APPENDIX A
SUMMARY OF PREVIOUS
INVESTIGATION AND CLEANUP ACTIONS

TABLE OF CONTENTS

List of Plates

List of Tables

LIST OF ACRONYMS AND ABBREVIATIONS

AST	aboveground storage tank
bgs	below ground surface
CDID	Consolidated Diking Improvement District
Closed BMP Facility	Closed Black Mud Pond Facility
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CVI	Chinook Ventures, Inc.
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
Ecology	Washington State Department of Ecology
EMCON	EMCON, Inc.
HTM	heat transfer media
MBTL	Millennium Bulk Terminals – Longview, LLC
MFG	McCully Frick & Gillman, Inc.
mg/kg	milligram per kilogram
mg/L	milligram per liter
MTCA	Model Toxics Control Act
Northwest Alloys	Northwest Alloys, Inc.
NPDES	National Pollutant Discharge Elimination System
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PNE	Pacific Northern Environmental
PNG	Pacific Northern Geoscience
RCRA	Resource Conservation and Recovery Act
Reynolds	Reynolds Metals Company
Reynolds Facility	former Reynolds Metals Reduction Plant
RI	Remedial Investigation
SEF	Sediment Evaluation Framework
SPL	spent potliner
TPH	total petroleum hydrocarbon
TPH-G	total petroleum hydrocarbon, gasoline-range
UST	underground storage tank

VOC	volatile organic compound
WAD	weak acid dissociable

1 INTRODUCTION

Extensive testing data were developed at the former Reynolds Metals Reduction Plant (Reynolds Facility) in addition to those collected during the Remedial Investigation/Feasibility Study (RI/FS). These additional data were developed as part of previous investigation and cleanup actions and by other studies conducted in parallel with the RI/FS. These studies provide useful information documenting the quality of soil, groundwater, surface water, and sediment within the RI/FS Study Area.

Table A-1 provides a concise summary of the previous studies that include useful testing data for the RI/FS Study Area. These available data were considered by the Washington State Department of Ecology (Ecology) as part of the agency's data gaps analysis. That analysis was used to finalize the scope of additional investigations for the RI/FS, as described in Section 3 of the RI/FS.

This appendix summarizes the locations and types of sampling performed as part of these previous investigation and cleanup actions. Plates A-1 through A-3 show the locations of the sampling data, along with the locations of previous removal or cleanup actions. The data are organized by area, including the West Plant (see Plate A-1), the East Plant (see Plate A-2), and the Columbia River sediments (see Plate A-3). Supporting investigation reports and data packages are included in Appendix C of the RI/FS.

2 WEST PLANT AREA

Table A-1 summarizes five studies completed within the West Plant area between 1985 and 2012. Plate A-1 identifies the locations of test samples collected as part of these studies, and Appendix C of the RI/FS contains the underlying study reports or data tables.

2.1 Landfill #2 (Industrial) and Fill Deposit B-3

Environmental testing was initiated in 1985 for the landfill (Landfill #2; see Plate A-1) and residual carbon fill deposit (Fill Deposit B-3; see Plate A-1) located in the southwest corner of the property. That work included the installation of soil borings through Landfill #2 and in the installation of soil borings and monitoring wells in adjacent areas (Sweet, Edwards, and Associates, Inc. 1986). During the initial testing, 11 composite samples from the landfill and three composite samples from the underlying alluvial soil were collected and analyzed for polycyclic aromatic hydrocarbons (PAHs) using U.S. Environmental Protection Agency (EPA) Method 610 (Sweet, Edwards, and Associates, Inc. 1986). PAHs were detected in the landfill samples. PAH concentrations were detected in one of the four additional borings placed in the vicinity (Sweet, Edwards, and Associates, Inc. 1986).

Groundwater sampling performed during the same 1985 field investigations included testing of four newly-installed monitoring wells (RLSW-1 through RLSW-4). No PAHs were detected in these groundwater samples, demonstrating that the compounds are not impacting groundwater quality (Sweet, Edwards, and Associates, Inc. 1986).

Additional groundwater testing was later performed in this area in July 2000 (MFG 2000) and again in 2002 (MFG 2003). In July 2000, as part of field investigations conducted by McCully Frick & Gillman, Inc. (MFG), for the *Limited Phase II Environmental Site Assessment Report – Reynolds Metals Site,* groundwater monitoring wells RLSW-1 through RLSW-4 were sampled and analyzed for dissolved Resource Conservation and Recovery Act (RCRA) metals plus antimony and nickel, fluoride, total cyanide, and ammonia. Ammonia, fluoride, and total cyanide were detected in all samples (MFG 2000). In 2002, additional groundwater samples were collected from the same locations sampled in July 2000; the samples were analyzed for total cyanide, weak acid dissociable (WAD) cyanide, and fluoride (MFG 2003).

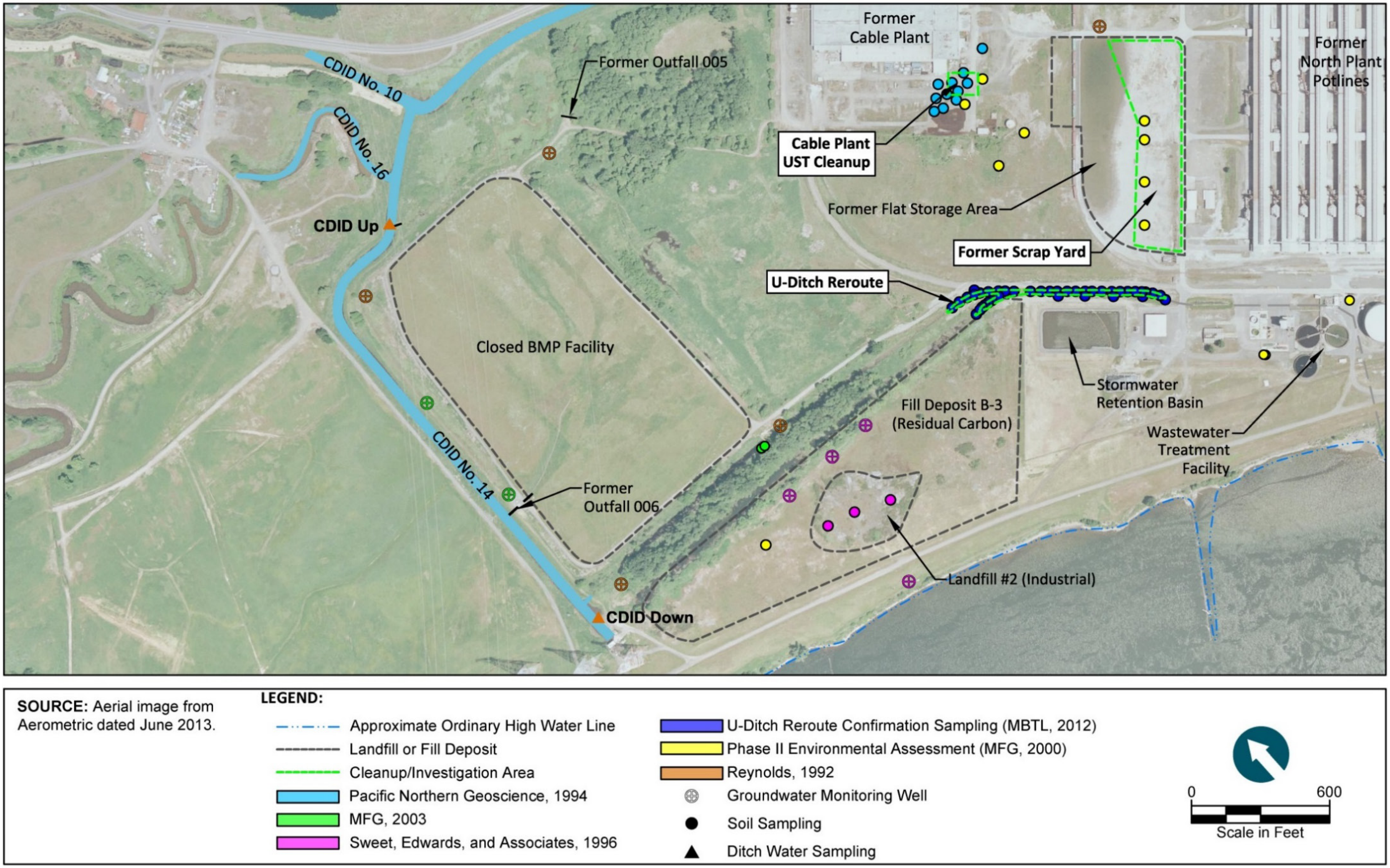


Plate A-1
Non RI-FS Sampling Locations – West Plant Area
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

2.2 Cable Plant Underground Storage Tank Cleanup

An underground storage tank (UST) located adjacent to the Cable Plant (see Plate A-1) was removed in 1991. Localized gasoline-impacted soil and groundwater in this area were cleaned up with Ecology oversight under the Voluntary Cleanup Program. In 2003, Ecology provided a No Further Action determination for this area (Anchor 2003).

The 1,000-gallon gasoline UST was originally installed by Reynolds Metals Company (Reynolds) in 1974 to fuel company vehicles and equipment. When the tank was removed, a small (approximately 0.0625-inch) hole was found in the tank, and the surrounding soil and groundwater appeared to be impacted with gasoline. Notification of the leaking gasoline was made to Ecology when Reynolds removed the UST in November 1991, and Reynolds initiated an independent cleanup of the area (Anchor 2003).

Soil and groundwater samples collected from the initial excavation detected gasoline-range total petroleum hydrocarbons (TPH-G) in soils and groundwater above Model Toxics Control Act (MTCA) cleanup levels (PNE 1991). In 1992, additional soil and groundwater sampling was conducted at the site (PNE 1992). Later, five groundwater monitoring wells were installed at the site by Pacific Northern Environmental, and soil and groundwater samples were collected from each well location to determine the extent of soil and groundwater contamination in the vicinity of the former UST (PNE 1993). In 1993, Reynolds initiated a focused RI/FS (PNG 1994). As part of the focused RI/FS, groundwater samples were collected from six existing and three new monitoring wells within and downgradient of the former tank excavation area (PNG 1994).

Soil impacted with total petroleum hydrocarbons (TPHs) was excavated and removed from the site in 1994. Confirmation testing results of remaining soils showed that cleanup levels had been achieved (PNG 1994). EMCON, Inc. was commissioned by Reynolds to monitor groundwater quality near the former UST area. Quarterly monitoring results were presented in the *1995 Annual Groundwater Monitoring Report, Reynolds Cable Plant, Longview, Washington* (EMCON 1996). TPH-G was not detected in groundwater samples from former UST area wells during the 1995 quarterly sampling (EMCON 1996). Groundwater monitoring continued until 1997.

Final remediation was documented in the *Voluntary Cleanup Report – Underground Gasoline Tank – Former Reynolds Longview Cable Plant*, which was submitted to Ecology on January 9, 2003 (Anchor 2003). Ecology provided a No Further Action determination for this area in a letter dated February 19, 2003.

2.3 Scrap Yard Soil Cleanup

The scrap yard was located west of the former North Plant potlines (see Plate A-1) and was historically used during Reynolds Facility operations for the handling of materials designated for reuse or off-site recycling (Anchor 2007a). In 2005, Chinook Ventures, Inc. (CVI), initiated a voluntary cleanup of the scrap yard area. The area of impacted soils was delineated, and CVI removed approximately 200 cubic yards of PAH-impacted soils from the scrap yard and disposed of the soils off site.

The scrap yard was first investigated in July 2000 as part of an investigation conducted by MFG for the Limited Phase II Environmental Site Assessment, including collection of four surface soil samples (SS-3 through SS-6). Soil samples were analyzed for RCRA metals, polychlorinated biphenyls (PCBs), and PAHs. Arsenic and PCBs were consistently below MTCA Method A soil cleanup levels for unrestricted land uses (20 and 1 milligrams per kilogram [mg/kg], respectively). PAHs were detected in the four soil samples; detected concentrations of benzo(a)pyrene exceeded Method A soil cleanup levels for unrestricted land uses, with concentrations ranging up to 47 mg/kg (MFG 2000).

In 2005, CVI sampled an additional ten locations within the north and south areas of the former scrap yard as a part of a focused FS and identified soils that exceeded the MTCA Industrial Use cleanup levels for PAHs (Anchor 2007b; Northwest Alloys 2011a). Other constituents were characterized but none exceeded MTCA Industrial Use cleanup levels. Soil samples collected after the cleanup confirmed that soil PAH concentrations were less than the MTCA Industrial Use cleanup levels (Anchor 2007b).

As shown on Plate A-1, the scrap yard footprint was later included within the flat storage area developed by CVI. The current RI/FS includes additional soil and groundwater testing in this area to assess soil quality following the removal of the stored products and the flat storage pad. That testing was extensive, and it confirmed that the flat storage area was free of soil impacts except for a localized area in the northeast corner (see Section 5.2.3 of the RI/FS). The management options for soils in this area are presented in the FS.

2.4 Closed BMP Facility Post-Closure Monitoring

The Ecology-approved Closure/Post-Closure Plan also established a long-term groundwater and ditch water monitoring program (Reynolds and CH2MHill 1991) for the Closed Black Mud Pond Facility (Closed BMP Facility). The ongoing monitoring program includes nine groundwater monitoring wells ("RL-series" wells). Seven of these wells (RL-1S/1D, RL-2S/2D, RL-3S/3D, and RL-5) are located immediately adjacent to the Closed BMP Facility. These wells are screened in the thick layer of silt/clay soils known as the Upper Alluvium. The groundwater monitoring program also includes two background wells (RL-4S/4D) that are located in a separate area, between the Cable Plant and the North Plant Potlines. Groundwater data is included in Appendix E. The monitoring program includes two ditch water sampling locations in the Consolidated Diking Improvement District (CDID) Ditch No. 14.

Groundwater and ditch water samples are analyzed quarterly for pH, specific conductance, chloride, fluoride, sulfate, and total and free cyanide. Annual reports, which include the results of quarterly groundwater and surface water monitoring since December 1983, are kept on file at the Reynolds Facility in accordance with the Ecology-approved Closure/Post-Closure Plan (Reynolds and CH2M Hill 1991).

Groundwater monitoring within the silt/clay soils surrounding the Closed BMP Facility has been performed since the early 1990s. Results of monitoring have shown that the closure and dewatering of the facility have been effective. As described in Section 5 of the RI, there are no adverse impacts to water quality in the adjacent CDID ditches for cyanide or fluoride. Cyanide levels in shallow groundwater within the silt/clay soils immediately adjacent to the Closed BMP Facility are protective of both drinking water and surface water quality. A significant improvement in groundwater fluoride concentrations in these adjacent wells has also been observed (Anchor QEA 2011).

Groundwater concentration of chromium, copper and nickel in the RL series wells were evaluated in comparison to the hardness based aquatic chronic freshwater criteria, and concentrations were less than the freshwater criteria (Appendix E)

2.5 U-Ditch Reconnection

The U-ditch is an earthen stormwater ditch located in the southwestern portion of the Reynolds Facility (see Plate A-1). The ditch is used to manage stormwater within the Reynolds Facility, and it is regulated under the facility's National Pollutant Discharge Elimination System (NPDES) permit.

A portion of the U-ditch channel had been filled with debris by CVI, and Ecology ordered CVI to re-establish the connection of the U-ditch (Ecology Administrative Order No. 9536). Millennium Bulk Terminals – Longview, LLC (MBTL), completed the connection in fall 2012, with the removal of the debris from the U-ditch. As part of the reconnection project, MBTL characterized and removed more than 14,000 tons of debris from the property, which was disposed of off site at a permitted landfill in Hillsboro, Oregon.

Following debris removal and grading activities, sampling was conducted in November 2012 to characterize the quality of the U-ditch bottom and side-walls. This soil sampling included the collection of 56 surface grab samples from sidewalls and within the base of the final graded U-ditch channel, as outlined in the U-ditch Sampling and Analysis Plan (MBTL 2012). Post-removal confirmation soil sampling locations are shown on Plate A-3, and laboratory analytical reports are included in Appendix C of the RI/FS Report.

3 EAST PLANT AREA

Table A-1 summarizes five studies completed within the East Plant area between 1985 and 2011. Plate A-2 identifies the locations of test samples collected as part of these studies, and Appendix C of the RI/FS contains the underlying study reports or data tables.

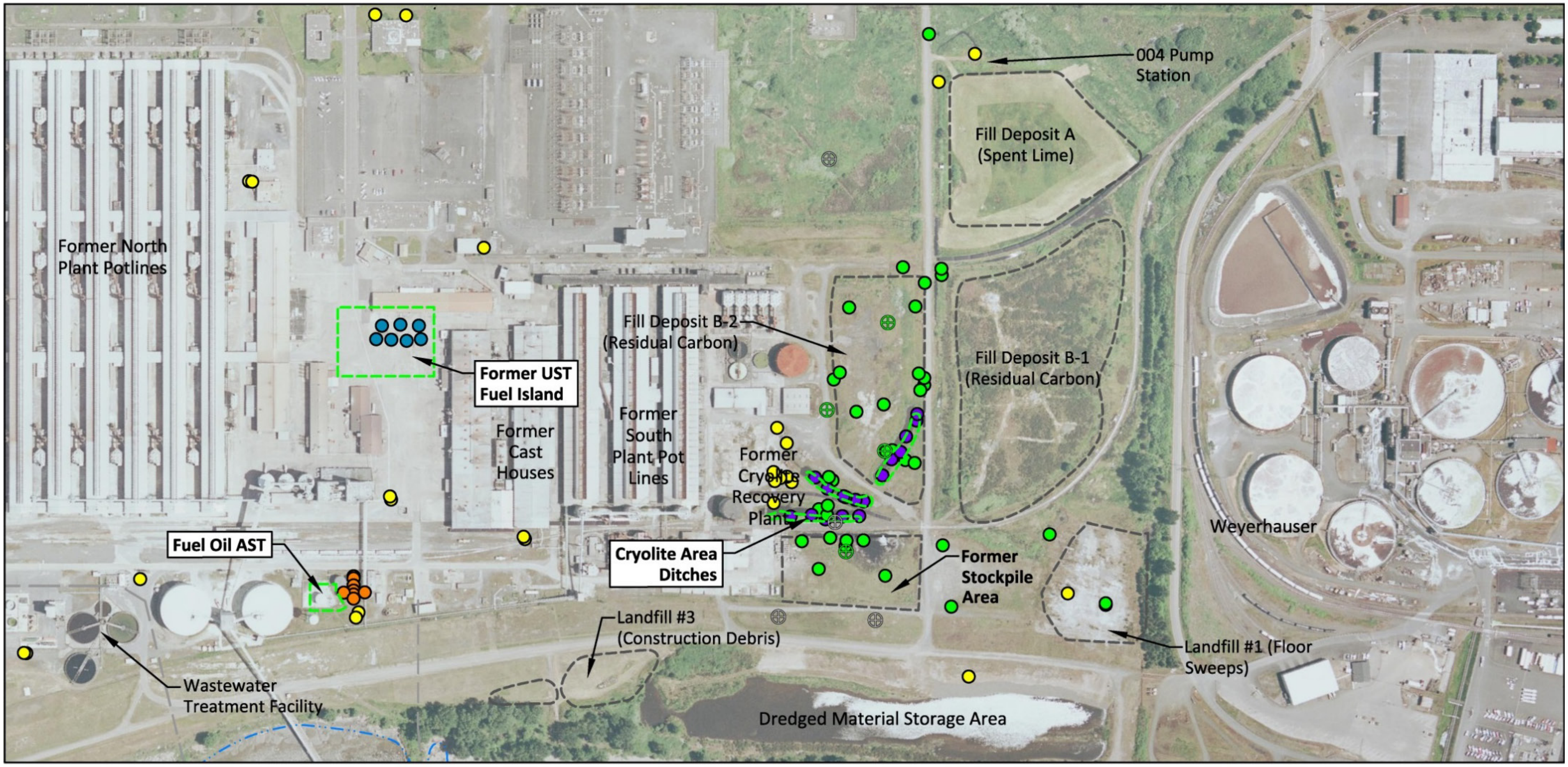
3.1 Former Stockpile Area

The former stockpile area used to manage spent potliner (SPL) was located southeast of the former Cryolite Recovery Plant (see Plate A-2). The SPL has long since been removed, along with the stockpile pad and underlying soils. Testing performed in this area is summarized subsequently.

Initial testing was performed under Ecology Order No DE 83-293, with the installation of six groundwater monitoring wells ("R-series" wells) in the former stockpile area in October 1982. These wells were monitored quarterly from 1983 to 2002 and have been part of an ongoing quarterly monitoring program since 2011. The wells have been tested for cyanide (total, WAD, and free), total fluoride, and total chloride. The quarterly testing data are summarized in annual reports that are maintained on site and available for Ecology review upon request.

In 1988, soil testing was performed by Reynolds, including four subsurface soil samples (Reynolds 1988). Soil samples were collected 8 feet from the edge of the former concrete storage pad at approximately 6 feet below ground surface (bgs). Total cyanide concentrations were low (32 to 50 mg/kg), as were fluoride concentrations (3,200 to 4,100 mg/kg; Reynolds 1988).

In 1989, Reynolds conducted additional surface soil sampling in the former stockpile footprint, including testing of 12 samples for fluoride and total cyanide. Total cyanide concentrations ranged from 5 to 5,370 mg/kg, and fluoride concentrations ranged from 230 to 8,710 mg/kg (Reynolds 1989). After the SPL stockpile was removed, Reynolds excavated the underlying soil down to the water table and disposed of the soil in an off-site permitted treatment, storage, and disposal facility (Northwest Alloys 2011b). After excavation, the area was partially backfilled with dredged sand.



SOURCE: Aerial image from Aerometric dated June 2013.

LEGEND:

- Approximate Ordinary High Water Line
- Landfill or Fill Deposit
- Cleanup/Investigation Area
- Cryolite Ditch Confirmation Samples
- MFG, 2003
- Evren Northwest, 2004
- Chinook HTM Oil Area (Anchor QEA, 2011b)
- Phase II Environmental Assessment (MFG, 2000)
- Ecology, 1985
- Groundwater Monitoring Well
- Soil Sampling Location

0 500
Scale in Feet

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Plate A-2
Non RI-FS Sampling Locations – East Plant Area
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

In 2002, MFG conducted soil and groundwater testing in the area of the former stockpile. No SPL was observed in the area (MFG 2003). Total cyanide concentrations in soil were very low (1.9 to 5.2 mg/kg), as were concentrations of fluoride (195 to 597 mg/kg). Total PAH concentrations ranged from 8.3 to 17.5 mg/kg (MFG 2003). Groundwater samples were tested for cyanide (total and WAD) and fluoride (MFG 2003).

3.2 Drum Soil Cleanup (1984)

In July 1984, a localized release from a drum was noted near Shed No. 1 near the North Plant Potline buildings (Reynolds 1984). The remaining liquid in the container was removed and placed into secure drums. PCBs were detected in soil samples, and associated impacted soils were removed in October 1984 and July and August 1985 (Reynolds 1986). The total quantity of soil removed initially included seventy-seven 55-gallon drums of soil, with follow-up excavations generating 105 cubic yards of soil. Final confirmation samples verified that trichlorobenzene and PCB concentrations were below 1 mg/kg (i.e., below the current industrial and residential soil cleanup levels; Ecology 1986). On February 20, 1986, Ecology approved the work as complete based on review of Reynolds' summary report and laboratory results (Ecology 1986).

3.3 Cleanup at the Diesel Aboveground Storage Tank

In 1991, Reynolds conducted an independent cleanup action to remove approximately 480 cubic yards of diesel-impacted soils adjacent to the 200,000-gallon diesel aboveground storage tank (AST). The AST is located between the alumina silos and the carbon plant (see Plate A-2).

The impacted soils were discovered in April 1991. Subsequent soil sampling by Reynolds confirmed diesel levels in the soil exceeding the MTCA Method A soil cleanup level (currently 2,000 mg/kg). Two groundwater samples were also collected; however, no constituents were detected above MTCA Method A groundwater cleanup levels, which indicated that the impacts were limited to soil (Reynolds 1991).

The excavation removed all of the impacted soils that could be safely accessed without compromising the integrity of the tank foundation. The excavated soils were treated using on-site bioremediation. The cleanup of the diesel AST area included recording of institutional controls to manage the impacted soils remaining contained in place between the active tank foundation (Reynolds 1991). That tank remains in use.

3.4 Fill Deposit A (Spent Lime)

Sampling was performed adjacent to the 8-acre fill deposit located in the northeastern area of the Reynolds Facility (Fill Deposit A; see Plate A-1) in 2000 as part of a Phase II Environmental Site Assessment (MFG 2000). Sampling performed by MFG included collection of two water samples (SW-2 and SW-3) from the internal stormwater drainage ditches located adjacent to the fill deposit. Water sample SW-2 was collected from the ditch east of the No. 004 pump station, and sample SW-3 was collected from the ditch north of Fill Deposit A (see Plate A-2). Both of these ditches are used to collect stormwater from within the facility boundaries, and they are managed under the facility's NPDES permit. Analyses performed as part of this testing included fluoride; total cyanide; oil and grease; total dissolved solids; total suspended solids; RCRA metals plus antimony, nickel, and aluminum; and PAHs (MFG 2000). No PAHs were detected (MFG 2000).

3.5 Landfill #1 (Floor Sweeps)

The floor sweeps landfill is located in the southeast corner of the site (Landfill #1; see Plate A-2). Soil and groundwater quality in this area was investigated by MFG in 2000 and 2002, providing information on the levels of fluoride, cyanide, metals, petroleum, and PAHs in these materials (MFG 2003).

In July 2000, MFG collected a composite soil sample (FS-1) from the center of Landfill #1. The sample was a composite of soil collected at 3, 7, and 10 feet bgs and was analyzed for fluoride, total cyanide, RCRA metals plus antimony and nickel, TPH-DRO, PAHs, and percent moisture. Fluoride and benzo(a)pyrene (carcinogenic polycyclic aromatic hydrocarbon [cPAH]) were both detected, consistent with the types of materials managed in this landfill. Total cyanide concentrations were very low, well below industrial soil cleanup levels (MFG 2000).

Additional soil borings were placed in 2002 (DP-1 to DP-4). Soil samples were tested for cyanide, WAD cyanide, fluoride, and total PAHs. Results were comparable to the 2000 soil sampling, with elevated fluoride and PAHs but very low cyanide levels (MFG 2003). Groundwater was sampled from a temporary soil boring in the center of Landfill #1 (DP1). Sample results for unfiltered parameters are not considered representative due to turbidity encountered during field sampling from the temporary boring. Fluoride, cyanide, and PAHs were detected; dissolved metals (arsenic, chromium, copper, and nickel) were not detected (MFG 2003).

3.6 Former Cryolite Recovery Plant and Nearby Fill Deposit B-2 (Residual Carbon)

The former Cryolite Recovery Plant has been removed (see Plate A-2). Environmental testing of soils and groundwater has been performed both within the former plant footprint, as well as within the adjacent fill deposit containing residual carbon.

MFG conducted sampling of surface and subsurface soils in the former Cryolite Recovery Plant area in both 2000 and 2002. Neither study identified any potential releases within the historical Cryolite Recovery Plant footprint. Of five locations tested by MFG within the former Cryolite Recovery Plant footprint, all soil samples had measured fluoride concentrations of 300 mg/kg or less, well below both the MTCA Method C Industrial cleanup level (210,000 mg/kg[1]) and also below residential soil cleanup levels. The soil samples had very low measured cyanide concentrations, ranging from fewer than 0.5 to 2.6 mg/kg (MFG 2000, 2003), well below applicable MTCA cleanup levels.

As expected, elevated fluoride concentrations were detected within the fill deposit used to manage residual carbon (Fill Deposit B-2; see Plate A-2). Testing in this area identified preliminary material thicknesses and provided information on the concentrations of fluoride, cyanide, and PAHs in the material (MFG 2003). Testing included 14 direct push borings and four piezometers (PZ-1 to PZ-4). Residual carbon material was encountered in each of the soil borings; waste material ranged from 0.25 to 6 feet in thickness, with an average thickness

[1] These concentrations are also below the MTCA Method B Unrestricted Use cleanup level of 4,800 mg/kg for fluoride.

of 3.1 feet (MFG 2003). Fluoride and PAH concentrations were elevated in the carbon materials. Cyanide levels were less than industrial soil cleanup levels (MFG 2003). Groundwater samples were collected from the temporary borings and the piezometers and tested for WAD cyanide, total cyanide, and fluoride (MFG 2003).

3.7 Fill Deposit B-1 (Residual Carbon)

Fill Deposit B-1 containing residual carbon is located along the eastern side of the property (see Plate A-2). During 2002 by MFG collected a soil sample (SD6) from the internal NPDES-regulated drainage ditch located west of this deposit. That soil sample was tested for cyanide, WAD cyanide, fluoride, and PAH compounds. Cyanide and fluoride concentrations were very low, both below residential soil cleanup levels (MFG 2003).

3.8 Soil Removal from the Former Cryolite Area Ditches

During 2008, soils containing elevated PAH concentrations were removed from the three ditches located southeast of the former Cryolite Recovery Plant (see Plate A-2). The three cryolite area ditches historically managed stormwater runoff from the area around the former Cryolite Recovery Plant. Currently, ditch water from this area is collected and treated in the on-site wastewater treatment plant. The presence of elevated PAH in the ditch soils had been identified during 2002 sampling performed by MFG (2002).

The cleanup completed in 2008 included removal of 5 to 6 feet of material from the bottom and sides of the ditches. Approximately 2,663 tons of material were removed and disposed in an off-site Subtitle D landfill (Northwest Alloys 2011a). Confirmation sampling established that the soil in the bottom of the ditches was below MTCA Method A soil cleanup levels.

3.9 Warehouse Underground Storage Tank and Fuel Island Cleanup

A cleanup was completed to address a localized area of diesel-impacted soil associated with a former UST fuel island (see Plate A-2). Soils from this area were excavated and treated successfully using on-site bioremediation. After treatment, the soils complied with MTCA Method A cleanup levels. With Ecology's approval, the treated soils were reused on site as fill.

The UST fuel island was located approximately 25 feet from a 10,000-gallon UST, which was decommissioned in May 2004. The decommissioning of the UST was conducted by the bankruptcy trustee in June 2004 (Evren Northwest 2004). The tank's contents were pumped from the tank, and the tank was then cleaned and removed from the ground. Sampling was performed following removal of the tank, product lines, and dispensers. Gasoline and PAH constituents were not detected, and benzene concentrations were below applicable groundwater cleanup levels in a confirmation groundwater sample collected from the tank excavation (Evren Northwest 2004).

No gasoline was detected in soil adjacent to the tank, fuel lines, or dispensers. However, elevated diesel-impacted soil was present under the middle dispenser between 2 and 9 feet bgs (Evren Northwest 2004).

The petroleum-contaminated soil in the fuel island area was removed in October 2007 by CVI (Northwest Alloys 2011a). Soils excavated from the former UST fuel island were treated using bioremediation. The treatment successfully reduced soil concentration to below MTCA Method A cleanup levels. With Ecology's approval, the treated soil was used for fill within former equipment concrete pits in the former Cable Plant warehouse floor (Northwest Alloys 2011a).

3.10 Cleanup of Heat Transfer Media (HTM Oil)

During CVI operations at the site, a release of heat transfer media (HTM) oil from the tank heating system was discovered within the containment area around the pitch storage tanks (see Plate A-2). HTM oil is similar to mineral oil. CVI conducted testing and removal of oil-impacted soil in the HTM Oil Area. The available data were provided to Ecology for review (Anchor QEA 2011). Additional soil and groundwater sampling was conducted as part of the RI/FS to document current conditions in this area. As described in Sections 5.2.6 and 5.3.7 of the RI/FS, the remaining soils did not exceed applicable soil cleanup levels, and no impacts to groundwater were detected.

4 SEDIMENTS

Investigations of Columbia River sediments adjacent to the Reynolds Facility were conducted in 1990 and 2010. Additional investigations were conducted offshore of the adjacent, up-river Weyerhaeuser facility in 2008 and 2010. The locations of these previous sediment sampling locations are shown on Plate A-3, and additional analytical data are presented in Appendix C of the RI/FS Report. None of these studies identified the presence of sediment contamination.

4.1 1990 Sediment Sampling by Ecology

In February 1990, Ecology conducted sediment sampling offshore of the site as part of a Class II NPDES Inspection at the Reynolds Facility (Ecology 1991). Sediment sample locations included three stations adjacent to Outfall 002A; the three sediment samples were identified as Upstream, Diffuser, and Downstream (see Plate A-3). Chemical testing included priority pollutants (fluoride, cyanide, volatile organic compounds [VOCs], PAHs, pesticides, and PCB Aroclors; Ecology 1991). No sediment impacts were detected near the Outfall 002A discharge. PCBs and pesticides were not detected in any of the test samples. Bioassays using *Hyallela azteca* and Microtox found no indication of toxicity in the sediment samples (Ecology 1991).

4.2 Weyerhaeuser Dredged Material Characterization

Weyerhaeuser conducted routine maintenance dredging in 2009 and 2010. In 2008 and 2009, sediment testing was performed within the proposed dredging areas, including testing of surface and subsurface sediments. Subsurface sediments included the proposed dredge material and the underlying sediments in accordance with the Dredged Material Management Program (DMMP) anti-degradation guidelines. Surface grab samples and subsurface core samples were collected within each dredge unit. Subsurface sediment samples were tested for Northwest Sediment Evaluation Framework (SEF) freshwater parameters, including testing for PCB Aroclors and dioxin/furans. No sample analysis results exceeded SEF freshwater or DMMP marine screening levels. The dioxin/furan toxic equivalency quotient concentrations were very low (fewer than 1.0 nanograms per kilogram dry weight) for the three samples tested, indicating no impacts to Columbia River sediments (DMMP 2009, 2010).

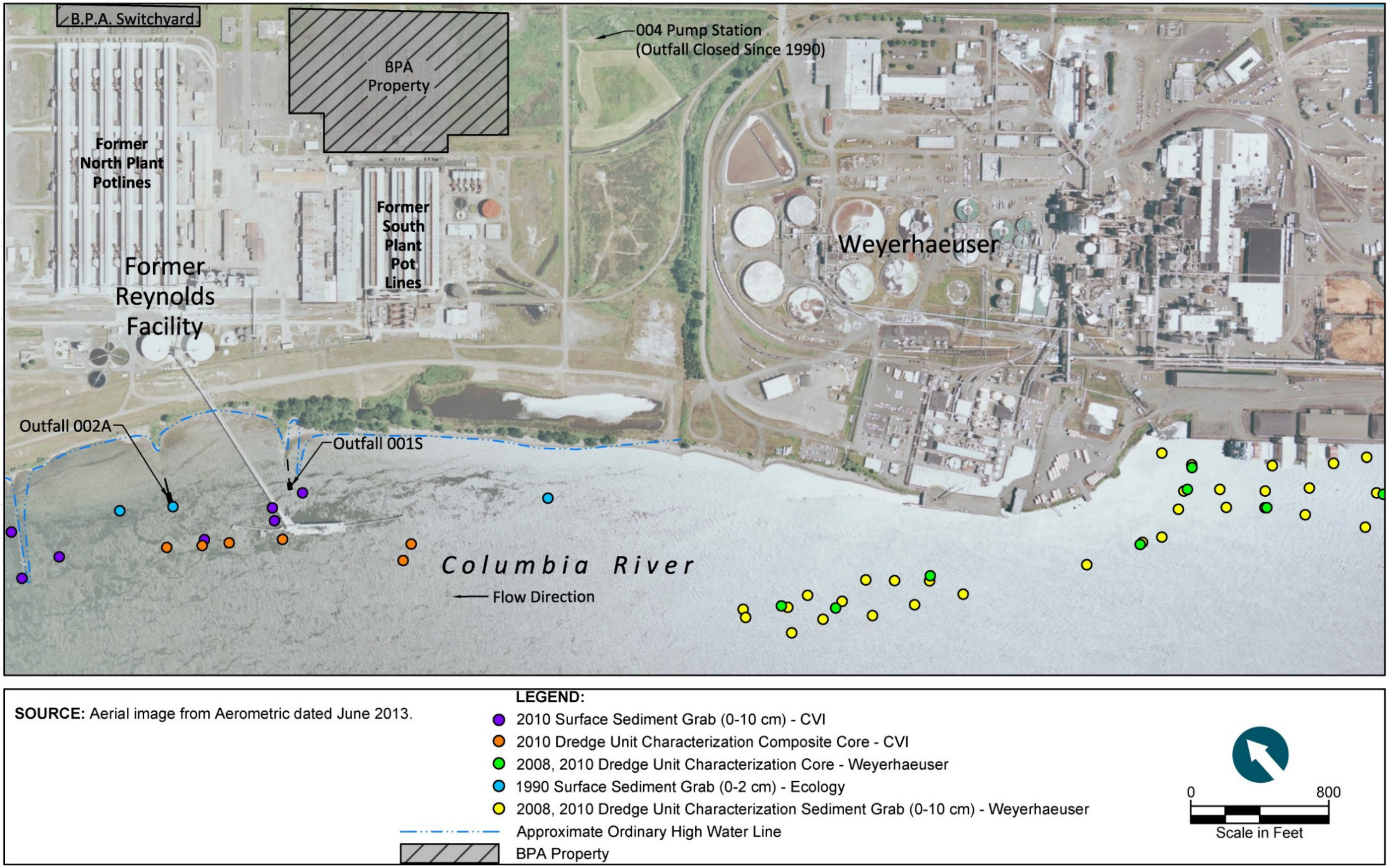

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Plate A-3
Historical Sediment Sampling Locations
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

4.3 2010 Chinook Ventures Sediment Sampling

In 2010, Ecology issued Agreed Order No. 7392, requiring CVI to investigate surface and subsurface sediments in the vicinity of the existing dock and berthing areas. The order was issued in response to a release of petroleum coke at the site in February 2010 (Anchor QEA 2010). The results of this study are presented in the DMMP suitability determination (DMMP 2010). Testing included seven surface sediment grab samples (at a depth interval of 0 to 10 centimeters below the mudline at the locations shown on Plate A-3 [SG01 to SG07]). Sample SG-REF2 was used as a reference.

