Install Freeze Wall Shoring for excavation perimeter (720 LF)***] – A comment box states that the freeze wall could be eliminated because of the shallower depth of excavation. According to the description of the Combined Port Alternative in Attachment 1, excavation would be less deep only in areas over DNAPL-contaminated soils. Areas without DNAPL levels of contamination would be excavated down to the Upper Silt. The amount of shoring and the type of shoring may be changed from the task in Alternative S1 (Comprehensive Excavation), but the need for shoring to protect workers during construction and ensure effective remedy construction is not eliminated. Cost estimates should be provided for Tasks #11 and #12.

2. Remedial Action Construction Tasks #19 [***Import of clean fill to site***] – The calculation of 2,393 CY of clean fill assumes 40% expansion of solidified soil. Alternative Specific Assumption number 7 for Alternative S5B assumes the volumetric expansion of solidified soil will be 35%. An explanation should be provided for the difference assumed in volumetric expansion for the Combined Port Alternative.

3. Remedial Action Construction Task #20 [***Contaminated water handling and Environmental Protection***] – The shallower depth of excavation for the Combined Port Alternative would decrease the amount of contaminated water to be managed compared to Alternative S1, but would not totally eliminate the generation of contaminated groundwater. An estimate should be provided in the Combined Port Alternative for this task.

4. The Combined Port Alternative does not include costs for stormwater handling and environmental protection. These activities were included in Alternative S5B as Remedial Action Construction as Task #14 for a cost of $11,000. This task should be added to the Combined Port Alternative and an estimate should be provided.

5. Remedial Action Construction Task #29 [***Rebuild Access Road (150 LF)***] – The Port's estimated cost for this task is $18,750. However, the unit cost in the December 2015 Feasibility Study to rebuild the access road is $6 per square foot, for a total cost of $22,500. An explanation should be provided for the difference in cost for the Combined Port Alternative.

Comments on attachments to email dated September 27, 2016, from Lisa Hendriksen (Port of Longview) to Kaia Petersen (Department of Ecology)

6. Contaminated Waste Disposal and Transportation Task #9 [***Contaminated water treatment and disposal***] - The shallow depth of excavation for the Combined Port Alternative would decrease the amount of contaminated water to be managed, but would not totally eliminate the generation of contaminated groundwater and its need for transport and disposal. A cost estimate should be provided in the Combined Port Alternative for this task.

7. Contaminated Waste Disposal and Transportation Tasks #10 [***Non-Hazardous Material Disposal Costs (Asphalt Recycling)***] and #11 [***Transportation Costs to Asphalt Recycler***] – The quantity of asphalt (320 tons) managed under the Combined Port Alternative is significantly less than the quantity managed under Alternative S1 and Alternative S5B (845 tons) in the December 2015 Feasibility Study. Especially since, under Task #14 [***Remove surface asphalt in storage yard and road***] of Remedial Action Construction, the Combined Port Alternative shows a similar quantity of surface asphalt removed (32,200 square feet) to the quantities given for Alternative S1 and Alternative S5B (32,600 square feet). An explanation should be provided for the difference in quantities used to calculate disposal and transportation costs for asphalt recycling in the Combined Port Alternative.

8. Engineering Costs (Capital Indirect) Task #8 [***Confirmational Sample Collection and Reporting***] – The cost for this task in Combined Port Alternative is $15,000. This is half the cost of this task in Alternative S1 ($30,000) and Alternative S5B ($33,000). An explanation should be provided for the difference in cost for the Combined Port Alternative.

Comments on attachments to email dated September 27, 2016, from Lisa Hendriksen (Port of Longview) to Kaia Petersen (Department of Ecology)

Ecology comments on **Attachment 4**: Combined Port Alternative – 2/3 Disposal as CAMU

1. See Ecology's comments on **Attachment 3** (Combined Port Alternative – All Disposal as CAMU) including, but not limited to, shoring, handling and disposal of contaminated water, stormwater, transportation and recycling/disposal of asphalt, and confirmational sampling.

2. Contaminated Waste Disposal and Transportation Tasks #7 [*Non-Hazardous Material Disposal Costs (Subtitle D)*] and #8 [*Transportation Costs to Subtitle D Landfill*] - Because of incorrect assumptions outlined in **Attachment 1** on the use of contained-in determinations, the amounts and disposal options for materials managed at Subtitle D Landfill should be reviewed and revised to reflect Ecology's comments.

Ecology comment on **Attachment 5**: Port of Longview Issue Timeline

The chronology of events concerning the expansion of treated soils is appreciated.

Department of Ecology (Ecology) response to ***Technical Memorandum, Technology Process Options for Soil Disposition, International Paper, Longview***, dated April 15, 2009:

The Technical Memorandum proposes management methods for contaminated soils inside the Maintenance Facility Area (MFA) of the International Paper site, such as using some of the excavated soils as backfill. At this time, Ecology is not able to fully address excavation and segregation options in the Technical Memorandum because we have not reviewed the technical memorandums on cleanup levels and point of compliance. Our response will only address how soils from the MFA may be managed offsite.

Ecology's offsite management options differ significantly from those proposed in the Technical Memorandum. This is due to the fact that excavated soils from the MFA will be subject to both state and federal cleanup and disposal regulations, including those specified by the Resource Conservation and Recovery Act (RCRA). This makes the sampling approach and selection of disposal options more complex.

In general, contaminated soil subject to state and federal regulations shall not be sent to any incinerator, thermal desorption unit, recycling facility, or any other facility unless it is a permitted hazardous waste facility. Specifically, International Paper's proposal of sending some MFA soil to an offsite facility for incorporation into cement or for incineration is not acceptable unless they are permitted solid or hazardous waste facilities. If they are permitted, further restrictions may still apply that could limit the feasibility or use of these approaches.

Soils in MFA contaminated with listed waste

The Department of Ecology considers the soils and groundwater in the MFA in the vicinity of the ditch that ran from the Treated Wood Product (TWP) Area to the MFA to be contaminated with F034-listed waste,[1] not F032-listed waste. Creosote was used to treat wood at the International Paper facility from 1937 to 1953. The ditch used to convey wastewater to the MFA operated from 1947 to 1953. International Paper converted to treating wood with pentachlorophenol mixtures in 1953 – which limits the potential amount of time for F032-listed waste to be conveyed by the ditch to the MFA.

Ecology acknowledges that there have been limited detections of pentachlorophenol (PCP) above screening limits in the vicinity of the MFA. PCP was detected in soil at boring PB34 (17,000 µg/kg at 7-9 feet bgs). However, there were no detections of PCP in a series of borings (PB52, 53, 54, and 57) taken around boring PB34 at the same depth.

The discussion on the following pages describes two options for management and offsite disposal of soil contaminated with F034-listed waste: 1) contained-in determinations and 2) offsite disposal of Corrective Action Management Unit (CAMU)-eligible waste. International Paper may use one or both of these options at the site. These options

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[1] F034-listed waste is wastewaters (except those that have not come into contact with process contaminants), process residues, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations.

represent the most straightforward and viable approaches Ecology can envision for the site. However, other potential options may be identified and proposed by International Paper.

1) Offsite disposal using contained-in determinations

Depending on the level of contamination in the soil, International Paper may request a contained-in determination from Ecology for excavated soils in the MFA. A contained-in determination will allow certain excavated soils to be managed as non-dangerous waste according to Ecology's "Contained-In Policy."[2]

For soil to receive a contained-in determination, the soil must not designate under federal characteristics (WAC 173-303-090) or state-only criteria (WAC 173-303-100).

Ecology has determined that soils from the MFA with contamination less than MTCA Method B cleanup levels from F034-regulated hazardous constituents may be disposed of in a RCRA Subtitle D facility.

For soils with contamination above MTCA Method B cleanup levels and below Method C cleanup levels or 10 times the Universal Treatment Standard (UTS) value for the F034-regulated hazardous constituents (which ever is higher), the soil can be disposed of as non-hazardous waste in a hazardous waste facility permitted under RCRA Subtitle C.

To see the contamination levels that will apply, look at the tabs "Contained-in Subtitle D" and "Contained-in Subtitle C" in the Excel file entitled "MFA offsite disposition 2010 02 23.xls." International Paper may propose different contamination levels that those in the Excel file. Any proposal should address:

- Waste properties (solubility, mobility, toxicity, and interactive effects of the contaminants present that can impact these properties.)
- Exposure potential and the effect of any management controls that could lessen this exposure potential.

If Ecology grants a contained-in determination to soils excavated from the MFA, the land disposal restrictions (LDRs) will not apply to those soils. The alternative LDR treatment standards for contaminated soil found in 40 CFR 268.49 state that if LDRs didn't apply to the listed waste when it contaminated the soil, and if LDRs apply to the listed waste now, and if the soil is determined not to contain the listed waste when the soil is first generated, then you needn't comply with LDRs. The date of LDR applicability for F034-listed waste is August 12, 1997. The LDRs didn't apply when the ditch used to convey wastewater to the MFA operated, so, when Ecology determines that excavated soils from the MFA contain F034-listed dangerous waste constituents at concentrations that do not warrant management as dangerous wastes, the LDRs won't apply to those soils.

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[2] Memo on the Contained-in Policy, from Tom Eaton (former Program Manager) to Hazardous Waste Staff, dated February 19, 1993.

Process for requesting contained-in determinations -

During excavation, when higher levels of contamination are encountered, soils from these areas should be segregated, sampled separately, and, if levels of contamination are within the ranges allowed, a separate contained-in request should be submitted for each segregated pile. Ecology expects separate requests for contained-in determinations will be submitted before any stockpiled soil is removed from the MFA. Each request for a contained-in determination should be made in writing; the request may be sent by email. Each request should include the following information:

- A site map showing the location of soil excavation in the MFA.
- Amount (volume or weight) of contaminated media and analytical data which is representative of the level of contamination.
- Tabulated analytical data showing comparison of sampling results with applicable MTCA cleanup levels and copies of original analytical laboratory reports (including practical quantitation limits).
- Sampling protocol (such as justifying why specific samples from soil borings were submitted for chemical analysis, justifying the number/location/depth of samples, and describing sampling techniques).
- Discussion of federal characteristic (WAC 173-303-090) and state-only (WAC 173-303-100) designation procedures.
- Description of proposed methods for handling, storage, treatment, or disposal of excavated soils that would be covered by the contained-in determination. Include the name and location of facilities that would receive the contained-in media.

Each contained-in request should provide data of adequate quantity and quality to represent site-specific conditions at the International Paper site. For excavated soil, the minimum number of samples necessary for a contained-in determination will depend on the volume of excavated soil included in the request:

Table 1:	
Cubic yards of excavated soil	**Minimum number of samples**
0 – 100	3
101 – 500	5
501 – 1000	7
1001 – 2000	10
Greater than 2000	10 plus 1 for each additional 500 cubic yards

For soils in drums, Ecology expects at least one sample per drum.

For any soils sampled for volatile contamination, the soil should be sampled shortly after excavation. In order to minimize the loss of volatile contamination, a minimum of six inches of soil must be removed from the surface of the excavated soil to obtain soil samples from an unexposed area. Discrete grab samples should be collected and prepared for volatile organic compounds (VOCs) according to EPA Method 5035A and the Toxics Cleanup Program's Implementation Memorandum #5 (http://www.ecy.wa.gov/pubs/0409087.pdf). Samples should be analyzed using EPA Analytical Method 8260 with, if necessary, the solvent volume corrected for soil moisture content according to Section 11.10.5 of EPA Method 8000C (http://www.ecy.wa.gov/pubs/0809042.pdf).