Testing also included analysis of subsurface sediment samples, which were also collected within the shoaled berth area. Subsurface sediment samples (locations are shown on Plate A-3) were analyzed for conventional parameters, metals, PAHs, semivolatile organic compounds, PCBs, and pesticides (DMMP 2010; Anchor QEA 2010).

None of the surface or subsurface test results exceeded screening levels approved by DMMP (DMMP 2010). Following review of the sampling report, DMMP issued a suitability determination approving the sediments in the berth area for management by open-water disposal. Dredging of this area has since been completed. DMMP also approved the use of a "moderate" sampling density for any future dredge material characterization work at the site.

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TABLE

Table A-1
Summary of Historical Cleanup Actions and Investigations

Area	References	Work Conducted	Available Data	Year(s) Conducted
Western Facility Area				
Landfill #2	Sweet, Edwards, and Associates, Inc. 1986	Investigation of soil, groundwater, and solid waste in Landfill #2 (industrial landfill). PAHs detected in one soil boring; no PAHs detected in groundwater.	Soil, landfill materials, groundwater	1985
	MFG 2000	Investigation of groundwater quality.	Groundwater	2000
	MFG 2003	Investigation of groundwater quality.	Groundwater	2002
Cable Plant UST Cleanup	Pacific Northern Environmental 1991	1,000-gallon UST decommissioned and removed. Soil testing conducted.	Soil	1991
	Pacific Northern Geoscience 1994	Focused RI/FS Report - Investigation of the extent of petroleum impacts. TPH-impacted soil excavated and removed from site. Confirmation testing of remaining soils showed that cleanup levels had been achieved.	Soil, groundwater	1994
	EMCON, Inc. 1996	Quarterly groundwater monitoring and sampling of Cable Plant area wells. Gasoline was not detected.	Groundwater	1995 - 1997
	Anchor 2003	Voluntary cleanup report summarizing investigation and cleanup actions completed. Ecology issued "No Further Action" letter in 2003.	Soil, groundwater	2003
Scrap Yard Soil Cleanup	MFG 2000	Soil testing conducted to verify existing soil quality. Soil PAHs in a localized area exceeded MTCA Method A Cleanup Levels.	Soil	2000 - 2005
	Anchor 2007b; Northwest Alloys 2011a	CVI completed additional soil sampling and then removed 200 cubic yards of contaminated soil. The soil was disposed off site. Confirmation samples were clean (below MTCA Method A Cleanup Levels).		
Closed BMP Facility Monitoring	Anchor QEA 2011a	Quarterly monitoring of groundwater and ditch waters has been performed consistent with the Ecology -approved closure and post-closure plan. The monitoring data demonstrate that water quality in the ditch is protected, and the closure and dewatering of the Closed BMP has been effective. Shallow groundwater quality adjacent to the facility (within the upper portion of the thick silt/clay deposit of the Upper Alluvium) shows decreasing trends in fluoride and alkalinity since closure.	Groundwater, ditch water	2004 - 2010
U-Ditch Reroute and Soil Removal	MBTL 2012c	During 2012, MBTL removed 14,000 tons of debris and materials that had been placed in the U-ditch by CVI. The original U-ditch alignment was restored. Soil testing results confirmed that chemical parameters for ditch sidewall and bottom samples were below industrial soil cleanup levels after removal of the debris.	Soil	2012
Eastern Facility Area				
Former Stockpile Area	Ecology 1985	Reynolds completed groundwater monitoring near the former stockpile area. This included installation and sampling of six groundwater monitoring wells.	Groundwater	1984 - 1985
	MFG 2003	MFG conducted soil and groundwater testing in the former stockpile area. Testing confirmed that no SPL remained in this area (SPL and contaminated soils had been previously removed form the site by Reynolds).	Soil, groundwater	2002
Drum Soil Cleanup	Ecology 1984b,c, 1986	Between July of 1984 and 1986, soil cleanup was conducted in a localized area associated with a leaking drum. Petroleum and PCB-impacted soil was removed and disposed offsite. Confirmation confirmed that impacted soils were successfully removed. In 1986, Ecology reviewed confirmation testing results and approved the work as complete.	Soil	1984 - 1986
Diesel AST	Reynolds 1991	Following a 1991 release to the spill containment area, Reynolds metals conducted the cleanup of petroleum-contaminated soils adjacent to the diesel AST. The cleanup was completed during 1992 and 1993, and included excavation, soil bioremediation, and backfilling of the area. The cleanup included placement of restrictive covenants to address the area of soil beneath the AST which could not be safely removed.	Soil removal	1991 - 1993
Fill Deposit A	MFG 2000	MFG conducted limited surface water sampling in the internal NPDES ditches adjacent to Fill Deposit A.	Surface water	2000
Landfill #1	MFG 2000	MFG conducted soil quality testing in Landfill #1 (floor sweeps). The presence of elevated PAH and fluoride concentrations was confirmed, consistent with the known landfill contents.	Soil	2000
	MFG 2003	MFG conducted an investigation of soil and groundwater quality new Landfill #1, including completion of four direct push borings.	Soil, groundwater	2002
Former Cryolite Recovery Plant	MFG 2000	Soil quality testing was performed at four soil sampling locations (CP-1 to CP-4) beneath the former cryolite recovery plant location. No exceedances of cleanup levels were noted.	Soil	2000
	MFG 2003	MFG completed soil quality testing from 5 direct push borings. No exceedances of cleanup levels were noted.	Soil	2002
Fill Deposit B-1	MFG 2003	MFG collected soil samples from within the internal NPDES-regulated ditches adjacent to Fill Deposit B-1.	Ditch sediment	2002
Fill Deposit B-2	MFG 2003	MFG completed soil and groundwater testing, including 9 direct push borings and four piezometers within and near Fill Deposit B-2. The presence of residual carbon within the Fill Deposit was confirmed, along with elevated concentrations of fluoride and PAH compounds.	Soil, groundwater	2002

Table A-1
Summary of Historical Cleanup Actions and Investigations

Area	References	Work Conducted	Available Data	Year(s) Conducted
Soil Removal from Former Cryolite Ditches	MFG 2003	Six ditch soil samples were tested. Results confirmed that the shallow ditch soils contained elevated concentrations of PAHs, cyanide, and fluoride.	Ditch soil	2002
	Northwest Alloys 2011a	Impacted ditch soils (approximately 2,663 tons) were removed from the ditches. Results of confirmation testing demonstrated that all impacted soil was removed, and the remaining ditch soils complied with MTCA Method A industrial soil cleanup levels for PAH compounds.	Ditch soil	2008
Warehouse UST and Fuel Island Cleanup	Evren Northwest 2004	A 10,000-gallon UST was decommissioned and removed. Soil and groundwater testing was performed in the vicinity.	Soil, groundwater	2004
	Northwest Alloys 2011a	CVI removed diesel-impacted soil. Post remediation soil samples indicated the remaining soils were below MTCA Method A Cleanup Levels. Soils were bio-remediated and then were used for fill within concrete-lined pits in the former Cable Plant warehouse floor.	Soil	2007 - 2011
HTM Oil Release Area	Anchor 2011	CVI removed soils impacted with heat transfer media (HTM) oil. Post-removal soil sampling data were collected. Testing documentation was limited, and locations of the test samples could not be confirmed. This area was subsequently re-sampled as part of the RI/FS investigation.	Soil	2010
Sediments				
1990 NPDES Sediment Sampling by Ecology	Ecology 1991	Sediment quality within the Columbia River was tested by Ecology near the Reynolds Facility NPDES outfalls . No sediment impacts identified.	Surface sediment	1991
2009 Weyerhaeuser Ship Access Channel DMMP Investigation	DMMP 2009	Surface and subsurface sediment testing was performed in September 2008. No sediment impacts were identified. Subsurface sediments in the ship access channel were approved for flow-lane disposal in the Columbia River.	Surface sediment, subsurface sediment	2009
2010 Weyerhaeuser Cargo Dock DMMP Investigation	DMMP 2010	Surface and subsurface sediment testing was performed in January 2010. No sediment impacts were identified. Subsurface sediments in the dock and turning basin were approved for flow-lane disposal in the Columbia River.	Surface sediment, subsurface sediment	2010
2010 CVI Sediment Investigation	CVI 2010; Anchor QEA 2010a,b; DMMP 2010b	Surface and subsurface sediment testing was performed in 2010. No sediment impacts were identified. Subsurface sediments in the berth area were approved for open-water disposal. Maintenance dredging of the berth area was completed during late 2011.	Surface sediment, subsurface sediment	2010

Notes:

BMP = Black Mud Pond
AO = Agreed Order
cPAH = carcinogenic polycyclic aromatic hydrocarbon
CVI = Chinook Ventures, Inc.
DMMP = Dredged Material Management Program
Ecology = Washington State Department of Ecology
FS = Feasibility Study
HTM = heat transfer media
MBTL = Millennium Bulk Terminals – Longview, LLC
MTCA = Model Toxics Control Act
NPDES = National Pollutant Discharge Elimination System
PAH = polycyclic aromatic hydrocarbon
RI = Remedial Investigation
RMC = Reynolds Metals Company
SPL = spent potliner
TPH = total petroleum hydrocarbon
PCB = polychlorinated biphenyl
UST = underground storage tank

APPENDIX B
CLOSURE AND POST-CLOSURE ACTIVITIES FOR THE CLOSED BMP FACILITY

TABLE OF CONTENTS

List of Plates

LIST OF ACRONYMS AND ABBREVIATIONS

CDID	Consolidated Diking Improvement District
Closed BMP Facility	Closed Black Mud Pond Facility
CVI	Chinook Ventures, Inc.
Ecology	Washington State Department of Ecology
Facility 71	Industrial Wastewater Chemical Treatment Plant
Facility 73	Stormwater Retention Basin and Filter Plant
G&O	Gibbs & Olson, Inc.
MBTL	Millennium Bulk Terminals – Longview, LLC
MCL	Maximum Contaminant Level
mg/L	milligram per liter
PAH	polycyclic aromatic hydrocarbon
ppm	parts per million
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
Reynolds	Reynolds Metals Company
Reynolds Facility	former Reynolds Metals Reduction Plant
RI	Remedial Investigation
SPL	spent potliner
WAC	Washington Administrative Code

1 INTRODUCTION

The Closed Black Mud Pond Facility (Closed BMP Facility) is a closed landfill located in the northwestern corner of the former Reynolds Metals Reduction Plant (Reynolds Facility). The location of the Closed BMP Facility is shown on Plate B-1.

The Closed BMP Facility contains residual carbon generated during the former on-site recycling process operated by Reynolds Metals Company (Reynolds). Closure activities were completed in 1992. The closure was conducted consistent with a Washington State Department of Ecology- (Ecology-) approved Closure and Post-Closure Plan, prepared in compliance with the State Dangerous Waste Regulations (Washington Administrative Code [WAC] 173-303) in effect at that time.

The closure activities were successfully completed, and the facility has been subject to an extensive post-closure care and monitoring program. Results of monitoring have shown that the closure and dewatering of the facility have been effective. As described in Section 5 of the Remedial Investigation (RI), there are no adverse impacts to water quality in the adjacent Consolidated Diking Improvement District (CDID) ditches for cyanide or fluoride. Cyanide levels in shallow groundwater within the silt/clay soils immediately adjacent to the Closed BMP Facility are protective of both drinking water and surface water quality. A significant improvement in groundwater fluoride concentrations in these adjacent wells has also been observed.

This appendix provides an overview of the Closed BMP Facility history and the findings of ongoing post-closure monitoring. The appendix also summarizes recent repairs and upgrades to the Closed BMP Facility that were performed by Millennium Bulk Terminals – Longview, LLC (MBTL), under Ecology oversight after acquisition of the facility assets from Chinook Ventures, Inc. (CVI), in early 2011.

Plate B-1
Location of the Closed BMP Facility
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

2 ORIGIN OF RESIDUAL CARBON

Residual carbon is a byproduct of the on-site recycling process that was used at the Reynolds Facility between 1953 and 1990. That process was known as the "cryolite recovery" process and was conducted in a cryolite recovery plant located on the east side of the Reynolds Facility. The former Cryolite Recovery Plant ceased operation in 1990 and has since been removed.

Cryolite is a compound composed of sodium, aluminum, and fluoride (Na_3AlF_6). Cryolite is critical to the aluminum manufacturing process, which cannot operate without it. It has been used globally in aluminum reduction plants since the 1800s. In the aluminum reduction process, alumina is placed in an aluminum manufacturing "pot" and is dissolved in cryolite. The resulting molten material consisting of alumina and cryolite is called bath. Electricity is then passed through the mixture, between an anode and a cathode (potliner), producing molten aluminum, which is separated for use.

The anodes and cathodes used in the reduction process are constructed from carbonaceous materials. The potliner consists of the carbon lining of the pots in which the molten aluminum is produced. Over time, this lining eventually becomes compromised and must be replaced. After removal from the pot, the cathode material is known as spent potliner (SPL). The SPL contains fluoride (from the cryolite solution used in the process) and polycyclic aromatic hydrocarbon (PAH) compounds (from the carbon materials). SPL can also contain cyanide, which can be produced during operation of the pots when nitrogen in the air combines with carbon in the carbonaceous materials. The levels of cyanide in SPL can vary depending on the specific production methods used and pot technology.

The cryolite recovery process was operated at the Reynolds Facility to recover reusable materials from SPL and also to recover reusable fluoride from the wet air emission control system solids (underflow solids). The SPL recycled at the Reynolds Facility came both from operations at the site, as well as from other northwest aluminum reduction plants. The underflow solids were collected in thickener tanks (also known as clarifiers) operated at two locations within the Reynolds Facility (Northwest Alloys 2011).

The cryolite recovery process involved digesting the SPL and underflow solids with sodium hydroxide and precipitating out the cryolite by addition of carbon dioxide. The cryolite was separated by filtration, dried, and was then either reused within the Reynolds Facility or was sold to other facilities for reuse.

Residual carbon is the solid carbonaceous material left over after the cryolite recovery process is complete. It has a characteristic dark color, consistent with the carbonaceous materials used to construct the aluminum manufacturing cathodes. This residual carbon is not SPL, and the cryolite recovery process modifies the material such that the residual carbon does not maintain the levels of chemicals commonly present in SPL. Residual carbon contained within the Closed BMP Facility was approximately 15 to 30 percent solids by weight with a pH of 10 to 12, consisting of mostly carbon and alumina (Reynolds and CH2M Hill 1991). Samples of residual carbon from other Reynolds Facility deposits have been extensively analyzed using fish bioassays (Ecology 1982; Reynolds 1982) and would not be classified as a dangerous waste under current Washington waste bioassay testing protocols.

3 CONSTRUCTION AND OPERATION

The Closed BMP Facility was initially constructed in 1972 for collection and management of residual carbon from the cryolite recovery process. The 33-acre facility was constructed in the northwest corner of the Reynolds Facility (see Plate B-1).

The Closed BMP Facility was formed by earthen dikes and a clay bottom lining constructed above the natural ground surface (Reynolds 1992). The dikes were constructed between approximately 10 and 17 feet above the surrounding ground elevation in order to prevent stormwater run-on (Reynolds and CH2M Hill 1991). In 1980, the top of the dike was raised from 17 feet to a top elevation of 22 feet to increase overall capacity (Reynolds and CH2M Hill 1991). Access roads were used for maintenance.

Between 1972 and 1990, residual carbon was pumped as a fine slurry into the constructed facility. Entrained water was separated by gravity and subsequently recycled to the Reynolds Facility's emissions control system. Residual carbon from the Cryolite Recovery Plant was the only material managed in the BMP Facility throughout its operational history (Reynolds and CH2M Hill 1991). The cryolite recovery process and resulting residual carbon material were consistent throughout the Cryolite Recovery Plant's operation. As a result, the residual carbon materials are chemically homogenous.

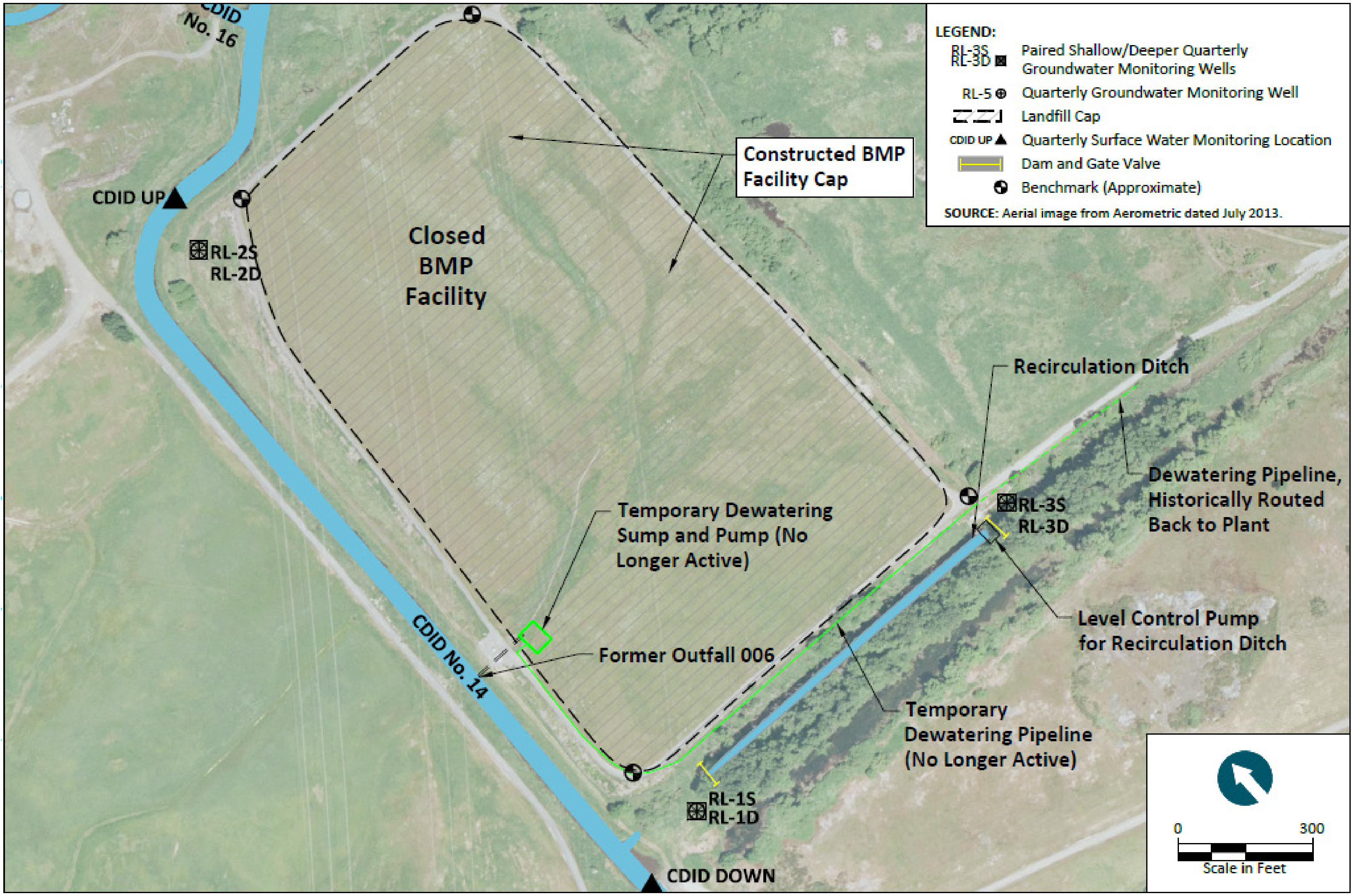
4 CLOSURE

The closure and post-closure plan for the Closed BMP Facility was developed consistent with regulatory requirements that were applicable when the facility was closed. These closure requirements were based on the results of analyses performed using a particular bioassay testing protocol that was used for state-only dangerous waste characterization under WAC 173-303 between 1983 and 1995.

Following promulgation of WAC 173-303 in 1983, Ecology implemented state-only waste characterization protocols that included fish bioassay tests. These tests were used to identify materials that were subject to special regulatory requirements as state-only dangerous wastes. The residual carbon managed in the Closed BMP Facility was tested at multiple times during its operation using Washington's static acute fish toxicity tests (Ecology 1982; Reynolds 1982). These residual carbon materials passed these tests at a concentration of 100 parts per million (ppm), which is the current test protocol used by Ecology for waste characterization testing. However, at the time, Ecology used a bioassay test protocol at a concentration of 1,000 ppm. Using that testing protocol, the residual carbon was determined to be subject to regulation under WAC 173-303.

Because residual carbon was considered a state-only dangerous waste in 1983 per the acute fish toxicity test results, Reynolds submitted a Dangerous Waste Management Facility (Part B) permit application to Ecology in 1984. Ecology commented on the document, and a revised Part B permit application was prepared in 1985 (Reynolds and CH2M Hill 1985). Reynolds operated under the provisions of the Part B permit application until the facility operations were terminated and the facility was closed. Since that time, the dangerous waste regulations (WAC 173-303) have been updated; under the revised bioassay testing criteria, residual carbon does not designate as a state-only dangerous waste.

No more residual carbon was produced at the Reynolds Facility after May 1990 when operations of the Cryolite Recovery Plant ceased (Northwest Alloys 2011). The Closure/Post-Closure Plan (Reynolds and CH2M Hill 1991) for the Closed BMP Facility was submitted to Ecology in 1991. Closure was completed in 1992 as a landfill under the State Dangerous Waste Regulations. Closure and post-closure plan elements are shown on Plate B-2.



Obligations of the Closure/Post-Closure Plan include quarterly groundwater and surface water monitoring, periodic elevation surveys (at benchmarks), and inspections and maintenance of the temporary dewatering sump and pipeline, the level control pump, dams, and gate valves at the recirculation ditch, and the cap and drainage systems, gas vents, dikes, and access roads (Reynolds 1992).

Plate B-2
BMP Facility Closure and Post-Closure Monitoring Elements
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

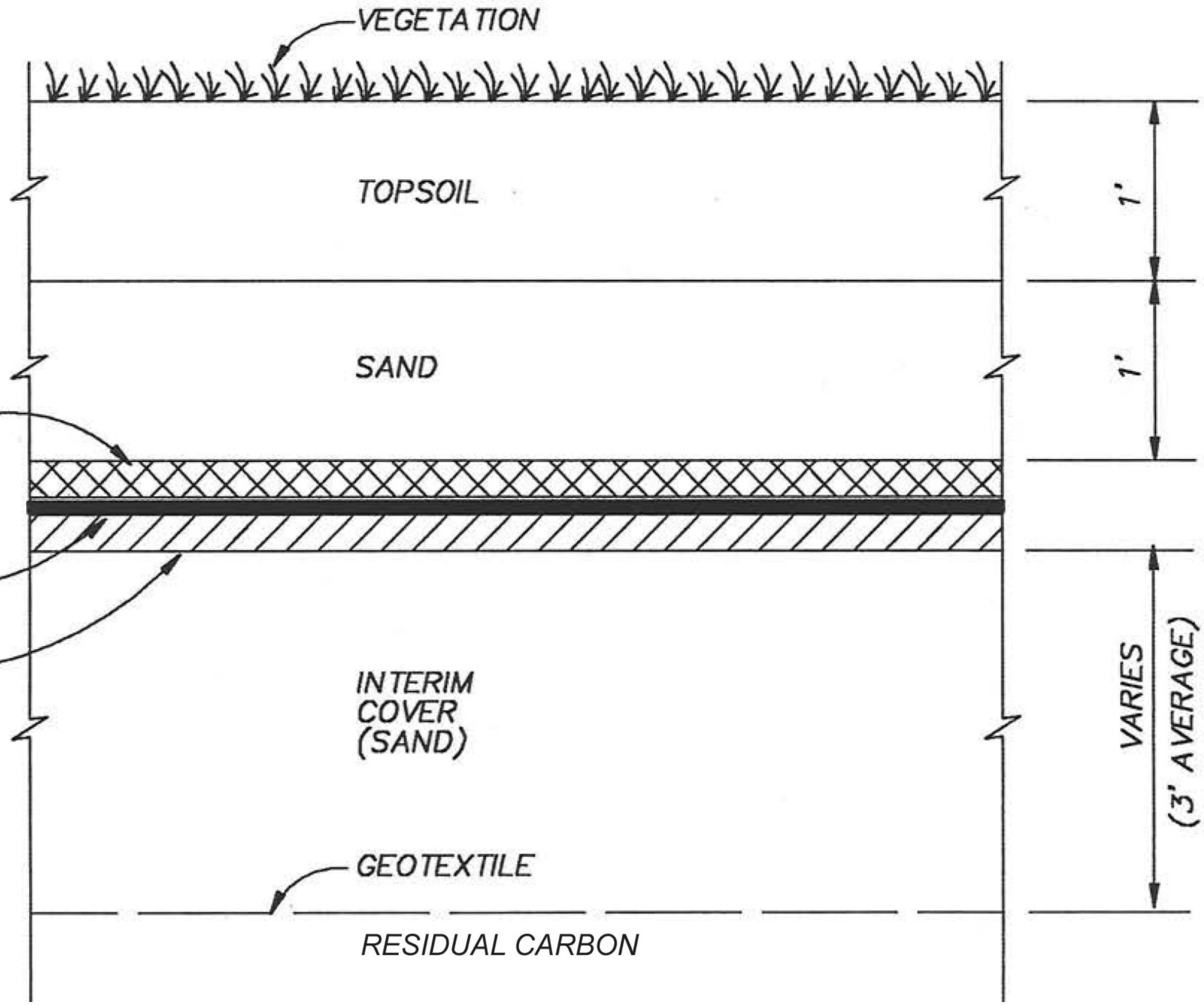
The closure activities included construction of an engineered landfill cap. The cap system is approximately 5 feet thick and is constructed of multiple layers, as shown on Plate B-3. The primary layers in the cap system include the following:

- A 3-foot thick working cover of sand placed over geotextile
- Barrier layers that include a geosyntheic clay lining and a polyvinyl chloride (PVC) geomembrane
- Drainage layers consisting of a composite draining net and a 1-foot thick sand drainage layer
- An erosion control layer consisting of 1 foot of topsoil and surficial vegetation (grass; Reynolds 1992)

Because the residual carbon materials initially contained entrained water, the closure activities included installation of a temporary dewatering system. A temporary dewatering sump and pump were installed after closure to remove the entrained water and assist in consolidation of the carbon material (see Plate B-2; Reynolds 1992). The produced water was originally conveyed back to the wastewater treatment plant using an enclosed pipeline (see Plate B-2). The removal of this entrained water left behind the residual carbon, which is classified as a very fine sand with some silt. The dewatering is complete, and the dewatering system is no longer active.

An internal facility ditch (known as the recirculation ditch) is located along the south side of the Closed BMP Facility. In accordance with the Ecology-approved BMP Closure/Post-Closure Plan (Reynolds and CH2M Hill 1991), a dam and gate valve was constructed at each end of the recirculation ditch, and all ditch water was pumped to the Industrial Wastewater Chemical Treatment Plant (Facility 71) for treatment. No water other than groundwater and precipitation is currently managed by the recirculation ditch.

Closure of the BMP also included provisions for management of stormwater from the top of the new landfill cap. At the time of closure, a new outfall (Outfall 006) was constructed (see Plate B-2; Reynolds 1992). Stormwater runoff from the clean surface of the landfill cap was collected using a system of perforated pipes installed within a sand drainage layer (above the cap barrier layers). In accordance with the closure plan approved by Ecology, Outfall 006 discharged stormwater runoff from the surface of the engineered cover system to the adjacent CDID Ditch No. 14 (see Plate B-2).



Source: Reynolds 1992

Plate B-3
BMP Cover Cross Section
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

5 POST-CLOSURE CARE AND MONITORING

The post-closure operation and monitoring program for the Closed BMP Facility includes several requirements. These are outlined on Plate B-2 and include the following:

- Operation and maintenance of the temporary dewatering system (no longer required)
- Periodic elevation surveys of the cap surface using established benchmarks at each corner of the landfill
- Routine inspections of the level control pump, dams, and gate valves at the recirculation ditch
- Regular inspections of the landfill cap and all drainage systems, gas vents, dikes, and access roads
- Quarterly groundwater and ditch water monitoring

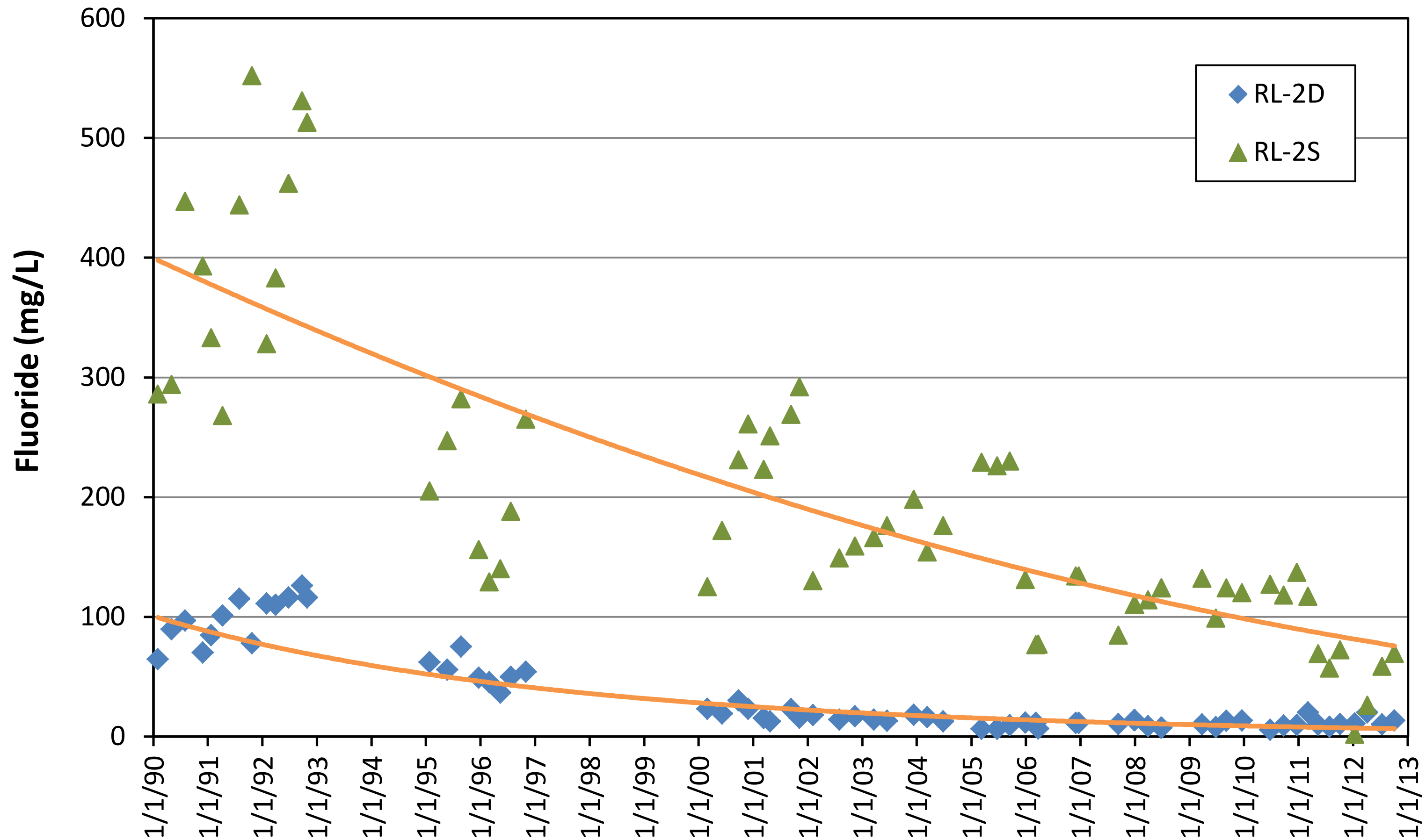
In accordance with the Post-Closure Operation and Maintenance Manual (Reynolds 1992), pumping of water from the temporary dewatering sump was no longer required after 2001 because the entrained water had been sufficiently removed, so it no longer gravity-drained into the sump from the closed landfill. The temporary dewatering pipeline that once conveyed leachate from the sump to the Reynolds treatment facility has been inactive since that time. The recirculation ditch continues to be managed consistent with the post-closure plan, though the ditch receives no inflows other than groundwater and precipitation. The recirculation ditch system (dams, gate valves, and pumps) is routinely inspected, and water levels are controlled using an automatic level control pump (see Plate B-2). When water levels exceed those specified for the control pump, water from the recirculation ditch (i.e., groundwater and rainwater) is pumped to Facility 71 for treatment prior to discharge to the Columbia River via Outfall 002A.

The Ecology-approved Closure/Post-Closure Plan also established a long-term groundwater and ditch water monitoring program (Reynolds and CH2MHill 1991). The ongoing monitoring program includes nine groundwater monitoring wells ("RL-series" wells). As shown on Plate B-2, seven of these wells (RL-1S/1D, RL-2S/2D, RL-3S/3D, and RL-5) are located immediately adjacent to the Closed BMP Facility. These wells are screened in the thick layer of silt/clay soils known as the Upper Alluvium. The groundwater monitoring program also includes two background wells (RL-4S/4D) that are located in a separate area, between the Cable Plant and the North Plant Potlines. The monitoring program includes two ditch water sampling locations in CDID Ditch No. 14, as shown on Plate B-2.

Groundwater and ditch water samples are analyzed quarterly for pH, specific conductance, chloride, fluoride, sulfate, and total and free cyanide. Annual reports, which include the results of quarterly groundwater and surface water monitoring since December 1983, are kept on file at the former Reynolds Facility in accordance with the Ecology-approved Closure/Post-Closure Plan (Reynolds and CH2M Hill 1991).

Groundwater monitoring within the silt/clay soils surrounding the Closed BMP Facility has been performed since the early 1990s. Results of monitoring show that the closure and dewatering of the facility has been effective. As described in Section 5 of the RI, there are no adverse impacts to water quality in the adjacent CDID ditches for cyanide or fluoride. Cyanide levels in shallow groundwater within the silt/clay soils immediately adjacent to the Closed BMP Facility are protective of both drinking water and surface water quality. A significant improvement in groundwater fluoride concentrations in these adjacent wells has also been observed.

Plate B-4 shows how the fluoride concentrations in wells RL-2S (shallower well, green symbols) and RL-2D (deeper well, blue symbols) have continued to decrease since facility closure. This is in part due to the properties of the alluvial soils, which restrict fluoride mobility through precipitation and sorption reactions (see Section 6 of the RI for a discussion of fluoride fate and transport evaluations).



Groundwater and ditch monitoring surrounding the Closed BMP has been performed since the early 1990s as part of the Ecology-approved closure and post-closure monitoring program. Results of monitoring have shown that the closure and dewatering of the facility have been effective. As described in Section 5 of the Remedial Investigation, there are no impacts to water quality in the adjacent CDID ditches for cyanide or fluoride. Cyanide levels in the shallow groundwater within the silt/clay soils immediately adjacent to the Closed BMP are protective of both drinking water and surface water quality. As shown in this plate, fluoride concentrations have been declining in shallow groundwater since facility closure. Fluoride concentrations in wells RL-2S (shallower well, green symbols above) and RL-2D (deeper well, blue symbols) continue to decrease, reflecting the properties of the alluvial soils which tend to restrict fluoride mobility (see Section 6 of the Remedial Investigation for a discussion of fluoride fate and transport evaluations).

ANCHOR QEA

Plate B-4

Reduction in Groundwater Fluoride Concentrations since Facility Closure
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

6 RECENT REPAIRS AND IMPROVEMENTS

Ecology continues to provide oversight for the Closed BMP Facility and to ensure compliance with the Ecology-approved Closure/Post-Closure Plan (Reynolds and CH2M Hill 1991).