Other contingent management for soils receiving contained-in determinations -

- So that there are no releases to the environment, Ecology expects that excavated soil will be loaded directly into containers or placed on liners and covered. All loads must be covered during transport to prevent dispersion by wind or rain

- Instructions shall be provided to the operator of the landfill that this soil is to be placed directly in the landfill cell and is not to be used for daily, intermediate, or final cover.

- International Paper shall provide copies of all soil analytical data, upon request, to the landfill operator.

- A thorough visual inspection of the exterior of the truck and trailers shall be made to ensure that spillage of soil has not occurred. All soil spillage shall be cleaned prior to authorizing the trucks to leave the site.

- Dust monitoring during loading shall occur and dust suppression measures, such as application of light water mist, shall be instituted to eliminate emissions of soil particles. Application of this light water mist shall not result in the creation of standing water or uncontrolled runoff.

2) <u>Offsite disposal as Corrective Action Management Unit (CAMU)-eligible waste</u>

For soils with contamination above MTCA Method C cleanup levels or 10 times the UTS value, under WAC 173-303-646920, Ecology may approve the disposal of MFA soils as CAMU-eligible waste in a RCRA Subtitle C landfill located outside of the state of Washington, without the soils meeting the land disposal restrictions.

Overview of regulatory requirements for offsite disposal of CAMU-eligible waste –

The landfill receiving the CAMU-eligible waste must be authorized to accept CAMU-eligible wastes pursuant to 40 CFR 264.555. In addition to the requirements of 40 CFR 264.555, the requirements of WAC 173-303-646910(1)(a), (b), (2), (3), and (6) must be met.

- Subsection 646910(1)(a) requires that the waste meets the definition of CAMU-eligible waste in -64650(3)(a) and (b). CAMU-eligible waste is defined, with some exceptions, as all "solid and dangerous wastes, and all media (including ground water, surface water, soils, and sediments) and debris, that are managed for implementing cleanup."

- Subsection 646910(1)(b) requires Ecology to identify principal hazardous constituents (PHCs) in the waste, according to the requirements WAC 173-303-64660(3)(d)(i) and (ii), and requires that the PHCs be treated according to certain standards.

  Please note that the treatment standards (which can be treatment to a particular contaminant concentration level or treatment by a particular technology) can be adjusted in two ways:

  > <u>WAC 173-303-646910(1)(b)(ii)</u> allows treatment standards to be adjusted in accordance with the requirements of WAC 173-303-646(3)(d)(v)(E)(I), where the long-term protection is offered by the design of the landfill and its engineering controls, the treatment standards in Subsection -64660(3)(d)(iv) are substantially met, and the PHCs in the waste are of very low mobility.
  >
  > <u>WAC 173-303-646910(1)(b)(iii)</u> allows treatment standards to be adjusted in accordance with the requirements of WAC 173-303-64660(3)(d)(v)(E)(II), where "cost-effective treatment has been used" and that treatment level or method significantly reduces the toxicity or mobility of PHCs in the waste, minimizing the short-term and long-term threat posed by the waste. The disposal facility must meet liner and leachate collection requirements for new land disposal units at WAC 173-303-665(2)(h) and (j) – this is a reference is to the liner and leachate collection requirements for RCRA Subtitle C landfills.

- Subsection 646910(2) requires the submittal of sufficient information to Ecology to approve placement of CAMU-eligible waste into an offsite dangerous waste landfill. The information required by WAC 173-303-64660(2)(a) through (c) for CAMU applications must be provided. This includes information about (a) the origin of the waste and how it was subsequently managed (including a description of the timing and circumstances surrounding the disposal and/or release, (b) whether the waste was listed or identified as dangerous waste at the time of disposal/and or release, and (c) whether the disposal and/or release of the waste occurred before or after the land disposal requirements of 40 CFR Part 268.

- Subsection 646910(3) requires Ecology to provide public notice and a reasonable opportunity for public comment before approving placement of CAMU-eligible waste in an offsite landfill.

- Subsection 646910(6) requires generators of CAMU-eligible wastes sent to an offsite dangerous waste landfill to comply with the reporting, tracking, and recordkeeping requirements of 40 CFR 268.7(a)(4). Offsite facilities treating CAMU-eligible waste must comply with the certification requirements of 40 CFR 268.7(b)(4), except that the certification must be with respect to the treatment requirements of -646910(1)(b).

40 CFR 264.555 has additional requirements for approving placement of CAMU-eligible waste in an offsite landfill. Part 264.555(e) outlines the necessary procedures for public comment and regulatory approval at the landfill.

Specific approach to offsite disposal of CAMU-eligible waste from the MFA –

Ecology has determined that the regulatory option for disposal of CAMU-eligible waste in an offsite landfill could be applied to certain soils from the MFA. Ecology considers the principal hazardous constituents (PHCs) for soils from the MFA to be the F034-regulated hazardous constituents. These constituents and Ecology's proposal for the <u>draft</u> contaminant concentration levels are found under the tab "CAMU-eligible" in the Excel file entitled "MFA offsite disposition 2010 02 23.xls." International Paper may propose treatment to different contaminant concentration levels or propose alternative treatment technologies as long as the adjusted treatment standards or methods meet the requirements of Subsection 646910(1)(b)(ii) <u>or</u> (iii).

The Chemical Waste Management Subtitle C landfill in Arlington, Oregon has been authorized by Oregon Department of Environmental Quality (ODEQ) to accept, store, treat, and dispose of CAMU-eligible wastes.

If International Paper wishes to pursue the option of offsite disposal of soils from the MFA as CAMU-eligible waste, Subsection 646910(2) requires International Paper to provide Ecology with sufficient information to approve placement of CAMU-eligible waste into an offsite dangerous waste landfill. The information required by WAC 173-303-64660(2)(a) could be outlined in the draft cleanup action plan for the MFA. The public notice and opportunity for public comment required under Subsection 646910(3) could be completed during the public comment period on the draft cleanup action plan.

40 CFR 264.555 outlines the necessary procedures for public comment and regulatory approval at the landfill receiving CAMU-eligible waste. Ecology has had telephone conversations with staff from the Oregon Department of Environmental Quality and Waste Management on the possibility of disposing of soils from the MFA as CAMU-eligible waste. Ecology can provide International Paper with contact information for those individuals and can participate in discussions between these parties and International Paper.

Summary

Ecology is available to answer questions about this response and is willing to discuss these and other options for offsite disposal with International Paper.

At this time, Ecology will proceed with reviewing the technical memorandums on cleanup levels and point of compliance.

Contained-in Determination - Soils - International Paper, Maintenance Facility Area - Disposal in RCRA Subtitle C Facility	Soil, Method C, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)	Soil, Method C, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)	Ten times Universal Treatment Standards (UTS, 40 CFR 268.48) for Nonwastewaters. * (Concentrations in mg/kg unless noted as "mg/l TCLP," or technology code)
acenaphthene (CAS #: 83-32-9)	Not Researched	2.10E+05	3.40E+01
arsenic, inorganic (CAS #: 7440-38-2)	8.80E+01	1.10E+03	5.0 mg/L TCLP*
chromium, total (CAS #: 7440-47-3)	Not Researched	Not Researched	6.0 mg/L TCLP*
anthracene (CAS #: 120-12-7)	Not Researched	1.10E+06	3.40E+01
benzo[a]anthracene (CAS #: 56-55-3)	1.80E+01	Not Researched	3.40E+01
benzo[a]pyrene (CAS #: 50-32-8)	1.80E+01	Not Researched	3.40E+01
benzo[b]fluoranthene (CAS #: 205-99-2)	1.80E+01	Not Researched	6.80E+01
benzo[k]fluoranthene (CAS #: 207-08-9)	1.80E+01	Not Researched	6.80E+01
chrysene (CAS #: 218-01-9)	1.80E+01	Not Researched	3.40E+01
dibenzo[a,h]anthracene (CAS #: 53-70-3)	1.80E+01	Not Researched	8.20E+01
fluoranthene (CAS #: 206-44-0)	Not Researched	1.40E+05	3.40E+01
fluorene (CAS #: 86-73-7)	Not Researched	1.40E+05	3.40E+01
indeno[1,2,3-cd]pyrene (CAS #: 193-39-5)	1.80E+01	Not Researched	3.40E+01
naphthalene (CAS #: 91-20-3)	Not Researched	7.00E+04	5.60E+01
pentachlorophenol (CAS #: 87-86-5)	1.10E+03	1.10E+05	7.40E+01

Contained-in Determination - Soils - International Paper, Maintenance Facility Area - Disposal in RCRA Subtitle C Facility	**Soil, Method C, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)**	**Soil, Method C, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)**	**Ten times Universal Treatment Standards (UTS, 40 CFR 268.48) for Nonwastewaters. * (Concentrations in mg/kg unless noted as "mg/l TCLP," or technology code)**
phenanthrene (CAS #: 85-01-8)	Not Researched	Not Researched	5.60E+01
pyrene (CAS #: 129-00-0)	Not Researched	1.10E+05	8.20E+01

Chemicals highlighted in purple are regulated hazardous constituents for F034-listed wastes

Chemicals highlighted in orange may be found in the Maintenance Facility Area. Determinations that environmental media do not contain listed wastes must consider all constituents listed in Appendix VII of 40 CFR 261 that are present in the listed waste, rather than just those constituents for which the waste was listed.

Values highlighted in yellow will be used for making contained-in determinations for the Maintenance Facility Area. These are Method C cleanup levels for that chemical, except when the 10 x UTS value is more than the Method C cleanup level for that chemical. Soils must be sent to RCRA Subtitle C facility as non-hazardous waste.

*For arsenic and chromium, values are based on the maximum concentration of those contaminants for the toxicity characteristic.

"Not Researched" means research has not been conducted and no value exists in the database for this parameter.

Contained-in Determination - Soils - International Paper, Maintenance Facility Area - Disposal in RCRA Subtitle D Facility	**Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use (mg/kg)**	**Soil, Method B, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use (mg/kg)***
acenaphthene (CAS #: 83-32-9)	Not Researched	4.80E+03
arsenic, inorganic (CAS #: 7440-38-2)	6.70E-01	<5.0 mg/L TCLP*
chromium, total (CAS #: 7440-47-3)	Not Researched	<6.0 mg/L TCLP*
anthracene (CAS #: 120-12-7)	Not Researched	2.40E+04
benzo[a]anthracene (CAS #: 56-55-3)	1.40E-01	Not Researched
benzo[a]pyrene (CAS #: 50-32-8)	1.40E-01	Not Researched
benzo[b]fluoranthene (CAS #: 205-99-2)	1.40E-01	Not Researched
benzo[k]fluoranthene (CAS #: 207-08-9)	1.40E-01	Not Researched
chrysene (CAS #: 218-01-9)	1.40E-01	Not Researched
dibenzo[a,h]anthracene (CAS #: 53-70-3)	1.40E-01	Not Researched
fluoranthene (CAS #: 206-44-0)	Not Researched	3.20E+03
fluorene (CAS #: 86-73-7)	Not Researched	3.20E+03
indeno[1,2,3-cd]pyrene (CAS #: 193-39-5)	1.40E-01	Not Researched
naphthalene (CAS #: 91-20-3)	Not Researched	1.60E+03
pentachlorophenol (CAS #: 87-86-5)	8.30E+00	2.40E+03

Contained-in Determination - Soils - International Paper, Maintenance Facility Area - Disposal in RCRA Subtitle D Facility	**Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use (mg/kg)**	**Soil, Method B, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use (mg/kg)***
phenanthrene (CAS #: 85-01-8)	Not Researched	Not Researched
pyrene (CAS #: 129-00-0)	Not Researched	2.40E+03

Chemicals highlighted in purple are regulated hazardous constituents for F034-listed wastes
Chemicals highlighted in orange may be found in the Maintenance Facility Area. Determinations that environmental media do not contain listed wastes must consider all constituents listed in Appendix VII of 40 CFR 261 that are present in the listed waste, rather than just those constituents for which the waste was listed.
Values highlighted in blue will be used for making contained-in determinations for the Maintenance Facility Area. These are Method B cleanup levels for that chemical. Soils may be sent to RCRA Subtitle D Facility.
*For arsenic and chromium, values are based on the maximum concentration of those contaminants for the toxicity characteristic.
"Not Researched" means research has not been conducted and no value exists in the database for this parameter.