During 2010, Ecology issued an order to CVI to repair damage to the landfill cover drainage system. That order also included a requirement to install security fencing around the Closed BMP Facility and a requirement to address invasive blackberries and weeds on the cap cover (Anchor QEA 2011). The work required under the Ecology order was completed by MBTL in 2011 after acquiring the facility assets from CVI. Work completed included the following:

- Repairs to the Closed BMP Facility cover were performed consistent with an engineering plan developed by Gibbs & Olson, Inc. (G&O). That plan was approved by Ecology in July 2011 after completion of a cap inspection under Ecology oversight. The cap inspection demonstrated that no damage had occurred to the cap barrier layers. The repair included repairs to the stormwater drainage conveyance on the landfill cover (see Plate B-5; Anchor QEA 2011).
- An updated maintenance plan was developed to address invasive blackberries and weeds on the cap cover (Anchor QEA 2011). Maintenance and inspection activities outlined in the plan include routine mowing of the landfill cap in accordance with the schedule and recommendations outlined in the G&O engineering plan and compliance with inspection requirements established by the 1992 Operation and Maintenance Manual (Reynolds 1992).
- As required by Ecology, fencing and locked gates were installed surrounding the Closed BMP Facility to restrict access to the landfill (see Plate B-5).

Separate from the actions required under the Ecology Order, MBTL completed additional improvements to the stormwater drainage system, consistent with Ecology approvals. That work included rerouting stormwater from Outfall 006 to further centralize stormwater management within the Reynolds Facility. Outfall 006 previously discharged to CDID Ditch No. 14. This discharge was modified so that the stormwater is collected and discharged to the south branch of the internal stormwater collection ditch, referred to as the U-Ditch (see Plate B-5). The U-Ditch is used to collect stormwater runoff for treatment at the Stormwater Retention Basin and Filter Plant (Facility 73) prior to discharge through Outfall 002A. The plan to reroute Outfall 006 was approved by Ecology and successfully completed as of April 2013 (see Plate B-5).

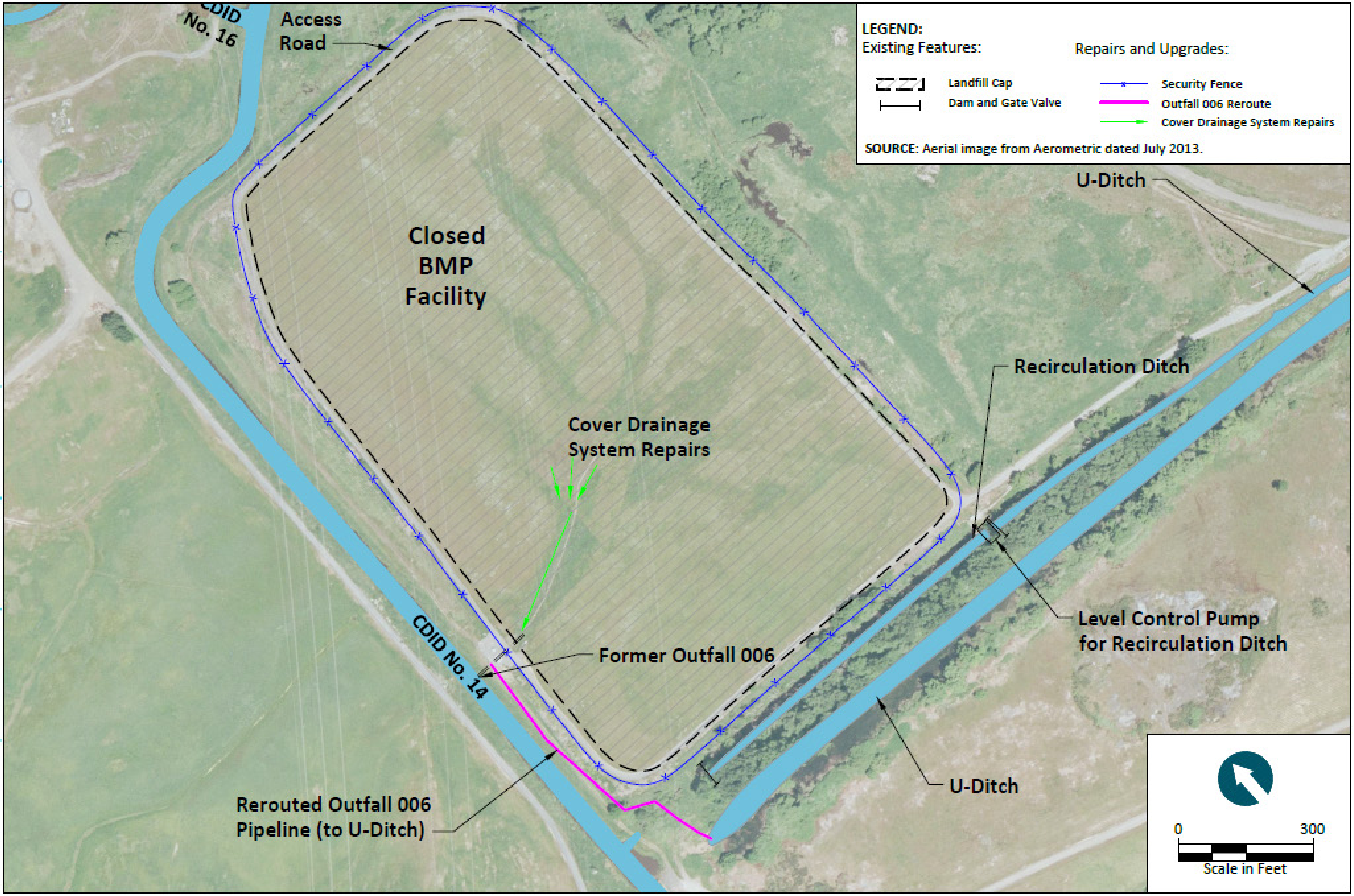


Plate B-5
Recent Repairs and Other Improvements to the Closed BMP Facility
Remedial Investigation/Feasibility Study
Former Reynolds Metals Reduction Plant – Longview

ANCHOR QEA

7 CONCLUSION

The Closed BMP Facility is landfill located in the northwestern corner of the Reynolds Facility that contains residual carbon generated between 1972 and 1990 during the operation of a former on-site recycling process. In 1992, it was closed as a landfill under the State Dangerous Waste Regulations (WAC 173-303). The closure activities were successfully completed, and the landfill has been subject to ongoing maintenance and monitoring since the early 1990s.

Results of monitoring have shown that the closure and dewatering of the facility have been effective. As described in Section 5 of the RI, there are no adverse impacts to water quality in the adjacent CDID ditches for cyanide or fluoride. Cyanide levels in shallow groundwater within the silt/clay soils immediately adjacent to the Closed BMP Facility are protective of both drinking water and surface water quality. A significant improvement in groundwater fluoride concentrations in these adjacent wells has also been observed.

Ecology continues to provide oversight for the Closed BMP Facility and to ensure compliance with the Ecology-approved Closure/Post-Closure Plan. MBTL recently completed repairs to the Closed BMP Facility cover system and related actions consistent with an Ecology order that had been issued to CVI, the previous facility operator. MBTL also recently completed upgrades to the stormwater management system. Ongoing maintenance and monitoring activities continue to be performed by MBTL in accordance with the approved Closure/Post-Closure Plan (Reynolds and CH2M Hill 1991).

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APPENDIX C
HISTORICAL CLEANUP ACTION REPORTS AND INVESTIGATION SUPPORTING INFORMATION

DOCUMENTS INCLUDED IN APPENDIX C

Facility-wide Documents

Historical Quarterly Groundwater Monitoring Results Memorandum, Former Reynolds Longview Reduction Plant – Longview.
Anchor QEA, LLC. Prepared for Millennium Bulk Terminals – Longview, LLC. October 15, 2013.

Demolition and Cleanup Accomplishments at the Former Reynolds Longview Reduction Plant.
Northwest Alloys, Inc. Longview, Washington. June 2011.

Addendum to Demolition and Cleanup Accomplishments at the Former Reynolds Longview Reduction Plant.
Northwest Alloys, Inc. Longview, Washington, and Millennium Bulk Terminals – Longview, LLC. June 2013.

Alcoa Longview Facility Data Report.
McCully Frick & Gillman, Inc. (2003), as submitted under Anchor Environmental, L.L.C. (2006). Prepared for Washington State Department of Ecology. August 2006.

West Plant Reports and Data

Voluntary Cleanup Report – Underground Gasoline Tank – Former Reynolds Longview Cable Plant.
Anchor Environmental, L.L.C. Prepared for Washington State Department of Ecology. January 2003.

U-Ditch Reroute and Soil Removal – Main Channel, Side Channel, and Main Channel Supplementary tables and U-Ditch Sample Locations figure.
Anchor QEA, LLC. Prepared for Millennium Bulk Terminals – Longview, LLC. 2012.

East Plant Reports and Data

Memorandum: Reynolds Drum Soil Cleanup, February 14, 1986, and Attachment: Letter to Tom Dickey (Reynolds), February 20, 1986.
Washington State Department of Ecology.

Independent Cleanup Documents, 200,000 Gallon Diesel AST.
Reynolds Metals Company. 1991-1993.

Soil Removal from Former Cryolite Ditches – Summary of Confirmational Testing Results table, Waste Profile Composite Sampling Results table, and Remediation Areas and Confirmation Sample Locations figure.
Anchor QEA, LLC. Prepared for Northwest Alloys, Inc. 2011.

Warehouse UST and Fuel Island Cleanup – Confirmation TPH Results for Former UST Fuel Island Soils table.
Anchor QEA, LLC. Prepared for Northwest Alloys, Inc. 2011.

Sediment

Reynolds Metals Company – Class II Inspection – February 1990.
Washington State Department of Ecology. June 1991.

Memorandum: Determination Regarding the Suitability of Proposed Dredged Material from the Weyerhaeuser Property, Longview, Washington, for Flow-Lane Disposal in the Columbia River, or for Beneficial Use.
Dredged Material Management Program. January 2, 2009.

Memorandum: Determination Regarding the Suitability of Proposed Dredged Material from the Weyerhaeuser Cargo Dock, Turning Basin and Salt Dock, Longview, Washington, for Flow-Lane Disposal in the Columbia River.
Dredged Material Management Program. March 26, 2010.

Memorandum: Determination Regarding the Suitability of Proposed Dredged Material from Berth 1 of the Chinook Ventures Facility, Longview, Washington, for Flowlane Disposal in the Columbia River.
Dredged Material Management Program. November 4, 2010.

Historical Quarterly Groundwater Monitoring Results Memorandum

Anchor QEA, LLC. Prepared for Millennium Bulk Terminals – Longview, LLC. October 15, 2013.

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MEMORANDUM

To:	James Demay, P.E., Washington State Department of Ecology	**Date:**	October 15, 2013
From:	Mark Larsen and Julia Fitts, Anchor QEA, LLC	**Project:**	130730-01.01
Re:	Former Reynolds Metals Reduction Plant RI/FS Historical Quarterly Groundwater Monitoring Results		

This memorandum summarizes previous quarterly groundwater monitoring events performed at the Former Reynolds Metals Reduction Plant in Longview, Washington. These data were collected separately from the Remedial Investigation/Feasibility Study, consistent with ongoing monitoring programs.

Between 2004 and 2010, quarterly groundwater sampling was conducted by Chinook Ventures, Inc. (Chinook) staff, the former owner of the facility assets. Laboratory analyses were performed by Columbia Analytical Services from 2004 to 2008 and by TestAmerica from 2009 to 2010. Since 2011, groundwater sampling has been performed by Millennium Bulk Terminals – Longview, LLC (MBTL), and its contractors. Since 2011, laboratory analyses have been performed by Apex Laboratories, LLC.

This memorandum and the attached tables (see Attachments A and B) summarize groundwater data collected during quarterly monitoring events from 2004 to 2010 by Chinook and data collected since 2011 by MBTL. Please note that the Chinook sampling data are tabulated based on available documentation, some of which have not been independently verified.

The Closed BMP Facility is located on the western portion of the property and includes quarterly sampling of nine groundwater monitoring wells (RL1S, RL1D, RL2S, RL2D, RL3S, RL3D, RL4S, RL4D, and RL5). The Former Spent Potliner (SPL) Area is located on the eastern portion of the property and includes quarterly groundwater sampling at six monitoring well locations (R1S, R1D, R2, R3, R4S, and R4D).

ATTACHMENT A
GROUNDWATER DATA COLLECTED DURING QUARTERLY MONITORING EVENTS FROM 2004 TO 2010 BY CHINOOK

Table A-1
Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL1D	3/10/2004	0.01		0.01	U			0.4	U	3		0.4	U	12.9	5.71	1,217
RL1D	6/25/2004	0.01	U	0.01	U			0.2		3.4		0.2	U	13.9	6.15	1,210
RL1D	9/20/2004														6.59	
RL1D	11/5/2004			0.01	U					2		0.2	U			
RL1D	3/10/2005	0.01	U	0.01	U	0.01	U	0.2		4		0.2	U	13.2	6.59	1,370
RL1D	6/22/2005	1.3		0.01	U	0.01	U	0.3		3		0.2	U	15	6.62	1,301
RL1D	9/15/2005	0.01	U	0.01	U	0.01	U	0.2		2.9				12.6	6.78	1,344
RL1D	12/28/2005	0.004	J	0.01	U	0.01	U	0.3		0.9		0.4	U	11	6.61	1,390
RL1D	3/9/2006	0.01	U	0.01	U	0.03		0.4	U	2.7		0.4	U	12.3	6.39	1,376
RL1D	5/24/2006													12.6	6.49	1,287
RL1D	12/21/2006	0.01	U	0.01	U	0.00001	U	0.3		2.9		0.2	U	11.4	6.91	1,378
RL1D	3/8/2007			0.01	U	0.01	U			3.8		0.2	U	11.4	7.17	1,341
RL1D	6/5/2007			0.01	U	0.01	U			2.6		0.2	U	13.8	6.65	995
RL1D	9/11/2007			0.01	U	0.01	U	0.38		2.5		0.2	U	13	6.99	1,365
RL1D	12/19/2007	0.01	U	0.01	U	0.01	U	0.3		3.1		0.2	U	11.7	6.54	1,281
RL1D	3/28/2008	0.01	U	0.01	U	0.01	U	0.3		3.1		0.2	U	10.2	6.5	1,234
RL1D	6/26/2008	0.01	U	0.01	U	0.01	U	0.2	U	3.5		0.2	U	16.3	6.63	1,368
RL1D	9/30/2008	0.01	U	0.01	U	0.01	U	0.4		3		0.2		16.6	6.83	1,353
RL1D	3/27/2009	0.0053		0.005	U			0.5	U	2.78		1	U	12.4	6.4	1,214
RL1D	6/26/2009	0.005	U	0.005	U			0.5	U	2.84		1	U	19.7	6.56	1,340
RL1D	9/4/2009	0.0467		0.005	U			0.5	U	5.93		1	U	20.3	6.71	
RL1D	12/18/2009	0.0059		0.005	U			0.5	U	4.67		1	U	13.2	6.28	1,197
RL1D	3/26/2010													13.1	6.44	1,460
RL1D	6/25/2010	0.0099		0.005	U		R	0.5	U	2.65		1	U	13.4	6.52	1,460
RL1D	9/22/2010													13.7	6.32	759
RL1D	9/24/2010	0.005	U	0.005	U		R	0.5	U	4.77		1	U	13.2	6.41	1,401
RL1D	12/20/2010	0.0082		0.0054		0.0068		0.5	U	5.03		1	U			

Table A-1
Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL1S	3/10/2004	0.01	U	0.01	U			1.4		2.4		24		12.4	5.8	201
RL1S	6/25/2004	0.01	U	0.01	U			3.5		2		13.2		13.6	5.13	380
RL1S	9/22/2004													15	6.489	
RL1S	11/5/2004			0.01	U					1		20.6				
RL1S	3/10/2005	0.007	J	0.01	U	0.01	U	4		1.5		13.7		13.2	6.48	319
RL1S	6/22/2005	0.01		0.01	U	0.01	U	4.6		1.6		12.2		14	6.5	390
RL1S	9/15/2005	0.03		0.01	U	0.01	U	10.4		2				13.4	6.83	482
RL1S	12/28/2005	0.01	U	0.01	U	0.01	U	0.4	U	10.6		24.8		11.7	5.83	179
RL1S	3/9/2006	0.01	U	0.01	U	0.01	U	0.4		4		21.7		11.1	5.74	194
RL1S	3/25/2006	0.01	U	0.01	U	0.01	U	3.1		1.5		11.9				
RL1S	5/25/2006													12.2	6.32	371
RL1S	12/20/2006	0.01	U	0.01	U	0.00001	U	0.2		1.2		22.2		9.1	6.3	176
RL1S	3/8/2007			0.01	U	0.01	U			1.2		19.6		11	6.31	191
RL1S	6/6/2007			0.01	U	0.01	U			2.1		5.9		6.74	13.2	475
RL1S	9/12/2007			0.02		0.01	U	15.7		2.1		7.5		17.5	7.18	737
RL1S	12/19/2007	0.01	U	0.01	U	0.01	U	0.3		2.2		16.4		11.9	6.62	136
RL1S	3/28/2008	0.01	U	0.01	U	0.01	U	0.2	U	3.5		17.6		9.9	6.47	154
RL1S	6/27/2008	0.01		0.01	U	0.01	U	3.9		1.5		9.6		16.7	6.83	390
RL1S	9/30/2008	0.02		0.01		0.01	U	9.4		1.9		3.8		16.5	6.96	553
RL1S	3/27/2009	12.8		0.0221				44.7		3.97		22.3		10.3	6.19	188
RL1S	6/26/2009	0.0219		0.005	U			1.49		4.42		13		15.2	6.54	150
RL1S	9/4/2009	0.0086		0.005	U			1.92		4.82		7.52		23.3	7.2	
RL1S	12/18/2009	0.005	U	0.005	U			0.71		3.8		15.4		17.3	6.01	173
RL1S	3/26/2010													12.1	6.51	0
RL1S	6/25/2010	0.0135		0.005	U	0.005	U	2.05		3.5		8.11		12.2	6.45	0
RL1S	9/24/2010	0.0095		0.005	U		R	4.33		3.75		3.76		14.5	6.21	667
RL1S	12/17/2010	0.0092		0.0052		0.005	U	1.68		3.76		20.8				

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Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)	Cyanide, Weak Acid Dissociable (WAD; mg/L)	Cyanide, free (mg/L)	Fluoride (mg/L)	Chloride, total (mg/L)	Sulfate (mg/L)	Temperature (°C)	pH	Specific conductivity (µS/cm)
RL2D	3/10/2004	0.14	0.15 U		16	27	33	12.1	6.78	2,770
RL2D	6/25/2004	0.73	0.01 U		12.5	23.3	25.7	12.9		2,200
RL2D	9/22/2004								6.996	
RL2D	3/10/2005	0.07	0.007 J	0.32	6.3	21.2	7.5	13.3	6.62	1,687
RL2D	6/22/2005	0.32	0.007 J	0.27	6.3	20.7	3.7	14	6.62	1,680
RL2D	9/15/2005	0.1	0.02	0.32	9.4	20.2		12.7	6.85	2,200
RL2D	12/28/2005	0.13	0.007 J	0.24	11.7	17.5	15.4	9.8	6.66	2,330
RL2D	3/9/2006	0.21	0.02	0.33	11.4	26.7	16.4	12.8	6.58	2,170
RL2D	3/25/2006	0.11	0.01 U	0.24	6.5	18.9	3.8			
RL2D	5/25/2006							12.7	6.46	1,600
RL2D	12/21/2006	0.5	0.02	0.32	11.4	25.1	17.9	10.7	7.04	2,600
RL2D	3/7/2007		0.01	0.28		26	17.9	12.6	7.44	2,260
RL2D	6/5/2007		0.02	0.21		23.8	2.6	12.7	6.85	1,670
RL2D	9/12/2007		0.02	0.3	10.3	29	17	13.8	7.31	2,350
RL2D	12/19/2007	0.1	0.01	0.305	13.7	31.6	13.9	10.3	7.15	3,070
RL2D	3/28/2008	0.08	0.02	0.3	8.6	27	10.4	9.4	7.55	2,700
RL2D	6/27/2008	0.08	0.01	0.29	7.4	25.8	5.9	14.9	6.93	2,100
RL2D	10/1/2008							17.8	7.34	3,250
RL2D	3/26/2009	0.0691	0.0108		10.1	29.3	11.2	11.3	6.66	2,300
RL2D	6/25/2009	0.489	0.011		7.76	27.7	8.25	15.6	6.66	3,200
RL2D	9/3/2009	0.0994	0.0145		13	34	25.6	18.2	6.69	
RL2D	12/17/2009	0.106	0.0217		13.4	35.9	20.7	11.6	6.85	2,850
RL2D	3/25/2010							12.2	6.5	2,700
RL2D	6/25/2010	0.175	0.0136	0.86	5.52	28.3	2.44	16.8	6.72	1,900
RL2D	9/22/2010	0.0798	0.005 U	1.32	8.97	34.7	11.3	14	6.46	2,500
RL2D	12/20/2010	0.118	0.005 U	1.19	9.6	35.4	14.4			
RL2S	3/10/2004	27	0.15 U		154	52	454	11.4	7.92	6,610

Table A-1
Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL2S	6/25/2004	30.8		0.04				176		59		553		13.9		10,400
RL2S	9/20/2004														9.82	
RL2S	3/10/2005	36.3		0.07		1.12		229		93		716		12.9	9.83	18,980
RL2S	6/22/2005	58.4		0.12		1.1		226		74.3		514		13	9.813	14,850
RL2S	9/15/2005	75		0.16		0.96		230		71				13.5	9.97	16,330
RL2S	12/28/2005	29.2		0.6		0.5		131		52		448		11	9.93	12,300
RL2S	3/9/2006	13.1		0.1		0.3		76.5		24.8		171		11.3	9.77	5,400
RL2S	3/24/2006	15.4		0.08		0.449		77		27		175				
RL2S	5/23/2006													11.5	9.71	6,510
RL2S	12/21/2006	33.8		0.06		0.77		134		44		456		10.7	9.97	11,700
RL2S	3/9/2007			0.07		0.5				35		295		10.3	9.91	8,280
RL2S	6/6/2007			0.22		0.61				45.5		302		13.3	9.85	8,800
RL2S	9/11/2007			0.18		0.4		84.5		40		246		14.7	9.67	7,590
RL2S	12/28/2007	35.8		0.05		0.43		110		47		389		9.7	9.56	11,200
RL2S	3/28/2008	29		0.24		0.37		114		38.8		256		9.4	9.85	9,400
RL2S	6/26/2008	33		0.2		0.6		124		46.8		317		18.1	9.76	9,900
RL2S	10/1/2008													17	9.67	7,920
RL2S	3/26/2009	28.4		0.416				132		63.8		428		10.6	9.44	11,000
RL2S	6/25/2009	25.2		0.0511				98.7		47		283		20	9.02	8,800
RL2S	9/3/2009	38.6		0.0779				124		58.5		398		16.9	9.41	
RL2S	12/17/2009	44.1		0.382				120		59.5		396		11.4	9.06	7,120
RL2S	3/25/2010													11.6	8.62	9,930
RL2S	6/25/2010	27.5		0.008		4.55		127		60.8		361		14.8	9.77	8,400
RL2S	9/22/2010	30.9		0.0212		3.59		118		61.1		340		17	9.57	10,900
RL2S	12/20/2010	46.8		0.1		3.72		137		68		443				
RL3D	3/10/2004	0.01	U	0.01	U			3.8		3		0.4	U	12.6	5.91	1,081
RL3D	6/25/2004	0.01	U	0.01	U			0.2	U	3.8		0.2	U	13.8	6.47	1,228

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Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL3D	9/20/2004														6.55	
RL3D	3/10/2005	0.01	U	0.01	U	0.01	U	0.2	U	5		0.2	U	13.7	6.62	1,180
RL3D	6/22/2005	0.01	U	0.01	U	0.01	U	0.2	U	3.8		0.2	U	15	6.57	1,226
RL3D	9/15/2005	0.01	U	0.01	U	0.01	U	0.3		3.9				13.1	6.63	1,253
RL3D	12/28/2005	0.003	J	0.01	U	0.01	U	0.2		1.4		0.4	U	11.7	6.49	1,330
RL3D	3/9/2006	0.008	J	0.01	U	0.02		0.4	U	3.6		0.4	U	12.4	6.29	1,298
RL3D	5/24/2006													12.6	6.45	1,171
RL3D	12/21/2006	0.01	U	0.02		0.02		0.2	U	3.9		0.2	U	11.5	7.11	1,286
RL3D	3/7/2007			0.01	U	0.01	U			4.8		0.2	U	13.4	7.93	1,126
RL3D	6/6/2007			0.01	U	0.01	U			3.3		0.2	U	13.7	6.56	1,195
RL3D	9/11/2007			0.01	U	0.01	U	2.81		3.4		0.2	U	14.3	7.09	1,282
RL3D	12/19/2007	0.01	U	0.01	U	0.01	U	0.2		3.9		0.2	U	11.5	6.65	1,197
RL3D	3/26/2008													11	6.68	1,275
RL3D	6/26/2008	0.01	U	0.01	U	0.01	U	0.2	U	4		0.2	U	16.7	6.63	1,206
RL3D	10/1/2008	0.01	U	0.01	U	0.01	U	0.2	U	3.9		0.2	U	15.4	6.92	1,225
RL3D	3/27/2009	0.007		0.005	U			0.55		4.25		1	U	11.5	6.67	1,040
RL3D	6/26/2009	0.005	U	0.005	U			0.57		4.34		1	U	15.6	6.66	1,240
RL3D	9/4/2009	0.005	U	0.005	U			0.5	U	4.13		1	U	20.4	6.54	
RL3D	12/18/2009	0.005	U	0.005	U			0.5	U	6.02		1	U	12.4	6.42	988
RL3D	3/26/2010													12.2	6.9	1,140
RL3D	6/25/2010	0.0124		0.005	U	0.0107		0.5	U	3.84		1	U	13.2	6.47	1,400
RL3D	9/23/2010	0.0119		0.005	U		R	0.5	U	5.72		1	U	13	6.42	1,283
RL3D	12/20/2010	0.0085		0.005	U	0.005	U	0.68		5.57		1.5				
RL3S	3/10/2004	0.08		0.01	U			12		6		17		11.1	6.19	769
RL3S	6/25/2004	0.14		0.01				17.1		11.5		38.2		13.8		1,356
RL3S	9/20/2004														7.04	
RL3S	3/10/2005	0.08		0.01		0.022		10.5		6.6		19.3		12.4	7.11	1,103

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Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL3S	6/22/2005	0.17		0.01	U	0.04		17.9		7.4		15.9		14	7.16	1,388
RL3S	9/15/2005	0.18		0.02		0.01	U	21.8		13.7				14.2	7.31	2,170
RL3S	12/28/2005	0.07		0.01	U	0.003	J	4.1		2.4		12.4		10.6	6.81	437
RL3S	3/9/2006	0.07		0.009	J	0.02		6.6		3		5.3		11.1	6.82	751
RL3S	3/25/2006	0.04		0.01	U	0.01	U	7		3.6		6.8				
RL3S	5/25/2006													12.4	6.94	648
RL3S	12/1/2006	0.08		0.01		0.01		8.8		4.2		3.9		9	7.37	935
RL3S	3/8/2007			0.01		0.01	U			4.6		7.7		11.4	7.19	845
RL3S	6/5/2007			0.02		0.01				5.2		12.1		14.2	7.01	756
RL3S	9/11/2007			0.02		0.01		16.5		7.7		6.9		15.3	8.1	1,349
RL3S	12/19/2007	0.06		0.01	U	0.01	U	7.4		3.9		3.3		11.6	6.76	791
RL3S	3/26/2008													9.7	7.05	864
RL3S	6/27/2008	0.07		0.01		0.01	U	9.2		4.7		2.6		13.3	7.15	859
RL3S	9/30/2008	0.07		0.02		0.01	U	10.6		6.5		1.9		14.8	7.16	857
RL3S	3/27/2009	0.0899		0.005	U			8.46		10.1		2.64		11.4	6.95	985
RL3S	6/26/2009	0.0559		0.007				8.91		11.6		2.55		18	7.22	860
RL3S	9/4/2009	0.109		0.0123				13.9		14		1	U	23.2	6.94	
RL3S	12/18/2009	0.0228		0.005	U			4.73		10.5		4.07		11.9	6.58	637
RL3S	3/25/2010													11.5	6.64	1
RL3S	6/24/2010	0.0903		0.011		0.0128		10.5		7.13		1	U	14.3	6.99	1
RL3S	9/23/2010	0.0506		0.005	U	0.0104		7.82		6.31		1.3		14.1	6.79	1,105
RL3S	12/16/2010	0.0615		0.0062		0.005		7.7		9.61		1.83				
RL4D	3/10/2004	0.01	U	0.01	U			0.4		11.6		0.4	U	13.1	6.22	522
RL4D	6/24/2004	0.01	U	0.01	U			0.3		9.8		0.2	U	15.4	5.38	417
RL4D	6/25/2004		U		U			0.3		9.8			U		5.38	549
RL4D	9/20/2004														6.52	
RL4D	3/10/2005	0.01	U	0.01	U	0.01	U	0.3		11.1		0.2	U	14.9	6.6	427

Table A-1
Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL4D	6/22/2005	0.01	U	0.01	U	0.01	U	0.3		10.7		0.2	U	14.5	6.66	477
RL4D	9/15/2005	0.01	U	0.01	U	0.01	U	0.3		10.6				14.4	6.72	464
RL4D	12/28/2005	0.006	J	0.01	U	0.01	U	0.2		1.6		0.4	U	12.9	6.5	414
RL4D	3/9/2006	0.16		0.01	U	0.009	J	0.4	U	10.2		0.4	U	12.9	6.36	560
RL4D	3/24/2006	0.01	U	0.01	U	0.01	U	0.4	U	8.8		0.4	U			
RL4D	5/24/2006													14	6.4	509
RL4D	12/1/2006		U	0.01		0.01			U	9.1		0.9			6.76	646
RL4D	12/21/2006													12.1	6.76	646
RL4D	12/21/2006	0.01	U	0.01		0.00001		0.2	U	9.1		0.9				
RL4D	3/8/2007			0.01	U	0.01	U			10.5		0.4		12.7	6.99	634
RL4D	6/5/2007													14.8	6.53	507
RL4D	6/5/2007			0.01	U	0.01	U			9.8		0.2	U			
RL4D	9/11/2007			0.01	U	0.01	U	1.02		9.5		0.2	U	19.4	6.88	686
RL4D	12/28/2007	0.01	U	0.01	U	0.01	U	1	U	10.4		1	U	10.2	6.97	769
RL4D	3/28/2008	0.01	U	0.01	U	0.01	U	0.3		8.6		0.2	U			
RL4D	6/19/2008	0.01	U	0.01	U	0.1	U	0.3		8.7		0.3		15.9	6.49	701
RL4D	3/26/2009	0.0063		0.005	U			0.5	U	10.6		3.58		11.9	6.66	717
RL4D	6/25/2009	0.162		0.005	U			1.17		9.41		8.87		20.8	6.41	730
RL4D	9/3/2009	0.005	U	0.005	U			0.5	U	9.69		11.8		22.4	6.56	
RL4D	12/17/2009	0.005	U	0.005	U			0.5	U	11.1		13.9		13.6	6.6	671
RL4D	3/25/2010													13.9	6.57	780
RL4D	6/24/2010	0.005	U	0.005	U	0.005	U	0.5	U	8.26		19.3		15.8	6.39	770
RL4D	9/22/2010	0.005	U	0.005	U	0.012		0.5	U	10.2		15		13.7	6.32	759
RL4D	12/16/2010	0.0108		0.005	U	0.005	U	0.5	U	11.2		14.2				
RL4S	3/10/2004	0.01	U	0.01	U			0.5		4.9		0.6		11.7	5.97	342
RL4S	6/24/2004	0.01	U	0.01	U			0.4		4.2		0.3		14.9	7.09	378
RL4S	9/20/2004														6.43	

Table A-1
Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL4S	3/10/2005	0.01	U	0.01	U	0.01	U	0.3		5.1		0.2	U	14.2		286
RL4S	6/24/2005	0.01	U	0.01	U	0.01	U	0.4		5		0.2	U	16	6.52	318
RL4S	9/15/2005	0.01	U	0.01	U	0.01	U	0.4		4.9				16.4	6.57	344
RL4S	12/28/2005	0.007	J	0.01	U	0.01	U	0.4		3.6		0.4	U	12.5	6.51	339
RL4S	3/9/2006	0.009	J	0.004	J	0.006	J	0.4	U	5		0.4	U	12.7	6.4	444
RL4S	3/24/2006	0.01	U	0.01	U	0.01	U	0.6		4.4		0.5		13.7	6.34	420
RL4S	12/21/2006		U	0.01		0.01	U	0.6		5.5		0.3		13	6.82	592
RL4S	3/8/2007			0.01	U	0.01	U			6.3		0.3		10.4	7.09	586
RL4S	6/6/2007			0.01	U	0.01	U			5.6		0.2	U	13.4	6.58	447
RL4S	9/12/2007			0.01	U	0.01	U	2.66		6		0.4		16.5	6.83	665
RL4S	12/21/2007	0.01	U	0.01	U	0.01	U	0.6		7.2		0.2	U	9.3	6.59	753
RL4S	3/28/2008	0.01	U	0.01	U	0.01	U	0.6		5.9		1.2		8.4	7.04	777
RL4S	6/20/2008	0.01	U	0.01	U	0.1	U	0.5		6.3		4.8		17.7	6.46	691
RL4S	3/27/2009	0.399		0.0056				3.2		7.89		5.51		9.6	7.24	837
RL4S	6/25/2009	0.0177		0.005	U			0.69		6.76		8.47		22.1	6.63	800
RL4S	9/3/2009	0.0053		0.005	U			0.54		6.91		8.75		20.2	6.48	
RL4S	12/17/2009	0.0061		0.0057				0.7		7.59		9.74		17.6	6.6	654
RL4S	3/25/2010													11.9	6.37	760
RL4S	6/25/2010	0.0127		0.005	U	0.043		0.63		7.07		5.75		13.5	6.55	681
RL4S	9/22/2010	0.0054		0.005	U	0.012		0.8		9.56		4.31		16.4	6.3	660
RL4S	12/17/2010	0.005	U	0.005	U	0.0051		0.74		10.5		3.03				
RL5	3/10/2004	0.02		0.01	U			2.7		9.2		71		11	5.81	599
RL5	6/25/2004	0.03		0.01	U			1.6		10		119		13.2		902
RL5	9/20/2004														6.47	
RL5	3/10/2005	0.06		0.01		0.01	U	1.2		17.3		202		12.8	6.41	862
RL5	6/22/2005	0.04		0.01	U	0.01	U	1.7		14.1		137		14	6.428	774
RL5	9/15/2005	0.05		0.01	U	0.01	U	1.7		14.2				13.7	6.51	603

Table A-1
Historical Groundwater Monitoring Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Cyanide, free (mg/L)		Fluoride (mg/L)		Chloride, total (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
RL5	12/28/2005	0.04		0.01	U	0.004	J	1.7		10.9		91.6		11	6.24	511
RL5	3/9/2006	0.03		0.02		0.01		2.2		8.8		58.5		12	6.25	450
RL5	3/25/2006	0.05		0.02		0.01	U	1.8		10.6		150				
RL5	5/25/2006													11.2	6.34	710
RL5	12/19/2006	0.03		0.01	U	0.02		2.3		7.7		74.9		9.3	6.58	457
RL5	3/8/2007			0.01	U	0.01	U			7.1		40.3		11.2	6.94	402
RL5	6/5/2007			0.02		0.01	U			9.4		91.6		11.2	6.83	419
RL5	9/11/2007			0.01	U	0.01	U	2.05		9		79		13.8	6.9	
RL5	12/21/2007	0.03		0.01		0.01	U	2.1	U	8.8		77.4		9.7	6.76	545
RL5	3/27/2008	0.02		0.01		0.01	U	2.1		7.9		70.2		12.9	7.01	539
RL5	6/26/2008	0.03		0.01		0.01	U	1.7		9		101		14.6	6.83	618
RL5	10/2/2008	0.02		0.01		0.01	U	1.9		10.4		105		19.1	6.98	627
RL5	3/25/2009	0.0326		0.0056				1.81		11.1		96.8		10.1	6.54	729
RL5	6/24/2009	0.0158		0.005	U			1.76		10.7		112		33	6.54	540
RL5	9/3/2009	0.0363		0.0063				1.73		12.3		105		20.1	6.6	
RL5	12/17/2009	0.047		0.0112				1.94		12.3		134		11.4	6.54	694
RL5	3/25/2010													12	6.39	760
RL5	6/24/2010	0.0303		0.0051		0.005	U	2.31		9.91		96.7		14.4	6.48	780
RL5	9/24/2010	0.0326		0.005	U	0.005	U	1.94		11.1		102				
RL5	10/14/2010	0.0371		0.005	U	0.0058		1.99		15.4		106				
RL5	12/16/2010	0.0359		0.0068		0.005	U	2.27		9.93		81.1				

Notes:
J = estimated value
U = not detected
°C = degrees Celsius
µS/cm = microSiemen per centimeter
mg/L= milligram per liter
WAD = weak acid dissociable