DRAFT Adjusted Treatment Standards for CAMU-eligible Waste - Soils, International Paper, Maintenance Facility Area	Soil, Method C, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)	Soil, Method C, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)	Ten times Universal Treatment Standards (UTS, 40 CFR 268.48) for Nonwastewaters.* (Concentrations in mg/kg unless noted as "mg/l TCLP," or technology code)
acenaphthene (CAS #: 83-32-9)	Not Researched	2.10E+05	3.40E+01
arsenic, inorganic (CAS #: 7440-38-2)	8.80E+01	1.10E+03	5.0 mg/L TCLP*
chromium, total (CAS #: 7440-47-3)	Not Researched	Not Researched	6.0 mg/L TCLP*
anthracene (CAS #: 120-12-7)	Not Researched	1.10E+06	3.40E+01
benzo[a]anthracene (CAS #: 56-55-3)	1.80E+01	Not Researched	3.40E+01
benzo[a]pyrene (CAS #: 50-32-8)	1.80E+01	Not Researched	3.40E+01
benzo[b]fluoranthene (CAS #: 205-99-2)	1.80E+01	Not Researched	6.80E+01
benzo[k]fluoranthene (CAS #: 207-08-9)	1.80E+01	Not Researched	6.80E+01
chrysene (CAS #: 218-01-9)	1.80E+01	Not Researched	3.40E+01
dibenzo[a,h]anthracene (CAS #: 53-70-3)	1.80E+01	Not Researched	8.20E+01
fluoranthene (CAS #: 206-44-0)	Not Researched	1.40E+05	3.40E+01
fluorene (CAS #: 86-73-7)	Not Researched	1.40E+05	3.40E+01
indeno[1,2,3-cd]pyrene (CAS #: 193-39-5)	1.80E+01	Not Researched	3.40E+01
naphthalene (CAS #: 91-20-3)	Not Researched	7.00E+04	5.60E+01
pentachlorophenol (CAS #: 87-86-5)	1.10E+03	1.10E+05	7.40E+01

DRAFT Adjusted Treatment Standards for CAMU-eligible Waste - Soils, International Paper, Maintenance Facility Area	Soil, Method C, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)	Soil, Method C, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use (mg/kg)	Ten times Universal Treatment Standards (UTS, 40 CFR 268.48) for Nonwastewaters.* (Concentrations in mg/kg unless noted as "mg/l TCLP," or technology code)
phenanthrene (CAS #: 85-01-8)	Not Researched	Not Researched	5.60E+01
pyrene (CAS #: 129-00-0)	Not Researched	1.10E+05	8.20E+01

Chemicals highlighted in purple are regulated hazardous constituents for F034-listed wastes
Chemicals highlighted in orange may be found in the Maintenance Facility Area.
Values highlighted in olive green are draft treatment standards for CAMU-eligible wastes from the Maintenance Facility Area. These are the Method C cleanup level for that chemical, except when the 10 x UTS value is more than the Method C cleanup level for that chemical.
*For arsenic and chromium, values are based on the maximum concentration of those contaminants for the toxicity characteristic.
"Not Researched" means research has not been conducted and no value exists in the database for this parameter.

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DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

February 19, 1993

TO: All Hazardous Waste Staff

FROM: Tom Eaton Tom Eaton

SUBJECT: Contained-in Policy

Many of you have recently heard about EPA's contained-in policy for contaminated environmental media. EPA's contained-in policy has been articulated over the years in a series of letters and memos from EPA Headquarters and regions. In a November 13, 1986 memo from Marcia Williams, EPA states, "...ground water contaminated with hazardous waste leachate is still subject to regulations since it contains a hazardous waste...the treatment, storage, or disposal of ground water contaminated with hazardous waste leachate must be handled as if the ground water itself were hazardous...however, if the ground water is treated such that it no longer contains a hazardous waste (it) would no longer be subject to regulation under Subtitle C of RCRA."

The contained-in policy is based on an EPA determination that although environmental media are usually not solid wastes, they frequently enter the RCRA system due to contamination by RCRA listed hazardous wastes. The contained-in policy states that environmental media, such as soils and groundwater, contaminated with a RCRA listed hazardous waste must be managed as if the media were hazardous waste until it no longer contains the hazardous waste or is delisted. Under EPA's current policy, contaminated environmental media may be determined to no longer contain hazardous waste when the hazardous constituents in the media fall below site-specific, risk-based levels <u>and</u> the media does not exhibit a characteristic. The contained-in policy is not a waiver from the requirement to designate material per WAC 173-303-070.

All contained-in determinations must be based on statistically adequate site-specific data and must, at a minimum, consider the concentration and risk of each constituent for which the hazardous waste was listed and any possible breakdown products. It is the responsibility of the facility to provide data of adequate quality and quantity. As interim policy, risk-based action levels should be established using residential standards calculated under the Model Toxics Control Act. Contingent management (i.e allowing application of the contained-in policy provided the media is managed in a specific manner which further reduces risk to human health or the environment) may be considered when appropriate. In some cases, Ecology may determine that contingent management requirements allow the site-specific, risk-based action levels to be calculated according to the MTCA industrial standards.

Contained-in determinations should consider the overall risk posed by the contaminated environmental media, including relevant site-specific factors as well as hazardous constituents. The policy should be applied equitably and consistently with regard to the required scientific analysis and risk management procedures. All contained-in determinations should be well documented. Please keep in mind, the State cannot make contained-in determinations regarding RCRA hazardous waste listings for which we are not authorized (i.e F032). Contained-in determinations for non-authorized waste codes may be referred to EPA Region 10.

Contained-in determinations should be relayed to the facility by letter or order, signed by the Regional Solid and Hazardous Waste Program Section Supervisor, or the Section Supervisor in the Nuclear and Mixed Waste Program or the Industrial Section. Until additional guidance is available, please send all contained-in decisions through Elizabeth McManus for review prior to issuance.

I believe the contained-in policy is a strong tool which will be especially useful at closure and post-closure sites. Attached are three recent EPA letters which clarify their use of the policy. A subgroup of the Northwest Corrective Action Workgroup has assumed the task of preparing a document regarding the appropriate use of the contained-in policy in EPA Region 10. This memo will serve as the State interim guidance on implementation of the contained-in policy and will be reevaluated when EPA regional guidance becomes available. Our representative on the subgroup and contact for this policy is Elizabeth McManus. Please contact her at (206) 493-9506 if you have any questions. I would like you and your staff to become familiar with this policy and I encourage you to implement it whenever reasonable and appropriate.

TE:EM:vvn
Attachment

GeoEngineers

PLAZA 600 BUILDING, 600 STEWART STREET, SUITE 1700, SEATTLE, WA 98101, TELEPHONE: (206) 728-2674, FAX: (206) 728-2732 www.geoengineers.com

MEMORANDUM

TO: Lisa Hendriksen

FROM: Chris Bailey

DATE: March 10, 2016

FILE: File 242-010-03

SUBJECT: Development of additional alternative for MFA cleanup action

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The cleanup action planning process being conducted for the Maintenance Facility Area (MFA) at the Port of Longview property by International Paper (IP) and URS/AECOM is currently at the stage of finalizing the Remedial Investigation (RI) and Feasibility Study (FS). The current FS documents being prepared by AECOM (previously URS), evaluates a range of alternatives to address soil and groundwater contamination, including contamination by non-aqueous phase liquid (NAPL), associated with former IP operations. The range of alternatives being evaluated generally include alternatives that primarily use removal and disposal of contaminated media or that primarily involve in situ solidification (ISS) of contaminated soil.

Pilot testing of the proposed ISS technology included in several alternatives in the most recent FS was documented in the June 28, 2013 URS document titled "*In Situ* Soil Remediation Treatability Study Report". The results indicated that a significant level of expansion, ranging from 26 to 48 percent, would result from the ISS process. The alternatives that utilize ISS being evaluated by IP for the cleanup action at the MFA site utilize ISS across the entire cross section of soil above the upper silt unit and have no provision for disposal of soil. As a result, these alternatives utilize significant grade changes at the ground surface to account for and accommodate the additional material generated by the expansion during ISS treatment.

As a result of reliance primarily on the ISS process, the preferred soil alternative carried in IP's Public Review Draft MFA RI/FS, "S5B – Solidification Outside and Inside Building", is expected to create short-term and long-term impacts to Port operations and operating costs. The factors associated with Alternative S5B that are expected to impact the Port include:

- ISS is proposed within the entire footprint of MTCA Method C exceedances. This expands the footprint of the area of required deed restrictions, as Ecology has indicated that any ISS-treated soil requires coverage by deed restrictions.
- ISS is proposed across the entire depth of soil above the upper silt. The treatment of soil immediately below the paving base course down to the upper silt discounts the lower concentrations, or unknown concentrations, of contaminants in this shallow soil, which may be capable of off-site disposal at reasonable cost. The treatment of this entire profile of soil creates a large volume of ISS-related expansion and mixes highly contaminated deeper soil with the marginally contaminated shallow soil immediately below the asphalt base material. This results in the need to adjust grades due to the vertical expansion.

- Grade changes at the site extend beyond the contaminated footprint. The vertical expansion of ISS-treated soil within the limits of contamination, and without consideration for disposal of lower concentration soil, results in the raising of the surface elevation within the area of contamination by several feet. This requires adjusting the grade of the surrounding surface to match the grade within the ISS footprint, resulting in a broad, sloped surface, including impacts to the grade of the adjacent access road.

Port Concerns with Preferred Alternative S5B

The issues stated above regarding IP's proposed preferred alternative, S5B – Solidification Outside and Inside Building, are expected to create several short-term and long-term concerns for Port operations, including the following:

- The presence of solidified soil triggers the need for deed restrictions at the site. The Port is willing to accommodate this to a degree, but the solidification process increases the volume of soil requiring coverage by the restriction.
- The ISS process significantly increases the volume of contaminated media remaining at the site, and requires raising the elevation of site surfaces within and beyond the limits of contamination to a degree that is expected to interfere with Port operations.
- The ISS treatment results in contaminated media (ISS-treated soil) closer to surface level relative to current conditions resulting in increased likelihood of encountering contaminated media during shallow construction activities (i.e., trenching, post-hole digging).
- Port costs associated with soil handling during future construction and maintenance projects is expected to increase relative to current conditions as a result of the larger volume created by the ISS process, and resulting higher elevation of contaminated soil relative to current conditions. Future projects in the vicinity of the MFA that involve earthwork, such as utility trenching and constructing material loading pits, would have higher construction costs due to the anticipated waste classification of the ISS-treated soil.

Based on discussions between IP and the Port, in the most recent version of the FS, the Public Review Draft MFA RIFS Report, dated December 18, 2015, IP altered the preferred alternative in an attempt to account for future development in the vicinity of the existing rail line and in the vicinity of potential utility lines. Soil in these locations would be excavated and consolidated with contaminated soil in other portions of the site for ISS treatment and the excavated areas would be backfilled with clean fill to reduce impacts to the Port in the event those areas would require future excavation for development purposes. However, this alteration of the preferred alternative does not include consideration for off-site disposal of soil, and therefore the volume of soil that is excavated from potential development areas and backfilled with clean soil results in further expansion of the volume of the overall process and additional changes to Site grades as a result. The increased elevation within and surrounding the treatment area associated with this revision to the preferred alternative results in even greater impact to elevations and slopes within the MFA and adjacent roadway, and results in significant filling up to and on top of the barrier wall for the TWP site.

Port-Proposed Alternative to Preferred Alternative S5B

In order to address some of the negative impacts to Port operations associated with IP's preferred alternative, GeoEngineers developed a revised version of Alternative S5B that would be expected to significantly reduce future impacts to Port operations and reduce future costs associated with construction projects within the MFA. The Port provided a Power Point file outlining the proposed alternative to IP and Ecology on March 19, 2015. This revised alternative combines the ISS treatment process with a moderate level of off-site disposal of lower-concentration soil to the degree needed to balance the expansion of ISS-treated soil and allow areas of the Site to remain as close as possible to current elevations. The general layout of the proposed alternative is presented in the attached figure. The general approach of this Port-proposed revised alternative S5B is as follows:

- Reduce the volume of contaminated soil on site by removing and disposing of contaminated soils where perceived threat to groundwater from excavation is minimal (e.g., areas without DNAPL).
- Reduce the footprint and thickness of solidified soil remaining on site by limiting ISS treatment to the soil layers where contamination is present at concentrations requiring higher cost off-site disposal and/or treatment methods.
- Eliminate exposure by Port workers to solidified soil during projects requiring shallow earthwork (i.e., trenching, post-hole digging, etc.).
- Eliminate effect of cleanup on final elevation and slopes within MFA.
- Reduce Port costs associated with soil handling during future construction projects.
- Reduce cleanup costs by utilizing ISS for significant volume of soil with highest contaminant levels and highest disposal costs.
- Reduce the footprint (vertical and lateral) of necessary deed restrictions that will affect future Port use of the Site

For comparison purposes, the proposed additional alternative was built on the assumptions and unit costs used in the IP FS. A combination of two existing alternatives in the IP FS was used to develop an alternative that achieves the approach described above. Using elements of alternatives S1 (comprehensive excavation) and S5B (solidification outside and under the Mechanic Shop), a revised version of alternative S5B was developed that would rely heavily on in situ treatment, while utilizing excavation and off-site disposal to a limited degree to minimize vertical expansion of the zone of contaminated soil and the resulting grade changes associated with the IP preferred alternative.

The basic principle of this combined alternative is to use ISS for NAPL-impacted soil within the footprint of observed NAPL, but only within the expected vertical profile of the NAPL to reduce the final volume of solidified soil. Contaminated soil that doesn't have NAPL and has lower disposal costs would be excavated and disposed of off-site. The attached figure shows the respective areas of treatment and excavation with off-site disposal. This combination addresses several of the Port's concerns with the current solidification preferred alternative:

- It prevents mixing the most highly contaminated soil immediately above the upper silt with cleaner soil immediately below the asphalt base material;
- It prevents a net increase in the volume of contaminated soil;
- It prevents the need to alter final elevations and slopes across the site as a result of vertical expansion of a large solidification volume; and,
- It results in clean fill across the site to a depth of 5-6 feet, allowing most utilities to be trenched without potential exposure to contaminated soil and allowing this shallow soil to be excluded from deed restrictions.

The proposed revised alternative was laid out using graphics from the IP FS, combining the elements of several of the alternatives. The footprint of the solidification process was developed based on the footprint of the IP FS Alternative S4-Excavation Outside Building Footprint from the IP FS, which is excavation of only the soil within the NAPL footprint, inside and outside the building. The area of soil exceedances outside the footprint of Alternative S4, which would be excavated and disposed of off-site is a small area to the northwest of the footprint of excavation under Alternative S4. The attached figure presents the layout of the components of the proposed revised Alternative S5B, including areas of proposed ISS and excavation with off-site disposal.

Cost Analysis of Port-Proposed Alternative to the IP Preferred Alternative S5B

The cost of the proposed revised Alternative S5B was evaluated based on the assumptions used in the IP FS, including capital unit costs, indirect costs, and long-term monitoring costs. The assumptions associated with the revised alternative were entered into costing spreadsheets obtained from IP from the FS. Based on the scope of the alternative described above, the primary cost assumptions are as follows:

- Solidification of approximately 3 to 4 feet of soil directly above the upper silt. This layer allows a factor of safety that all of the NAPL impacted soil is treated
- Within the footprint of the solidification, soil below the asphalt paving structural base material would be excavated down to the expected upper surface of the soil to be solidified. On average, this is approximately 4 feet, considering an average 10-foot total depth to the top of the upper silt, but would be less in some areas.
- Outside the footprint of the solidification (limited area in the northwest portion of the site) soil will be excavated down to the upper silt.
- All excavated soil exceeds MTCA Method B levels, but is eligible for a contained-in determination and disposal as non-hazardous material at a Subtitle C facility or as CAMU-eligible waste.
- All excavated soil is assumed to exceed Method C limits, requiring CAMU-eligible disposal at $160/ton (IP FS cost). This is a conservative assumption, as it is expected that some soil immediately below the base material likely does not exceed Method C limits and can be disposed of at a Subtitle D facility for $52/ton (IP FS cost) after a contained-in determination. You can see below how the percentage that does not exceed Method C impacts the cost.

Based on these assumptions, the total cost for the combined alternative is estimated at $4.04 million. Additional cost savings may be realized based on the actual disposal and/or reuse options for excavated soil. Some excavated soil likely meets MTCA Method C, allowing reuse as fill rather than disposal as CAMU-eligible waste ($160/ton). If not used as fill and disposed at Subtitle D facility with a contained-in determination, significant savings can also be achieved; approximately $215,000 for each 25% excavated soil that can be disposed of as Subtitle D waste, versus CAMU-eligible waste

For comparison, the cost for Alternative S5B is $3,420,000 and the cost for alternative S1 is $5,830,000. The proposed revised alternative has a delta of $620,000 over the current alternative S5B while still falling significantly short of the cost of Alternative S1. The attached table presents a comparison of the proposed revised alternative to the current Alternatives S1 and S5B in the IP FS. This table also includes an evaluation of potential future costs associated with hypothetical Port projects and the respective disposal costs for the three alternatives. This analysis indicates that under Alternative S5B that relies solely on ISS, the potential future cost of disposing of solidified soil excavated to construct a potential dump pit project is approximately double the cost of incorporating a moderate level of excavation during cleanup, as included in the proposed alternative described in this memorandum ($1,250,000 versus $620,000).

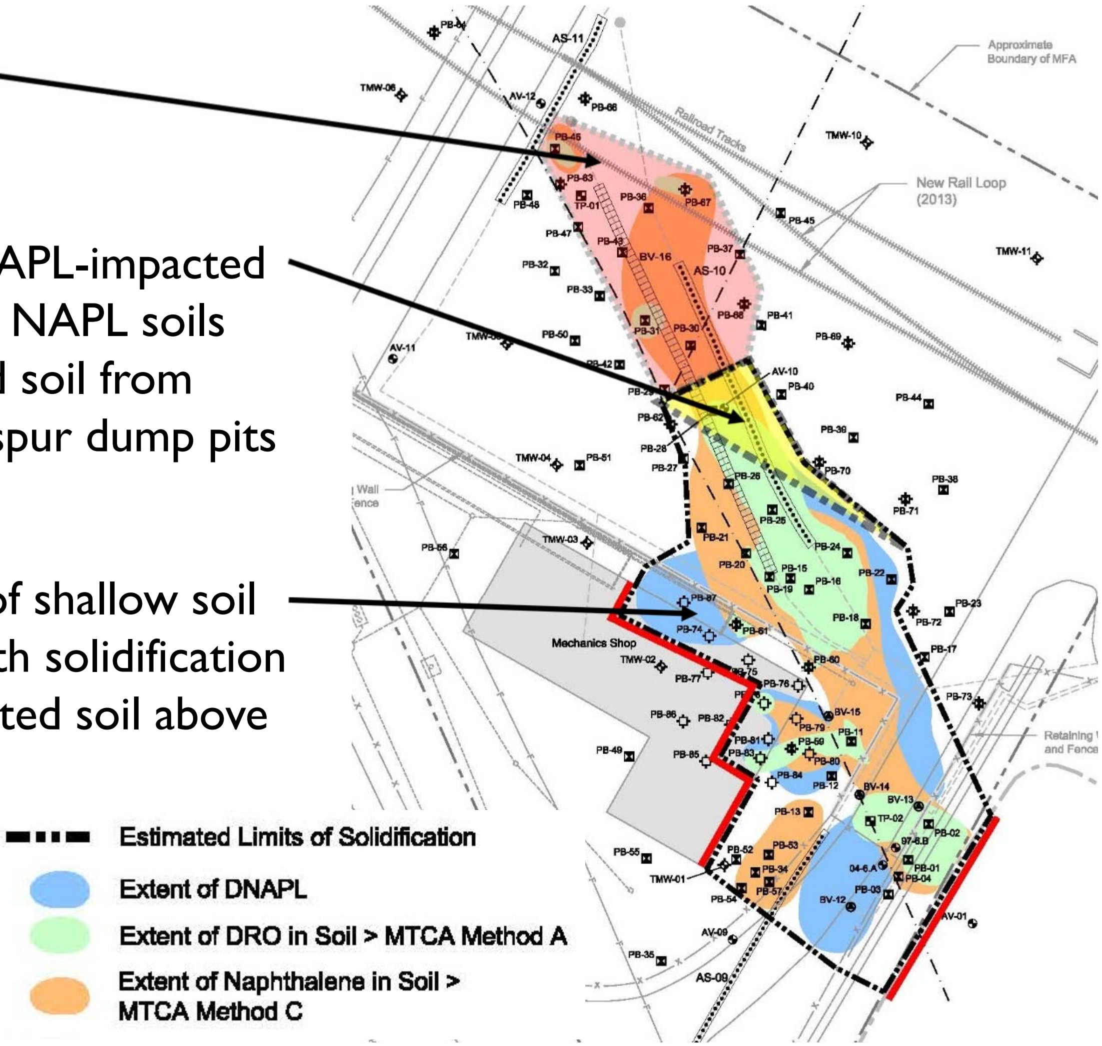
The current preferred alternative carried by IP through the RI/FS process utilizes proven treatment technologies to address contaminants at the Port of Longview MFA site. However, the alternative selection process performed in the FS has focused on selecting an alternative that will be cost-effective for IP, without adequately considering the effects of the selected alternative on current or future Port operations within the MFA or future costs incurred by the Port during future construction at the site. Incorporating the changes to the current preferred alternative in the FS represented by the proposed revised alternative described in this memorandum would achieve a permanent cleanup action while also reducing the short term and long term impacts to the Port resulting from the conditions following construction of the cleanup action.

We sincerely appreciate the opportunity to provide these services to the Port of Longview. Please contact us with any questions.

Sincerely,

Chris Bailey

Port-Proposed Compromise Alternative



Area of Excavation and Disposal Only

Potential area of excavation of NAPL-impacted soil and consolidation with other NAPL soils for solidification to limit solidified soil from within potential footprint of rail spur dump pits

Area of excavation and disposal of shallow soil overlying NAPL-impacted soil with solidification of 3-foot interval of NAPL-impacted soil above upper silt.