Table A-2
Historical Groundwater Metals Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
RL1D	12/20/2010	1	U	122,000		2	U	2	U	62,100		2	U	21,800	
RL1D	9/24/2010	1	U	121,000		2	U	2	U	59,100		2	U	24,700	
RL1D	6/25/2010	1	U	120,000		2	U	2	U	60,800		2	U	25,000	
RL1D	12/18/2009	1	U	117,000		2	U	2	U	61,700		2	U	25,500	
RL1D	9/4/2009	1	U	119,000		2	U	2	U	64,700		1	U	27,400	
RL1D	6/26/2009	1	U	117,000		2	U	2	U	66,900		1	U	27,500	
RL1D	3/27/2009	1	U	118,000		2	U	2	U	61,500		1.96		26,000	
RL1D	6/26/2008	5	U	121,000		5	U	10	U	63,400		20	U	26,800	
RL1D	3/28/2008	5	U	118,000		5	U	10	U	63,600		20	U	26,700	
RL1D	12/19/2007	5	U	116,000		5	U	10	U	63,800		20	U	26,100	
RL1D	9/11/2007	5	U	111,000		5	U	10	U	57,400		20	U	24,400	
RL1D	6/5/2007	5	U	115,000		5	U	10	U	59,900		20*	U	25,200	
RL1D	3/8/2007	5	U	127,000		5	U	10	U	65,600		20	U	27,000	
RL1D	12/21/2006	5	U	117,000		5	U	10	U	60,900		20*	U	25,500	
RL1D	3/24/2006	5	U	129,000		5	U	10	U	64,300		20	U	26,800	
RL1D	3/9/2006	5	U	117,000		5	U	10	U	59,100		20	U	26,200	
RL1D	12/28/2005	5	U	113,000		5	U	10	U	60,200		20	U	27,100	
RL1D	9/15/2005	5	U	121,000		5	U	10	U	61,600		20	U	26,700	
RL1D	6/22/2005	5	U	119,000		5	U	10	U	60,800		20	U	26,200	
RL1D	3/10/2005	5	U	112,000		5	U	10	U	58,300		20	U	24,700	
RL1D	11/5/2004	5	U	120,000		5	U	10	U	62,100		20	U	27,800	
RL1D	6/25/2004	5	U	121,000		5	U	10	U	62,000		20	U	25,900	
RL1D	3/11/2004	5	U	120,000		5	U	10	U	61,000		20	U	27,100	
RL1S	12/17/2010	1	U	9,560		2	U	2.69		4,570		3.04		37,900	
RL1S	9/24/2010	1	U	18,900		2	U	2	U	8,620		2.71		66,700	
RL1S	6/25/2010	1	U	14,900		2	U	2	U	7,020		4.08		45,500	
RL1S	12/18/2009	1	U	8,340		2	U	8.54		3,640		5.46		32,300	
RL1S	9/4/2009	1	U	14,400		2	U	9.37		6,570		6.71		61,200	
RL1S	6/26/2009	1	U	11,700		2	U	31.2		5,260		9.64		49,900	

Table A-2
Historical Groundwater Metals Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
RL1S	3/27/2009	5	U	9,230		10	U	10	U	4,430		8.36		196,000	
RL1S	6/27/2008	5	U	14,600		5	U	10	U	7,480		20	U	58,200	
RL1S	3/28/2008	5	U	9,560		5	U	10	U	4,780		20	U	14,300	
RL1S	12/19/2007	5	U	7,250		5	U	10	U	3,500		20	U	13,300	
RL1S	9/12/2007	5	U	15,500		5	U	10	U	7,970		20	U	131,000	
RL1S	6/6/2007	5	U	17,500		5	U	10	U	8,950		20*	U	114,000	
RL1S	3/8/2007	5	U	13,000		5	U	10	U	6,230		20	U	21,600	
RL1S	12/20/2006	5	U	9,900		5	U	10	U	4,700		20*	U	15,700	
RL1S	3/25/2006	5	U	17,800		5	U	10	U	8,500		20	U	54,800	
RL1S	3/9/2006	5	U	10,100		5	U	10	U	4,860		20	U	15,800	
RL1S	12/28/2005	5	U	12,200		5	U	10	U	5,860		20	U	13,700	
RL1S	9/15/2005	5	U	17,900		5	U	10	U	8,750		20	U	108,000	
RL1S	6/22/2005	5	U	17,800		5	U	10	U	8,450		20	U	60,200	
RL1S	3/10/2005	5	U	14,400		5	U	10	U	6,840		20	U	48,800	
RL1S	11/5/2004	5	U	11,800		5	U	10	U	5,830		20	U	42,200	
RL1S	6/25/2004	5	U	15,600		5	U	10	U	7,570		20	U	62,000	
RL1S	3/11/2004	5	U	10,400		5	U	10	U	5,040		20	U	26,200	
RL2D	12/20/2010	2.03		57,600		2	U	2	U	33,300		2.07		538,000	
RL2D	9/22/2010	1.63		65,400		2	U	2	U	32,100		2	U	429,000	
RL2D	6/25/2010	1.19		74,800		2	U	2	U	36,000		2	U	272,000	
RL2D	12/17/2009	2.99		61,900		2	U	2	U	30,200		4.5		759,000	
RL2D	9/3/2009	2.79		64,000		2	U	2	U	30,800		3.99		624,000	
RL2D	6/25/2009	1.18		74,500		2	U	2	U	37,200		1.65		388,000	
RL2D	3/26/2009	2.19		58,300		2	U	2	U	28,800		3.27		551,000	
RL2D	6/27/2008	5	U	66,700		5	U	10	U	34,700		20	U	283,000	
RL2D	3/28/2008	5	U	65,700		5	U	10	U	35,200		20	U	396,000	
RL2D	12/19/2007	5	U	55,900		5	U	10	U	30,400		20	U	596,000	
RL2D	9/12/2007	5	U	57,300		5	U	10	U	287,000		20	U	457,000	
RL2D	6/5/2007	5	U	72,800		5	U	10	U	35,300		20*	U	224,000	

Table A-2
Historical Groundwater Metals Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
RL2D	3/7/2007	5	U	68,200		5	U	10	U	33,200		20	U	457,000	
RL2D	12/21/2006	5	U	59,800		5	U	10	U	28,500		20*	U	479,000	
RL2D	3/25/2006	5	U	75,900		5	U	10	U	36,900		20	U	254,000	
RL2D	3/9/2006	5	U	59,100		5	U	10	U	29,200		20	U	431,000	
RL2D	12/28/2005	5	U	56,200		5	U	10	U	29,100		20	U	462,000	
RL2D	9/15/2005	5	U	63,300		5	U	10	U	30,900		20	U	408,000	
RL2D	6/22/2005	5	U	72,200		5	U	10	U	34,800		20	U	254,000	
RL2D	3/10/2005	5	U	65,800		5	U	10	U	32,600		20	U	288,000	
RL2D	6/25/2004	5	U	52,100		5	U	10	U	27,800		20	U	514,000	
RL2D	3/11/2004	5	U	47,100		5	U	10	U	25,100		20	U	558,000	
RL2S	12/20/2010	60.8		6,470		63.1		10	U	2,820		18.4		4,290,000	
RL2S	9/22/2010	47.6		6,010		124		40	U	2,540		85.6		3,210,000	
RL2S	6/25/2010	9.12		6,980		12.2		2	U	2,890		8.83		3,410,000	
RL2S	12/17/2009	55.1		9,480		23.3		2	U	3,660		4.7		3,690,000	
RL2S	9/3/2009	10.8		7,480		8.29		4	U	3,020		2.5		3,260,000	
RL2S	6/25/2009	50	U	1,370		10	U	10	U	549		50	U	2,820,000	
RL2S	3/26/2009	51.7		8,380		93.6		20	U	2,690		86.3		3,640,000	
RL2S	6/27/2008	39.4		6,140		85		11		2,830		61		2,800,000	
RL2S	3/28/2008	15.9		2,690		42.3		10	U	769		29		1,220,000	
RL2S	12/28/2007	43		7,860		106		20	U	3,010		74		2,790,000	
RL2S	9/11/2007	32.6		6,740		55		10	U	1,970		40.3		2,060,000	
RL2S	6/6/2007	33.3		5,300		65		10	U	1,640		51*		2,490,000	
RL2S	3/9/2007	36		6,500		76		20	U	1,540		57		2,460,000	
RL2S	12/21/2006	27.4		8,010		94.7		16		2,600		78*		3,120,000	
RL2S	3/24/2006	26.9		5,610		52.1		10	U	1,820		47		1,810,000	
RL2S	3/9/2006	21		5,150		42.9		10	U	1,560		36		1,550,000	
RL2S	12/28/2005	38		6,210		115		10	U	2,570		89		3,630,000	
RL2S	9/15/2005	64		6,600		99.1		10	U	2,740		124		5,160,000	
RL2S	6/22/2005	56		6,760		155		20	U	2,860		135		4,870,000	

Table A-2
Historical Groundwater Metals Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
RL2S	3/10/2005	58.7		8,310		101		10	U	4,350		121		5,610,000	
RL2S	6/25/2004	31.7		5,410		76.2		10	U	2,070		67		2,790,000	
RL2S	3/11/2004	46.1		5,950		121		10	U	2,140		110		3,780,000	
RL3D	12/20/2010	1	U	77,600		2	U	2	U	40,300		2	U	28,800	
RL3D	9/23/2010	1	U	99,400		2	U	2	U	51,800		2	U	30,300	
RL3D	6/25/2010	1	U	104,000		2	U	2	U	52,400		2	U	32,400	
RL3D	12/18/2009	1	U	79,600		2	U	2	U	50,500		2	U	30,500	
RL3D	9/4/2009	1	U	101,000		2	U	2	U	54,500		1	U	32,100	
RL3D	6/26/2009	1	U	95,600		2	U	2	U	51,800		1	U	34,900	
RL3D	3/27/2009	1	U	95,600		2	U	2	U	46,400		1.64		29,900	
RL3D	10/1/2008	5	U	109,000		5	U	10	U	53,700		20	U	30,400	
RL3D	6/26/2008	5	U	104,000		5	U	10	U	53,200		20	U	34,200	
RL3D	12/19/2007	5	U	111,000		5	U	10	U	59,800		20	U	31,600	
RL3D	9/11/2007	5	U	108,000		5	U	10	U	53,300		20	U	29,000	
RL3D	6/6/2007	5	U	108,000		5	U	10	U	54,400		20*	U	29,100	
RL3D	3/7/2007	5	U	122,000		5	U	10	U	60,800		20	U	31,900	
RL3D	12/21/2006	5	U	115,000		5	U	10	U	56,100		20*	U	31,500	
RL3D	3/24/2006	5	U	120,000		5	U	10	U	58,800		20	U	31,800	
RL3D	3/9/2006	5	U	111,000		5	U	10	U	54,600		20	U	31,100	
RL3D	12/28/2005	5	U	109,000		5	U	10	U	56,300		20	U	32,500	
RL3D	9/15/2005	5	U	115,000		5	U	10	U	55,800		20	U	30,600	
RL3D	6/22/2005	5	U	119,000		5	U	10	U	57,800		20	U	32,000	
RL3D	3/10/2005	5	U	114,000		5	U	10	U	57,400		20	U	31,100	
RL3D	6/25/2004	5	U	112,000		5	U	10	U	57,500		20	U	30,400	
RL3D	3/11/2004	5	U	111,000		5	U	10	U	55,500		20	U	32,600	
RL3S	12/16/2010	1.53		38,600		2	U	2	U	3,340		2	U	154,000	
RL3S	9/23/2010	1.65		29,200		2	U	2	U	13,300		2	U	158,000	
RL3S	6/24/2010	2.74		27,000		2	U	2	U	12,800		2	U	210,000	

Table A-2
Historical Groundwater Metals Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
RL3S	12/18/2009	1	U	29,700		2	U	2	U	12,100		2	U	91,200	
RL3S	9/4/2009	2.75		29,300		2.33		2	U	14,500		1.26		354,000	
RL3S	6/26/2009	1.52		28,500		2	U	2	U	13,600		1	U	201,000	
RL3S	3/27/2009	1.18		27,100		2	U	2	U	12,700		1.36		189,000	
RL3S	6/27/2008	7.4		24,900		5	U	10	U	11,400		20	U	158,000	
RL3S	12/19/2007	5	U	28,400		5	U	10	U	14,200		20	U	136,000	
RL3S	9/11/2007	5	U	20,600		5	U	10	U	10,600		20	U	281,000	
RL3S	6/5/2007	5	U	20,200		5	U	10	U	10,000		20*	U	203,000	
RL3S	3/8/2007	5	U	33,800		5	U	10	U	16,500		20	U	174,000	
RL3S	12/20/2006	5	U	32,300		5	U	10	U	15,100		20*	U	171,000	
RL3S	3/25/2006	5	U	24,500		5	U	10	U	11,200		20	U	124,000	
RL3S	3/9/2006	5	U	27,800		5	U	10	U	12,500		20	U	125,000	
RL3S	12/28/2005	5	U	23,200		5	U	10	U	10,100		20	U	81,200	
RL3S	9/15/2005	5.2		29,900		14.2		10	U	14,100		20	U	515,000	
RL3S	6/22/2005	5	U	28,200		7.6		10	U	13,200		20	U	324,000	
RL3S	3/10/2005	5	U	29,400		5	U	10	U	13,200		20	U	235,000	
RL3S	6/25/2004	5	U	26,000		5	U	10	U	12,700		20	U	256,000	
RL3S	3/11/2004	5	U	33,100		11.4		10	U	17,100		20	U	393,000	
RL4D	12/16/2010	1	U	53,800		2	U	2	U	24,800		2	U	23,600	
RL4D	9/22/2010	1	U	50,200		2	U	2	U	23,700		2	U	23,900	
RL4D	6/24/2010	1	U	50,500		2	U	2	U	23,800		2	U	23,800	
RL4D	12/17/2009	1	U	59,900		2	U	2	U	26,100		2	U	25,800	
RL4D	9/3/2009	1	U	56,800		2	U	2	U	27,100		1.72		25,500	
RL4D	6/25/2009	1	U	57,700		2	U	2	U	27,200		1	U	30,400	
RL4D	3/26/2009	1	U	54,700		2	U	2	U	25,000		1.1		24,500	
RL4D	6/19/2008	5	U	51,000		5	U	10	U	25,300		20	U	22,400	
RL4D	3/28/2008	5	U	53,200		5	U	10	U	26,500		20	U	23,700	
RL4D	12/28/2007	5	U	55,000		5	U	10	U	27,100		20	U	22,600	
RL4D	9/11/2007	5	U	51,200		5	U	10	U	24,000		20	U	20,400	

Table A-2
Historical Groundwater Metals Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
RL4D	6/5/2007	5	U	47,200		5	U	10	U	22,100		20*	U	18,500	
RL4D	3/8/2007	5	U	49,600		5	U	10	U	23,000		20	U	23,200	
RL4D	12/21/2006	5	U	44,600		5	U	10	U	20,500		20*	U	22,400	
RL4D	3/24/2006	5	U	40,600		5	U	10	U	18,500		20	U	16,200	
RL4D	3/9/2006	5	U	39,400		5	U	10	U	17,800		20	U	16,200	
RL4D	12/28/2005	5	U	35,900		5.3		10	U	16,800		20	U	18,500	
RL4D	9/15/2005	5	U	39,700		5	U	10	U	18,000		20	U	15,800	
RL4D	6/22/2005	5	U	39,700		5	U	10	U	17,800		20	U	16,000	
RL4D	3/10/2005	5	U	38,600		5	U	10	U	17,600		20	U	15,500	
RL4D	6/24/2004	5	U	39,900		5	U	10	U	18,300		20	U	15,900	
RL4D	3/11/2004	5	U	38,400		5	U	10	U	18,300		20	U	16,200	
RL4S	12/17/2010	1.29		39,200		2	U	2	U	21,500		2	U	46,400	
RL4S	9/22/2010	1.24		36,100		2	U	2	U	19,000		2	U	35,900	
RL4S	6/25/2010	1.49		39,000		2	U	2	U	20,100		2	U	42,000	
RL4S	12/17/2009	1.29		44,800		2	U	2	U	23,000		2.24		66,100	
RL4S	9/3/2009	1.26		50,200		2	U	2	U	26,600		2.86		52,900	
RL4S	6/25/2009	1	U	53,000		2	U	2	U	27,800		5		63,200	
RL4S	3/27/2009	1.03		43,400		2	U	2	U	25,000		4.37		96,600	
RL4S	6/20/2008	5	U	41,500		5	U	10	U	23,100		20	U	42,100	
RL4S	3/28/2008	5	U	42,900		5	U	10	U	25,100		20	U	64,400	
RL4S	12/21/2007	5	U	42,800		5	U	10	U	25,100		20	U	43,900	
RL4S	9/12/2007	5	U	39,200		5	U	10	U	20,300		20	U	36,200	
RL4S	6/6/2007	5	U	36,500		5	U	10	U	19,200		20*	U	35,400	
RL4S	3/8/2007	5	U	38,900		5	U	10	U	20,100		20	U	40,000	
RL4S	12/21/2006	5	U	32,600		5	U	10	U	17,000		20*	U	35,900	
RL4S	3/24/2006	5	U	29,600		5	U	10	U	14,900		20	U	30,200	
RL4S	3/9/2006	5	U	25,300		5	U	10	U	13,300		20	U	27,100	
RL4S	12/28/2005	5	U	23,600		5	U	10	U	12,600		20	U	26,700	
RL4S	9/15/2005	5	U	25,400		5	U	10	U	13,200		20	U	25,900	

Table A-2
Historical Groundwater Metals Results for the Closed BMP Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
RL4S	6/24/2005	5	U	24,700		5	U	10	U	12,600		20	U	24,900	
RL4S	3/10/2005	5	U	23,900		5	U	10	U	12,400		20	U	24,200	
RL4S	6/24/2004	5	U	21,600		5	U	10	U	11,400		20	U	23,400	
RL4S	3/11/2004	5	U	20,700		5	U	10	U	11,300		20	U	24,300	
RL5	9/3/2009	1	U	9,830		2	U	15.6		4,410		5.32		125,000	
RL5	6/24/2009	1	U	10,200		2	U	22.2		4,530		5.21		137,000	
RL5	3/25/2009	1	U	8,930		2	U	26.2		3,960		5.34		136,000	
RL5	10/2/2008	5	U	9,480		5	U	16		4,100		20	U	127,000	
RL5	6/26/2008	5	U	7,810		5	U	17		3,560		20	U	124,000	
RL5	3/27/2008	5	U	7,050		5	U	25		3,070		20	U	113,000	
RL5	12/21/2007	5	U	6,440		5	U	22		2,750		20	U	105,000	
RL5	9/11/2007	5	U	7,260		5	U	25.9		3,260		20	U	116,000	
RL5	6/5/2007	5	U	6,770		5	U	33		2,940		20*	U	109,000	
RL5	3/8/2007	5	U	4,560		5	U	61		1,930		20	U	82,000	
RL5	12/19/2006	5	U	5,740		5	U	47		2,350		20*	U	93,100	
RL5	3/25/2006	5	U	13,800		5	U	42		5,860		20	U	159,000	
RL5	3/9/2006	5	U	5,210		5	U	42		2,140		20	U	96,600	
RL5	12/28/2005	5	U	7,210		5	U	21		3,110		20	U	124,000	
RL5	9/15/2005	5	U	11,300		5	U	18	U	4,860		20	U	143,000	
RL5	6/22/2005	5	U	11,600		5	U	30		5,020		20	U	155,000	
RL5	3/10/2005	5	U	15,100		5	U	20		6,530		20	U	171,000	
RL5	6/25/2004	5	U	8,180		5	U	29		3,480		20	U	120,000	
RL5	3/11/2004	5	U	5,330		5	U	45.8		2,180		20	U	93,200	

Notes:

*Nickel data from December 2006 and June 2007 was designated Total Metals on the laboratory report. These values seem to be consistent with the Dissolved Metals data suggesting the Total Metals label may have been a typo.

1 = February 4, 2014 update – Result values for chromium, copper, and nickel should be regarded as overestimates of actual concentrations due to method interference (see Appendix E).

U = Not Detected; J = Estimated Value µg/L= microgram per liter

Table A-3
Historical Groundwater Monitoring Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Chloride, total (mg/L)		Cyanide, free (mg/L)		Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Fluoride (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
R1D	3/23/2004					0.02		0.01	U					16.2	6.23	1,968
R1D	6/25/2004									0.4				15.3		1,620
R1D	9/20/2004														6.639	
R1D	11/5/2004									0.5						
R1D	3/10/2005	124		0.01	U	0.03		0.01	U	0.5				15	6.61	1,925
R1D	6/23/2005	118		0.01	U	0.04		0.01	U	0.6		0.2	U	14	6.62	1,919
R1D	9/15/2005	117		0.01	U	0.04		0.02		0.6				14.4	6.64	1,855
R1D	12/28/2005	112		0.01	U	0.03		0.008	J	0.6		0.4	U	13.2	6.51	2,090
R1D	3/9/2006	112		0.03		0.07		0.03		0.4		0.4	U	12.4	6.39	1,996
R1D	3/25/2006	90		0.01	U	0.04		0.01	U	0.4	U					
R1D	5/25/2006	90			U	0.04			U		U			14.1	6.43	1,802
R1D	9/28/2006	104		0.01	U	0.03		0.01	U	0.6				18.1	6.76	1,848
R1D	12/14/2006	110		0.00001	U	0.03		0.03		1	U			10.1	6.92	1,992
R1D	3/8/2007	113		0.01	U			0.02						13	7.06	1,950
R1D	6/6/2007	123		0.01	U			0.03						13	6.62	1,912
R1D	9/11/2007	111		0.01	U			0.01		1.76				17.7	7.01	1,893
R1D	12/28/2007	116		0.01	U	0.04		0.01	U	1	U			11.5	6.7	1,976
R1D	3/21/2008													10.3	6.6	2,100
R1D	6/19/2008	113		0.1	U	0.04		0.01		0.2	U	0.2		19.3	6.52	1,982
R1D	9/26/2008	120		0.01	U	0.03		0.01		0.6				16	6.76	2,030
R1D	3/26/2009	118				0.0368		0.005	U	0.65				13.4	6.45	1,921
R1D	6/23/2009													14.2	6.55	2,090
R1D	9/2/2009	125				0.0241		0.0075		0.52				23.5	6.95	
R1D	12/17/2009	116				0.034		0.0074		0.5	U			12.8	6.6	1,883
R1D	3/24/2010	109		0.005	U	0.0243		0.0052		0.61				13.6	6.29	2,120
R1D	6/25/2010	116		0.005	U	0.0207		0.0055		0.53				14	6.52	2,030
R1D	9/23/2010	120		0.0166		0.0241		0.005	U	0.51				14.4	6.59	2,100

Table A-3
Historical Groundwater Monitoring Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Chloride, total (mg/L)		Cyanide, free (mg/L)		Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Fluoride (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
R1D	12/16/2010	125		0.0154		0.0344		0.0062		0.63						
R1S	3/23/2004					0.03		0.01	U					15.5	5.72	507
R1S	6/25/2004									37				14.4	6.21	625
R1S	9/20/2004														7.28	
R1S	11/5/2004									38.5						
R1S	3/10/2005	3.2		0.01	U	0.06		0.01	U	31.7				13.1	7.31	374
R1S	6/23/2005	2.2		0.01	U	0.07		0.01	U	29.1		0.2	U	14	7.33	437
R1S	9/15/2005	2.2		0.01	U	0.05		0.01	U	24				16.1	7.16	396
R1S	12/28/2005	1.6		0.01	U	0.04		0.01	U	30.8		0.6		11.5	7.16	455
R1S	3/9/2006	1.4		0.005	J	0.06		0.008	J	24.3		0.4	U	11.5	6.96	446
R1S	3/25/2006	1.6		0.01	U	0.04		0.01	U	25.1						
R1S	5/25/2006	1.6			U	0.04			U	25.1				13.6	6.98	391
R1S	9/28/2006	1.2		0.01	U	0.07		0.01	U	22.1				19.9	7.16	350
R1S	12/14/2006	1.6			U	0.05		0.01		30.2				12.2	7.49	490
R1S	12/21/2006	1.6		0.00001	U	0.05		0.01		30.2						
R1S	3/8/2007	1.5		0.01	U			0.01	U					10.4	7.63	524
R1S	6/6/2007	2.9		0.01	U			0.01	U					12.9	7.4	352
R1S	9/12/2007	2.4		0.01	U			0.01	U	35.8				19.5	7.66	453
R1S	12/28/2007	2.4		0.01	U	0.04		0.01	U	43.9				11.4	7.01	536
R1S	3/21/2008													9.4	7.68	595
R1S	6/20/2008	3.6		0.1	U	0.03		0.01	U	30.3		4.7		14.2	7.55	432
R1S	9/26/2008	5.3		0.01	U	0.06		0.01	U	31.5				16.2	7.43	406
R1S	3/25/2009	2.2				0.0441		0.005	U	27.9				11.4	6.76	459
R1S	6/24/2009	3.35				0.0346		0.0078		23.9				15.3	7.4	600
R1S	9/2/2009	4.08				0.0516		0.005	U	23.1				29.5	7.71	
R1S	12/17/2009	2.16				0.0591		0.0082		26.7				13.1	7.12	380

Table A-3
Historical Groundwater Monitoring Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Chloride, total (mg/L)		Cyanide, free (mg/L)		Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Fluoride (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
R1S	3/24/2010	2.15		0.005	U	0.024		0.005	U	28.8				11.6	6.75	490
R1S	6/24/2010	3.19		0.0127		0.027		0.0128		28.5				12.7	7.18	413
R1S	9/23/2010	4.57		0.0051		0.048		0.0052		24.4				15.7	6.81	431
R1S	12/16/2010	2.89		0.005	U	0.0279		0.005	U	35.9						
R2	3/23/2004	7.4				0.23		0.007	J	1.7		0.5		13	6.51	497
R2	6/30/2004	6.6				0.01	U	0.01	U	0.3		0.2	U	18	6.853	
R2	9/24/2004													16	6.508	
R2	3/10/2005	7.7		0.01	U	0.005		0.01	U	0.3				12.2	6.67	402
R2	6/24/2005	7.2		0.01	U	0.005	J	0.01	U	0.3		0.5		15	6.54	430
R2	9/15/2005	7.2		0.01	U	0.01	U	0.01	U	0.4				13.8	6.78	413
R2	12/28/2005	1.5		0.01	U	0.008	J	0.01	U	0.3		0.3		10.2	6.37	400
R2	3/9/2006	7.3		0.009	J	0.009	J	0.01	U	0.4	U	0.4	U	9.8	6.47	471
R2	5/24/2006	6		0.01	U	0.01	U	0.01	U	0.4				11.9	6.43	486
R2	9/28/2006	7.1		0.01	U	0.01		0.01	U	0.5				16.5	6.67	420
R2	12/20/2006	6.9		0.00001	U	0.01	U	0.01		0.4				7.9	6.61	486
R2	3/8/2007	7.2		0.01	U			0.02	U					9.1	6.57	464
R2	6/6/2007	6.9		0.01	U			0.01	U					10.6	6.77	345
R2	9/12/2007	6.7		0.01	U			0.01		3.38					6.7	522
R2	12/31/2007	6.9		0.01	U	0.01	U	0.01	U	0.2	U			8.6	6.71	490
R2	3/28/2008	6.3		0.01	U	0.01	U	0.01	U	0.4				9.6	6.7	421
R2	6/19/2008	6		0.1	U	0.01	U	0.01	U	0.4		0.4		13.6	7.1	458
R2	3/25/2009	6.52				0.0129		0.005	U	0.58				11.8	7	539
R2	6/25/2009	6.46				0.005	U	0.005	U	0.5	U			13.6	6.56	430
R2	9/4/2009	8.03				0.0098		0.005	U	0.5	U			16.6	6.76	
R2	12/17/2009	6.84				0.0056		0.0054		0.51				10.9	6.4	375
R2	3/24/2010	6.25		0.005	U	0.005	U	0.005	U	0.75				9.7	6.21	440

Table A-3
Historical Groundwater Monitoring Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Chloride, total (mg/L)		Cyanide, free (mg/L)		Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Fluoride (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
R2	6/23/2010	5.84		0.0208		0.005	U	0.005	U	0.73				11.4	6.36	356
R2	9/24/2010	6.75		0.0102		0.0055		0.005	U	0.59				12.6	6.41	465
R2	12/17/2010	7.16		0.005	U	0.005	U	0.005	U	0.67						
R3[1]	3/23/2004	55		0.4		166				2,560		263		16.9	8.12	2,630
R3	6/25/2004									2,510				14.9	7.78	22,900
R3	9/23/2004														10.291	
R3	11/5/2004									2,050						
R3[1]	3/10/2005	69		0.3		282		11.7		2,460				14.9	10.37	30,400
R3[1]	6/23/2005	61		0.06		251		13.2		2,550		274		15	10.29	26,700
R3[1]	9/15/2005	65		0.02		363		12.1		2,450				15.9	10.43	28,000
R3[1]	12/28/2005	85		0.6		235		9.2		2,400		262		12.9	10.48	28,300
R3[1]	3/9/2006			0.43		319		9.7		2,510		254		12	10.23	27,000
R3[1]	3/24/2006	69		0.34		187		10.1		2,460						
R3[1]	5/24/2006	69		0.34		187		10.2		2,460				12.6	10.19	26,300
R3[1]	9/28/2006	84		0.9		253		10.2		2,310				16.8	10.3	26,200
R3[1]	12/14/2006	56		0.07		266		10.1		2,540				10.8	10.42	26,000
R3[1]	3/8/2007	81		1.5				10.1						11.9	10.27	26,700
R3[1]	6/5/2007	0.5		1				11.8						14.7	10.33	24,200
R3[1]	9/11/2007	53		1.2				10.6		2,380				18.1	10.2	24,800
R3[1]	12/31/2007	86		0.01		241		9		2,070				11.5	10.11	26,900
R3	3/21/2008													10.5	10.31	26,000
R3[1]	6/19/2008	57		1.2		222		10.1		2,390		217		14.6	10.36	25,300
R3[1]	3/26/2009	68.5		0.379		288				2,250				13.7	10.17	230
R3[1]	6/25/2009	58.4			R	257				2,130				15.7	9.69	26,200
R3[1]	9/2/2009	61.3			R	179				2,160				25.3	10.23	
R3[1]	12/18/2009	249		0.236		229				2,080				12.7	10.39	21,900

Table A-3
Historical Groundwater Monitoring Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Chloride, total (mg/L)		Cyanide, free (mg/L)		Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Fluoride (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
R3	3/26/2010													13	9.59	26,100
R3[1]	6/25/2010		R	0.032		112		40.3		2,080				14.5	10.18	25,900
R3[1]	9/22/2010	66		0.0251		28.8		51.8		2,080		153		14.8	10.07	25,000
R3[1]	12/17/2010	61		0.0648		335		30.5		2,100						
R4D	3/23/2004	10.7				0.03		0.01	U	1.8		0.2	U	16	6.62	1,218
R4D	6/25/2004									1.3						1,326
R4D	9/20/2004														6.67	
R4D	11/5/2004									1.3						
R4D	3/10/2005	10.6		0.01	U	0.03		0.01	U	1.5				14.7	6.67	1,340
R4D	6/23/2005	9.6		0.01	U	0.03		0.01	U	1.5		0.2	U	15	6.71	1,338
R4D	9/15/2005	10.3		0.01	U	0.03		0.01	U	1.6				14.1	6.75	1,276
R4D	12/28/2005	3.9		0.01	U	0.03		0.01	U	1.7		0.4	U	13	6.57	1,380
R4D	3/9/2006	10.2		0.01		0.07		0.01	U	1.7		0.4	U			
R4D	3/25/2006	8.1		0.01	U	0.03		0.01	U	1.4						
R4D	5/25/2006	8.1			U	0.03			U	1.4				13.8	6.49	1,231
R4D	9/28/2006	11		0.01	U	0.03		0.01		1.7				15.9	6.84	1,266
R4D	12/14/2006	8.8		0.02		0.04		0.02		1.9				12.6	6.71	1,375
R4D	12/21/2006	8.8		0.00002		0.04		0.02		1.9						
R4D	3/9/2007	9.3		0.01	U			0.02						11.2	7.07	1,357
R4D	6/6/2007	9		0.01	U			0.01	U					13.6	6.78	1,234
R4D	9/11/2007	9.7		0.01	U			0.01		1.65				18.6	6.91	1,273
R4D	12/28/2007	10.1		0.01	U	0.03		0.01	U	1.7				11	6.81	1,303
R4D	3/21/2008													12.5	6.69	1,410
R4D	6/19/2008	9		0.1	U	0.03		0.01		1.6		0.2	U	15.8	6.72	1,275
R4D	9/26/2008	10.4		0.01	U	0.03		0.02		1.7				15.2	6.8	1,338
R4D	3/26/2009	0.5	U			0.0296		0.005	U	1.84				13.1	6.63	1,250

Table A-3
Historical Groundwater Monitoring Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Chloride, total (mg/L)		Cyanide, free (mg/L)		Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Fluoride (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
R4D	6/24/2009	9.94				0.0279		0.005	U	1.22				14.7	6.43	1,380
R4D	9/3/2009	10.2				0.0294		0.0082		1.69				23.7	6.83	
R4D	12/17/2009	11.2				0.0274		0.0082		1.6				17.8	6.67	1,184
R4D	3/24/2010													13.1	6.3	1,440
R4D	6/24/2010	9.78		0.005	U	0.0211		0.0053		1.59				14.8	6.53	1,400
R4D	9/24/2010	12			R	0.0226		0.005	U	1.68				13.6	6.62	1,349
R4D	12/16/2010	13.2		0.0362		0.0281		0.005	U	1.63						
R4S	3/23/2004					1.3		0.008	J					16.6	5.86	1,840
R4S	6/25/2004									7.8				14.9	6.38	1,863
R4S	9/20/2004														6.895	
R4S	11/3/2004									8.5						
R4S	3/5/2005															
R4S	3/10/2005	10.9		0.01	U	0.03		0.007	J	8.5				15.7	7.02	2,110
R4S	6/23/2005	9.6		0.01	U	0.04		0.01	U	8.1		0.2	U	15	6.91	1,922
R4S	9/15/2005	10.1		0.01	U	3.9		0.02		9.5				14.3	7.12	1,999
R4S	12/28/2005	3.2		0.01	U	0.04		0.008	J	10.6		0.4	U	13.2	6.96	2,130
R4S	3/9/2006	10		0.04		0.06		0.02		7.7		0.4	U	11.9	6.7	1,859
R4S	3/24/2006	10.3		0.01	U	0.03		0.01		6						
R4S	5/24/2006	10.3			U	0.03		0.01		6				12.9	6.75	1,704
R4S	9/28/2006	11		0.01	U	0.03		0.01		9.9				15.1	6.93	1,861
R4S	12/20/2006	8		0.00003		0.04		0.02		9.6				10.7	7.12	2,030
R4S	3/8/2007	9.4		0.01	U			0.03						11.8	7.53	1,888
R4S	6/6/2007	9.3		0.01	U			0.02						12.7	6.85	1,710
R4S	9/11/2007	10		0.01	U			0.02		8.3				17	7.14	1,952
R4S	12/28/2007	9.9		0.01	U	0.03		0.01		11.3				10.9	6.75	1,940
R4S	3/21/2008													10.9	6.84	2,100

Table A-3
Historical Groundwater Monitoring Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Chloride, total (mg/L)		Cyanide, free (mg/L)		Cyanide, total (mg/L)		Cyanide, Weak Acid Dissociable (WAD; mg/L)		Fluoride (mg/L)		Sulfate (mg/L)		Temperature (°C)	pH	Specific conductivity (µS/cm)
R4S	6/20/2008	9.6		0.1	U	0.03		0.02		8.9		0.2	U	15.4	6.81	1,781
R4S	9/26/2008													19.5	7.42	2,040
R4S	3/26/2009	10.1				0.0354		0.005	U	9.73				14.8	6.89	1,774
R4S	6/24/2009	12.8				0.334		0.0154		16.7				21.7	6.86	2,100
R4S	9/2/2009	0.5	U			0.173		0.0096		12.9				27.6	7.15	
R4S	12/17/2009	11.5				0.0417		0.0099		11.1				13.3	6.78	1,724
R4S	3/24/2010	9.73		0.005	U	0.0261		0.007		7.2				12.1	6.41	1,800
R4S	6/25/2010	9.54		0.0093		0.0455		0.0085		7.24				13	6.8	1,760
R4S	9/24/2010	12		0.0102		0.0291		0.005	U	9.62				14.1	6.65	1,875
R4S	12/20/2010	12.2		0.0082		0.0327		0.0054		8.86						

Notes:

1 = Free and WAD Cyanide results for Location ID R-3 have been been swapped due to a laboratory database discrepancy (apparent column transposition) with the tabulated data that could not be verified with the original laboratory reports (unavailable at the time of publication).