▬ ▪ ▪ ▬ Estimated Limits of Solidification

🔵 Extent of DNAPL

🟢 Extent of DRO in Soil > MTCA Method A

🟠 Extent of Naphthalene in Soil > MTCA Method C

Comparison of Alternatives

	Existing S1	Existing S5B	POL Proposed
DNAPL Soil Under and Outside Building	Excavation, Treatment, and Disposal	Solidification	Solidification
Non DNAPL Soil exceeding MTCA C Under and Outside Building	Excavation and Disposal	Solidification	Excavation and Disposal
Soil Below MTCA C within Cleanup Area	Excavation and Disposal	Solidification	Potential Stockpile and Reuse
Volume of Contaminated Soil Removed/Remaining	6500CY / 0 CY	0CY / 11830 CY	3570 cy / 4100 cy
Alternative Cost	$5.830M	$3.420M	$4.040M
Potential Future Disposal Costs (150-foot long trench, 35CY [53 tons])	$0	$8,400	$0
Potential Future Disposal Costs (5,200 CY [7,800 tons] during dump pit construction)	$0 (excavated clean fill reused by Port)	$1,250,000 (dispose of solidified soil as CAMU-eligible)	$0 (excavated clean fill reused by Port)

To: Department of Ecology
Kaia Peterson
Ava Edmonson

From: Port of Longview
Lisa Hendriksen

RE: Port of Longview Alternative

Per our discussion on August 17, 2016 at a meeting at the Department of Ecology, the Port of Longview appreciates the opportunity to once again present an alternative for addressing contaminated soil in the MFA area that the Port feels should be evaluated in the cleanup action selection process for the MFA Site. This is the third time the Port has presented this alternative; previous versions were presented in March 2015 and December 2015.

The version attached to this memo is conceptually the same as the Port previously has presented. Revisions were made to unit costs from the 2016 FS that were updated since the 2014 FS upon which the cost estimate for our alternative was based, and to incorporate monitoring that was added to the IPCo alternative cost estimates since the 2014 FS. The cost estimate files for the Port's alternative are attached to this memo.

Attachment 1 is the GeoEngineer's memo describing the alternative, which was previously presented to Ecology; the costs within this attachment do not included the updated costs presented in the 2016 FS. **Attachment 2** is the revised graphical representation of the elements of the Port alternative, reflecting the excavation (from IPCo Alternative S1) and solidification (from IPCo Alternative S5B) components that were combined to make up the single Port alternative.

Attachment 3 is the cost estimate file for the Port Combined alternative utilizing the format from the IPCo FS. This version of the cost estimate combines the respective solidification, excavation, and disposal elements and uses a conservative assumption that all of the excavated soil requires CAMU-eligible disposal. This conservative estimate shows the total cost of the alternative to be $4.67M, which is $740K more than the current preferred alternative S5B in the FS. Because this is a conservative estimate with respect to disposal costs, an alternate version was developed using a more reasonable disposal scenario. The cost estimate for this version is presented as **Attachment 4**. In this scenario, the CAMU-eligible disposal is reduced to 2/3 of the total disposal, with the remainder disposed as Subtitle D waste. This reduces the cost of the Port alternative to $4.35M, or approximately $300k less than the Port conservative scenario and $440k more than the preferred alternative. For reference, the current Alternative S1 in the FS, relying solely on off-site disposal, is $6.44M.

Attachment 5 is provided to respond to the statement that "the Port keeps changing their minds," which is inaccurate. This attachment is a timeline of milestone events beginning in 2011 which demonstrates the discussions regarding the development of the solidification technology for the MFA Site and how that technology has been included in FS alternatives. The Port initially raised the issue of expected expansion of treated soil by the solidification technology in 2011 when IPCo was developing the scope of treatability testing. At that time and repeatedly after the treatability test results indicated a substantial expansion of treated soil should be expected, the Port has consistently expressed its concerns regarding the effect of the expected expansion of soil treated by solidification.

The Port raised the volumetric expansion issue with IPCo again in December 2013 during a meeting at the Port regarding the Treatability Analysis results. IPCo stated they understood the Port's concern and it was the Ports' understanding that they would seek to accommodate this issue in the next version of the RI/FS. Unfortunately, the February 2014 FS draft version contained no such accommodation.

While the Port acknowledges the role solidification plays in a cost effective alternative for the MFA Site, the Port has consistently expressed its significant concern regarding the increased volume of contaminated materials, the resultant decreased distance between ground surface and contaminated materials, the increased risk to workers, and increased disposal costs for the Port if the expanded, contaminated soil is allowed to displace clean shallow soil. A discussion with IPCo regarding these concerns led to changes to Alternative S5B in the 2015 FS. However, these changes - intended to mitigate some of the Port's concerns - actually led to exacerbated conditions with contaminated solidified soil immediately under pavement in some areas and an increased effect on topography of what is currently a flat storage area.

As you will see in Attachment 5, in July 2015 the Port advised IPCo in email correspondence that the Commission could potentially support the SB5 alternative, but still had significant concern regarding the volumetric expansion. The Port also advised IPCo that the Commission has ultimate decision-making authority over the Port's approval or disapproval of the final alternative.

In September 2015, after several conference calls between IPCo and the Port to try and resolve our differences and come up with a solution that would meet both of our needs, the Port advised IPCo that the Commission did not support of the SB5 alternative. IPCo chose to move forward anyway, without any further considerations to the 'Port Alternative'.

Ecology stated during the August 17, 2016 meeting that the final RI/FS issued in July 2016 resolved some of the Port's concerns regarding off-site disposal, incorporated the Port's concerns regarding volumetric expansion and future use of Port property, and satisfied our DCA concerns by adjusting the costs. The Port asked GeoEngineers to do a cross reverence between the February 2014 and October 2015 version and the October 2015 and July version.

These are the main points regarding comparison of alternatives:

- The costs for Alternative S5B (or Alternative S1) did not change between the October 2015 and July 2016 versions of the FS, suggesting that substantive changes to the alternatives were not made during that period.
- Regarding inclusion of off-site disposal, the cost estimates for the 2014, 2015, and 2016 versions of the FS all eliminate off-site disposal of soil. Those iterations all limit disposal costs to varying amounts of asphalt disposal/recycling. In contrast, the 2011 version of the FS included costs for disposal of clean overburden soil. The cost for this disposal in the 2011 FS is not insignificant, about $240k of raw cost before contingency and multipliers.
- Several changes were made to costs between the February 2014 and October 2015 versions of the FS. These changes were primarily associated with incorporating the zoned approach for Alternative S5B where soil was excavated and relocated from downgradient portions of the site prior to solidification. This change was made in the October 2015 version. Minor changes to unit costs as well as adding additional monitoring were also incorporated in the October 2015 version.
- The DCA method appears constant through the multiple versions; comparing the quantity of contamination addressed through either solidification or off-site treatment/disposal to cost to determine greatest benefit per

unit cost. This method continues to score on-site solidification the same as excavation and off-site disposal, which the Port disagrees with. This evaluation method fails to consider that the solidification method results in an increased volume of contaminated media on site, results in the need for restrictive covenants on an increased volume of media, increases future costs for Port construction and maintenance activities, and increases risk to Port and contractor workers under some construction and maintenance scenarios. This has been a repeat subject in comments provided to Ecology.

- A comparison of the FS text between 2015 and 2016 versions indicates minimal substantive changes.
  - The main changes observed include adding further emphasis regarding the need to monitor the asphalt paving to preserve the necessary barrier above the remaining contaminants.

- Section 7:
  - Text was added to Section 7.4.7 of the 2016 version to address final grade restrictions and storm water collection associated with the increased elevation of the treated area and resulting slopes.

  - There is the inclusion of additional sampling to characterize the extent of clean soil to be used as backfill. The Port had requested this be incorporated as a way to characterize soil that doesn't require solidification, including the extent of soil that can be cost-effectively disposed of off-site as a way to mitigate the expansion of soil selected for treatment due to high disposal costs (NAPL-impacted soil). In the revised FS, this sampling is only being used to characterize soil that can be used as backfill, rather than as a way to segregate soil for disposal to reduce the overall volume of contaminated soil on site. This is a small step, but is still not a commitment to include off-site disposal as an option during construction. This is how it is worded in Section 7.4.7 of the 2015/2016 FS: During the pilot test, further characterization of shallow soil in Zone 1 would be conducted to assess whether any soil below 3 feet bgs could be removed from in situ solidification treatment. Any soil identified as containing concentrations of COCs below cleanup levels could be placed above solidified soil within Zones 2 and 3 to provide additional depth in which the Port could work during potential future development or could be used as backfill in Zone 1. Soil with contaminant concentrations below Method C cleanup levels but above Method B cleanup levels would still be considered contaminated, requiring coverage by restrictive covenants, and replacing actual clean soil/base material with soil requiring coverage by a restrictive covenant would be considered unacceptable to the Port.

- Section 8:
  - The 2016 version of the FS was revised to include the statement "volume of contaminants is unchanged by the solidification process", which is generally true but not a common measure of performance considering we are typically working with contaminants present within a medium, like soil or groundwater. This has a connection to the evaluation of permanence in the FS, which is described in Section 8.2.5 as "The degree to which the alternative permanently reduces the toxicity, mobility or *volume of hazardous substances*…". This is the language in MTCA guiding the DCA. The change of volume of contaminated media should be evaluated, not the volume of contaminants.

- Section 9:
  - In multiple instances in Section 9, the 2016 version of the FS was edited to emphasize that the "volume of contaminants is unchanged by the solidification process". This statement *de-emphasizes* the primary issue for the Port, which is that the mass, volume, and vertical extent of contaminated media increases as a result of the solidification process. The volume of media (soil and groundwater) containing contaminants at concentrations above risk-based levels should be the primary concern in the RI/FS, particularly if the technology doesn't affect the mass of contaminants and the resulting media is

    considered contaminated media that requires coverage under restrictive covenants or requires disposal as contaminated or hazardous material.

    - In multiple instances in Section 9, the 2016 version of the FS was edited to refer to the solidified contaminated soil as “treatment residuals” that will be left on site. The “residuals” terminology implies a situation where a small fraction of waste is generated by a treatment process (e.g., ash resulting from combustion) and undermines the Port’s concern that the result of the solidification process is an increased mass and volume of contaminated media that requires the same considerations as the current contaminated soil from the standpoint of direct-contact exposure and waste handling and disposal. In contrast, Section 9.1.2 of the 2016 FS describing the Permanence criterion states that “*the volume of the treated soil will increase*” when referring to the solidification alternative but the statement “*There is no change to the volume of contaminants and impacted soil with this technology*” is used when referring to off-site disposal. Different terminology is being used for essentially the same issue to prevent a direct comparison of the effect of each alternative.

    - The evaluation of "Consideration of Public Concern" continues to be deficient because the Port's long-term impact arguments are not mentioned (aside from the slope issue). The Port is a public agency that is authorized to represent the public in the economic development of its facilities for the benefit of the public. Therefore, all of the Port's concerns should need to be addressed in this section of the FS.

- Generally, the changes made in the past few versions of the MFA FS *have not addressed the Port’s primary issue associated with a solidification-only alternative*; increased net volume of, and reduced depth to, contaminated media and the likely future risks and costs to the Port.

- Regarding addressing Port concerns, the only substantive changes between the 2015 and 2016 document involved addressing the anticipated slope issues and crane movement. No changes were made to address the Port's future redevelopment plans or the long-term impacts on the Port's business from the necessary deed restrictions due to leaving contamination in place.

- One thing missing in the "Protectiveness" evaluation is the consideration of the impacts on future redevelopment by the Port. This is not a site where the landowner is agreeing to not disturb the residual contamination through a voluntarily negotiated strict deed restriction and therefore, there should be some consideration of the Port's future development plans in assessing protectiveness of the solidification alternative.