J = estimated value

U = not detected

R = sample result rejected (quality assurance/quality control)

°C = degrees Celsius

µS/cm = microSiemen per centimeter

mg/L= milligram per liter

SPL = Spent Pot Liner

WAD = weak acid dissociable

Table A-4
Historical Groundwater Metals Results for the Former SPL Area: 2004 to 2010

Location ID	Sample Date	Arsenic, Dissolved (µg/L)		Calcium, Dissolved (µg/L)		[1]Chromium, Dissolved (µg/L)		[1]Copper, Dissolved (µg/L)		Magnesium, Dissolved (µg/L)		[1]Nickel, Dissolved (µg/L)		Sodium, Dissolved (µg/L)	
R1D	12/28/2005	5	U	118,000		5	U	10	U	63,600		20	U	129,000	
R1S	12/28/2005	5	U	12,700		5	U	10	U	4,840		20	U	104,000	
R1S	3/25/2009	1	U	12,000		2	U	2	U	4,720		1	U	79,900	
R1S	6/24/2009	1	U	13,200		2	U	2	U	5,120		1	U	88,300	
R1S	9/2/2009	1	U	14,100		2	U	2	U	5,500		1	U	91,800	
R2	6/30/2004					5	U	10	U	16,500				31,200	
R2	12/28/2005	5	U	30,200		5	U	10	U	14,000		20	U	31,400	
R2	3/25/2009	1	U	27,400		2	U	3		12,400		1	U	28,900	
R2	6/25/2009	1	U	32,600		2	U	2	U	14,100		1	U	32,300	
R2	9/4/2009	1.25		34,200		2	U	2	U	15,500		2.14		29,700	
R3	12/28/2005	85		447		232		20	U	332		102		8,590	
R4D	12/28/2005	5	U	74,200		5	U	10	U	42,700		20	U	113,000	
R4S	12/28/2005	5	U	85,100		5.2		10	U	41,900		20	U	368,000	

Notes:
J = estimated value
U = not detected
µg/L = microgram per liter
SPL = Spent Pot Liner
1 = February 4, 2014 update – Result values for chromium, copper, and nickel should be regarded as overestimates of actual concentrations due to method interference (see Appendix E).

ATTACHMENT B
GROUNDWATER DATA COLLECTED DURING QUARTERLY MONITORING EVENTS SINCE 2011 BY MILLENNIUM BULK TERMINALS – LONGVIEW, LLC

Table B-1
Groundwater Field Sampling Parameters for the Closed BMP Area: 2011 to Current

Location ID	Date	Sample ID	Volume Purged (liters)	pH	Specific Conductance (µS/cm)	Temperature (^{o}C)	Turbidity at Start of Sampling, NTU	Turbidity at End of Sampling, NTU
RL-1S	3/2/2011	MBT-030211-08	3.5	5.82	234	9.47	43.2	34.5
RL-1S	5/10/2011	MBT-051011-08	3.2	5.75	373	9.93	42.9	89.0
RL-1S	7/27/2011	MBT-072711-15	6.5	4.12	366	11.47	19.7	17.7
RL-1S	10/6/2011	RL-1S-100611	4.0	6.34	410	12.13	8.89	17.3
RL-1S	1/12/2012	MBT-011212-15	9.5	7.38	244	8.54	80.3	24.8
RL-1S	4/5/2012	BMP-040512-07	9.5	7.98	176	9.16	41.4	52.3
RL-1S	7/12/2012	BMP-071212-07	6.6	4.96	273	11.83	18.4	20.2
RL-1S	10/4/2012	BMP-100412-01	1.9	6.40	313	12.30	83.3	15.9
RL-1S	2/13/2013	BMP-021313-06	4.7	6.11	206	10.85	18.4	18.9
RL-1S	4/24/2013	BMP-042413-07	4.7	5.85	175	10.06	9.7	9.4
RL-1S	7/17/2013	BMP-071713-06	4.7	5.61	248	11.51	59.7	32.9
RL-1D	3/3/2011	MBT-030311-13	18.2	6.55	1367	10.67	>1000	>1000
RL-1D	5/10/2011	MBT-051011-09	20.9	6.45	1324	11.09	>1000	>1000
RL-1D	7/26/2011	MBT-072611-08	19.0	6.27	1352	12.45	>1000	>1000
RL-1D	10/6/2011	RL-1D-100611	20.8	6.65	1268	12.40	354	61.9
RL-1D	1/11/2012	MBT-011112-08	17.0	7.34	1077	9.29	706	134
RL-1D	4/4/2012	BMP-040412-05	18.9	8.34	967	10.09	80.3	93.8
RL-1D	2/13/2013	BMP-021313-07	13.3	6.53	1318	10.85	>1000	53.7
RL-1D	4/24/2013	BMP-042413-08	15.1	6.47	1346	10.42	377.30	>1000
RL-1D	7/17/2013	BMP-071713-07	15.1	6.27	1321	11.87	161.00	114.0
RL-2S	3/4/2011	MBT-030411-17	24.6	9.86	6984	10.32	7.75	6.35
RL-2S	5/11/2011	MBT-051111-18	7.6	9.56	5241	10.79	2.86	17.1
RL-2S	7/27/2011	MBT-072711-16	6.5	9.65	6116	11.95	6.94	7.59
RL-2S	10/6/2011	RL-2S-100611	8.5	9.68	5470	13.03	5.54	6.75
RL-2S	1/12/2012	MBT-011212-16	5.7	10.56	7099	8.91	13.5	12.5
RL-2S	4/5/2012	BMP-040512-11	8.0	8.49	3246	10.39	25.7	27.8
RL-2S	7/12/2012	BMP-071212-09	6.0	9.53	5193	12.90	13.8	12.8
RL-2S	10/4/2012	BMP-100412-05	6.6	9.37	3250	13.04	22.0	6.36
RL-2S	2/13/2013	BMP-021313-08	5.7	9.10	5500	10.86	3.1	6.4

Table B-1
Groundwater Field Sampling Parameters for the Closed BMP Area: 2011 to Current

Location ID	Date	Sample ID	Volume Purged (liters)	pH	Specific Conductance (µS/cm)	Temperature (°C)	Turbidity at Start of Sampling, NTU	Turbidity at End of Sampling, NTU
RL-2S	4/24/2013	BMP-042413-10	5.7	9.75	4435	11.26	41.7	6.92
RL-2S	7/17/2013	BMP-071713-08	5.7	9.38	7259	12.02	4.3	2.47
RL-2D	3/3/2011	MBT-030311-12	2.6	6.92	4308	14.48	10.9	9.86
RL-2D	5/11/2011	MBT-051111-17	49.4	6.64	2366	11.20	2.60	2.86
RL-2D	7/26/2011	MBT-072611-11	47.5	6.49	2339	12.51	4.22	1.76
RL-2D	10/6/2011	RL-2D-100611	45.5	6.85	2596	11.72	5.15	5.65
RL-2D	1/11/2012	MBT-011112-11	48.3	7.71	2362	11.39	6.09	3.34
RL-2D	4/4/2012	BMP-040412-03	53.0	8.47	2069	10.85	8.20	11.5
RL-2D	7/11/2012	BMP-071112-03	45.4	6.54	2323	13.13	6.64	10.6
RL-2D	10/4/2012	BMP-100412-06	45.4	6.80	2740	11.84	14.9	22.8
RL-2D	2/12/2013	BMP-021213-04	45.4	6.61	3136	11.08	4.26	4.2
RL-2D	4/23/2013	BMP-042313-03	46.6	6.65	2451	11.43	1.32	1.83
RL-2D	7/16/2013	BMP-071613-03	45.4	6.48	2441	12.02	2.97	4.96
RL-3S	3/3/2011	MBT-030311-11	2.1	6.85	1071	10.05	11.7	6.57
RL-3S	5/11/2011	MBT-051111-15	3.5	6.73	1037	11.00	4.21	3.52
RL-3S	7/26/2011	MBT-072611-12	3.4	6.64	1583	15.81	8.40	2.72
RL-3S	10/6/2011	RL-3S-100611	2.8	6.91	1661	13.54	5.43	4.74
RL-3S	1/11/2012	MBT-011112-13	3.0	7.66	859	11.21	164	111
RL-3S	4/4/2012	BMP-040412-02	3.0	7.59	1189	9.41	80.3	64.7
RL-3S	7/11/2012	BMP-071112-04	3.2	6.77	1709	15.78	10.7	10.9
RL-3S	10/4/2012	BMP-100412-09	6.2	6.30	1224	14.25	5.48	5.48
RL-3S	2/13/2013	BMP-021313-09	4.8	6.70	1581	10.63	26.4	15.3
RL-3S	4/23/2013	BMP-042313-05	2.8	7.00	1309	13.29	7.38	13.27
RL-3S	7/16/2013	BMP-071613-04	4.5	6.78	1191	14.84	6.63	5.2
RL-3D	3/4/2011	MBT-030311-18	22.7	6.59	949	11.25	6.29	1000
RL-3D	5/11/2011	MBT-051111-16	26.6	6.59	935	13.85	>1000	>1000
RL-3D	7/27/2011	MBT-072711-17	19.0	6.43	1041	13.17	1000	>1000
RL-3D	10/6/2011	RL-3D-100611	18.2	6.65	1165	12.51	303	64.5

Table B-1
Groundwater Field Sampling Parameters for the Closed BMP Area: 2011 to Current

Location ID	Date	Sample ID	Volume Purged (liters)	pH	Specific Conductance (µS/cm)	Temperature (^oC)	Turbidity at Start of Sampling, NTU	Turbidity at End of Sampling, NTU
RL-3D	1/12/2012	MBT-011212-17	18.9	7.55	985	9.71	217	168
RL-3D	4/5/2012	BMP-040512-09	18.9	8.26	886	11.32	79.8	80.2
RL-3D	7/12/2012	BMP-071212-10	17.0	6.51	1156	13.97	47.1	47.8
RL-3D	10/4/2012	BMP-100412-08	19.8	7.29	1130	12.80	>1000	602
RL-3D	2/13/2013	BMP-021313-10	17.0	6.75	1072	11.13	97.24	81.8
RL-3D	4/24/2013	BMP-042413-11	17.0	6.73	1158	12.14	250.1	64.2
RL-3D	7/17/2013	BMP-071713-11	17.0	6.52	1176	13.29	133.5	116
RL-4S	3/3/2011	MBT-030311-14	9.1	7.00	526	10.77	188	165
RL-4S	5/11/2011	MBT-051111-14	9.5	6.51	574	12.19	68.3	88.9
RL-4S	7/27/2011	MBT-072711-18	8.0	6.29	548	15.49	44.2	131
RL-4S	10/6/2011	RL-4S-100611	6.0	6.55	506	16.34	42.2	147
RL-4S	1/12/2012	MBT-011212-18	7.6	7.28	459	10.55	108	99.1
RL-4S	4/5/2012	BMP-040512-06	7.6	9.87	400	10.08	137	113
RL-4S	7/12/2012	BMP-071212-11	7.0	6.36	543	15.10	46	68
RL-4S	10/4/2012	BMP-100412-10	5.7	7.48	476	17.83	36.6	35.4
RL-4S	2/13/2013	BMP-021313-11	8.5	6.60	427	11.04	105	77
RL-4S	4/24/2013	BMP-042413-12	8.5	6.54	520	12.41	52.46	59.08
RL-4S	7/17/2013	BMP-071713-12	8.5	6.46	560	15.63	70.71	49.38
RL-4D	3/3/2011	MBT-030311-10	64.4	6.43	705	12.64	696	733
RL-4D	5/11/2011	MBT-051111-13	60.8	6.38	668	13.08	19.9	23.8
RL-4D	7/26/2011	MBT-072611-14	58.9	6.24	653	13.90	18.7	15.3
RL-4D	10/6/2011	RL-4D-100611	56.8	6.62	674	13.30	1710	1676
RL-4D	1/11/2012	MBT-011112-14	60.6	6.95	557	12.86	1000	874
RL-4D	4/4/2012	BMP-040412-01	64.4	9.98	507	12.76	>1000	>1000
RL-4D	7/11/2012	BMP-071112-06	60.6	6.32	643	14.30	993	1000
RL-4D	10/4/2012	BMP-100412-11	56.7	6.76	633	13.55	321	>1000
RL-4D	2/13/2013	BMP-021313-12	60.2	6.19	653	12.79	138	86
RL-4D	4/23/2013	BMP-042313-06	60.2	6.50	653	13.40	405	302
RL-4D	7/16/2013	BMP-071613-05	56.8	6.44	667	14.08	327	311

Table B-1

Groundwater Field Sampling Parameters for the Closed BMP Area: 2011 to Current

Location ID	Date	Sample ID	Volume Purged (liters)	pH	Specific Conductance (µS/cm)	Temperature (°C)	Turbidity at Start of Sampling, NTU	Turbidity at End of Sampling, NTU
RL-5	3/4/2011	MBT-030311-15	2.4	6.22	625	9.37	20.1	21.1
RL-5	5/10/2011	MBT-051011-12	2.0	6.61	618	13.95	13.1	12.9
RL-5	7/26/2011	MBT-072611-13	2.4	5.90	638	13.92	11.7	8.01
RL-5	10/7/2011	RL-5-100711	5.7	6.49	628	11.01	105	15.0
RL-5	1/11/2012	MBT-011112-12	3.3	8.57	598	10.73	22.2	21.6
RL-5	4/5/2012	BMP-040512-12	5.1	7.79	387	10.42	25.4	24.9
RL-5	7/12/2012	BMP-071212-12	9.5	6.18	655	12.41	16.0	12.6
RL-5	10/4/2012	BMP-100412-12	4.9	6.10	609	10.27	9.83	24.8
RL-5	2/12/2013	BMP-021213-05	3.6	6.17	597	10.35	11.8	8.34
RL-5	4/23/2013	BMP-042313-04	3.0	6.57	581	13.69	14.56	13.47
RL-5	7/17/2013	BMP-071713-09	9.5	6.25	709	11.47	8.84	8.92

Notes:

°C = degrees Celsius

µS/cm = microSiemens per centimeter

BMP = Black Mud Pond

NTU = nephelometric turbidity units

Table B-2
Groundwater Monitoring Results for Closed BMP Area: 2011 to Current

Location ID	Sample ID	Date	Total Cyanide (mg/L)		WAD Cyanide (mg/L)		Free Cyanide (mg/L)		Fluoride (mg/L)		Fluoride Analytical Method	Chloride (mg/L)		Sulfate (mg/L)		Dissolved Arsenic (µg/L)		Dissolved Calcium (µg/L)		Dissolved [1]Chromium (µg/L)		Dissolved [1]Copper (µg/L)		Dissolved Magnesium (µg/L)		Dissolved [1]Nickel (µg/L)		Dissolved Sodium (µg/L)	
RL-1S	MBT-030211-08	3/2/2011	0.00500	U	0.00500	U	0.00500	U	2.59		USEPA 300.0/9056A	2.84		12.9		0.567	J	7550		0.500	J	11.6		3460		4.49		39600	
RL-1S	MBT-051011-08	5/10/2011	0.00500	U	0.00500	U	0.00500	UJ	7.99		USEPA 300.0/9056A	2.15		11.2		0.800	J	6980		1.66	J	17.4		3300		8.92		71500	
RL-1S	MBT-072711-15	7/27/2011	0.00800		0.00550		0.00500	U	7.42		USEPA 300.0/9056A	3.05		4.54		0.889	J	11400		1.70	J	2.51	J	5350		5.04		83100	
RL-1S	RL-1S-100611	10/6/2011	0.0154		0.00500		0.00500	U	9.79		USEPA 300.0/9056A	3.75		1.88		0.967	J	13600		2.32	U	4.00	U	6390		2.71		100000	
RL-1S	MBT-011212-15	1/12/2012	0.00500	U	0.00500	U	0.00500	U	3.20		USEPA 300.0/9056A	3.07		12.2		0.411	J	9230		0.789	J	3.87	J	4230		4.19		45200	
RL-1S	BMP-040512-07	4/5/2012	0.00500	U	0.00500	U	0.00500	U	7.78		SM4500-F-C (probe)	3.35		10.2		0.600		6630		1.07		14.8		2860		6.16		63900	
RL-1S	BMP-071212-07	7/12/2012	0.00500	U	0.00500	U	0.00500	U	3.76		SM4500-F-C (probe)	3.48		5.29		1.22	J	12500		1.31	J	1.28	J	5590		5.28		51600	
RL-1S	BMP-100412-01	10/4/2012	0.0329		0.00670		0.00500	U	16.3		SM4500-F-C (probe)	4.36		1.00	U	1.56	J	15300		1.74	J	2.00	U	7290		2.84		111000	
RL-1S	BMP-021313-06	2/13/2013	0.00500	U	0.00500	U	0.00210	J	1.88		SM4500-F-C (probe)	4.28		9.71		0.500	U	9610		0.500	U	1.38	J	4550		3.00		31200	
RL-1S	BMP-042413-07	4/24/2013	0.00500	U	0.00500	U	0.00200	U	1.60		SM4500-F-C (probe)	2.81		10.80		0.370		9260		0.500	U	1.71	J	4400		2.86		29700	
RL-1S	BMP-071713-06	7/17/2013	0.00550		0.00500	U	0.00200	U	2.83		SM4500-F-C (probe)	2.77		2.68		0.323		13900		0.811	J	1.00	U	6400		2.06		43100	
RL-1D	MBT-030311-13	3/3/2011	0.0150	U	0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	2.82		1.00	U	1.32	J	134000		0.244	J	0.411	J	63200		1.53	J	26000	
RL-1D	MBT-051011-09	5/10/2011	0.00500	U	0.0150	U	0.00500	UJ	1.00	U	USEPA 300.0/9056A	2.69		1.00	U	1.18	J	117000		1.36	J	0.578	J	60500		0.678	J	24800	
RL-1D	MBT-072611-08	7/26/2011	0.0150	U	0.0150	U	0.00500	UJ	---	R	SM4500-F (probe)	2.74		1.00	U	1.37	J	111000		2.0	U	4.00	U	58900		0.900	J	23900	
RL-1D	RL-1D-100611	10/6/2011	0.00500	U	0.00500	U	0.00500	U	0.333		SM4500-F (probe)	2.85		1.00	U	1.20	J	122000		2.0	U	4.00	U	58900		1.09	J	24000	
RL-1D	MBT-011112-08	1/11/2012	0.00500	U	0.00500	U	0.00500	U	0.330		SM4500-F (probe)	2.77		1.00	U	1.04		130000		1.72		4.00	U	63100		1.62	J	24300	
RL-1D	BMP-040412-05	4/4/2012	0.00500	U	0.00500	U	0.00500	UJ	0.395		SM4500-F-C (probe)	2.16		1.00	U	1.31	J	125000		1.59	J	4.00	U	62400		2.28		25100	
RL-1D	BMP-071212-08	7/12/2012	0.00500	U	0.00500	U	0.00500	U	0.289		SM4500-F-C (probe)	2.80		1.00	U	1.39	J	120000		0.844	J	2.00	U	59500		2.54		24800	
RL-1D	BMP-100412-02	10/4/2012	0.00500	U	0.00500	U	0.00500	U	0.357		SM4500-F-C (probe)	2.86		1.00	U	0.967	J	250000		4.00	U	2.00	U	122000		1.73	J	24500	
RL-1D	BMP-021313-07	2/13/2013	0.00500	U	0.00500	U	0.00200	U	0.313		SM4500-F-C (probe)	2.88		1.00	U	0.967	J	114000		0.856	J	1.00	U	60300		1.71	J	24800	
RL-1D	BMP-042413-08	4/24/2013	0.00500	U	0.00500	U	0.00200	U	0.256		SM4500-F-C (probe)	2.85		1.00	U	1.180	J	126000		0.678	J	1.00	U	66000		1.00	J	25500	
RL-1D (FD)	BMP-042413-09	4/24/2013	0.00500	U	0.00500	U	0.00200	U	0.262		SM4500-F-C (probe)	2.83		1.00	U	1.140	J	120000		0.711	J	1.00	U	62600		1.17	J	26100	
RL-1D	BMP-071713-07	7/17/2013	0.00500	U	0.00500	U	0.00200	U	0.306		SM4500-F-C (probe)	2.79		1.00	U	0.989	J	120000		1.340	J	1.00	U	58600		1.79	J	24000	
RL-2S	MBT-030411-17	3/4/2011	29.0		0.0501		0.00500	U	117		USEPA 300.0/9056A	42.0		297		12.2	J	1690		22.9		3.11	J	342	J	22.9		755000	
RL-2S	MBT-051111-18	5/11/2011	15.7		0.0398		0.00500	U	69.1		USEPA 300.0/9056A	33.0		146		19.7		5750		31.8		4.39	J	1060		27.1		1200000	
RL-2S	MBT-072711-16	7/27/2011	12.4		0.140		0.00220	J	57.1		USEPA 300.0/9056A	31.8		127		2.82		1080		5.97		1.00	J	199		4.5		160000	
RL-2S	RL-2S-100611	10/6/2011	21.3		0.106		0.03220		72.3		USEPA 300.0/9056A	39.4		164		19.5		4510		35.8		20.0	U	882		26.1		1040000	
RL-2S	MBT-011212-16	1/12/2012	26.4		0.184		0.00500	U	1.75		USEPA 300.0/9056A	1.06		5.57		37.6		9680		94.9		40.0	U	3210		77.9		2230000	
RL-2S	BMP-040512-11	4/5/2012	8.82		0.0740		0.00500	U	26.2		SM4500-F-C (probe)	14.1		69.0		16.1		5210		33.9		7.14		1310		25.5		960000	
RL-2S	BMP-071212-09	7/12/2012	15.1		0.116		0.00500	U	58.6		SM4500-F-C (probe)	36.6		157		33.0		11900		56.7		2.00	U	2420		57.6		1480000	
RL-2S	BMP-100412-05	10/4/2012	19.2		0.0248		0.00500	U	69.4		SM4500-F-C (probe)	33.2		166		34.0		9730		66.7		20.0	U	2140		65.9		1750000	
RL-2S	BMP-021313-08	2/13/2013	11.0		0.0334		0.00200	U	81.4		SM4500-F-C (probe)	34.8		186		23.3		8910		51.2		9.51		2560		33.8		1160000	
RL-2S	BMP-042413-10	4/24/2013	23.6		0.0373		0.00200	U	86.3		SM4500-F-C (probe)	42.4		225		41.6		11900		92.5		12.60	J	3180		69.0		2260000	
RL-2S	BMP-071713-08	7/17/2013	12.5		0.0471		0.00200	U	83.8		SM4500-F-C (probe)	54.3		214		33.0	J	9830		66.8		22.50	U	3430		50.2		1970000	
RL-2D	MBT-030311-12	3/3/2011	0.880		0.0278		0.00500	U	20.2		USEPA 300.0/9056A	39.2		42.0		10.0	J	79800		13.1	J	40.0	U	35000		13.6	J	923000	
RL-2D	MBT-051111-17	5/11/2011	0.228		0.0103		0.00500	U	9.83		USEPA 300.0/9056A	30.1		15.4		3.94		70600		4.66		0.578	J	36400		4.07		469000	
RL-2D	MBT-072611-11	7/26/2011	0.258		0.0106	U	0.00500	UJ	8.04		USEPA 300.0/9056A	28.5		10.4		2.69		73600		2.64		0.322	J	39700		2.71		284000	
RL-2D	RL-2D-100611	10/6/2011	0.562		0.0205		0.00500	U	10.4		USEPA 300.0/9056A	35.2		15.7		5.84		66700		9.97		4.00	U	32300		6.63		590000	
RL-2D	MBT-011112-11	1/11/2012	0.208		0.0128		0.00500	U	10.8	J	USEPA 300.0/9056A	31.8		15.2		3.72		72200		3.78	J	4.00	U	36800		6.76		491000	

Table B-2
Groundwater Monitoring Results for Closed BMP Area: 2011 to Current

Location ID	Sample ID	Date	Total Cyanide (mg/L)		WAD Cyanide (mg/L)		Free Cyanide (mg/L)		Fluoride (mg/L)		Fluoride Analytical Method	Chloride (mg/L)		Sulfate (mg/L)		Dissolved Arsenic (µg/L)		Dissolved Calcium (µg/L)		Dissolved [1]Chromium (µg/L)		Dissolved [1]Copper (µg/L)		Dissolved Magnesium (µg/L)		Dissolved [1]Nickel (µg/L)		Dissolved Sodium (µg/L)	
RL-2D	BMP-040412-03	4/4/2012	**0.894**	J	**0.0277**		0.00500	UJ	**20.2**		SM4500-F (probe)	**39.4**		**33.5**		**6.61**	J	**76100**		**7.94**	J	10.00	U	**37400**		**15.0**		**691000**	
RL-2D (FD)	BMP-040412-04	4/4/2012	**0.574**	J	**0.0215**		0.00500	UJ	**20.4**		SM4500-F (probe)	**39.7**		**33.1**		**7.33**	J	**77200**		**7.83**	J	10.00	U	**37900**		**15.1**		**680000**	
RL-2D	BMP-071112-03	7/11/2012	**1.02**		**0.0230**		0.00500	U	**10.2**		SM4500-F (probe)	**33.6**		**12.6**		**5.11**		**73900**		**6.47**		2.00	U	**35300**		**8.53**		**584000**	
RL-2D	BMP-100412-06	10/4/2012	**0.112**		0.0200	U	0.00500	U	**13.3**		SM4500-F (probe)	**32.5**		**17.4**		**4.72**	J	**75100**		**4.56**	J	10.0	U	**36800**		**10.5**		**563000**	
RL-2D (FD)	BMP-100412-07	10/4/2012	**0.115**		**0.0129**		0.00500	U	**13.7**		SM4500-F (probe)	**32.5**		**18.1**		**4.83**	J	**73500**		**3.89**	J	10.0	U	**35900**		**10.1**		**580000**	
RL-2D	BMP-021213-04	2/12/2013	**0.239**		**0.0196**		0.00200	U	**16.6**		SM4500-F (probe)	**40.4**		**27.6**		**7.66**		**60500**		**12.4**		**1.47**		**31800**		**7.74**		**711000**	
RL-2D	BMP-042313-03	4/23/2013	**0.0891**		**0.0142**		**0.00400**	J	**12.3**		SM4500-F (probe)	**35.2**		**15.9**		**3.81**		**73200**		**4.89**		1.00	U	**35400**		**3.9**		**478000**	
RL-2D	BMP-071613-03	7/16/2013	**0.464**		**0.0135**		0.00200	U	**10.3**		SM4500-F (probe)	**34.0**		**14.1**		**3.9**		**76900**		**5.11**		1.00	U	**35200**		**3.79**		**466000**	
RL-3S	MBT-030311-11	3/3/2011	**0.0226**		**0.00840**		0.00500	U	**3.07**		USEPA 300.0/9056A	**9.72**		1.00	U	**12.9**		**62300**		2.00	U	**0.311**	J	**31400**		**1.66**	J	**172000**	
RL-3S	MBT-051111-15	5/11/2011	**0.0297**		0.00500	U	0.00500	U	**3.62**		USEPA 300.0/9056A	**9.92**		1.00	U	**12.9**		**57000**		**1.51**	J	**0.322**	J	**27100**		**1.23**	J	**155000**	
RL-3S	MBT-072611-12	7/26/2011	**0.0422**		0.0100	U	0.00500	U	**6.09**		USEPA 300.0/9056A	**14.0**		1.00	U	**10.4**		**58600**		2.0	U	4.00	U	**32600**		**1.77**	J	**253000**	
RL-3S	RL-3S-100611	10/6/2011	**0.0271**		**0.00740**		0.00500	U	**4.12**		USEPA 300.0/9056A	**10.5**		**1.46**		**17.6**		**65700**		2.0	U	4.00	U	**27700**		**1.84**	J	**164000**	
RL-3S	MBT-01112-13	1/11/2012	**0.0245**		**0.00670**		0.00500	U	**2.95**	J	USEPA 300.0/9056A	**11.2**		**3.56**		**6.13**		**71200**		**1.02**		4.00	U	**33300**		**3.76**		**152000**	
RL-3S	BMP-040412-02	4/4/2012	**0.0354**	J	**0.0129**		0.00500	UJ	**7.38**		SM4500-F (probe)	**17.3**		1.00	U	**9.42**		**84300**		**1.77**	J	4.00	U	**43200**		**4.53**		**243000**	
RL-3S	BMP-071112-04	7/11/2012	**0.0520**		**0.0138**		0.00500	U	**7.59**		SM4500-F (probe)	**18.5**		10.0	U	**8.16**		**79200**		**1.38**	J	2.00	U	**41300**		**6.03**		**260000**	
RL-3S (FD)	BMP-071112-05	7/11/2012	**0.0529**		**0.0136**		0.00500	U	**7.68**		SM4500-F (probe)	**18.3**		10.0	U	**8.09**		**75300**		**1.32**	J	2.00	U	**40500**		**5.84**		**255000**	
RL-3S	BMP-100412-09	10/4/2012	**0.0349**		**0.00960**		0.00500	U	**6.28**		SM4500-F (probe)	**11.5**		1.00	U	**12.1**		**64000**		**0.933**	J	2.00	U	**30100**		**3.04**		**181000**	
RL-3S	BMP-021313-09	2/13/2013	**0.0393**		**0.01060**		0.00200	U	**7.75**		SM4500-F (probe)	**17.2**		**2.17**		**8.97**		**83400**		**1.220**	J	1.00	U	**46500**		**2.20**		**233000**	
RL-3S	BMP-042313-05	4/23/2013	**0.0448**		**0.00630**		0.00200	U	**9.98**		SM4500-F (probe)	**10.9**		**13.90**		**7.33**		**52200**		**0.733**	J	1.00	U	**30800**		**1.62**	J	**181000**	
RL-3S	BMP-071613-04	7/16/2013	**0.0468**		**0.00910**		0.00200	U	**13.0**		SM4500-F (probe)	**8.85**		**13.0**		**6.66**		**36600**		**1.280**	J	1.00	U	**21200**		**1.41**	J	**171000**	
RL-3D	MBT-030411-18	3/4/2011	0.00500	U	0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**3.90**		1.00	U	**1.66**	J	**99900**		2.00	U	**0.378**	J	**51900**		**1.19**	J	**35300**	
RL-3D	MBT-051111-16	5/11/2011	0.0300	U	0.0150	U	**0.00200**	J	1.00	U	USEPA 300.0/9056A	**3.67**		1.00	U	**1.58**	J	**101000**		**1.36**	J	**0.300**	J	**50800**		**0.489**	J	**30600**	
RL-3D	MBT-072711-17	7/27/2011	0.0150	U	0.0150	U	**0.00350**	J	**0.223**	J	SM4500-F (probe)	**3.33**		1.00	U	**1.42**	J	**100000**		2.0	U	**0.511**	J	**52100**		**0.767**	J	**29600**	
RL-3D	RL-3D-100611	10/6/2011	0.00500	U	0.00500	U	0.00500	U	**0.267**		SM4500-F (probe)	**3.63**		1.00	U	**1.48**	J	**118000**		2.0	U	4.00	U	**54900**		**1.40**	J	**29000**	
RL-3D	MBT-011212-17	1/12/2012	0.00500	U	0.00500	U	0.00500	U	**0.457**		SM4500-F (probe)	**3.99**		1.00	U	**1.21**		**108000**		**1.14**		4.00	U	**52700**		**1.93**	J	**33400**	
RL-3D	BMP-040512-09	4/5/2012	0.00500	U	0.00500	U	0.00500	U	**0.470**		SM4500-F-C (probe)	**4.14**		1.00	U	**1.79**		**113000**		**1.00**		2.00	U	**55200**		**1.73**	J	**36500**	
RL-3D	BMP-071212-10	7/12/2012	0.00500	U	0.00500	U	0.00500	U	**0.314**		SM4500-F-C (probe)	**4.01**		1.00	U	**1.53**	J	**105000**		**0.567**	J	2.00	U	**51400**		**2.33**		**32800**	
RL-3D	BMP-100412-08	10/4/2012	0.00500	U	0.00500	U	0.00500	U	**0.368**		SM4500-F-C (probe)	**3.87**		1.00	U	**1.32**	J	**117000**		**0.589**	J	2.00	U	**55800**		**1.87**	J	**32000**	
RL-3D	BMP-021313-10	2/13/2013	0.00500	U	0.00500	U	0.00200	U	**0.316**		SM4500-F-C (probe)	**3.86**		1.00	U	**1.14**	J	**102000**		**0.922**	J	1.00	U	**52600**		**1.83**	J	**32200**	
RL-3D	BMP-042413-11	4/24/2013	0.00500	U	0.00500	U	0.00200	U	**0.301**		SM4500-F-C (probe)	**3.74**		1.00	U	**0.522**	J	**109000**		**0.589**	J	**1.73**	J	**45200**		**0.83**	J	**25500**	
RL-3D	BMP-071713-11	7/17/2013	**0.00500**	U	0.00500	U	0.00200	U	**0.260**		SM4500-F-C (probe)	**3.69**		1.00	U	**1.29**	J	**110000**		**1.00**	J	1.00	U	**52400**		**1.38**	J	**28800**	
RL-4S	MBT-030311-14	3/3/2011	0.00500	U	0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**9.20**		**1.74**		**4.01**		**37700**		2.00	U	**0.300**	J	**20800**		**1.63**	J	**42200**	
RL-4S	MBT-051111-14	5/11/2011	**0.00610**		0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**10.3**		**2.45**		**3.23**		**37900**		**1.47**	J	**0.356**	J	**19700**		**1.10**	J	**37100**	
RL-4S	MBT-072711-18	7/27/2011	0.00500	U	0.00500	U	**0.00440**	J	**0.761**	J	SM4500-F (probe)	**11.1**		**1.13**		**5.16**		**33400**		2.0	U	4.00	U	**18300**		**1.14**	J	**33900**	
RL-4S	RL-4S-100611	10/6/2011	0.00500	U	0.00500	U	0.00500	U	**0.940**		SM4500-F (probe)	**12.0**		1.00	U	**3.14**		**32700**		2.0	U	4.00	U	**18000**		**1.46**	J	**34600**	
RL-4S	MBT-011212-18	1/12/2012	0.00500	U	0.00500	U	0.00500	U	**0.901**		SM4500-F (probe)	**11.9**		**2.23**		**2.59**		**41000**		**0.967**	J	4.00	U	**21400**		**1.97**	J	**38600**	
RL-4S	BMP-040512-06	4/5/2012	0.00500	U	0.00500	U	0.00500	U	**0.911**		SM4500-F (probe)	**12.8**		**1.20**		**2.23**		**43200**		**0.778**	J	2.00	U	**22000**		**1.61**	J	**37900**	
RL-4S	BMP-071212-11	7/12/2012	0.00500	U	0.00500	U	0.00500	U	**0.744**		SM4500-F (probe)	**13.8**		**1.18**		**3.34**		**38500**		**0.744**	J	2.00	U	**19800**		**1.88**	J	**35200**	
RL-4S	BMP-100412-10	10/4/2012	0.00500	U	**0.00650**		0.00500	U	**0.882**		SM4500-F (probe)	**12.0**		1.00	U	**4.34**		**36500**		**0.578**	J	2.00	U	**19100**		**1.56**	J	**34800**	