- The "Effectiveness over the Long Term" section is deficient because it ignores the Port's future development of the site. It simply uses the WAC designations to rank solidification over off-site disposal. It is clearly stated in the WAC that that list should only serve as a guide. Solidification is only effective long term if the material remains undisturbed. That is not the expectation here, so some adjustment to the list should be accounted for given the Port's stated plans regarding redevelopment of the site. The Port’s desire to develop the property and the expanded vertical footprint of the contaminants, resulting in future exposure to contaminated media by Site workers, should definitely affect the long term effectiveness.

Although the Port understands that alternative S1 appears disproportionately costly, we feel that an alternative that combines the best elements of solidification and off-site disposal would provide the highest level of protectiveness and permanence with a moderate level of increased cost associated with off-site disposal of the quantity of soil required to maintain site-wide grades and maintain an acceptable depth below ground surface to contaminated media. This would provide for a remedy that protects human health and the environment, while allowing the Port to serve its statutory mandate of economic development and productive use of its property.

Port of Longview Issue Timeline

July 1 2011	Port provides comments by email on ISSS Treatability Testing Work Plan, indicating concern regarding expansion resulting from treatment and the removal of clean soil to allow expansion of treated soil, resulting in increased volume of contaminated media.
July 8, 2011	Port provides comments on 2011 RI/FS. Comments included concerns regarding quantification of the expected bulking of solidified soil resulting in increased volume of contaminated soil left on site following cleanup and how this should affect the Permanence of the alternative (expected reduction of toxicity, mobility, and volume).
October 14, 2013	Port provides comments on IP Cleanup Action Alternative Conceptual Technical Memorandum. Port commented on the expected increased volume of contaminated soil resulting from the solidification technology and the desire to incorporate excavation and off-site disposal of clean and/or marginally contaminated soil to allow solidification without affecting topography of the site and impacting future development.
April 21, 2014	Port provides comments on 2014 FS sections of RI/FS. Port continues to comment regarding expansion of solidified soil and including excavation in the alternative: "…discussion is needed regarding the issues associated with the increased mass of the stabilized soil and the possibility that material may need to be removed and transported off-site for disposal if the stabilized soil expands beyond the existing limits of contaminated soil, increasing the volume and weight of contaminated media at the Site and affecting the final surface grades of the facility."
August 20, 2014	Port emails Ecology regarding re-issuance of FS
September 8, 2014	Ecology Comments on Revised FS Sections
October 7, 2014	Port and Ecology have a conference call regarding revised FS
November 5, 2014	Port notifies Ecology that they are meeting with IPCo regarding issues with the alternatives and to request a meeting in January
December 10, 2014	Attorney Meeting Between International Paper and the Port of Longview
January 5, 2015	Meeting with Ecology regarding attorney meeting in December 2014
January 27, 2015	GeoEngineers develops new "Port Alternative" by utilizing the components of S1 (excavation) and S5 (solidification)
February 10- March 4, 2015	Port emails cost estimates and outline of "Port Alternative" to Ecology and IPCo
February 24, 2015	Meeting set for review of "Port Alternative" for March 20th
March 4, 2015	Port emails revised cost estimates to Ecology and IPCo
March 19, 2015	Port emails slide deck of "Port Alternative" to IPCo and Ecology
March 20, 2015	At Ecology request, in lieu of Ecology and Port meeting - Technical Call Between IPCo and the Port of Longview
March 27, 2015	Technical Meeting Between International Paper and the Port of Longview
March 30, 2015	Conference call with Ecology regarding meeting on the 27th
April 27, 2015	Delivery of Draft Technical Memorandum to the Port of Longview
May 4, 2015	Delivery of Draft Technical Memorandum to Ecology (comments did not reflect all concerns/comments raised by the Port in the final to Ecology)
May 11, 2015	Conference call between Port, IPCo, Ecology, AECOM, GeoEngineers regarding Tech Memo
May 15, 2015	Port email communication to IPCo and Ecology regarding Alternative SB5 tentative support and their great deal of concern with the volume of contaminated material being left on site and the potential costs of future disposal if work is conducted in that area.
July 10, 2015	Port – IPCo and Ecology email correspondence of upcoming meeting on the 29th. Port informed both that they had not had an in-depth discussion with Commission on alternatives changes

July 29, 2015	Ecology meeting with IPCo, Port and associated attorneys
August 17, 2015	Port, GeoEngineers, IPCo, and AECOM and attorneys discussed moving forward and alternatives, cost sharing, incorporation of "Port Alternative" into IPCo FS document.
September 3, 2015	Port, GeoEngineers, IPCo, AECOM conference call regarding "Port Alternative"
September 9, 2015	Port staff discussion with Commission
September 9, 2015	Port email correspondence to IPCo regarding Commission direction re: inclusion of "Port Alternative" in IPCo FS
September 21, 2015	IPCo call to Port; Moving forward with drafted FS parallel to Port; will not include "Port Alternative" in IPCo FS
September 28, 2015	Port call to Ecology regarding upcoming October 8th RI/FS deadline
October 26, 2015	GeoEngineers on behalf of the Port submits comments on last draft of the RI/FS and restates comments proved on previous versions of the RI/FS that have not been addressed by Ecology and IP. Specifically, the Port provided comments on the Draft RI/FS on July 8, 2011, the Draft Final Revised RI on September 23, 2013, the Draft Final Revised RI/FS Cleanup Action Alternative Conceptual Technical Memorandum on October 14, 2013, and the Draft Final FS on April 21, 2014. The Port continues to stand by earlier comments and reiterated those issues.
November 9, 2015	Ecology comments to Port regarding 10/26 comments
November 9, 2015	Port seeks a conference call with Ecology
November 11, 2015	Port and Ecology discuss comments and concerns regarding RI/FS
November 23, 2015	Port email correspondence with Sally Toteff regarding setting up a meeting between the Port and Ecology
December 17, 2015	Port and Port attorney met with Ecology staff and Sally Toteff and AG regarding issues of the current IPCo FS alternative.
December 2015- March 2016	Port and Ecology email correspondence regarding additional information regarding crane movement.
January 6, 2016	Port email to Ecology with crane information and stressing that the crane movement was not the main issue but the future development at this site with the proposed preferred alternative negatively impacts the Port's current operations as well as future opportunity
March 17, 2016	Ecology requesting additional information on the cranes
April 4, 2016	Port email to Ecology with additional information on cranes
June 30, 2016	Ecology email regarding crane movement

Comparison of Alternatives

	Existing S1	Existing S5B	POL Proposed
DNAPL Soil Under and Outside Building	Excavation, Treatment, and Disposal	Solidification	Solidification
Non-DNAPL Soil exceeding MTCA C Under and Outside Building	Excavation and Disposal	Solidification	Excavation and Disposal
Soil Below MTCA C within Cleanup Area	Excavation and Disposal	Solidification	Potential Stockpile and Reuse
Volume of Contaminated Soil Removed/Remaining	6500CY / 0 CY	0CY / 11830 CY	3570 cy / 4100 cy
Alternative Cost	$6.43M	$3.93M	$4.64M

COMBINED PORT ALTERNATIVE - 2/3 DISPOSAL AS CAMU

Client International Paper
Location Longview, Washington
Project MFA Area Remediation
Document RI/FS Cost Estimate
Soil Removal YES
Soil Treatment Area 26,400 SF
Treatment Perimeter 1,120 LF
Soil Disposal Volume 3,567 CY

Estimator
Report Date
Last Updated
Source of Costs
Groundwater Treatment
GW Treatment Area
GW Treatment Method
Treatment Depth

Alternative Specific Assumptions

1 7467 ~~10,400~~ CY of soil will be excavated over 26,400 ~~34,700~~ SF area
2 3,900 CY of soil excavated will be clean overburden materials
3 2378 ~~6,500~~ CY of soil excavated will be above Method C cleanup levels
3 1189 CY of soil excavated will be above Method B but below Method C cleanup levels
4 2766 ~~8,450~~ CY of soil will be solidified over 24900 ~~32,600~~ SF area outside building footprint
5 An additional 167 ~~550~~ CY of soil will be solidified from a 1500 ~~2,100~~ SF area under the Mechanics Shop
6 Zone of solidification will be lower 3-foot, directly above upper silt ~~3 to 10 feet bgs~~
7 A portion of the Port's maintenance building will be removed to access contaminated soil
8 Some of the Port's maintenance operations will be temporarily moved
9 Average depth of excavation will be 8 feet bgs
10 ~~510 CY of soil containing DNAPL will be treated by RCRA stabilization with CAMU approval~~
11 ~~All soil with DNAPL will be transported to Arlington, OR for RCRA stabilization~~
12 Non DNAPL contaminated soil above Method C will be landfilled as CAMU-eligible waste in Arlington, OR
13 Existing utilities will need to be removed and replaced following excavation and treatment activities
14 4 months will be needed to perform the work
15 4 to 5 weeks will be needed for the solidification / stabilization tasks
16 Site will be restored to existing conditions following remediation
17 Water is readily available on site

Christopher L. Bailey:
10,400CY - 26400SFx3ft/27 =

Christopher L. Bailey:
7467CY total excavated - 3,900 CY clean overburden (asphalt base) = 3,567CY. Assume 1/3 of soil excavated below asphalt base exceeds method C but not Method

Christopher L. Bailey:
7467CY total excavated - 3,900 CY clean overburden (asphalt base) = 3,567CY. Assume 2/3 of soil excavated below asphalt base exceeds method C

Christopher L. Bailey:
24900SFx3ft/27 = 2766CY

Christopher L. Bailey:
Solidification of 3-foot zone directly above upper silt

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,622,755	1	Mobilization / demobilization	1	LS	$67,000	$67,000
	2	Contractor Work Plans	240	HR	$90	$21,600
	3	Solidification Pilot Testing	350	CY	$300	$105,000
	4	Temporary relocation of Port maintenance operations	1	LS	$30,000	$30,000
	5	Demo Port's Maintenance Building (east corner)	3,000	SF	$25	$75,000
	6	Demo Horizontal bioventing wells & connection piping	800	LF	$37	$29,600
	7	Decommission groundwater monitoring & biovent wells	35	EA	$920	$32,200
	8	Specialty Subcontractors (surveyor, utility locate)	1	LS	$8,000	$8,000
	9	Demo underground utilities and fencing	1	LS	$28,000	$28,000
	10	Demo retaining wall	160	LF	$75	$12,000
	11	Install Freeze Wall Shoring for building (200 LF)	0	SF	$34	$0
	12	Install Freeze Wall Shoring for excavation perimeter (720 LF)	0	SF	$31	$0
	13	Install Sheet Pile Wall Shoring along slurry wall (100 LF)	2,500	SF	$45	$112,500
	14	Remove surface asphalt in storage yard and road	32,200	SF	$0.88	$28,336
	15	Remove 42-inch HDPE culvert and replace after excavation	125	LF	$150	$18,750
	16	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$27	$105,300
	17	Excavation and Stockpiling of Contaminated Soil	3,567	CY	$28	$99,867
	18	Loading of Contaminated Soil	5,350	TN	$6	$32,100
	19	Import of clean fill to the site	2,393	CY	$20	$47,869
	20	Contaminated water handling and Environmental Protection	0	LS	$32,500	$0
	21	Backfill and Compaction of Excavation	7,467	CY	$9	$67,200
	22	Solidification Materials (8% NewCem Slag Cement)	352	TN	$130	$45,760
	23	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	88	TN	$230	$20,240
	24	Solidification Materials (0.5% Caustic Soda)	22	TN	$1,275	$28,050
	25	Solidification Labor and Equipment Outside Building Footrprint	2,767	CY	$60	$166,000
	26	Solidification labor and Equipment Under Mechanics Shop	167	CY	$60	$10,000
	27	Geotextile fabric marker layer over solidified soil	2,933	SY	$1.75	$5,133
	28	Asphalt paving of site	32,600	SF	$4.00	$130,400
	29	Rebuild Access Road (150 LF)	3,750	SF	$5	$18,750
	30	Rebuild retaining wall	160	LF	$150	$24,000
	31	Replace connection piping for bioventing system	600	LF	$40	$24,000
	32	Reconstruct maintenance building (east corner)	3,000	SF	$50	$150,000
	33	Monitoring Well Installation	10	EA	$5,400	$54,000
	34	Contractor Reporting and Closeout Submittals	290	HR	$90	$26,100
Contaminated Waste Disposal and Transportation						
$709,857	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	3,567	TN	$115	$410,167
	6	Transportation Costs to Subtitle C Landfill	3,567	TN	$55	$196,167
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	1,783	TN	$30	$53,500
	8	Transportation Costs to Subtitle D Landfill	1,783	TN	$25	$44,583
	9	Contaminated water treatment and disposal	0	GAL	$0.20	$0
	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	320	TN	$8	$2,560
	11	Transportation Costs to Asphalt Recycler	320	TN	$9	$2,880
Subtotal Contractor Costs						**$2,332,612**
Contractor Contingency (%)			**20**	%	$2,332,612	$466,522
Total Contractor Costs						**$2,800,000**

Christopher L. Bailey:
Eliminate Freeze Wall due to shallow depth of excavation and ability to demolish part of building

Christopher L. Bailey:
10400CY - 26400SF x 3FT / 27 (solidification volume) - 3900CY (asphalt base) = 3567CY

Christopher L. Bailey:
3567CY - 40% x 2933CY (volume of solidified soil) to account for reduced need for backfill as a result of expansion of solidified soil

Christopher L. Bailey:
Eliminate water handling as a result of solidification in deeper soil across most areas.

Christopher L. Bailey:
24900SF x 3ft thickness / 27 = 2766CY

Christopher L. Bailey:
1500SF x 3 ft thickness / 27 = 167CY

Christopher L. Bailey:
Removal of portion of building and overlying soil eliminates need for expensive solidification process

Christopher L. Bailey:
Assume all excavated soil disposed of as CAMU-Eligible waste

Christopher L. Bailey:
Eliminate water disposal as a result of solidification in deeper soil across most areas.

COMBINED PORT ALTERNATIVE - 2/3 DISPOSAL AS CAMU **(CONTINUED)**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$2,800,000	$56,000
Christopher L. Bailey: Average of IP design percentages for S1 (3%) and S5b (7%)	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$2,800,000	$28,000
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	3	Engineering Design (% DCC)	5	%	$2,800,000	$140,000
	4	Planning for temporary relocation of Port Maintenance Ops	100	HR	$135	$13,500
	5	Bid & RFI Support	60	HR	$135	$8,100
	6	Construction Oversight and QA (% DCC)	5	%	$2,800,000	$140,000
	7	System Startup (if applicable)	0	LS	$0	$0
	8	Confirmational Sample Collection and Reporting	1	LS	$15,000	$15,000
	9	Closure Documentation & Reporting	1	LS	$53,000	$53,000
Subtotal Engineering Costs						**$528,600**
Contractor Contingency (%)			**10**	%	$528,600	$52,860
Total Engineering Costs						**$581,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LONG-TERM MONITORING COSTS						
Annual O&M Cost (Institutional Controls Maintenance and Asphalt Inspection/Repair as Needed			***30***	***Years of Annual O&M***		
$15,036	1	Project Management and Coordiation	16	Hr	$135	$2,160
	2	Annual Inspection and Reporting	32	Hr	$110	$3,520
	3	Update Ics Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						$15,000
O&M Contingency (%)			**25**	%	$15,000	$3,750
Total Annual O&M Cost						$18,800
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical performance of solidified soil)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Total Annual O&M and LTM Cost						$26,330
LTM Contingency (%)			**25**	%	$26,330	$6,583
Total Annual LTM Cost						$32,900
Total Annual O&M and LTM Cost						$51,700
Total Non-Routine O&M Cost		Estimated to be 2% of Construction Costs				$0
Total O&M and LTM Cost		***Years till project completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***0.03***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$3,380,000	**$3,380,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$4,029,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$224,000	**$4,253,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$101,000	**$4,354,000**
TOTAL PRESENT-WORTH COST				**$4,350,000**

COMBINED PORT ALTERNATIVE - ALL DISPOSAL AS CAMU

Client	International Paper		**Estimator**	
Location	Longview, Washington		**Report Date**	
Project	MFA Area Remediation		**Last Updated**	
Document	RI/FS Cost Estimate		**Source of Costs**	
Soil Removal	YES		**Groundwater Treatment**	
Soil Treatment Area	26,400	SF	**GW Treatment Area**	
Treatment Perimeter	1,120	LF	**GW Treatment Method**	
Soil Disposal Volume	3,567	CY	**Treatment Depth**	FT bgs

Christopher L. Bailey:

10,400CY - 26400SFx3ft/27 =

Alternative

1 7467 ~~10,400~~ CY of soil will be excavated over 26,400 ~~34,700~~ SF area
2 3,900 CY of soil excavated will be clean overburden materials
3 3567 ~~6,500~~ CY of soil excavated will be above Method C cleanup levels

Alternative Specific

4 2766 ~~8,450~~ CY of soil will be solidified over 24900 ~~32,600~~ SF area outside building footprint
5 An additional 167 ~~550~~ CY of soil will be solidified from a 1500 ~~2,100~~ SF area under the Mechanics Shop
6 Zone of solidification will be lower 3-foot, directly above upper silt ~~3 to 10 feet bgs~~

Specific Assumptions

7 A portion of the Port's maintenance building will be removed to access contaminated soil
8 Some of the Port's maintenance operations will be temporarily moved
9 Average depth of excavation will be 8 feet bgs
10 ~~510 CY of soil containing DNAPL will be treated by RCRA stabilization with CAMU approval~~
11 ~~All soil with DNAPL will be transported to Arlington, OR for RCRA stabilization~~
12 Non DNAPL contaminated soil above Method C will be landfilled as CAMU-eligible waste in Arlington, OR
13 Existing utilities will need to be removed and replaced following excavation and treatment activities
14 4 months will be needed to perform the work
15 4 to 5 weeks will be needed for the solidification / stabilization tasks
16 Site will be restored to existing conditions following remediation
17 Water is readily available on site

Christopher L. Bailey:

7467CY total excavated - 3,900 CY clean overburden (asphalt base) = 3,567CY

Christopher L. Bailey:

24900SFx3ft/27 = 2766CY

Christopher L. Bailey:

Solidification of 3-foot zone directly above upper silt

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
CONTRACTOR COSTS (CAPITAL DIRECT)						
Remedial Action Construction						
$1,622,755	1	Mobilization / demobilization	1	LS	$67,000	$67,000
	2	Contractor Work Plans	240	HR	$90	$21,600
Christopher L. Bailey: Eliminate Freeze Wall due to shallow depth of excavation and ability to demolish part of building	3	Solidification Pilot Testing	350	CY	$300	$105,000
	4	Temporary relocation of Port maintenance operations	1	LS	$30,000	$30,000
	5	Demo Port's Maintenance Building (east corner)	3,000	SF	$25	$75,000
	6	Demo Horizontal bioventing wells & connection piping	800	LF	$37	$29,600
	7	Decommission groundwater monitoring & biovent wells	35	EA	$920	$32,200
	8	Specialty Subcontractors (surveyor, utility locate)	1	LS	$8,000	$8,000
	9	Demo underground utilities and fencing	1	LS	$28,000	$28,000
Christopher L. Bailey: 10400CY - 26400SF x 3FT / 27 (solidification volume) - 3900CY	10	Demo retaining wall	160	LF	$75	$12,000
	11	Install Freeze Wall Shoring for building (200 LF)	0	SF	$34	$0
	12	Install Freeze Wall Shoring for excavation perimeter (720 LF)	0	SF	$31	$0
Christopher L. Bailey: 3567CY - 40% x 2933CY (volume of solidified soil) to account for reduced need for backfill as a result of expansion of solidified soil	13	Install Sheet Pile Wall Shoring along slurry wall (100 LF)	2,500	SF	$45	$112,500
	14	Remove surface asphalt in storage yard and road	32,200	SF	$0.88	$28,336
	15	Remove 42-inch HDPE culvert and replace after excavation	125	LF	$150	$18,750
	16	Excavation and Stockpiling of Overburden (0 to 3 FT bgs)	3,900	CY	$27	$105,300
	17	Excavation and Stockpiling of Contaminated Soil	3,567	CY	$28	$99,867
Christopher L. Bailey: Eliminate water handling as a result of solidification in deeper soil across most areas.	18	Loading of Contaminated Soil	5,350	TN	$6	$32,100
	19	Import of clean fill to the site	2,393	CY	$20	$47,86
	20	Contaminated water handling and Environmental Protection	0	LS	$32,500	$
	21	Backfill and Compaction of Excavation	7,467	CY	$9	$67,20
	22	Solidification Materials (8% NewCem Slag Cement)	352	TN	$130	$45,760
Christopher L. Bailey: 24900SF x 3ft thickness / 27 = 2766CY	23	Solidification Materials (2% Bentonite Grout - Hydrogel 90)	88	TN	$230	$20,240
	24	Solidification Materials (0.5% Caustic Soda)	22	TN	$1,275	$28,050
	25	Solidification Labor and Equipment Outside Building Footrprint	2,767	CY	$60	$166,000
Christopher L. Bailey: 1500SF x 3 ft thickness / 27 = 167CY	26	Solidification labor and Equipment Under Mechanics Shop	167	CY	$60	$10,000
	27	Geotextile fabric marker layer over solidified soil	2,933	SY	$1.75	$5,133
	28	Asphalt paving of site	32,600	SF	$4.00	$130,400
Christopher L. Bailey: Removal of portion of building and overlying soil eliminates need for expensive solidification process	29	Rebuild Access Road (150 LF)	3,750	SF	$5	$18,75
	30	Rebuild retaining wall	160	LF	$150	$24,00
	31	Replace connection piping for bioventing system	600	LF	$40	$24,000
	32	Reconstruct maintenance building (east corner)	3,000	SF	$50	$150,000
	33	Monitoring Well Installation	10	EA	$5,400	$54,000
	34	Contractor Reporting and Closeout Submittals	290	HR	$90	$26,100
Contaminated Waste Disposal and Transportation						
$918,240	1	NAPL Soil (CAMU RCRA Stabilization) Costs	0	TN	$255	$0
Christopher L. Bailey: Eliminate these costs as they are a component of solidification	2	Transportation Costs to RCRA Stabilization Facility	0	TN	$55	$0
	3	Liquid NAPL Material Disposal Costs (Incinerator)	0	GAL	$10	$0
	4	Liquid NAPL Transportation Costs to Incinerator	0	DRUM	$250	$0
	5	CAMU-Eligible Material Disposal Costs (Subtitle C Landfill)	5,350	TN	$115	$615,250
Christopher L. Bailey: Assume all excavated soil disposed of as CAMU-Eligible waste	6	Transportation Costs to Subtitle C Landfill	5,350	TN	$55	$294,250
	7	Non-Hazardous Material Disposal Costs (Subtitle D)	60	TN	$30	$1,800
	8	Transportation Costs to Subtitle D Landfill	60	TN	$25	$1,500
	9	Contaminated water treatment and disposal	0	GAL	$0.20	$0
Christopher L. Bailey: Eliminate water disposal as a result of solidification in deeper	10	Non-Hazardous Material Disposal Costs (Asphalt Recycling)	320	TN	$8	$2,56
	11	Transportation Costs to Asphalt Recycler	320	TN	$9	$2,88
Subtotal Contractor Costs						**$2,540,995**
Contractor Contingency (%)			**20**	%	$2,540,995	$508,199
Total Contractor Costs						**$3,050,000**