Table B-2

Groundwater Monitoring Results for Closed BMP Area: 2011 to Current

Location ID	Sample ID	Date	Total Cyanide (mg/L)		WAD Cyanide (mg/L)		Free Cyanide (mg/L)		Fluoride (mg/L)		Fluoride Analytical Method	Chloride (mg/L)		Sulfate (mg/L)		Dissolved Arsenic (µg/L)		Dissolved Calcium (µg/L)		Dissolved [1]Chromium (µg/L)		Dissolved [1]Copper (µg/L)		Dissolved Magnesium (µg/L)		Dissolved [1]Nickel (µg/L)		Dissolved Sodium (µg/L)	
RL-4S	BMP-021313-11	2/13/2013	0.00500	U	0.00500		0.00200	U	**0.790**		SM4500-F (probe)	**12.7**		**3.54**		**1.94**	J	**40500**		**0.722**	J	1.00	U	**21500**		**1.49**	J	**38300**	
RL-4S	BMP-042413-12	4/24/2013	0.00500	U	0.00500		0.00200	U	**0.901**		SM4500-F (probe)	**12.0**		**2.41**		**2.99**		**38400**		**0.656**	J	1.00	U	**21100**		**1.12**	J	**37000**	
RL-4S	BMP-071713-12	7/17/2013	0.00500	U	0.00500		0.00200	U	**0.872**		SM4500-F (probe)	**11.0**		**2.45**		**3.92**		**39400**		**1.93**	J	1.00	U	**20300**		**1.34**	J	**36100**	
RL-4D	MBT-030311-10	3/3/2011	0.00500	U	0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**9.31**		**13.1**		**1.39**	J	**50500**		**0.267**	J	4.00	U	**24300**		**0.778**	J	**27600**	
RL-4D	MBT-051111-13	5/11/2011	**0.0510**		0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**9.81**		**11.0**		**1.56**	J	**45900**		**1.29**	J	4.00	U	**23100**		2.00	U	**25100**	
RL-4D	MBT-072611-14	7/26/2011	0.00500	U	0.00500	U	0.00500	UJ	**0.296**	J	SM4500-F (probe)	**10.0**		**8.98**		**1.52**	J	**44300**		2.0	U	4.00	U	**22400**		**0.656**	J	**24400**	
RL-4D	RL-4D-100611	10/6/2011	0.00500	U	0.00500	U	0.00500	U	**0.300**		SM4500-F (probe)	**10.2**		**7.05**		**1.39**	J	**44700**		2.0	U	4.00	U	**22000**		**0.778**	J	**24400**	
RL-4D	MBT-011112-14	1/11/2012	0.00500	U	0.00500	U	0.00500	U	**0.331**		SM4500-F (probe)	**10.7**		**6.06**		**1.46**		**50100**		**0.944**	J	4.00	U	**24200**		**1.24**	J	**26200**	
RL-4D	BMP-040412-01	4/4/2012	0.00500	U	0.00500	U	0.00500	UJ	**0.411**		SM4500-F (probe)	**11.5**		**5.66**		**1.61**	J	**49300**		**1.19**	J	4.00	U	**23100**		**1.07**	J	**26200**	
RL-4D	BMP-07112-06	7/11/2012	**0.00660**		0.00500	U	0.00500	U	**0.353**		SM4500-F (probe)	**12.3**		**4.15**		**1.20**	J	**46400**		**0.689**	J	2.00	U	**21500**		**1.53**	J	**25300**	
RL-4D	BMP-100412-11	10/4/2012	0.00500	U	**0.00760**		0.00500	U	**0.406**		SM4500-F (probe)	**12.1**		**2.51**		**1.30**	J	**45400**		**0.900**	J	2.00	U	**21300**		**1.07**	J	**25100**	
RL-4D	BMP-021313-12	2/13/2013	0.00500	U	0.00500		0.00200	U	**0.350**		SM4500-F (probe)	**13.1**		**3.95**		**0.967**	J	**49000**		**0.533**	J	1.00	U	**23400**		**0.956**	J	**27700**	
RL-4D	BMP-042313-06	4/23/2013	0.00500	U	0.00500		0.00200	U	**0.422**		SM4500-F (probe)	**13.3**		**5.10**		**0.900**	J	**44600**		0.500	U	1.00	U	**22000**		**0.700**	J	**27000**	
RL-4D	BMP-071613-05	7/16/2013	0.00500	U	0.00500		0.00200	U	**0.362**		SM4500-F (probe)	**13.0**		**4.28**		**1.040**	J	**43400**		**0.844**	J	1.00	U	**20100**		**0.778**	J	**25300**	
RL-5	MBT-030411-15	3/4/2011	**0.0184**		**0.00780**		0.00500	U	**2.73**		USEPA 300.0/9056A	**7.96**		**60.1**		**1.18**	J	**8380**		**0.844**	J	**19.1**		**3730**		**6.14**		**139000**	
RL-5	MBT-051011-12	5/10/2011	**0.0230**		**0.00570**		**0.00200**	J	**2.82**		USEPA 300.0/9056A	**7.21**		**56.7**		**1.04**	J	**8340**		**1.59**	J	**20.6**		**3880**		**6.73**		**134000**	
RL-5	MBT-072611-13	7/26/2011	**0.0288**		0.00500	U	0.00500	UJ	**2.39**		USEPA 300.0/9056A	**7.95**		**76.7**		**1.33**	J	**7860**		2.0	U	**11.6**		**3690**		**4.69**		**124000**	
RL-5	RL-5-100711	10/7/2011	**0.0332**		**0.00640**		0.00500	U	**2.26**		USEPA 300.0/9056A	**8.55**		**78.2**		**1.32**	J	**8980**		2.0	U	**22.7**		**4330**		**8.23**		**148000**	
RL-5	MBT-011112-12	1/11/2012	**0.0683**		**0.0136**		0.00500	U	**2.88**	J	USEPA 300.0/9056A	**9.04**		**93.6**		**1.20**		**11000**		**1.12**		**21.7**		**4800**		**8.41**		**160000**	
RL-5	BMP-040512-12	4/5/2012	**0.0275**		**0.00670**		0.00500	U	**3.04**		SM4500-F-C (probe)	**7.04**		**48.6**		**0.867**		**7520**		**1.41**		**20.1**		**3180**		**6.26**		**122000**	
RL-5	BMP-071212-12	7/12/2012	**0.0378**		**0.00600**		0.00500	U	**2.50**		SM4500-F-C (probe)	**8.19**		**105**		**1.41**	J	**10500**		**0.700**	J	**19.1**		**4490**		**7.34**		**151000**	
RL-5	BMP-100412-12	10/4/2012	**0.0314**		**0.00990**		0.00500	U	**2.79**		SM4500-F-C (probe)	**8.04**		**77.5**		**1.50**	J	**9570**		**1.16**	J	**17.8**		**4150**		**8.29**		**141000**	
RL-5	BMP-021213-05	2/12/2013	**0.0355**		**0.00940**		0.00200	U	**2.73**		SM4500-F-C (probe)	**7.03**		**61.9**		**1.18**	J	**8170**		**1.17**	J	**21.4**		**3540**		**6.24**		**136000**	
RL-5	BMP-042313-04	4/23/2013	**0.0263**		0.00500	U	0.00200	U	**3.56**		SM4500-F-C (probe)	**6.30**		**46.0**		**1.12**	J	**7630**		**1.09**	J	**24.1**		**3380**		**6.92**		**124000**	
RL-5	BMP-071713-09	7/17/2013	**0.0283**		**0.00530**		0.00200	U	**2.59**		SM4500-F-C (probe)	**6.79**		**84.0**		**1.01**	J	**8790**		**1.00**	J	**18.4**		**3940**		**6.13**		**136000**	
RL-5 (FD)	BMP-071713-10	7/17/2013	**0.0344**		**0.00550**		0.00200	U	**2.64**		SM4500-F-C (probe)	**6.78**		**83.9**		**1.14**	J	**9160**		**1.02**	J	**19.4**		**4150**		**6.47**		**142000**	

Notes:

µg/L = micrograms per liter (parts per billion)

J = estimated value

R = rejected and unusable value

U = not detected above method reporting limit

BMP = Black Mud Pond (Closed BMP Facility)

FD = field duplicate sample

mg/L = milligrams per liter (parts per million)

WAD = weak acid dissociable

1 = February 4, 2014 update – Result values for chromium, copper, and nickel should be regarded as overestimates of actual concentrations due to method interference (see Appendix E).

Table B-3
Groundwater Field Sampling Parameters for the Former SPL Area: 2011 to Current

Location ID	Sample ID	Date	pH	Specific Conductance (µS/cm)	Temperature (degrees Celsius)	Turbidity at Start of Sampling, NTU	Turbidity at End of Sampling, NTU
R-1S	MBT-030211-04	3/2/2011	7.19	619	10.26	15.5	5.08
R-1S	MBT-050911-03	5/9/2011	7.23	538	11.10	3.8	4.44
R-1S	MBT-072511-02	7/25/2011	6.69	485	14.22	1.4	1.99
R-1S	R-1S-100511	10/5/2011	7.37	555	14.05	2.0	1.92
R-1S	MBT-011012-03	1/10/2012	7.69	408	11.78	11.0	7.37
R-1S	SPL-040312-06	4/3/2012	8.89	383	10.10	21.6	10.10
R-1S	SPL-070912-04	7/9/2012	7.01	507	14.37	1.7	1.27
R-1S	SPL-100312-06	10/3/2012	7.14	485	15.29	9.94	2.28
R-1S	SPL-021113-02	2/11/2013	6.82	473	10.32	6.9	6.13
R-1S	SPL-042213-03	4/22/2013	7.29	567	12.51	4.07	4.32
R-1S	SPL-042213-03	7/15/2013	7.01	480	15.61	8.42	2.45
R-1D	MBT-030211-07	3/2/2011	6.50	2,038	11.08	42.4	53.7
R-1D	MBT-050911-06	5/9/2011	6.36	2,001	12.37	56.1	42.7
R-1D	MBT-072511-04	7/25/2011	6.11	2,005	13.29	83.7	77.8
R-1D	R-1D-100511	10/5/2011	6.57	2,012	12.55	83.9	72.0
R-1D	MBT-011012-04	1/10/2012	6.72	1,603	11.39	61.6	48.5
R-1D	SPL-040312-07	4/3/2012	8.61	1,502	11.20	33.1	61.6
R-1D	SPL-070912-05	7/9/2012	6.25	2,045	13.78	28.1	30.5
R-1D	SPL-100312-05	10/3/2012	6.71	1,965	13.58	32.16	35.3
R-1D	SPL-021113-03	2/11/2013	6.45	2,004	10.27	37.0	37.0
R-1D	SPL-0242213-04	4/22/2013	6.56	2,040	11.97	45.34	47.16
R-1D	SPL-0242213-04	7/15/2013	6.36	2,060	14.33	50.39	32.25
R-2	MBT-030211-06	3/2/2011	6.45	410	8.11	7.82	10.1
R-2	MBT-050911-01	5/9/2011	6.20	378	10.48	6.77	6.3
R-2	MBT-072511-07	7/25/2011	5.12	413	12.12	195	161.0
R-2	R-2-100511	10/5/2011	6.69	510	11.71	23.10	19.8
R-2	MBT-011012-01	1/10/2012	7.46	319	9.93	9.23	8.94
R-2	SPL-040312-01	4/3/2012	10.04	265	8.51	4.12	3.06
R-2	SPL-070912-01	7/9/2012	6.31	394	12.35	5.37	5.19

Table B-3
Groundwater Field Sampling Parameters for the Former SPL Area: 2011 to Current

Location ID	Sample ID	Date	pH	Specific Conductance (µS/cm)	Temperature (degrees Celsius)	Turbidity at Start of Sampling, NTU	Turbidity at End of Sampling, NTU
R-2	SPL-100312-01	10/3/2012	6.74	418	11.48	3.66	1.62
R-2	SPL-021113-01	2/11/2013	6.23	384	8.80	8.24	4.6
R-2	SPL-042213-01	4/22/2013	6.57	394	10.07	12.16	11.4
R-2	SPL-042213-01	7/15/2013	6.39	400	12.65	19.01	18.26
R-3	MBT-030211-05	3/2/2011	10.12	23,987	9.77	6.02	10.1
R-3	MBT-050911-02	5/9/2011	10.10	22,888	12.51	23.50	24.7
R-3	MBT-072511-03	7/25/2011	10.19	22,920	13.09	33.50	8.74
R-3	R-3-100511	10/5/2011	10.12	22,330	12.49	1.69	1.52
R-3	MBT-011012-02	1/10/2012	10.59	18,990	12.09	2.99	3.47
R-3	SPL-040312	4/3/2012	10.95	17,150	11.50	4.17	4.86
R-3	SPL-070912-02	7/9/2012	10.07	22,349	17.47	2.52	2.61
R-3	SPL-100312-07	10/3/2012	10.16	22,084	16.32	2.09	2.09
R-3	SPL-021213-06	2/12/2013	10.38	21,635	9.47	3.12	2.81
R-3	SPL-042213-02	4/22/2013	10.07	21,472	14.02	1.4	1.27
R-3	SPL-042213-02	7/15/2013	10.02	22,209	17.56	0.34	0.21
R-4S	MBT-030111-03	3/1/2011	7.08	1,915	11.64	40.0	41.5
R-4S	MBT-050911-05	5/9/2011	6.79	1,967	11.50	59.0	24.3
R-4S	MBT-072511-05	7/25/2011	6.48	1,887	12.81	441	433
R-4S	R-4S-100511	10/5/2011	6.88	1,755	13.56	37.8	28.1
R-4S	MBT-011012-07	1/10/2012	8.22	1,483	11.92	32.6	39.1
R-4S	SPL-040312-04	4/3/2012	8.41	1,294	12.02	26.8	31.7
R-4S	SPL-070912-07	7/9/2012	6.31	1,928	12.81	41.2	38.6
R-4S	SPL-100312-02	10/3/2012	7.01	1,686	13.91	5.79	18.8
R-4S	SPL-021213-07	2/12/2013	7.40	1,907	11.52	29.38	33.93
R-4S	SPL-042213-07	4/22/2013	7.17	1,987	11.29	23.76	34.29
R-4S	SPL-042213-07	7/15/2013	7.00	1,986	13.34	5.49	13.69
R-4D	MBT-030111-01	3/1/2011	6.57	1,328	11.59	83.6	77.6
R-4D	MBT-050911-04	5/9/2011	6.53	1,305	12.53	68.8	58.9

Table B-3

Groundwater Field Sampling Parameters for the Former SPL Area: 2011 to Current

Location ID	Sample ID	Date	pH	Specific Conductance (µS/cm)	Temperature (degrees Celsius)	Turbidity at Start of Sampling, NTU	Turbidity at End of Sampling, NTU
R-4D	MBT-072511-01	7/25/2011	6.35	1,292	13.22	317	266
R-4D	R-4D-100511	10/5/2011	6.69	1,159	12.80	41.3	5.25
R-4D	MBT-011012-05	1/10/2012	7.99	1,064	11.86	20.1	21.1
R-4D	SPL-040312-03	4/3/2012	8.79	986	12.23	56.0	37.8
R-4D	SPL-070912-06	7/9/2012	6.44	1,293	14.64	63.6	44.1
R-4D	SPL-100312-03	10/3/2012	6.80	1,280	13.95	7.10	11.0
R-4D	SPL-021113-04	2/11/2013	6.62	1,277	11.61	28.0	52
R-4D	SPL-042213-06	4/22/2013	6.57	1,253	13.00	447.30	479.6
R-4D	SPL-042213-06	7/15/2013	6.40	1,292	15.53	54.83	51.2

Notes:

µS/cm = microSiemens per centimeter

NTU = nephelometric turbidity units

SPL = Spent Pot Liner

Table B-4
Groundwater Monitoring Results for the Former SPL Area: 2011 to Current

Location ID	Sample ID	Date	Total Cyanide (mg/L)		WAD Cyanide (mg/L)		Free Cyanide (mg/L)		Fluoride (mg/L)		Fluoride Analytical Method	Chloride (mg/L)	
R-1S	MBT-030211-04	3/2/2011	**0.0170**		**0.0125**		0.00500	U	**39.9**		USEPA 300.0/9056A	**1.51**	
R-1S	MBT-050911-03	5/9/2011	**0.0207**		0.00670	U	0.00500	U	**35.4**		USEPA 300.0/9056A	**2.95**	
R-1S	MBT-072511-02	7/25/2011	**0.0199**		**0.0178**		0.00500	UJ	**32.5**		USEPA 300.0/9056A	**2.24**	
R-1S	R-1S-100511	10/5/2011	**0.0331**		**0.0123**		0.00500	U	**30.1**		USEPA 300.0/9056A	**2.38**	
R-1S	MBT-011012-03	1/10/2012	**0.0395**		**0.00910**		0.00500	U	**37.6**		USEPA 300.0/9056A	**3.07**	
R-1S	SPL-040312-06	4/3/2012	**0.0240**	**J**	**0.01140**		0.00500	U	**41.2**		SM4500-F (probe)	**1.61**	
R-1S	SPL-070912-04	7/9/2012	**0.0226**		**0.00870**		0.00500	U	**35.6**		SM4500-F (probe)	**3.62**	
R-1S	SPL-100312-06	10/3/2012	**0.0417**		**0.0111**		0.00500	U	**29.8**		SM4500-F (probe)	**2.86**	
R-1S	SPL-021113-02	2/11/2013	**0.0343**		**0.00830**		0.00200	U	**30.3**		SM4500-F (probe)	**3.16**	
R-1S	SPL-042213-03	4/22/2013	**0.0241**		**0.0114**		0.00200	U	**31.4**		SM4500-F (probe)	**2.85**	
R-1S	SPL-071513-05	7/15/2013	**0.0240**		0.00500	U	0.00200	U	**27.4**		SM4500-F (probe)	**4.25**	
R-1D	MBT-030211-07	3/2/2011	**0.0231**		**0.00860**		0.00500	U	1.00	U	USEPA 300.0/9056A	**107**	
R-1D	MBT-050911-06	5/9/2011	**0.0520**		0.00510	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**108**	
R-1D (FD)	MBT-050911-07	5/9/2011	**0.0430**		**0.0142**		**0.00260**		1.00	U	USEPA 300.0/9056A	**109**	
R-1D	MBT-072511-04	7/25/2011	**0.0432**		**0.0501**		**0.00660**	**J**	**0.586**	**J**	SM4500-F (probe)	**108**	
R-1D	R-1D-100511	10/5/2011	**0.0537**		**0.0235**		**0.00360**	**J**	**0.668**		SM4500-F (probe)	**105**	
R-1D	MBT-011012-04	1/10/2012	**0.0482**		**0.0248**		**0.00700**		**0.550**	**J**	SM4500-F (probe)	**108**	
R-1D	SPL-040312-07	4/3/2012	**0.0377**	**J**	**0.0103**		0.00500	U	**0.615**		SM4500-F (probe)	**108**	
R-1D	SPL-070912-05	7/9/2012	**0.0461**		**0.0143**		**0.00250**	**J**	**0.633**		SM4500-F (probe)	**104**	
R-1D	SPL-100312-05	10/3/2012	**0.0590**		**0.0171**		**0.00290**	**J**	**0.879**		SM4500-F (probe)	**105**	
R-1D	SPL-021113-03	2/11/2013	**0.0279**		**0.00760**		0.00200	U	**0.641**		SM4500-F (probe)	**103**	
R-1D	SPL-042213-04	4/22/2013	**0.0349**		**0.0139**		**0.00260**	**J**	**0.668**		SM4500-F (probe)	**110**	
R-1D (FD)	SPL-042213-05	4/22/2013	**0.0416**		**0.0173**		**0.00670**		**0.668**		SM4500-F (probe)	**110**	
R-1D	SPL-071513-06	7/15/2013	**0.0403**		**0.0111**		**0.00800**		**0.628**		SM4500-F (probe)	**105**	
R-2	MBT-030211-06	3/2/2011	0.00500	U	0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**5.93**	
R-2	MBT-050911-01	5/9/2011	0.00500	U	0.00500	U	0.00500	U	1.00	U	USEPA 300.0/9056A	**5.77**	
R-2	MBT-072511-07	7/25/2011	0.00500	U	0.00500	U	0.00500	UJ	**0.478**	**J**	SM4500-F (probe)	**5.73**	
R-2	R-2-100511	10/5/2011	**0.00550**		0.00500	U	0.00500	U	**0.512**		SM4500-F (probe)	**5.95**	
R-2	MBT-011012-01	1/10/2012	0.00500	U	0.00500	U	0.00500	U	**0.469**	**J**	SM4500-F (probe)	**5.92**	

Table B-4
Groundwater Monitoring Results for the Former SPL Area: 2011 to Current

Location ID	Sample ID	Date	Total Cyanide (mg/L)		WAD Cyanide (mg/L)		Free Cyanide (mg/L)		Fluoride (mg/L)		Fluoride Analytical Method	Chloride (mg/L)	
R-2	SPL-040312-01	4/3/2012	**0.00570**	**J**	0.00500	U	0.00500	U	**0.546**		SM4500-F (probe)	**5.68**	
R-2	SPL-070912-01	7/9/2012	0.00500	U	0.00500	U	0.00500	U	**0.519**		SM4500-F (probe)	**5.66**	
R-2	SPL-100312-01	10/3/2012	**0.00700**		0.00500	U	0.00500	U	**0.521**		SM4500-F (probe)	**5.65**	
R-2	SPL-021113-01	2/11/2013	0.00500	U	0.00500	U	0.00200	U	**0.518**		SM4500-F (probe)	**5.70**	
R-2	SPL-042213-01	4/22/2013	0.00500	U	0.00500	U	0.00200	U	**0.546**		SM4500-F (probe)	**5.56**	
R-2	SPL-071513-01	7/15/2013	**0.00530**		0.00500	U	**0.00230**	**J**	**0.567**		SM4500-F (probe)	**5.51**	
R-2 (FD)	SPL-071513-02	7/15/2013	0.00500	U	0.00500	U	**0.00350**	**J**	**0.498**		SM4500-F (probe)	**5.48**	
R-3	MBT-030211-05	3/2/2011	**253**		**0.0368**		0.00500	U	**2020**		USEPA 300.0/9056A	**64.5**	
R-3	MBT-050911-02	5/9/2011	**353**		**0.304**		**0.00840**		**2020**		USEPA 300.0/9056A	**63.5**	
R-3	MBT-072511-03	7/25/2011	**368**		**0.734**		**0.00720**	**J**	**2100**		USEPA 300.0/9056A	**47.6**	
R-3	R-3-100511	10/5/2011	**376**		**0.488**		**0.00620**		**2180**		USEPA 300.0/9056A	**74.7**	
R-3	MBT-011012-02	1/10/2012	**407**		**0.279**		**0.02110**	**J**	**2200**		USEPA 300.0/9056A	**68.4**	
R-3	SPL-040312-02	4/3/2012	**396**	**J**	**0.815**		**0.0330**		**2000**		SM4500-F (probe)	**70.8**	
R-3	SPL-070912-02	7/9/2012	**356**		**0.605**		0.0050	U	**1970**		SM4500-F (probe)	**69.5**	
R-3 (FD)	SPL-070912-03	7/9/2012	**360**		**0.590**		0.0050	U	**1920**		SM4500-F (probe)	**69.0**	
R-3	SPL-100312-07	10/3/2012	**363**		**0.484**		**0.00580**		**1920**		SM4500-F (probe)	**61.0**	
R-3	SPL-021213-06	2/12/2013	**309**		**0.034**		**0.00980**		**2010**		SM4500-F (probe)	**63.1**	
R-3	SPL-042213-02	4/22/2013	**300**		**0.893**		**0.00680**		**1960**		SM4500-F (probe)	**63.4**	
R-3	SPL-071513-03	7/15/2013	**284**		**0.126**		**0.00880**		**2060**		SM4500-F (probe)	**56.4**	
R-4S	MBT-030111-03	3/1/2011	**0.0222**		**0.00530**		0.00500	UJ	**8.44**		USEPA 300.0/9056A	**8.64**	
R-4S	MBT-050911-05	5/9/2011	**0.0203**		**0.0174**		0.00500	U	**7.70**		USEPA 300.0/9056A	**8.65**	
R-4S	MBT-072511-05	7/25/2011	**0.0250**		**0.0295**		0.00500	UJ	**8.25**		USEPA 300.0/9056A	**8.66**	
R-4S (FD)	MBT-072511-06	7/25/2011	**0.0245**		**0.0293**		0.00500	UJ	**8.28**		USEPA 300.0/9056A	**8.66**	
R-4S	R-4S-100511	10/5/2011	**0.0238**		**0.00970**		0.00500	U	**11.4**		USEPA 300.0/9056A	**9.49**	
R-4S	MBT-011012-07	1/10/2012	**0.0247**		**0.0110**		0.00500	U	**12.0**		USEPA 300.0/9056A	**10.9**	
R-4S	SPL-040312-04	4/3/2012	**0.0182**	**J**	**0.00910**		0.00500	U	**9.79**		SM4500-F (probe)	**11.2**	
R-4S (FD)	SPL-040312-05	4/3/2012	**0.0392**	**J**	**0.00720**		0.00500	U	**9.63**		SM4500-F (probe)	**11.2**	
R-4S	SPL-070912-07	7/9/2012	**0.0294**		**0.00680**		0.00500	U	**8.35**		SM4500-F (probe)	**11.0**	
R-4S	SPL-100312-02	10/3/2012	**0.0310**		**0.00860**		0.00500	U	**14.5**		SM4500-F (probe)	**8.32**	

Table B-4
Groundwater Monitoring Results for the Former SPL Area: 2011 to Current

Location ID	Sample ID	Date	Total Cyanide (mg/L)		WAD Cyanide (mg/L)		Free Cyanide (mg/L)		Fluoride (mg/L)		Fluoride Analytical Method	Chloride (mg/L)	
R-4S	SPL-021213-07	2/12/2013	**0.0232**		**0.00690**		0.00200	U	**15.7**		SM4500-F (probe)	**8.31**	
R-4S	SPL-042213-07	4/22/2013	**0.0231**		**0.00700**		0.00200	U	**21.6**		SM4500-F (probe)	**8.60**	
R-4S	SPL-071513-07	7/15/2013	**0.0239**		**0.00540**		**0.00250**	**J**	**12.4**		SM4500-F (probe)	**8.17**	
R-4D	MBT-030111-01	3/1/2011	**0.0259**		**0.00550**		0.00500	UJ	**1.70**		USEPA 300.0/9056A	**8.89**	
R-4D (FD)	MBT-030111-02	3/1/2011	**0.0256**		**0.00540**		0.00500	UJ	**1.68**		USEPA 300.0/9056A	**8.91**	
R-4D	MBT-050911-04	5/9/2011	**0.0296**		0.00690	U	0.00500	U	**1.83**		USEPA 300.0/9056A	**8.88**	
R-4D	MBT-072511-01	7/25/2011	**0.0380**		**0.0175**		0.00500	UJ	**1.83**		USEPA 300.0/9056A	**8.89**	
R-4D	R-4D-100511	10/5/2011	**0.0259**		**0.00630**		0.00500	U	**1.54**		USEPA 300.0/9056A	**8.99**	
R-4D	MBT-011012-05	1/10/2012	**0.0340**		**0.00680**		0.00500	U	**1.76**		USEPA 300.0/9056A	**8.79**	
R-4D (FD)	MBT-011012-06	1/10/2012	**0.0309**		**0.00680**		0.00500	U	**1.72**		USEPA 300.0/9056A	**8.79**	
R-4D	SPL-040312-03	4/3/2012	**0.0419**	J	**0.00860**		0.00500	U	**2.15**		SM4500-F (probe)	**8.97**	
R-4D	SPL-070912-06	7/9/2012	**0.0366**		**0.00850**		0.00500	U	**2.12**		SM4500-F (probe)	**11.2**	
R-4D	SPL-100312-03	10/3/2012	**0.0292**		**0.00660**		0.00500	U	**2.10**		SM4500-F (probe)	**9.16**	
R-4D (FD)	SPL-100312-04	10/3/2012	**0.0299**		**0.00660**		0.00500	U	**2.09**		SM4500-F (probe)	**9.22**	
R-4D	SPL-021113-04	2/11/2013	**0.0309**		**0.00600**		0.00200	U	**1.94**		SM4500-F (probe)	**9.28**	
R-4D (FD)	SPL-021113-05	2/11/2013	**0.0309**		**0.00600**		0.00200	U	**1.93**		SM4500-F (probe)	**9.26**	
R-4D	SPL-042213-06	4/22/2013	**0.0430**		**0.00590**		0.00200	U	**1.85**		SM4500-F (probe)	**9.41**	
R-4D	SPL-071513-04	7/15/2013	**0.0357**		**0.00520**		0.00200	U	**1.76**		SM4500-F (probe)	**9.22**	

Notes:
J = estimated value
U = not detected above method reporting limit
FD = field duplicate sample
mg/L = milligram per liter
SPL = Spent Pot Liner
WAD = weak acid dissociable

Demolition and Cleanup Accomplishments at the Former Reynolds Longview Reduction Plant

Northwest Alloys, Inc. Longview, Washington.
June 2011.

DEMOLITION AND CLEANUP ACCOMPLISHMENTS

AT

THE FORMER REYNOLDS LONGVIEW REDUCTION PLANT

Northwest Alloys, Inc. • Longview, Washington

June 2011

TABLE OF CONTENTS

TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

Calbag	Calbag Metals Co.
Chinook	Chinook Ventures, LLC
Envirocon	Envirocon Inc.
ESPs	Electrostatic Precipitators
FS	Feasibility Study
MTCA	Model Toxics Control Act
Millennium	Millennium Bulk Terminals – Longview
NWA	Northwest Alloys, Inc.
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
Reynolds	Reynolds Metals Company
SPL	spent potliner (or potliner)
VOC	volatile organic compound
WAC	Washington Administrative Code
WDOE	Washington Department of Ecology

EXECUTIVE SUMMARY

The Reynolds Metals Company (Reynolds) Longview Reduction Plant was constructed in 1941 at 4029 Industrial Way in Longview, Washington. The plant was expanded in 1968 and operated by Reynolds until 2001. In 2001, Reynolds sold the plant to Longview Aluminum, but retained ownership of the land and the Cryolite Recovery Plant. Longview Aluminum later declared bankruptcy in 2003. Chinook Ventures, LLC (Chinook) purchased the remaining assets, including the buildings, structures and process equipment, from the bankruptcy trustee and entered into a long-term ground lease with Reynolds, effective November 30, 2004. Reynolds assigned its obligation and interests in the lease to Northwest Alloys Inc. (NWA), on September 30, 2005. Chinook was the sole operator of the plant until January 2011, when Chinook sold the plant assets to Millennium Bulk Terminals – Longview (Millennium).

In May 2004, Reynolds hired Envirocon Inc. (Envirocon) to demolish the Cryolite Recovery Plant. During the Cryolite Recovery Plant demolition project approximately 800 tons of metals and 150 tons of concrete were recycled; 161 tons of construction debris and 132 tons of brick/refractory were disposed of as non-hazardous waste in an off-site Resource Conservation and Recovery Act (RCRA) Subtitle D landfill; and 850 tons of underflow solids, a Washington State dangerous waste, was disposed in the Chemical Waste Management RCRA Subtitle C landfill in Arlington, Oregon.

A total of 40 potroom transformers were sold by the bankruptcy trustee to Calbag Metals Co. (Calbag) in Portland, Oregon. Calbag recycled the transformer metals and transformer oil.

In early 2005, Chinook began a plant-wide demolition and cleanup project. Chinook hired Envirocon to perform the demolition of the North Plant and South Plant potrooms under a work plan approved by the Washington Department of Ecology (WDOE). Additional work was self-performed by Chinook and continued until Chinook sold the plant in 2011. Various accomplishments include:

- Reduction plant equipment in the north and south potrooms was removed, including: the pot superstructures, anodes, cathodes, bus, and other hardware. Wastes generated in the process were managed in accordance with local, state and federal requirements. Metals including copper, aluminum, and steel were recycled.

- Anode carbon totaling 24,324 tons was stored, subsequently crushed, and sold for re-use in the steel industry as cover flux or as an additive for carbon steel.
- The potrooms were cleaned including outside courtyards.
- The fume control systems attached to the potrooms, consisting of ductwork, pre-scrubbers and Electrostatic Precipitators (ESPs) were cleaned. In addition, the fume sludge handling equipment including piping, tanks, and clarifiers were cleaned.
- Equipment in the two cast houses were demolished and cleaned. The furnaces and other casting equipment were removed and the rooms were cleaned, including the casting pits.
- The mixer side of the Carbon Plant was demolished and cleaned. The mixers and related piping were removed and recycled.
- Maintenance buildings, the pot digging building, pin-and-channel building, pot relining building, and compressor buildings were cleaned.
- The unloading tower and the central loading/unloading tower were cleaned, including the South Plant alumina handling system.
- The waste and stormwater systems were cleaned including the Wastewater Treatment Plant, the storm drain lines, and the stormwater multi-media filter building.
- The Cable Plant cast house and warehouse were cleaned.
- Contaminated soils were removed from the former scrap yard and properly disposed at an off-site landfill.
- Other materials, including scrap metals, used oil, and unused transformers were recycled.

On June 15, 2007, Chinook and NWA signed Agreed Order No. 4263 (AO4263) with the WDOE which, in summary, required the parties to complete a Remedial Investigation (RI) and Feasibility Study (FS) in accordance with the Model Toxics Control Act (MTCA; Chapter 173-340 of the Washington Administrative Code [WAC]). In accordance with AO4263, Chinook and NWA submitted a RI Report in June 2007 and a Focused FS in September 2007. The Focused FS identified 11 areas of potential concern. In 2008, WDOE approved the proposed remedial action for two of the areas identified in the Focused FS: the on-site ditches near the former Cryolite Recovery Plant and the former fuel island. Accordingly, Chinook completed the following work in those areas:

- Soil from the three south ditches near the former Cryolite Recovery Plant was removed to meet preliminary soil cleanup levels established in the Focused FS.
- Diesel contaminated soil under the former fuel island near the plant warehouse was removed, bio-remediated, and used for fill on-site per WDOE approval.

Over the period that Chinook owned the plant, the following metals were recycled:

- 3,568 tons of copper
- 7,578 tons of aluminum, and
- 38,440 tons of steel.

In addition, the following process materials and contaminated soils were removed from the facility:

- 24,324 tons of anode carbon was beneficially reused or recycled,
- 29,270 tons of hazardous waste was disposed of in permitted off-site facilities, and,
- 9,688 tons of non-hazardous waste and contaminated soils were collected and disposed in permitted off-site facilities.

Millennium took ownership of the facility on January 11, 2011. Millennium is continuing the cleanup of the site and through May 2011, has disposed of approximately:

- 63 tons of cleanup debris.
- 60 tons of wood waste,
- 15 tons of pitch-impacted debris,
- 5 tons of underflow solids,
- 1,801,512 gallons of thin stillage, and
- 775,000 gallons of storm water from the outdoor coke storage area.

1 INTRODUCTION

The Reynolds Longview Reduction Plant was constructed in 1941 at 4029 Industrial Way in Longview, Washington. The plant was expanded in 1968 and operated by Reynolds until 2001. In 2001, Reynolds sold the plant to Longview Aluminum, but retained ownership of the land and the Cryolite Recovery Plant. Longview Aluminum later declared bankruptcy in 2003. In 2004, Chinook purchased the remaining assets, including the buildings, structures and process equipment, from the bankruptcy trustee and entered into a long-term ground lease with Reynolds, effective November 30, 2004. Reynolds assigned its obligation and interests in the lease to NWA, on September 30, 2005. Chinook immediately began to remove the reduction plant equipment that would not be used by Chinook; to dispose of wastes generated during the demolition process; and, to clean other equipment and buildings. Chinook was the sole operator of the plant until January 2011, when Chinook sold the plant assets to Millennium.

This report summarizes the work accomplished by Reynolds, the bankruptcy trustee, Chinook, and Millennium from 2003 when Longview declared bankruptcy through May 2011.

2 EARLY DEMOLITION AND CLEANUP ACCOMPLISHMENTS

This section describes the demolition and cleanup activities performed by Reynolds or the bankruptcy trustee prior to the sale of the facility assets to Chinook.

2.1 Cryolite Recovery Plant Demolition

In May 2004, Reynolds hired Envirocon to demolish the Cryolite Recovery Plant. The project took five months, concluding in October 2004. Envirocon developed a work plan which was approved and permitted by Cowlitz County. Work began in early August 2004, and proceeded approximately as follows:

1. Stormwater and erosion controls were established.
2. The digester tanks and related equipment were removed.
3. The slurry tanks, liquor tanks, and precipitator tank were removed.
4. The cryolite dry bins and demolish the rotary kiln were removed.
5. The lime station was removed.
6. The cryolite building and contents were vacuumed, cleaned, and then demolished.
7. Pits and trenches were cleaned and backfilled with clean material.
8. Tank and building debris (e.g., waste material, concrete, etc.) were contained and shipped off site for disposal.

During the Cryolite Recovery Plant demolition project, approximately 800 tons of metals and 150 tons of concrete were recycled; approximately 161 tons of construction debris and 132 tons of brick/ refractory were disposed at an off-site RCRA Subtitle D landfill; and, approximately 850 tons of debris were disposed of in the Chemical Waste Management RCRA Subtitle C landfill in Arlington, Oregon.

2.2 Potroom Transformers

Under the direction of the bankruptcy trustee, the 16 North Plant transformers and the 24 South Plant transformers were sold to Calbag. Calbag drained the transformers and recycled the non-polychlorinated biphenyl (PCB) mineral oil from each transformer. The transformers were then loaded onto rail cars and transported to the Calbag facility for demolition and recycle of the metal components.

3 CHINOOK DEMOLITION AND CLEANUP ACCOMPLISHMENTS

During the period from 2004 through January 2011, Chinook Ventures conducted demolition, cleanup, and recycling activities in several areas of the facility. This section is organized to discuss activities that occurred within the various site facilities.

3.1 North and South Plant Potrooms

In late 2004, Chinook hired Envirocon to perform the demolition of the aluminum smelting equipment located in the North Plant and South Plant potrooms. The North Plant consisted of six potrooms, rooms 51 through 56 that were built in the late 1960s. The South Plant consisted of three potrooms, rooms J, K, and L, that were built during World War II. Envirocon began the project in January 2005 and prepared a construction work plan that was approved by the WDOE prior to construction.

The demolition was conducted in both the north and south plant potrooms simultaneously. Work proceeded in general accordance with the sequence described below:

- Ductwork for the fume systems was disconnected.
- Floor plates were removed.
- Anode and cathode bus work was disconnected and the buses were then removed.
- The side and end doors were removed.
- Hardware, such as the ore bins on the North Plant pots, was removed as appropriate.
- The anode superstructures were pulled and the anode pins and channels were stripped prior to breaking the anode carbon into smaller pieces.
- The bath and metal pads were stripped from the top of the cathodes.
- The cathodes were removed and sheared in half horizontally below the collector bars.
- The upper half of the pot shell was removed and transported to the pot digging building for potliner removal.
- The alumina insulation was removed from the remainder of the cathode shell.
- The fume ducts were cleaned or removed from the inside of the potrooms.
- Recyclable metals were prepared for off-site transport.

The anode and cathode bus work in the South Plant was made of copper. The bus work in the North Plant was made of aluminum, as were the side doors. Most of the other hardware was made from steel. The equipment and hardware was cleaned in accordance with the Work Plan and the metals were sized and sold as scrap. Approximate total quantities of metals recycled from the potlines are listed in Table 1.