COMBINED PORT ALTERNATIVE - ALL DISPOSAL AS CAMU (CONTINUED)

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ENGINEERING COSTS (CAPITAL INDIRECT)						
Christopher L. Bailey: Average of IP design percentages for S1 (3%) and S5b (7%)	1	General Coordination, Meetings, and Planning (% DCC)	2	%	$3,050,000	$61,000
	2	Regulatory Review, Coordination, and Meetings (% DCC)	1	%	$3,050,000	$30,500
	3	Pilot Test Sampling, CBR, and Reporting	1	LS	$75,000	$75,000
	3	Engineering Design (% DCC)	5	%	$3,050,000	$152,500
	4	Planning for temporary relocation of Port Maintenance Ops	100	HR	$135	$13,500
	5	Bid & RFI Support	60	HR	$135	$8,100
	6	Construction Oversight and QA (% DCC)	5	%	$3,050,000	$152,500
	7	System Startup (if applicable)	0	LS	$0	$0
	8	Confirmational Sample Collection and Reporting	1	LS	$15,000	$15,00
	9	Closure Documentation & Reporting	1	LS	$53,000	$53,00
Subtotal Engineering Costs						**$561,100**
Contractor Contingency (%)			**10**	%	$561,100	$56,110
Total Engineering Costs						**$617,000**

Category	Task #	Task Description	Quantity	Unit	Unit Cost	Total Cost
ANNUAL O&M and / or LONG-TERM MONITORING COSTS						
Annual O&M Cost (Institutional Controls Maintenance and Asphalt Inspection/Repair as Needed			***30***	***Years of Annual O&M***		
$15,036	1	Project Management and Coordiation	16	Hr	$135	$2,160
	2	Annual Inspection and Reporting	32	Hr	$110	$3,520
	3	Update Ics Plan (once every 5 years)	1	LS	$750	$750
	4	Prorated Cost for Asphalt Repairs	1	LS	$8,606	$8,606
Subtotal Annual O&M Cost						$15,000
O&M Contingency (%)			**25**	%	$15,000	$3,750
Total Annual O&M Cost						$18,800
Annual LTM Cost (Monitoring and Sampling of Leachate and Physical performance of solidified soil)			***10***	***Years of Annual LTM***		
$26,330	1	Project Management & Coordination	24	HR	$135	$3,240
	2	Mob/Demob for Sampling (semi-annual)	2	EA	$1,800	$3,600
	3	Pickup Truck Rental	6	DY	$65	$390
	4	Sampling Labor and Supplies	20	EA	$400	$8,000
	5	Analytical Testing (DRO and SVOCs)	20	EA	$380	$7,600
	6	Annual Reporting	1	LS	$3,500	$3,500
Total Annual O&M and LTM Cost						$26,330
LTM Contingency (%)			**25**	%	$26,330	$6,583
Total Annual LTM Cost						$32,900
Total Annual O&M and LTM Cost						$51,700
Total Non-Routine O&M Cost		Estimated to be 2% of Construction Costs				$0
Total O&M and LTM Cost		***Years till project completion***	***30***			$893,000
Present-Worth O&M Cost		***Presumed Interest Rate***	***0.03***			**$649,000**

ALTERNATIVE COST SUMMARY			**Rounded Total**	**Cumulative Total**
TOTAL CAPITAL COSTS (DIRECT & INDIRECT)			$3,670,000	**$3,670,000**
TOTAL O&M COSTS (PRESENT WORTH)			$649,000	**$4,319,000**
SALES TAX (Washington State)	Percentage of Direct Capital Costs	8.0%	$244,000	**$4,563,000**
AGENCY OVERSIGHT (Ecology)	Percentage of Capital Costs	3.0%	$110,000	**$4,673,000**
TOTAL PRESENT-WORTH COST				**$4,670,000**

MEMORANDUM

TO: Kaia Petersen

FROM Chuck Hoffman

SUBJECT: International Paper/Port of Longview – Post-Remediation Site Grades in Maintenance Facility Area (MFA) and along North Tie Road

DATE: March 23, 2016

Materials Reviewed:

I have reviewed the following documents and videos related to International Paper's proposal to treat contaminated soils with a mixture of cement and other material to solidify the contaminated soils, and then regrade and cap the site with asphalt-concrete pavement:

- *Final In Situ Soil Remediation Treatability Study Report*, URS, dated June 2013.
- Section 7.4.7 Alternative S5B – Solidification Outside and Inside Building Footprint with Relocation of Soil Near Railroad Tracks, pages 7-22 to 7-26, in *Remedial Investigation/Feasibility Study Report*, AECOM, dated December 18, 2015.
- Figures
    - 3-2 **Geologic Cross Section Locations – Maintenance Facility Area**
    - 3-3 **Geologic Cross Section A-A' – Maintenance Facility Area**
    - 3-4 **Geologic Cross Section B-B' – Maintenance Facility Area**
    - 3-5 **Geologic Cross Section C-C' – Maintenance Facility Area**
    - 3-6 **Extent of Sheen and DNAPL Occurrence in Soil – Maintenance Facility Area**
    - 4 **Alternative S5B Proposed Treatment Zone Area Cover Details**
    - 7-9 **Alternative S5B Proposed Treatment Area Zones and Post Remediation Site Grades**
    - 7-10 **Alternative S5B Conceptual Building Solidification Layout**
    - M-1 **Alternative S5B Site Grade Cross Section Location Figure**, and
    - M-2 **Alternative S5B Site Grade Cross Sections A-A', B-B', and C-C'**
- Email message from Lisa Hendriksen, Port of Longview, to Ava Edmonson, Ecology, dated January 6, 2016.
- Email message from Christopher Bailey, GeoEngineers, to Lisa Hendriksen, Port of Longview, dated October 22, 2015, with a link to videos of 3-D models of proposed site grade (attached to email message from Lisa Hendriksen, Port of Longview, to Kaia Petersen, Ecology, dated March 11, 2015).

GeoEngineers used CAD files from AECOM to print a 3-dimensional model of the proposed site after the regrade. GeoEngineers provided videos of two models, one at a 1:1 vertical to horizontal scale and another at a 2:1 vertical to horizontal scale. The 1:1 scale provides a more accurate version of how the site would look after the potential regrade while the 2:1 scale version exaggerates the heights of the potential regrade and the slopes relative to the surface area of the site.

Review:

According to the discussions in the Treatability Study Report and the RI/FS Report of the cleanup alternatives and based on bench scale tests, the addition of cement and bentonite clay to treat the contaminated soils will increase the original volume by 26 to 36 percent. International Paper is proposing that all the treated contaminated soil remains onsite and has provided a potential plan for the site regrade.

Figures M-1 and M-2 are plan drawings of the potential regrade that show surface elevations if the original volume increases by 35 percent. Figure M-1 indicates the depth of treated soils will gradually increase from the northwest area of the project to the southeast corner. Figure M-2 indicates the maximum depth of treated soil will be about 5 to 6 feet at the southeast area of the proposed treatment area. This regrade has a 33 percent slope on the east edge of the treated soil that encroaches slightly onto the Treated Wood Products (TWP) Area.

Slope of North Tie Road – A portion of North Tie Road along the east side of the MFA would be regraded. Figure M-2, Section B-B', which follows the alignment of North Tie Road, shows a gradual rise of about 3 percent from the north boundary of the MFA to the area adjacent to the Mechanics Shop. The regrade is at the maximum height in that area and then North Tie Road has a downward slope of 5 percent to the southern boundary of the MFA.

Slope North of the Mechanics Shop – The large area north of the Mechanics Shop has a proposed regrade that slopes upward at a grade of 3 percent from the north boundary of the MFA to approximately 30 feet from the structure.

Slopes Near Mechanics Shop – According to Figure M-1 the slope then decreases from the maximum height at a grade of about 10 percent toward the Mechanics Shop. On the east side of the Mechanics Shop the regrade slopes downward from the roadway toward the structure at an approximate 6 percent grade. The proposed regrade will direct stormwater towards the Mechanics Shop. However, the description of Alternative S5B in the RI/FS Report states the project will include a strip drain around the structure that will connect with the Port's existing stormwater collection system.

Discussion:

According to the Email message from Lisa Hendriksen to Ava Edmonson, a concern of the Port is that the proposed project would limit the use of the Port's mobile crane manufactured by Liehberr. The email states:

> *The Liehberr crane can traverse a cross slope of up to 2% and a grade of up to 5%. Initial drawings of the solidification area demonstrate cross slopes of up to 6% and grades up to 33% at Gate 4, which would not allow for the crane to be moved through that gate.*

I looked up the Liehberr website and found the model (an LHM series) of crane the Port has based on images the Port sent by Email. The website did not have information regarding the maximum grade or cross slope the cranes can traverse. [Note: Kaia requested the model number for the Port's crane from Lisa Hendriksen. Lisa responded that the Port has two cranes. As of March 23, Lisa has not been able to provide the model numbers for the two cranes.]

The maximum proposed grade of North Tie Road is 5 percent so the Port's crane should be able to utilize the regraded road. The cross-slope of the regraded area north of the Mechanics Shop is proposed at 3 percent. If the maximum cross-slope the crane can traverse is 2 percent, then this area would be too steep for east/west movement of the crane across the MFA. The slopes decrease at slopes greater than 2 percent towards the Mechanics Shop on the north and east side from the maximum height of the regrade, but, because these areas are near the structure, it seems unlikely the crane would be used at these locations.

The Email from the Port also states a concern about “grades up to 33% at Gate 4”. This grade is located on the easternmost boundary of the proposed treatment area, slightly on the TWP Area, and parallels North Tie Road. The horizontal distance from the east edge of the road to where the treated soil begins to slope varies from 10 to 30 feet. The Port’s crane would not be traversing this slope, if it was possible, because the crane would then have to travel on the TWP Area. Heavy vehicles cannot drive onto the TWP Area because of the potential to damage the underground slurry wall and liners that are part of the remedial action for the TWP Area.

International Paper’s proposal shows some treated soil placed on a small portion of the TWP Area. This may be of concern to us because the regrade could increase stormwater infiltration into that part of the TWP Area at the base of the proposed slope. However, the RI/FS report states that stormwater could be controlled by installing catchment structures or by sloping the soil toward existing stormwater swales and that additional evaluation of stormwater control could be performed during design.

Summary:

- The Port will be able to move their crane along the proposed grade for North Tie Road.
- The proposed cross-slope north of the Mechanics Shop is too steep and will have to be adjusted for the Port to drive their crane across that area of the MFA.
- The slope of 33 percent mentioned by the Port in their January 6 Email is 10 to 30 feet from North Tie Road and is located in the TWP Area, where heavy vehicles should not be operated because of the potential to damage existing underground structures.
- Slopes of 6 and 10 percent on the north and east sides of the Mechanics Shop would direct stormwater towards the shop. However, International Paper is proposing to install a strip drain that will collect and convey stormwater to the Port’s existing stormwater collection system. If the Port has a need to operate the crane next to the Mechanics Shop, then these slopes will require adjustment.