Approximately 26,000 tons of spent potliner (SPL) was removed from the cathodes at the pot digging building and disposed of in the Chemical Waste Management RCRA Subtitle C landfill in Arlington, Oregon. The anode pins and channels were removed from the carbon anodes, and the anode carbon was placed in the South Plant potrooms for temporary storage.

Envirocon completed most of the cleanup and decontamination of smelter process materials before the end of their contract with Chinook. Envirocon washed four of the North Plant potrooms, rooms 53 through 56. The washing started in the monitor at the roof line and continued to the potroom floor. Envirocon also washed the basements and courtyards under and between these rooms. Solids from the wash water were collected and disposed of off-site, and the wash water was treated in the stormwater settlement pond, which is followed by multi-media filters, prior to discharge to the Columbia River. Envirocon completed their work at the end of 2005, at which time Chinook continued the cleanup by self-performing the work.

After cleanup, Chinook converted the North Plant potrooms into covered flat storage areas for bulk materials. Pre-cast floor pads, cast on-site by Specialty Concrete, were set in place where the electrolytic cells, or pots, once stood. The river end and center section of potroom 51 were the first areas where pre-cast concrete pads were installed. Chinook then set up crusher equipment in these areas and began crushing anode carbon. The crushed anode carbon was sold to Nucor Steel and Pacific Metallurgical Inc. for beneficial use as cover flux for steel furnaces and as a carbon additive for carbon steel alloys. The anode crusher operation was later moved to the southern end of Facility 19. Chinook recycled or reused 24,324 tons of anode carbon that would have otherwise required landfill disposal.

The final two North Plant rooms, 51 and 52, were cleaned by Chinook following the relocation of the crusher to Facility 19.

The cleanup of the three potlines in the South Plant (J, K, and L lines) was also completed by Chinook. Starting in the roof monitor, Chinook washed the rooms down to the floor level. The floors and pot trenches in each line were then cleaned, and the materials and debris generated by that process were properly disposed of. The quantities of debris generated by the South Plant potlines cleanup are included with the other cleanup debris in Table 1.

3.2 Cast House

Two of the former reduction plant buildings, the North Plant Cast House (Facility 20) and the South Plant Cast House (Facility 19), contained the Aluminum Plant casting operations. Chinook cleaned up Facility 20, by removing the furnaces and casting equipment and reusing or recycling the majority of the demolition material. The casting pits were backfilled with clean material and covered with concrete. A steel operation run by MMF moved into this area in July 2007. The refractory generated in the demolition process was tested by Chinook and test results were submitted to WDOE. WDOE approved the beneficial use of the refractory for backfill. Some of the waste refractory was used for fill near or under the new railroad spur which was built by Chinook, and some was placed in the casting pit on the rectifier end of Facility 20 and in the quench pit in the floor of the Cable Plant cast house.

Chinook moved their anode carbon crushing equipment to Facility 19 in January 2007. The crusher operation was subsequently moved to the former pot digger building in October 2009. Final cleanup of Facility 19 was completed in October 2010. The casting pits and other depressions in the floor were backfilled with Columbia River sand and paved with concrete.

3.3 Maintenance Buildings

The maintenance operations at the former reduction plant consisted of several plant facilities, including a weld shop, paint shop, auto shop, millwright shop, machine shop, and an electrical shop. These areas have been cleaned by Chinook. Oils, greases and paint were retained and used by Chinook. Waste oil generated by Chinook was stored and recycled by used oil recyclers.

3.4 Carbon Plant

The carbon facility at the former reduction plant was designed to manufacture anode carbon paste and cathode paste on the "wet" side and to crush (or size) calcined petroleum coke and anthracite coal on the "dry" side.

Chinook used the dry side equipment to pulverize petroleum coke for resale. The floors and tunnels on the wet side were cleaned by Chinook, including removal of the mixers, pitch scales, and connected piping. Scrap metal generated in the removal of the equipment was recycled. Cleanup material totaling 46 tons was managed as pitch-contaminated debris and disposed of off-site in the Chemical Waste Management RCRA Subtitle C landfill in Arlington, Oregon. This work was completed in January 2011.

3.5 Fume Control System

The fume control system for the former reduction plant consisted of 46 wet pre-scrubbers followed by 31 wet ESPs. Chinook cleaned the pre-scrubbers and ESPs in the North and South Plants and the associated duct work, piping, and clarifiers. Chinook also cleaned the fume system sludge handling building and tanks (Facility 72). Approximately 3,224 tons of debris (referred to as underflow solids, or UFS) from the fume system was disposed of in the Chemical Waste Management RCRA Subtitle C landfill in Arlington, Oregon.

3.6 Wastewater Management Facilities

Chinook continued to operate and maintain the wastewater systems, including the Wastewater Treatment Plant (Facility 71) and the storm water treatment system, which consists of a settling pond followed by multi-media filters (Facility 73). Chinook finished cleaning the interior of the buildings and the exterior of the process equipment in Facility 73 and Facility 71.

Chinook cleaned approximately 98% of the underground stormwater system, including the South Plant storm drains, the North Plant storm drains, and the other plant storm drains which include: maintenance, cast houses, Carbon Plant, office buildings, other open areas, and the parking lots. The only sections of the stormwater system that have not been cleaned are a short section of the main drain line from the South Plant area, the storm water sump at Facility 77, and the storm water settling pond.

3.7 Pot Digging Building

Following the removal of SPL from the Pot-Digging Building, Chinook cleaned the building and the equipment. Chinook also cleaned the associated dust collector, duct work, and fans. Chinook began using the building for anode carbon crushing in October 2009. In addition to processing on-site anode carbon, Chinook accepted anode carbon from two other reduction plants that have ceased operations: the Kaiser Tacoma Works and the Goldendale Reduction Plant. The crushed anode carbon was also sold to Nucor Steel and Pacific Metallurgical Inc. for beneficial use. Recycling these materials for use in the steel industry is a good example of beneficially using what might have otherwise been waste.

3.8 Pot Relining Building and Pin and Channel Building

Chinook cleaned the former pot relining building, Facility 34. The building is now used as a fabrication shop. Chinook also cleaned the pin and channel building, Facility 35, which is now used for equipment storage.

3.9 Compressor Rooms and Central Unloading Towers

Both the North and South Plant compressor rooms were cleaned by Chinook. The central unloading towers were also cleaned by Chinook. Associated with the unloading tower is the alumina handling system. Process material removal and cleaning of the South Plant alumina transfer system was completed in October 2010.

3.10 Cable Plant

The former Reynolds Metals Cable Plant consists of a cast house and a large warehouse supported by office buildings, maintenance shops, and other auxiliary buildings. Chinook completed the cleanup of the cast house and the warehouse from the ceiling to the floor and below ground areas in November 2010.

3.11 Scrap Yard

A surface and subsurface soil sampling plan was prepared for the area previously used by Reynolds to manage scrap metals. The purpose of the sampling was to investigate potential contamination from past practices and to prepare the area for future use. Ten discrete locations within the former scrap yard footprint were sampled and tested for fluoride, total cyanide, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), PCBs, and metals. Only one sample contained concentrations of PAHs above the preliminary soil cleanup levels established in the Focused FS. Other constituents sampled were below the Focused FS preliminary soil cleanup levels. Subsequently, Chinook excavated and disposed of 1,004 tons of rock and soil at an off-site RCRA Subtitle D facility.

3.12 Oil Recycling

By the end of 2010, Chinook recycled approximately 15 transformers. These included spare transformers and others that were removed from operation by Chinook. The transformers did not contain PCB-containing oils. The transformer oil was either sold to an oil recycler or stored for reuse. Chinook routinely managed used oil from other sources including motor oil, hydraulic oil, and heat transfer material (HTM) oil by selling these materials to used oil recyclers.

3.13 MTCA Cleanup Activities

On June 15, 2007, Chinook and NWA signed AO4263 with the WDOE which, in summary, required the parties to complete a RI and FS in accordance with MTCA. In accordance with AO4263, Chinook and NWA submitted a RI Report in June 2007 and a Focused FS in September 2007. The Focused FS identified 11 areas of potential concern. In 2008, WDOE approved the proposed remedial action for two of the areas identified in the Focused FS: the on-site ditches near the former Cryolite Recovery Plant and the former fuel island. The following sections describe the completed remedial activities.

3.13.1 South Ditches

Process residue, containing concentrations of PAHs above the Washington State dangerous waste criteria, impacted surface soils contained in three on-site ditches near the former Cryolite Recovery Plant. Beginning in October 2008, Chinook pumped the water out of the ditches and removed the process residue and adjacent bottom and sidewall soils until a horizon of apparent native, non-affected soils was visible. Approximately 2,663 tons of process residue, soil, and debris were removed from the ditches. Test results from samples of the removed materials were less than the Washington State dangerous waste and were disposed in an off-site RCRA Subtitle D landfill. Following removal, four confirmation soil samples were taken from the bottom of each ditch and submitted to a certified laboratory for PAH analyses using EPA 8270M-SIM. These samples were reported with PAH concentrations less than the preliminary soil cleanup levels presented in the Focused FS.

3.13.2 Fuel Island

In May 2004, the bankruptcy trustee decommissioned the plant's 10,000-gallon underground gasoline tank. Soil samples taken under the fuel island showed levels of diesel exceeding preliminary soil cleanup levels established in the Focused FS in accordance with MTCA Method A values for industrial properties. In October 2007, Chinook began removing the concrete and diesel contaminated soil. The excavation measured approximately 24 feet wide by 42 feet long and was 10 feet deep. Post remediation soil samples from the excavation walls and floor were tested for diesel. Test results showed that the remaining soils met the preliminary cleanup levels established in the Focused FS. Soil removed from the excavation was placed at the site of the former Cryolite Recovery Plant and bio-remediated to below MTCA Method A cleanup levels. With WDOE's approval, the bio-remediated soil was used for fill in concrete pits in the former Cable Plant warehouse floor.

4 MILLENNIUM CLEANUP ACCOMPLISHMENTS

Millennium took ownership of the facility on January 11, 2011. To help facilitate an expedited transition of site operations from Chinook to Millennium, Millennium leased 2 to 3 acres of storage space to Chinook for temporary storage of equipment still belonging to Chinook. Chinook began moving their equipment to the leased site immediately and finished this task in May 2011.

As Chinook's equipment was cleared from the plant, Millennium proceeded to clean up the areas formerly operated by Chinook. Initial activities included clearing and disposing scrap wood, metal, and other general debris and waste materials identified. The plant parking lots and main courtyards have been swept and cleaned by Millennium, who has maintained an outstanding level of housekeeping practices. Through May 2011, Millennium cleared and disposed of approximately:

- 63 tons of clean-up debris,
- 60 tons of wood waste,
- 15 tons of pitch contaminated debris, and
- 5 tons of underflow solids.

In addition, Millennium shipped 1,801,512 gallons of thin stillage (corn milk) to the Cowlitz County Publicly-owned Treatment Works (POTW) and 775,000 gallons of stormwater from the outside coke storage area to an off-site permitted waste water treatment plant, Cascade General in Portland Oregon.

Table 1

Total Materials Recycled, Reused, or Disposed Of

Material	Source	How Managed	Total Quantity in Tons
Copper	Potrooms	Recycled	3,568
Aluminum	Potrooms	Recycled	7,538
Aluminum	General Plant	Recycled	40
Steel	Potrooms	Recycled	28,600
Steel	General Plan	Recycled	9,840
Anode Carbon	Potrooms	Reused	24,324
Spent Potliner	Potrooms	Disposed of	26,000
Underflow Solids	Fume System	Disposed of	3,224
Scrap Yard Debris	Scrap Yard	Disposed of	1,004
ESP Cleanings	ESPS	Disposed of	500
Bath	Potrooms	Disposed of	3,275
Cleanup debris	Potrooms, General Plant	Disposed of	2,246
Ditch cleanup dirt	South Ditches	Disposed of	2,663
Pitch contaminated debris	Carbon Plant	Disposed of	46
Copper, Brass	General Plant	Recycled	68
Steel, Aluminum	Cryolite Recovery Plant	Recycled	800
Concrete	Cryolite Recovery Plant	Recycled	150
Construction Debris	Cryolite Recovery Plant	Disposed of	161
Brick/Refractory	Cryolite Recovery Plant and Cast Houses	Reused	532
Underflow Solids	Cryolite Recovery Plant	Disposed of	850
Wood Waste	General Plant	Disposed of	60
Thin Stillage (corn milk)	Imported from off-site	Disposed of	1,801,512 gallons
Storm Water	Coke Storage Area	Disposed of	775,000 gallons

Addendum to Demolition and Cleanup Accomplishments at the Former Reynolds Longview Reduction Plant

Northwest Alloys, Inc. Longview, Washington, and Millennium Bulk Terminals – Longview, LLC. July 2013.

ADDENDUM TO DEMOLITION AND CLEANUP ACCOMPLISHMENTS AT THE FORMER REYNOLDS LONGVIEW REDUCTION PLANT

Northwest Alloys, Inc. • Longview, Washington

and

Millennium Bulk Terminals - Longview, LLC

July 2013

1 INTRODUCTION

This addendum supplements information contained within the *Demolition and Cleanup Accomplishments at the Former Reynolds Longview Reduction Plant* report prepared by Northwest Alloys, Inc. (Northwest Alloys) in 2011.

Between June 2011 and the end of December 2012, Millennium Bulk Terminals – Longview, LLC (MBTL) continued to remove and clean up unwanted equipment or unpermitted structures and storage areas and associated materials that were developed by Chinook Ventures, Inc. (CVI) prior to MBTL's purchase of the former Reynolds Metals Reduction Plant (Reynolds Facility). In addition, MBTL has voluntarily undertaken and completed other cleanups and has managed additional wastes, as described further in Section 2. The work described herein was performed under the Washington State Department of Ecology's (Ecology's) supervision.

MBTL's work at the Reynolds Facility has resulted in the removal of more than 200,000 tons of wastes and materials since MBTL's purchase of the Reynolds Facility assets in early 2011. MBTL has also removed unpermitted conveyors and structures that had been installed by CVI and has completed repairs of the Consolidated Diking Improvement District (CDID) levee that had been damaged by CVI.

MBTL and Northwest Alloys continue to work with Ecology to implement a Remedial Investigation and Feasibility Study (RI/FS) consistent with the Model Toxics Control Act (MTCA) Agreed Order overseen by Ecology.

2 ADDITIONAL ACCOMPLISHMENTS

This section describes the demolition and cleanup activities performed by MBTL between June 2011 and December 2012. Summaries of the quantities discussed in this section are included in Table 1.

2.1 Stormwater Settling Pond Maintenance

During summer 2012, MBTL performed routine maintenance on the stormwater settling pond. The work included removal of settled solids that had accumulated in the pond since completion of the last solids removal event in 2001. Beginning in mid-July, the pond was drained, and the settled solids were allowed to dry in place to the extent possible. A lined drying bed was constructed next to the pond, and the settled solids were transferred to the drying bed. In addition, the inlet piping and the effluent pump sump were cleaned, and the resulting material/solids removed during cleaning were also placed in the drying bed. The stormwater settling pond cleanup material was disposed of off site in a permitted landfill in Hillsboro, Oregon. More than 1,000 tons of settled solids were removed and properly disposed of off site.

2.2 Commissioning of the Replacement Treatment System

During late 2011 and early 2012, MBTL completed the commissioning of the replacement water treatment system. This work was conducted consistent with a design approved by Ecology. Pending commissioning of the treatment system, approximately 725,000 gallons of collected process waters were managed by off-site disposal. The treatment system continues to operate consistent with National Pollutant Discharge Elimination System (NPDES) permit requirements.

2.3 Petroleum Coke Storage Area Pad Cleanup and Removal

MBTL coordinated with regulatory authorities and the owner of the green petroleum coke from CVI's former storage pad to remove more than 100,000 tons of green petroleum coke from the site during summer and fall 2012. MBTL then removed and disposed of the petroleum coke storage area pad, which consisted of concrete, soil, and residual petroleum coke. Between summer and fall 2012, approximately 21,000 tons of petroleum coke storage area pad cleanup debris was shipped to a permitted landfill in Hillsboro, Oregon.

2.4 Petroleum Coke Storage Area Stormwater Management

MBTL managed stormwater that had come in contact with the green petroleum coke by either evaporation or collecting the stormwater and shipping it to off-site permitted wastewater facilities. From June 2011 until removal of the green petroleum coke in fall 2012, more than 2,000,000 gallons of stormwater was shipped for off-site disposal, and approximately 4,000,000 gallons was evaporated at the site.

2.5 Alkaline Ore

The demolition of the North Plant and South Plant potrooms is described in the *Demolition and Cleanup Accomplishments at the Former Reynolds Longview Reduction Plant* report. The cathode insulation, referred to as alkaline ore, was stored by CVI in the potrooms for possible reuse. Because of the high sodium content of the alkaline ore, a suitable reuse application was not identified by CVI. Accordingly, MBTL shipped approximately 6,500 tons of alkaline ore to a permitted landfill in Hillsboro, Oregon, for disposal.

2.6 Other Reusable or Recyclable Materials

Materials remaining on site included a number of reusable or recyclable materials. For materials owned by other parties, MBTL coordinated with materials owners and obtained applicable permits and approvals to ensure that materials were removed safely. Reusable and recyclable materials removed from the site include the following:

- More than 2,500 tons of alumina ore
- More than 20,000 tons of anode carbon
- More than 26,000 tons of fly ash
- More than 1,200 tons of scrap metal

2.7 Wood Block Floor in Maintenance Machine Shop

The machine shop floor in the maintenance machine shop building was equipped with a wood block floor. Following the closure of the Reynolds Facility, this floor fell into disrepair, and much of the flooring was loose and significantly damaged. Testing showed that the oil and mastic in the floor contained asbestos, polychlorinated biphenyls, and lead. An asbestos abatement contractor was hired by MBTL to remove the floor. The project was completed in 3 months, and approximately 68 tons of flooring, including some of the cement under and around the perimeter of the floor, was removed and disposed of in a permitted Toxic Substances Control Act and hazardous waste landfill in Arlington, Oregon.

2.8 U-ditch Restoration

When CVI constructed a new railroad line to connect the former on-site cable plant to the existing rail lines that paralleled the river end of the North Plant, they filled in a drainage ditch (referred to as the U-ditch) that, at the time, conveyed stormwater from the western portion of the property back to the Reynolds Facility's stormwater treatment system. This change in the U-ditch by CVI was in violation of the site's NPDES permit, so Ecology issued an Administrative Order to CVI to correct the situation. CVI did not reconnect the U-ditch. MBTL received approval from Ecology to reconnect the U-ditch. The fill used by CVI to close the U-ditch consisted of site demolition debris. After the ditch was reopened, MBTL separated the sampled clean fill from the demolition debris-contaminated fill and disposed of more than 14,000 tons of the demolition debris-contaminated fill in a permitted landfill in Hillsboro, Oregon. The segregated clean fill was stored for proposed 2013 regrading of the ditch.

2.9 Removal and Disposal of Other Materials

MBTL continued to conduct general site cleanup and remove miscellaneous debris and other materials. Materials removed from the site and disposed at appropriately permitted off-site treatment/disposal facilities include the following:

- Approximately 700 tons of cleanup debris
- Approximately 90 tons of wood waste
- Approximately 20 tons of pitch-impacted debris
- More than 200 tons of underflow solids

2.10 Other Completed Actions

MBTL continued to remove unpermitted structures that had been installed by CVI and other historical debris and infrastructure, in addition to repairing infrastructure still in operation. These actions include the following:

- Removal of product handling conveyors and other unpermitted structures previously placed at the site by CVI
- Removal of the unpermitted conveyor system and product loader that had previously been installed on the dock by CVI
- Completion of in-water migration measures, including the removal of creosote-treated structures
- Repair of the CDID levee that had been damaged by CVI
- Repair of the Reynolds Facility dock, including restoration of the fire suppression system for the dock
- Upgrades to the facility's potable water system
- Re-establishment of on-site facilities for use by MBTL employees

3 SUMMARY

Since purchasing the Reynolds Facility assets in early 2011, MBTL has made great progress in restoring conditions at the Reynolds Facility. To date, MBTL has removed more than 200,000 tons of wastes and materials, has removed unpermitted conveyors and structures that had been installed by CVI, and has completed repairs of the CDID levee that had been damaged by CVI.

MBTL's progress at the Reynolds Facility is ongoing. The attached photographs illustrate the improved conditions achieved since MBTL's purchase of the Reynolds Facility assets from CVI in early 2011. MBTL and Northwest Alloys continue to work with Ecology to implement a RI/FS consistent with the MTCA Agreed Order overseen by Ecology.

Table 1
Demolition and Cleanup Accomplishments: June 2011 through December 2012

Material	Source	How Managed	Quantity
Settled solids	Stormwater settling pond	Disposed of in a permitted landfill	More than 1,000 tons
Process water	Commissioning of treatment system	Shipped to permitted wastewater treatment plants	Approximately 725,000 gallons
Green petroleum coke	Green petroleum coke	Removed and exported by product owner	More than 100,000 tons
Petroleum coke, soil, and concrete	Petroleum coke storage area	Disposed of in a permitted landfill	Approximately 21,000 tons
Stormwater	Petroleum coke storage area	Shipped to permitted wastewater treatment plants	More than 2 million gallons
Alkaline ore	Cathode demolition	Disposed of in a permitted landfill	Approximately 6,500 tons
Alumina ore	Glencore	Removed by Glencore	Approximately 2,500 tons
Carbon	Anode carbon	Recycling in the steel industry	More than 20,000 tons
Fly ash	LaFarge	Reused by LaFarge	More than 26,000 tons
Wood and concrete	Maintenance machine shop floor	Disposed of in a permitted Subtitle C landfill	Approximately 68 tons
Scrap metal	Site cleanup and structure removal	Recycled	More than 1,200 tons
Demolition debris and soil	U-ditch restoration	Disposed of in a permitted landfill	More than 14,000 tons
Cleanup debris	Site cleanup	Disposed of in a permitted landfill	Approximately 700 tons
Wood waste	Site cleanup	Disposed of in a permitted landfill	Approximately 90 tons
Pitch-impacted debris	Site cleanup	Disposed of in a permitted landfill	More than 20 tons
Underflow solids	Site cleanup	Disposed of in a permitted landfill	More than 200 tons

Notes:
The quantities shown in this table include only materials removed from the Reynolds Facility between June 2011 and December 2012. For information on actions completed and materials removed from the Reynolds Facility prior to that date, refer to the *Demolition and Cleanup Accomplishments at the Former Reynolds Longview Reduction Plant* report prepared by Northwest Alloys in 2011.

Photographs

Flat Storage Area

Previous Conditions

Current Conditions

North Plant Potlines

Previous Conditions

Current Conditions

South Plant Potlines

Previous Conditions

Current Conditions

Maintenance Courtyard


Previous Conditions


Current Conditions

Closed Black Mud Pond Facility


Previous Conditions


Current Conditions

Waste Treatment Facility (U-ditch)


Previous Conditions


Current Conditions

Product Handling

Previous Conditions

Current Conditions

CDID Levee Repair

Previous Conditions

Current Conditions

Alcoa Longview Facility Data Report

McCully Frick & Gillman, Inc. (2003), as submitted under Anchor Environmental, L.L.C. (2006). Prepared for Washington State Department of Ecology. August 2006.

ANCHOR ENVIRONMENTAL, L.L.C.

Anchor Environmental, L.L.C.
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Seattle, Washington 98101
Phone 206.287.9130
Fax 206.287.9131

August 2, 2006
060354-01

Ms. Carol Kraege
Washington State Department of Ecology
Industrial Section
PO Box 47600
Olympia, WA 98504-7600

Dear Ms. Kraege:

The purpose of this letter is to transmit environmental data from investigations performed by MFG on behalf of Alcoa at the former Reynolds Metals Corporation Longview facility (site) in Longview, Washington. The site characterization activities conducted by MFG provide information that assists with quantifying the environmental conditions at the site and further establish a soil, sediment, groundwater, and surface water database to be used for evaluating future site environmental strategy. Past investigations at the site, combined with the recent work by MFG, has resulted in a detailed understanding of the shallow groundwater, surface water, soil, and on-site ditch sediment in site areas where waste materials exist.

Site History

As you know, the site is located at 4029 Industrial Way on the north bank of the Columbia River in Cowlitz County, Washington near Longview. The site covers approximately 416 acres with approximately 100 acres of developed area. The southern portion of the facility (South Plant) began aluminum smelting and casting operations in 1941. The larger North Plant began aluminum smelting and casting operations in 1967. The Longview facility was shut down in March 2003.

Investigation Summary

The MFG investigations commenced in July 2002 and were concluded in September 2003. Table 1 summarizes the actual data collection activities at the site in 2002 and 2003. The attached data report contains all of the data collected by MFG. The tables and figures in this data report are organized as follows:

Volume I

- Chronology of Field Events, Well Construction Information: Tables 1 – 2
- Facility Site Location Map, Site Plan, All Monitoring/Sampling Locations: Figures 1 – 3
- North Plant Groundwater Data/Figures: Tables 3 – 11; Figures 4 – 8
- North Plant Surface Water Data/Figures: Table 12; Figure 9
- North Plant Soil Data/Figures: Figure 10
- South Plant Soil Data: Tables 13 – 14
- South Plant Groundwater Data/Figures: Tables 5 – 18, 20 – 22; Figures 11 – 13, 16 – 17
- South Plant Sediment Data/Figures: Table 19; Figure 14
- South Plant Surface Water Data/Figures: Table 23; Figure 15

Volume II

- Appendix A: August 1970 Color Enhanced Aerial Photograph of Plant
- Appendix B: Data Evaluation Summaries
- Appendix C: Boring Logs and Screened Intervals for North Plant Wells and Piezometers
- Appendix D: Hydrographs for BMP Area Wells, Piezometers, Surface Water-Groundwater Pairs, and Surface Water Benchmarks
- Appendix E: Trilinear and Stiff Diagrams
- Appendix F: Boring Logs for South Plant Direct-Push and Hollow Stem Auger Borings
- Appendix G: Boring Logs and Screened Intervals for South Plant Wells and Piezometers
- Appendix H: Hydrographs for South Plant Wells, Piezometers, Surface Water-Groundwater Pairs, and Surface Water Benchmarks

Please feel free to call (206 287 9130) or e-mail me (jkeithly@anchorenv.com) if you have any questions or concerns. We appreciate the open exchange of information on this project trust that we will continue to have an open dialog.

Sincerely,

James Keithly
Anchor Environmental, L.L.C.

Cc: Andy Hanes, Alcoa
Mark Stiffler, Alcoa

Barry Oliver, Chinook Ventures
Alan Parks, Chinook Ventures
Tom Dickey, Anchor Environmental
Kristen Gaines, Anchor Environmental

List of Tables

List of Figures

List of Appendices

TABLES

Table 1
Chronology of Field Events

Date	Event	Notes
July 29, 2002	Sediment samples collected at six locations from the ditches in the South Plant Area Staff gauges or mini-piezometers installed at four locations (G-1A/B, G-3A/B, G-4A/B, and G-8A/B); surface water measurement benchmarks identified at four other locations (G-2, G-5, G-6, and G-7) in the South Plant Area and near the BMP.	
July 30, 2002	Quarterly groundwater monitoring begins on wells RL-4S, RL-4D, RL-5, RL-3D and RL- 3S in the BMP Area	Not in original Scope. Due to staffing issues, the Plant was unable to provide the personnel to perform this quarterly monitoring. MFG stepped in and conducted the monitoring for this quarter.
July 31, 2002	Continued quarterly groundwater monitoring of wells RL-4S, RL-5, RL-3D, RL-3S, RL1D, RL-2S, RL2D, RL-1S, and RL1D. Sample collected from CDID Down surface water monitoring station in the BMP Area.	
August 1, 2002	Continued quarterly monitoring of the CDID Up surface water monitoring station, wells RL-1S, RL-1D, RL-4S, RL-4D in the BMP Area. Began quarter monitoring of well R-3 in the South Plant Area.	
August 2, 2002	Continued quarterly groundwater monitoring of wells R-2, R-4S, and R-1D in the South Plant Area.	
August 5, 2002	Continued quarterly groundwater monitoring of wells R-1D, R-4D, and R-1D in the South Plant Area. Began quarterly groundwater monitoring of wells RLSW-2 and RLSW-3 in the Old Industrial Landfill Area.	
August 6, 2002	Continued quarterly groundwater monitoring of wells RLSW-4 and RLSW-1 in the Old Industrial Landfill Area.	
August 27, 2002	Site-wide monthly water level measurements begins at 19 existing monitoring wells five staff gauge/mini-piezometers, and four benchmark locations. Surveyors begin acquiring benchmark data prior to shooting all water level measurement locations.	An additional staff gauge/mini-piezometer installed in low lying area south of well RL-5 (G-9A/B).
September 10, 2002	First of four quarterly rounds of surface water sampling begins. Samples collected at MFG stations SW-4, SW-5, SW-6, SW-7, SW-8 in the South Plant Area and stations SW-9 in the BMP Area	
September 11, 2002	Direct push soil sampling begins in South Plant Area. Borings DP-1, DP-2, DP-3, DP-4, DP-5, DP-6, DP-7, and DP-8 completed.	
September 12, 2002	Continued direct push soil sampling in South Plant Area. Borings DP-9, DP-10, and DP-11 completed.	At 1300 hr, direct push rig breaks down, ending field work until September 24, 2002.
September 17, 2002	Surveyors begin shooting DP-1 though DP-11.	
September 24, 2002	Resumed direct push soil sampling in South Plant Area. Borings DP-12, DP-13, DP-14, DP-15, DP-16, DP-17, DP-18, and DP-19 completed.	DP-20 began, but macrocore sampler could not be recovered. No sample collected.
September 25, 2002	Site-wide monthly water level measurements collected.	MW-9 near the Cable Plant added to monitoring network.

Date	Event	Notes
October 29, 2002	Site-wide monthly water level measurements collected.	CDID down benchmark added to monitoring network.
November 25, 2002	Site-wide monthly water level measurements collected. Second of four quarterly rounds of surface water sampling completed. Samples collected at MFG stations SW-4, SW-5, SW-6, SW-7, SW-8 in the South Plant Area and stations SW-9, CDID Up and CDID Down in the BMP Area.	
November 25 and November 26, 2002	Site-wide monthly water level measurements collected. Five piezometers installed in the South Plant area and two installed between BMP and CDID ditch. Well development begins on PZ-1, PZ-2, PZ-3, and PZ-4.	
November 27, 2002	Well development PZ-1, PZ-4, PZ-5, PZ-6 and PZ-7.	
December 2 and December 3, 2002	Completed well development and collected groundwater samples from PZ-1, PZ-2, PZ-3, PZ-4, PZ-5, PZ-6, and PZ-7.	
December 4, 2002	Surveyors shoot DP-12 through DP-19, and PZ-1 though PZ-7.	
December 27, 2002	Site-wide monthly water level measurements collected.	
January 29, 2003	Site-wide monthly water level measurements collected.	
February 25, 2003	Site-wide monthly water level measurements collected.	
March 24, 2003	Site-wide monthly water level measurements collected Third of four quarterly rounds of surface water sampling completed. Samples collected at MFG stations SW-4, SW-5, SW-6, SW-7, SW-8 in the South Plant Area and stations SW-9, CDID Up and CDID Down in the BMP Area.	
March 25, 2003	Second of four quarterly rounds of samples collected from PZ-2, PZ-3, PZ-4, PZ-5, PZ6, and PZ-7.	PZ-1 not sampled due to problem with casing. The casing was repaied by the driller in April 2003.
April 29, 2003	Site-wide monthly water level measurements collected.	
May 29, 2003	Site-wide monthly water level measurements collected.	
June 29 & 30, 2003	Third of four quarterly rounds of samples collected from PZ-1, PZ-2, PZ-3, PZ-4, PZ-5, PZ6, and PZ-7.	
July 1, 2003	Site-wide monthly water level measurements collected. Fourth of four quarterly rounds of surface water sampling completed. Samples collected at MFG stations SW-4, SW-5, SW-6, SW-7, SW-8 in the South Plant Area and stations SW-9, CDID Up and CDID Down in the BMP Area.	
August 12, 2003	Samples collected from drums of investigation-derived waste (IDW) for characterization purposes	
September 25, 2003	IDW hauled off-site by Philip Services	
September 30, 2003	Fourth of four quarterly rounds of samples collected from PZ-1, PZ-2, PZ-5, PZ6, and PZ-7	

Note:

BMP Black Mud Pond

CDID Consolidated Diking and Improvement District (Cowlitz County)

Table 2
Well Construction Information

Well/Piezometer Number	Location of Well/Piezometer at Facility	Total Depth of Borehole (ft bgs)	PVC Well Casing Diameter (Inches)	Screen Slot Size	Steel Casing Stickup (ft ags)	PVC Casing Stickup (ft ags)	Screened Interval		Ground Surface Elevation (ft NAVD88)	Measuring Point Elevation (Top of PVC Casing) (ft NAVD88)	Screened Interval Elevation	
							Top of Screen (ft bgs)	Bottom of Screen (ft bgs)			Top of Screen (ft NAVD88)	Bottom of Screen (ft NAVD88)
CPMW-9	Cable Plant	15	2	0.010	0.00	-0.38	6	14	12.30	11.92	6.30	-1.70
R 1D	South Plant	24	2	0.010	0.90	0.79	20	24	16.59	17.38	-3.41	-7.41
R 1S	South Plant	12	2	0.010	0.47	0.30	7	12	16.54	16.84	9.54	4.54
R 2	South Plant	14	2	0.010	2.05	1.63	9	14	7.42	9.05	-1.58	-6.58
R 3	South Plant	24	2	0.010	0.54	0.39	19	24	12.44	12.83	-6.56	-11.56
R 4D	South Plant	27	2	0.010	1.14	0.97	23	27	17.73	18.70	-5.27	-9.27
R 4S	South Plant	19	2	0.010	1.07	0.94	14	19	17.62	18.56	3.62	-1.38
RL-1D	BMP	38	2	0.010	1.92	1.77	28	38	10.43	12.20	-17.57	-27.57
RL-1S	BMP	17	2	0.010	1.96	1.83	8	18	10.52	12.35	2.52	-7.48
RL-2D	BMP	33	2	0.010	2.00	1.93	23	33	8.34	10.27	-14.66	-24.66
RL-2S	BMP	17.5	2	0.010	2.66	2.45	7.5	17.5	8.27	10.72	0.77	-9.23
RL-3D	BMP	38	2	0.010	2.45	2.35	28	38	10.33	12.68	-17.67	-27.67
RL-3S	BMP	17.5	2	0.010	2.59	2.33	7.5	17.5	10.42	12.75	2.92	-7.08
RL-4D	BMP	35	2	0.010	1.39	1.28	25	35	8.33	9.61	-16.67	-26.67
RL-4S	BMP	13.5	2	0.010	1.70	1.58	8.5	13.5	8.33	9.91	-0.17	-5.17
RL-5	BMP	22	2	0.010	3.42	3.24	12	22	14.15	17.39	2.15	-7.85
RLSW1	OIL	18	1.5	0.010	1.91	1.77	9	18	14.15	15.92	5.15	-3.85
RLSW2	OIL	18	1.5	0.010	2.02	2.02	9	18	15.46	17.48	6.46	-2.54
RLSW3	OIL	18	1.5	0.010	1.75	1.48	9	18	13.50	14.98	4.50	-4.50
RLSW4	OIL	28.5	1.5	0.010	1.69	1.51	18	28.5	27.78	29.29	9.78	-0.72
PZ-1	South Plant	13.7	2	0.010	2.96	2.58	8.6	13	12.34	14.92	3.74	-0.66
PZ-2	South Plant	25.3	2	0.010	3.15	2.48	20.2	24.6	14.24	16.72	-5.96	-10.36
PZ-3	South Plant	10.3	2	0.010	3.10	2.73	5.1	9.5	10.17	12.90	5.07	0.67
PZ-4	South Plant	18.2	2	0.010	3.14	2.74	13	17.4	8.53	11.27	-4.47	-8.87
PZ-5	South Plant	23.5	2	0.010	2.61	1.99	18.4	22.8	9.91	11.90	-8.49	-12.89
PZ-6	BMP	12.6	2	0.010	2.99	2.52	7.5	11.9	4.49	7.01	-3.01	-7.41
PZ-7	BMP	18.6	2	0.010	3.06	2.63	8.4	17.8	7.73	10.36	-0.67	-10.07

Notes:

BMP = Black Mud Pond

OIL - Old Industrial Landfill

ft ags = feet above ground surface

ft bgs = feet below ground surface

Table 3
North Groundwater Water Level Elevations

Monitoring Station Name	RL-1S	RL-1D	RL-2S	RL-2D	RL-3S	RL-3D	RL-4S	RL-4D	RL-5	CPMW-9	PZ-6	PZ-7	G6	G7	G8A	G8B	G9A	G9B	CDID Down	CDID RMC PS
Monitoring Station Location	Black Mud Pond Area									Cable Plant	West Side BMP		BMP Recirc Ditch	Cable plant sample platform	Cable Plant Ditch		East Side BMP		CDID Pump Station	
Station Type	Well	Well	Well	Well	Well	Well	Piez	Piez	Piez	Piez	Piez	SG	Mpiez	Ditch	SG	Mpiez	SG	Mpiez	Ditch	Ditch
Measuring Point Location	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	PM	PM	SG	TOSC	SG	TOSC	Pipe on walkway	SG
Date	Water Level Elevations (ft NAVD88)																			
26-Jul-02																				0.50
30-Jul-02					4.86	2.82	3.60	3.13	1.49											
31-Jul-02	1.20	0.74	0.07	0.05																
02-Aug-02																				0.50
23-Aug-02																				0.30
27-Aug-02	1.91	2.65	0.41	0.26	3.29	4.66	3.55	3.62	0.49				4.30		Dry	Dry	Dry	Dry		
30-Aug-02																				0.50
25-Sep-02	1.63	2.55	0.33	0.11	3.90	4.16	3.10	3.11	0.49	2.90			4.07	Dry	Dry	0.41	Dry	Dry		
27-Sep-02																				0.50
14-Oct-02	1.72	3.58	0.45	0.50	4.05	4.25	4.15	3.80	0.10											
25-Oct-02																				0.50
29-Oct-02	1.70	2.14	0.41	0.34	3.94	4.09	3.80	3.59	0.03	3.60			4.11	1.97	Dry	1.83	Dry	Dry		
01-Nov-02																				0.60
25-Nov-02	1.78	2.18	0.57	0.64	4.27	4.22	5.45	4.58	0.65	4.58			4.38	2.81	3.16	3.16	Dry	Dry	0.32	
02-Dec-02											0.74	1.46								
27-Dec-02	2.49	2.88	1.66	1.85	5.53	5.34	6.81	6.08	4.95	6.00	1.11	0.13	5.06	2.91	3.79	3.62	Dry	4.63	0.07	
29-Jan-03	3.02	3.18	2.50	2.14	6.04	5.42	7.17	6.18	5.60	6.14	2.15	1.10	4.26	3.06	3.20	3.12	Dry	5.10	0.33	
25-Feb-03	2.80	3.33	1.87	1.88	5.52	5.61	6.85	6.13	5.60	6.27	1.80	0.14	3.98	2.88	2.88	3.08	Dry	5.48	0.27	
24-Mar-03	2.94	0.96	3.30	2.60	5.99	4.69	7.48	6.55	5.99	7.28	2.70	2.28	5.41	3.10	3.10	3.32	7.48	5.88	0.55	
29-Apr-03	2.58	3.51	1.25	1.55	5.64	5.63	6.91	6.31	5.66	6.49	1.43	0.27	5.13	3.85	3.86	3.85	Dry	6.38	0.08	
29-May-03	2.34	3.19	0.99	1.19	5.08	5.33	5.77	5.53	4.19	5.89	0.16	0.73	5.43	3.61	3.60	3.55	Dry	6.41	0.48	
01-Jul-03	2.14	2.78	0.67	0.75	4.82	5.02	4.96	4.42	2.57	5.00	0.46	1.20	5.19	3.20	3.20	3.11	Dry	6.01	0.27	

Notes:

All water levels are in feet NAVD88

SPL Ditch = Spent Pot Liner Ditch

Piez = Piezometer

Mpiez = Mini Piezometer

PM = Paint Mark

RMC PS = CDID pump station located just down stream of CDID Down location (measured by CDID personnel on an irregular basis)

SG = Staff Gauge

TOC = Top of PVC Casing

TOSC = Top of Steel Casing

Blank Cell = no measurement

Table 4
Old Industrial Landfill Water Level Elevations

Well Name	RLSW-1	RLSW-2	RLSW-3	RLSW-4
Date	Water Level Elevations (ft NAVD88)			
05-Aug-02		6.28	5.79	
06-Aug-02	6.46			11.26
27-Aug-02	5.98	6	5.76	11.27
25-Sep-02	5.43	5.39	5.16	10.99
29-Oct-02	5.55	5.54	5.43	10.76
25-Nov-02	6.07	6.06	5.84	10.6
27-Dec-02	8.04	7.99	7.74	11.05
29-Jan-03	8.39	8.98	8.08	11.69
25-Feb-03	8.4	8.97	8.25	12.08
24-Mar-03	8.71	9.81	8.73	12.39
29-Apr-03	8.61	9.42	8.3	12.37
29-May-03	7.96	8.15	7.6	12.11
01-Jul-03	7.15	7.05	6.81	11.82

Notes:

All measuring points were top of outer steel well casing

Blank Cell = no measurement

Table 5
North Groundwater Vertical Gradients

Well Pair	RL-1S	RL-1D	RL-2S	RL-2D	RL-3S	RL-3D	RL-4S	RL-4D
Bottom of Screen (ft NAVD88)	**-7.48**		**-9.23**		**-7.08**		**-5.17**	
Top of Screen (ft bgs)		**-17.57**		**-14.66**		**-17.67**		**-16.67**
6/30/2002								
Water Level Elevation (ft NAVD88)					4.86	2.82	3.6	3.13
Vertical Gradient (ft/ft)					0.193		0.041	
7/31/2002								
Water Level Elevation (ft NAVD88)	1.2	0.74	0.07	0.05				
Vertical Gradient (ft/ft)	0.046		0.004					
8/27/2002								
Water Level Elevation (ft NAVD88)	1.91	2.65	0.41	0.26	3.29	4.66	3.55	3.62
Vertical Gradient (ft/ft)	-0.073		0.028		-0.129		-0.006	
9/25/2002								
Water Level Elevation (ft NAVD88)	1.63	2.55	0.33	0.11	3.90	4.16	3.10	3.11
Vertical Gradient (ft/ft)	-0.091		0.041		-0.025		-0.001	
10/14/2002								
Water Level Elevation (ft NAVD88)	1.72	3.58	0.45	0.5	4.05	4.25	4.15	3.80
Vertical Gradient (ft/ft)	-0.184		-0.009		-0.019		0.030	
11/25/2002								
Water Level Elevation (ft NAVD88)	1.78	2.18	0.57	0.64	4.27	4.22	5.45	4.58
Vertical Gradient (ft/ft)	-0.040		-0.013		0.005		0.076	
12/27/2002								
Water Level Elevation (ft NAVD88)	2.49	2.88	1.66	1.85	5.53	5.34	6.81	6.08
Vertical Gradient (ft/ft)	-0.039		-0.035		0.018		0.063	
1/29/2003								
Water Level Elevation (ft NAVD88)	3.02	3.18	2.50	2.14	6.04	5.42	7.17	6.18
Vertical Gradient (ft/ft)	-0.016		0.066		0.059		0.086	
2/25/2003								
Water Level Elevation (ft NAVD88)	2.80	3.33	1.87	1.88	5.52	5.61	6.85	6.13
Vertical Gradient (ft/ft)	-0.053		-0.002		-0.008		0.063	
3/24/2003								
Water Level Elevation (ft NAVD88)	2.94	0.96	3.30	2.6	5.99	4.69	7.48	6.55
Vertical Gradient (ft/ft)	0.196		0.129		0.123		0.081	
4/29/2003								
Water Level Elevation (ft NAVD88)	2.58	3.51	1.25	1.55	5.64	5.63	6.91	6.31
Vertical Gradient (ft/ft)	-0.092		-0.055		0.001		0.052	
5/29/2003								
Water Level Elevation (ft NAVD88)	2.34	3.19	0.99	1.19	5.08	5.33	5.77	5.53
Vertical Gradient (ft/ft)	-0.084		-0.037		-0.024		0.021	
7/1/2003								
Water Level Elevation (ft NAVD88)	2.14	2.78	0.67	0.75	4.82	5.02	4.96	4.42
Vertical Gradient (ft/ft)	-0.063		-0.015		-0.019		0.047	

Notes:

Vertical Gradient (ft/ft) = (Water Level$_{\text{shallow well}}$ - Water Level$_{\text{deep well}}$)/(Bottom of Screen$_{\text{shallow well}}$ - Top of Screen$_{\text{deep well}}$)

Positive vertical gradient value = downward vertical gradient

Negative vertical gradient value = upward vertical gradient

Table 6
North Groundwater Hydraulic Calculations

Date	December 27, 2002	March 24, 2003	July 1, 2003
Estimated Average Hydraulic Conductivity (*K* : ft/day)	0.83	0.83	0.83
Calculated Average Horizontal Hydraulic Gradient (*i* ; ft/ft)	0.002	0.002	0.002
Effective Porosity (n_e; percent by volume)	35 - 45	35 - 45	35 - 45
Estimated Horizontal Groundwater Flow Velocity (*v* ; ft/day)	0.0047 - 0.0037	0.0047 - 0.0037	0.0047 - 0.0037

Notes:

Horizontal Groundwater Flow Velocity = v = $(K_h i)/n_e$

K: obtained from aquifer test results performed by Reynolds and CH_2MHill (1991) for BMP Closure and Post Closure Plan

n_e: very fine - medium sands, sandy silt, silt: estimated from Table 5.1 in Groundwater and Wells (Driscoll, 1986)

Table 7
North Groundwater Surface Water/Groundwater Interaction

Monitoring Station Name	G8A	G8B	Surface Water Gaining or Losing	G9A	G9B	Surface Water Gaining or Losing
Monitoring Station Location	Cable Plant Ditch	Cable Plant Ditch		East Side BMP	East Side BMP	
Station Type	SG	Mpiez		SG	Mpiez	
Measuring Point Location	SG	TOSC		SG	TOSC	
Date	Water Level Elevations (ft NAVD88)					
27-Aug-02	Dry	Dry	---	Dry	Dry	---
25-Sep-02	Dry	0.41	---	Dry	Dry	---
29-Oct-02	Dry	1.83	---	Dry	Dry	---
25-Nov-02	3.16	3.16	---	Dry	Dry	---
27-Dec-02	3.79	3.62	Losing	Dry	4.63	---
29-Jan-03	3.20	3.12	Losing	Dry	5.10	---
25-Feb-03	2.88	3.08	Gaining	Dry	5.48	---
24-Mar-03	3.10	3.32	Gaining	7.48	5.88	Losing
29-Apr-03	3.86	3.85	Losing	Dry	6.38	---
29-May-03	3.60	3.55	Losing	Dry	6.41	---
01-Jul-03	3.20	3.11	Losing	Dry	6.01	---

Notes:

Surface Water Gaining or Losing: Surface water level is greater than groundwater = surface water is losing water to groundwater; Surface water level is less than groundwater = surface water is gaining water from groundwater

SPL Ditch = Spent Pot Liner Ditch

Mpiez = Mini Piezometer

SG = Staff Gauge

TOSC = Top of Steel Casing

Table 8
Black Mud Pond Area Wells—Wet, Dry, Average Year Water Level Elevations

Well Name		RL1S	RL1D	RL2S	RL2D	RL3S	RL3D	RL4S	RL4D	RL5
Measuring Point Elevation (Top of outer steel casing) (ft NGVD88)		12.35	12.2	10.72	10.27	12.75	12.68	9.91	9.61	17.39
Date	Precipitation	Water Level Elevation (ft NGVD88)								
18-Dec-95	Wet Year 66.08 inches	6.35	6.62	8.14	6.94	8.25	5.18	7.16	6.61	5.89
26-Feb-96		2.43	2.28	2.97	2.44	5.00	4.93	7.24	6.78	5.14
13-May-96		4.85	3.03	0.64	1.02	4.58	6.76	5.91	5.28	4.97
22-Jul-96		1.40	2.35	0.72	0.72	4.20	4.48	5.16	4.71	2.44
29-Nov-93	Dry Year 33.22	3.27	1.03	0.72	0.69	4.50	4.43	5.41	4.36	0.72
7-Nov-94		2.10	2.12	2.39	2.27	5.00	4.76	6.24	5.44	5.39
6-Mar-94		1.18	1.87	0.55	0.85	4.33	6.93	4.49	4.19	2.72
8-Aug-94		0.77	1.87	0.14	0.19	3.58	3.93	3.41	3.03	0.89
17-Nov-97	Avg Year 46.97 inches	1.60	2.23	1.35	1.27	4.80	4.68	6.16	5.61	4.82
23-Feb-98		3.09	3.34	4.17	2.81	5.80	5.38	7.69	6.46	5.87
8-Jun-98		1.84	2.33	1.18	1.33	4.65	4.88	5.95	5.68	4.68
14-Sep-98		1.10	1.78	0.46	0.37	3.75	3.96	3.46	3.21	0.52

Table 9
North Groundwater One-Time Conventional and Inorganic Results

	Units	RL-1D	RL-1S	RL-2D	RL-2S	RL-3D	RL-3S	RL-4D	RL-4S	RL-5	RLSW1	RLSW2	RLSW3	RLSW4
	Date	8/2/2002	8/1/2002	7/31/2002	7/31/2002	7/31/2002	7/30/2002	7/30/2002	7/31/2002	7/31/2002	8/5/2003	8/5/2003	8/5/2003	8/5/2003
General Water Chemistry														
Bicarbonate Alkalinity as $CaCO_3$	mg/L	740	259	1,210	3,200	719	700	240	132	170	1,270	758	400	2,160
Carbonate Alkalinity as $CaCO_3$	mg/L	2 U	2 U	2 U	3,820	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Total Alkalinity as CaCO3	mg/L	740	259	1,210	7,020	719	700	240	132	170	1,270	758	400	2,160
Calcium, Dissolved	ug/L	123,000	18,500	53,100	5,810	115,000	29,100	45,300	18,300	8,310	28,100	13,700	90,700	45,200
Magnesium, Dissolved	ug/L	60,700	9,380	25,900	2,270	55,700	14,000	20,700	10,400	3,790	16,400	6,520	44,200	19,990
Potassium, Dissolved	ug/L	2,430	2,000 U	2,690	4,530	3,030	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	2,000 U	4,410	10,600
Sodium, Dissolved	ug/L	25,800	113,000	440,000	3,480,000	30,400	280,000	16,300	22,600	121,000	617,000	443,000	242,000	977,000
Ammonia as Nitrogen	mg/L	18.8	0.29 J	6.7	30	26.5	1.36	5.3	1.06	0.05 U	0.90	0.05 U	3.8	4
Nitrate as Nitrogen	mg/L	0.2 U	0.2 UJ	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U
Solids, Total Dissolved	mg/L	688	384	1,450	9,040	824	732	338	212	450	95	60	182	5 U
Solids, Total Suspended	mg/L	121	112	196	9	252	7	552	294	460	1,690	1,220	1,100	2,780
Sulfate	mg/L	0.2	10.3	31	523	0.3	25	0.3	2	108	17	6	20	19
Chloride	mg/L	5.0	3.4	23	60	4.9	8	13.0	4.7	10.3	84	108	0.5	69
Inorganics														
Total Cyanide	mg/L	0.20	0.020	0.35	38.6	0.003 U	0.14	0.03	0.003 U	0.003	0.92	0.03	0.30	0.19
WAD Cyanide	mg/L	0.003 U	0.003 J	0.003 U	0.23	0.003 U	0.03	0.003 U	0.003 U	0.008	0.03	0.01	0.08	0.08
Fluoride	mg/L	0.2 U	11.4	14	149	0.2 U	16	0.3	0.6	1.8	61	78	10	103
Metals														
Arsenic	µg/L	5 U	5U	5 U	47	5 U	5 U	5 U	5 U	5 U	5 U	5	5 U	6.9
Copper	µg/L	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U	16	10 U	18.3	10 U	10 U
Chromium	µg/L	5 U	5U	5 U	103	5 U	5.6	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Nickel	µg/L	20 U	20 U	20 U	97	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Field Parameters														
Temperature	C	12.6	16.3	12.4	15.4	16.0	15.0	16.1	13.0	21.3	15.7	16.9	15.6	13.6
Conductivity	µmhos/cm	840	227	1,474	7,348	8,355	534	374	162	343	1,608	1,206	1,105	2,504
pH	Std. Units	5.88	6.04	6.24	8.81	5.90	6.15	5.78	5.81	6.16	6.76	6.94	5.93	6.95
Red-ox Potential	mV	-8	-1	-61	-107	-60	-67	-60	123	-32	-53	19	-2	-84
Dissolved Oxygen	% sat	7.9	9.2	15.1	9.6	12.3	9.9	9.9	8.5	10	11.2	10.4	11.7	12.6

Notes:
C - Celsius
mg/L- Milligrams per liter
µg/L- Micrograms per liter
µmhos/cm - micromhos per cenitmeter
Std. Units - standard units
mV - milivolts
% Sat - percent saturation
U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.
UJ - Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected

Table 10
North Groundwater One-Time PAH Results

		RL-1D		RL-1S		RL-2D		RL-2S		RL-3D		RL-3S		RL-4D		RL-4S		RL-5		PZ-6		PZ-7		RLSW1		RLSW2		RLSW3		RLSW4	
Parameter	**Units**	**8/2/2002**	**Q**	**8/1/2002**	**Q**	**7/31/2002**	**Q**	**7/31/2002**	**Q**	**7/31/2002**	**Q**	**7/30/2002**	**Q**	**7/30/2002**	**Q**	**7/30/2002**	**Q**	**7/31/2002**	**Q**	**12/3/2002**	**Q**	**12/3/2002**	**Q**	**7/30/2002**	**Q**	**7/31/2002**	**Q**	**12/3/2002**	**Q**	**12/3/2002**	**Q**
Acenaphthene	µg/L	1	UJ	0.98	UJ	1	UJ	1.1	UJ	1.2	UJ	0.96	UJ	1.2	UJ	1	UJ	0.96	UJ	0.98	UJ	0.96	UJ	1	UJ	1	UJ	0.99	UJ	1	UJ
Acenaphthylene	µg/L	1	UJ	0.98	UJ	1	UJ	1.1	U	1.2	UJ	0.96	UJ	1.2	UJ	1	UJ	0.96	UJ	0.98	UJ	0.96	UJ	1	UJ	1	UJ	0.99	UJ	1	UJ
Anthracene	µg/L	0.1	U	0.098	U	0.1	U	0.11	U	0.12	U	0.096	U	0.12	U	0.1	U	0.096	U	0.55		0.096	U	0.1	U	0.1	U	0.099	U	0.1	U
Benz(a)anthracene	µg/L	0.1	U	0.098	U	0.1	U	0.11	U	0.12	U	0.096	U	0.12	U	0.1	U	0.096	U	0.5		0.096	U	0.1	U	0.1	U	0.099	U	0.1	U
Benzo(a)pyrene	µg/L	0.1	U	0.098	U	0.1	U	0.11	U	0.12	U	0.096	U	0.12	U	0.1	U	0.096	U	0.098	U	0.096	U	0.1	U	0.1	U	0.099	U	0.1	U
Benzo(b)fluoranthene	µg/L	0.2	U	0.2	U	0.23		2.9	J	0.24	U	0.2	U	0.23	U	0.2	U	0.2	U	1.3	J	0.3	J	0.2	U	0.2	U	0.2	U	0.2	J
Benzo(g,h,i)perylene	µg/L	0.2	U	0.2	U	0.2	U	0.22	U	0.24	U	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Benzo(k)fluoranthene	µg/L	0.1	U	0.098	U	0.1	U	0.11	U	0.12	U	0.096	U	0.12	U	0.1	U	0.096	U	0.14		0.096	U	0.1	U	0.1	U	0.099	U	0.1	U
Chrysene	µg/L	0.1	U	0.098	U	0.1	U	0.11	U	0.12	U	0.096	U	0.12	U	0.1	U	0.096	U	0.72		0.096	U	0.1	U	0.1	U	0.1		0.1	U
Dibenz(a,h)anthracene	µg/L	0.2	U	0.2	U	0.2	U	0.22	U	0.24	U	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Fluoranthene	µg/L	0.2	U	0.22		0.2	U	0.22	U	0.24	U	0.2	U	0.23	U	0.2	U	0.2	U	4.4	UJ	0.2	U	0.2	U	0.2	U	0.2	UJ	0.2	U
Fluorene	µg/L	0.2	U	0.2	U	0.2	U	0.22	U	0.24	U	0.2	U	0.23	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Indeno(1,2,3-cd)pyrene	µg/L	0.1	U	0.098	U	0.1	U	0.11	U	0.12	U	0.096	U	0.12	U	0.1	U	0.096	U	0.098	U	0.096	U	0.1	U	0.1	U	0.099	U	0.1	U
Naphthalene	µg/L	1	UJ	0.98	U	1	UJ	1.1	UJ	1.2	UJ	0.96	UJ	1.2	UJ	1	UJ	0.96	UJ	0.98	UJ	0.96	UJ	1	UJ	1	UJ	0.99	UJ	1	UJ
Phenanthrene	µg/L	0.1	U	0.098	U	0.1	U	0.33	J	0.12	U	0.096	U	0.12	U	0.1	U	0.096	U	4.6		0.11		0.1	U	0.1	U	0.099	U	0.1	U
Pyrene	µg/L	0.2	U	0.2	U	0.2	U	0.22	U	0.24	U	0.2	U	0.23	U	0.2	U	0.2	U	3.5		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U

Notes:

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.

J - Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.

UJ -Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

PAH - Polycyclic Aromatic Hydrocarbons

Table 11
North Groundwater Quarterly Piezometer Well Analytical Results

	Units	PZ-6				PZ-7			
		12/3/2002[a]	3/24/2003	6/30/2003	9/29/2003	12/3/2002[a]	3/24/2003	6/30/2003	9/29/2003
General Water Chemistry									
Alkalinity, Total as CaCO3	mg/L		3						
Bicarbonate Alkalinity as $CaCO_3$	mg/L	1,330	806	1,320	2,370	910	1,280	2,500	2,300
Carbonate Alkalinity as $CaCO_3$	mg/L	676	2,240 J	1,300	1,030	2 U	2 UJ	2 U	2 U
Calcium	ug/L	12,700	8,920	7,630	15,500	6,540	26,700	52,500	46,800
Magnesium	ug/L	4,090	724	809	4,820	3,150	12,100	20,400	23,100
Potassium	ug/L	3,150	1,830	2,930	4,590	2,000 U	2,290	4,490	6,310
Sodium	ug/L	598,000	1,740,000	1,600,000	9,860,000	215,000	616,000	1,260,000	1,080,000
Chloride	mg/L	37	46	31	39	11	18	27	29
Sulfate	mg/L	182	287	206	320	16	52	7	30
Ammonia as Nitrogen[b]	mg/L	10.8	NA	NA	NA	3.79	NA	NA	NA
Nitrate as Nitrogen[b]	mg/L	0.5 UJ	NA	NA	NA	0.2 UJ	NA	NA	NA
Solids, Total Dissolved[b]	mg/L	3,680	NA	NA	NA	1,280	NA	NA	NA
Solids, Total Suspended[b]	mg/L	364	NA	NA	NA	52	NA	NA	NA
Inorganics									
Cyanide, Total	mg/L	5	6	6.4	12	0.13	0.25	0.7	0.41
Cyanide, Weak Acid Dissociable (WAD)	mg/L	0	0.07		0.15 J	0.01 U	0.03		0.06 J
Fluoride	mg/L	82.00	104	115	110	16	27	47	40
Field Parameters									
Conductivity	µmhos/cm	6,464	4,323	3,699	4,725	2,312	2,055	2,911	2,759
pH	Std. Units	9.2	9.77	9.63	8.04	6.79	6.64	7.01	6.84
Red-ox Potential	mV	1	-184	-132	-5	61	-106	-142	-90
Dissolved Oxygen	% sat	40.9	26.8	64.1	23.8	33.2	25.2	71.5	2.0

Notes:
C - Celsius
NA - Sample not analyzed for this parameter.
mg/L- Milligrams per liter
mV - millivolts
µg/L- Micrograms per liter
Std. Units - standard units
µmhos/cm - micromhos per cenitmeter
% Sat - percent saturation
a Metal values for this date are totals; remaining dates are dissolved.
b Analyzed for only during first round per Sampling and Analysis Plan
U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.
J - Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.
UJ -Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

Table 12
North Plant One-Time and Quarterly Surface Water Analytical Results

		CDID UP				CDID DOWN				SW-9			
	Units	8/1/2002[a]	11/25/2002	3/24/2003	7/1/2003	7/31/2002[a]	11/25/2002	3/24/2003	7/1/2003	9/10/2002	11/25/2002	3/24/2003	7/1/2003
General Water Chemistry													
Alkalinity, Total as CaCO3	mg/L												
Bicarbonate Alkalinity as CaCO3	mg/L	109	94	60	121	156	103	83	341	2,160	2,110	316	906
Carbonate Alkalinity as CaCO3	mg/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	484	264	2U	40
Arsenic, Dissolved	ug/L	5 U	5 U[e]	5 U[f]	5 U[g]	5 U	5 U[e]	5 U[f]	5 U[g]	NA	NA	NA	NA
Calcium, Dissolved[b]	ug/L	18,500	NA	NA	NA	19,000	NA	NA	NA	26,300	NA	NA	NA
Calcium, Total	ug/L	NA	16,500	13,100	20,000	NA	16,200	16,200	23,200	NA	20,700	12,700	24,400
Copper, Dissolved	ug/L	10 U	10 U[e]	11.2[f]	10 U[g]	10 U	10 U[e]	10 U[f]	10 U[g]	NA	NA	NA	NA
Chromium, Dissolved	ug/L	5 U	5 U[e]	5 U[f]	5 U[g]	5 U	5 U[e]	5 U[f]	5 U[g]	NA	NA	NA	NA
Magnesium, Dissolved[b]	ug/L	8,760	NA	NA	NA	8,780	NA	NA	NA	15,700	NA	NA	NA
Magnesium, Total	ug/L	NA	7,390	5,890	9,200	NA	7,110	6,990	11,400	NA	13,100	7,130	12,500
Nickel, Dissolved	ug/L	20 U	20 U[e]	20 U[f]	20U[g]	20 U	20 U[e]	20 U[f]	20U[g]	NA	NA	NA	NA
Potassium, Dissolved[b]	ug/L	2,000 U	NA	NA	NA	2,000 U	NA	NA	NA	6,840	NA	NA	NA
Potassium, Total	ug/L	NA	3,050	1,450	2,000 U	NA	2,850	1,890	2,000 U	NA	10,900	1,330	3,390
Sodium, Dissolved[b]	ug/L	19,100	NA	NA	NA	45,300	NA	NA	NA	1,290,000	NA	NA	NA
Sodium, Total	ug/L	NA	16,000	11,500	31,900	NA	NA	17,600	142,000	NA	1,100,000	137,000	489,000
Chloride	mg/L	9.3	5.5[e]	0.46[f]	7.3[g]	8.7	9.0[e]	5.6[f]	7.0[g]	NA[e]	28	5	11
Sulfate	mg/L	5.2	7.7[e]	150[f]	6.5[g]	9.6	13.0[e]	13.7[f]	14.0[g]	201	131	19	56
Ammonia as Nitrogen[c]	mg/L	0.05 U	NA	NA	NA	0.05 U	NA	NA	NA	2.06	NA	NA	NA
Nitrate as Nitrogen[c]	mg/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Solids, Total Dissolved[c]	mg/L	159	NA	NA	NA	254	NA	NA	NA	3,610	NA	NA	NA
Solids, Total Suspended[c]	mg/L	17	NA	NA	NA	12	NA	NA	NA	6	NA	NA	NA
Inorganics													
Cyanide, Total	mg/L	0.003 U	0.005 U[e]	0.003 U[f]	0.010[g]	0.009 J	0.0182[e]	0.040[f]	0.020[g]	1.6	1.45	0.05 J	0.37
Cyanide, Weak Acid Dissociable (WAD)	mg/L	0.003 U	0.005 U[e]	0.003 U[f]	0.010[g]	0.006 J	0.005 U[e]	0.007 J[f]	0.010[g]	0.06	0.080	0.01	0.01 J
Fluoride	mg/L	0.50	0.47[e]	0.70[f]	0.80[g]	8.7	4.67[e]	1.7[f]	5.0[g]	69	58	20	37 J
Field													
pH	Std. Units	6.4	5.5	6.0	6.8	6.8	6.4	6.1	8.2	8.5	8.5	7	8.5
Specific Conductance	µmhos/cm	144.0	304.7	174.3	185.1	211.2	329.2	230.8	453.2	3,148	6,401	781.8	1,286
PAHs[c]													
Acenaphthene	ug/L	0.98 U	NA	NA	NA	0.96 U	NA	NA	NA	1 U	NA	NA	NA
Acenaphthylene	ug/L	0.98 U	NA	NA	NA	0.96 U	NA	NA	NA	1 U	NA	NA	NA
Anthracene	ug/L	0.098 U	NA	NA	NA	0.096 U	NA	NA	NA	0.1 U	NA	NA	NA
Benz(a)anthracene	ug/L	0.098 U	NA	NA	NA	0.096 U	NA	NA	NA	0.1 U	NA	NA	NA
Benzo(a)pyrene	ug/L	0.098 U	NA	NA	NA	0.096 U	NA	NA	NA	0.1 U	NA	NA	NA
Benzo(b)fluoranthene	ug/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Benzo(g,h,i)perylene	ug/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Benzo(k)fluoranthene	ug/L	0.098 U	NA	NA	NA	0.096 U	NA	NA	NA	0.1 U	NA	NA	NA
Chrysene	ug/L	0.098 U	NA	NA	NA	0.096 U	NA	NA	NA	0.1 U	NA	NA	NA
Dibenz(a,h)anthracene	ug/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Fluoranthene	ug/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Fluorene	ug/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	ug/L	0.098 U	NA	NA	NA	0.096 U	NA	NA	NA	0.1 U	NA	NA	NA
Naphthalene	ug/L	0.96 U	NA	NA	NA	0.96 U	NA	NA	NA	1 U	NA	NA	NA
Phenanthrene	ug/L	0.098 U	NA	NA	NA	0.096 U	NA	NA	NA	0.1 U	NA	NA	NA
Pyrene	ug/L	0.2 UJ	NA	NA	NA	0.2 UJ	NA	NA	NA	0.2 UJ	NA	NA	NA

Notes:

a Includes facility quarterly monitoring parameters collected by MFG

b MFG followed the Plant's protocol while conducting the quarterly monitoring in the 3rd quarter of calendar year 2002. This protocol called for filtering the samples to be analyzed for metals.

c Analyzed for only during first round per Sampling and Analysis Plan.

d Laboratory error : Marked for analysis on the chain of custody form but missed by laboratory.

e Collected and analyzed by Plant October 2002

f Collected and analyzed by Plant March 2003

g Collected and analyzed by Plant June 2003

NA - Sample not analyzed for this parameter.

J - The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.

UJ -Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

Table 13
South Plant Boring Logs Summary

CEAT	Boring / Piezometer	Total Depth of Boring (feet bgs)	Interval of Fill Material (feet bgs)	Interval of Waste Material (feet bgs)	Interval of Native Material (feet bgs)
Former SPL Storage Area					
4	DP-5	16	0 - 0.25	0.25 - 4.75	4.75 - 16
4	DP-6	12	0 - 1.5	NE	1.5 - 12
4	PZ-5	24	0 - 4.5	NE	4.5 - 24
Floor Sweeping Landfill					
6	DP-1 / DP-1R	24	0 - 0.25	0.25 - 21.5	21.5 - 24
Between Floor Sweeping Landfill and South Black Mud Ponds					
5/6	DP-2	12	0 - 2.5	NE	2.5 - 20
Between Floor Sweeping Landfill and Former SPL Storage Area					
4/6	DP-3	20	0 - 4	4 - 8*	8 - 20
4/6	DP-4	8	NE	0 - 1.75	1.75 - 8
Black Mud Pond East of Cryolite Plant					
8	DP-8	12	NE	0 - 2.75	2.75 - 12
8	DP-9	12	0 - 1	1 - 7	7 - 12
8	DP-10	12	0 - 1.5	1.5 - 6	6 - 12
8	DP-11	12	0 - 0.75	0.75 - 5	5 - 12
8	DP-12	12	0 - 1	1 - 3	3 - 12
8	DP-13	12	0 - 1.5	1.5 - 3.5	3.5 - 12
8	DP-14	12	0 - 2	2 - 4	4 - 12
8	DP-15	12	0 - 4.5	NE	4.5 - 12
8	DP-16	12	0 - 1.25	1.25 - 4	4 - 12
8	DP-17	12	0 - 4.5	NE	4.5 - 12
8	DP-18	12	0 - 4.25	4.25 - 4.5	4.5 - 12
8	DP-19	12	NE	0 - 4.5	4.5 - 12
8	DP-20	8	0 - 4	NE	NE
8	B-21	7.5	0 - 2.25	2.25 - 6.5	6.5 - 7.5
8	PZ-1	14	0 - 1.25	1.25 - 3.5	3.5 - 14
8	PZ-2	26.5	0 - 1.25	1.25 - 4.5	4.5 - 26.5
8	PZ-3	11.5	0 - 1.5	1.5 - 2	2 - 11.5
8	PZ-4	19	0 - 0.75	0.75 - 6.25	6.25 - 19
Cryolite Plant					
9	DP-7	12	0 - 0.25	0.25 - 1.25	1.25 - 12

Notes:

bgs = below ground surface

Fill = Cover or construction fill

Waste = material other than construction fill

NE = not encountered

* Estimated due to poor recovery

Table 14
South Plant Area Subsurface Soil Analytical Results

Parameter	Depth[a] ® Units	DP-1	DP-2	DP-4	DP-5	DP-6	DP-7	DP-8	DP-9	DP-10A	DP-10B	DP-11
		Sampling Station, Date Collected and Depth Interval (ft bgs)										
		9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/12/2002	9/12/2002	9/12/2002	9/12/2002
		Composite[b]	3 - 4	0.1 - 0.25	2 - 5.4	0.5 - 1.5	0.25 - 1.25	0.2 - 0.75	0 - 1	1.5 - 3.8	4 - 6	0.75 - 1.5
Conventionals												
Solids, Total	Percent	82	69.6	93.8	91.6	91.9	91.5	89.3	94.8	87.4	48.7	88.7
Inorganics												
Cyanide, Total	mg/Kg	20.5	2.4	1.7 J	5.2	1.9 J	1.3 J	14.7	1.8 J	0.9 J	256 J	48 J
Cyanide, Weak Acid Dissociable (WAD)	mg/Kg	4.3	1.5 J	1.1 J	1.7	1.5 U	1.6	6.3	0.7	0.6 U	145	14
Fluoride	mg/Kg	906	366	80	195	597	172	677	218	221	1,040	151
Polycyclic Aromatic Hydrocarbons (PAH)												
Total PAHs[c]	µg/Kg	1,773,065	119	35,097	8,324	27,530	16,746	84,094	90,844	1,121	3,024,677	142,714
2-Methylnaphthalene	ug/Kg	12,000 D	7.2 U	5.6	63	19	5.5	56	52	5.8 U	200	24
Acenaphthene	ug/Kg	55,000 D	7.2 U	39	230	96	35	200	590	5.8 U	3,400 D	130
Acenaphthylene	ug/Kg	130 U	7.2 U	5.4 U	5.5 U	5.5 U	5.5 U	46	5.9	5.8 U	77	27
Anthracene	ug/Kg	93,000 D	7.2 U	190	150	390	57	7,500 D	1,100 D	7.4	85,000 D	1,900 D
Benz(a)anthracene	ug/Kg	90,000 D	7.2 U	1,200 D	370	1,000 D	830	2,800 D	7,500 D	68	140,000 D	4,900 D
Benzo(a)pyrene	ug/Kg	95,000 D	7.2 U	1,800 D	480	1,700 D	940	4,300 D	8,800 D	65	62,000 D	2,800 D
Benzo(b)fluoranthene	ug/Kg	150,000 D	13	7,600 D	1,000	4,400 D	2,400 D	16,000 D	11,000 D	230	160,000 D	38,000 D
Benzo(g,h,i)perylene	ug/Kg	56,000 D	7.2 U	4,700 D	890	4,700 D	3,600 D	8,000 D	4,600 D	75	15,000 D	2,700 D
Benzo(k)fluoranthene	ug/Kg	53,000 D	7.2 U	2,500 D	370	1,500 D	890	4,300 D	8,400 D	81	76,000 D	13,000 D
Chrysene	ug/Kg	110,000 D	9.7	4,400 D	740	4,700 D	3,000 D	8,400 D	9,100 D	160	200,000 D	23,000 D
Dibenz(a,h)anthracene	ug/Kg	15,000 D	7.2 U	890	130	1100	360	1,900 D	1,100 D	18	6,600 D	11,00 D
Dibenzofuran	ug/Kg	44,000 D	7.2 U	34	150	130	18	280	210	5.8 U	6,300 D	230
Fluoranthene	ug/Kg	300,000 D	18	3,300 D	1,000	1,400 D	940	9,700 D	13,000 D	130	880,000 D	22,000 D
Fluorene	ug/Kg	54,000 D	7.2 U	23	140	120	31	420	490	5.8 U	12,000 D	62
Indeno(1,2,3-cd)pyrene	ug/Kg	63,000 D	7.2 U	4,300 D	800	4,000 D	2,300 D	8,000 D	5,900 D	77	18,000 D	3,800 D
Naphthalene	ug/Kg	23,000 D	7.2 U	13	68	32	7	92	96	5.8 U	100	41
Phenanthrene	ug/Kg	310,000 D	16	1,200 D	860	940 D	230	4,400 D	6,900 D	42	580,000 D	13,000 D
Pyrene	ug/Kg	250,000 D	15	2,900 D	880	1,300 D	1,100	7,700 D	12,000 D	150	780,000 D	16,000 D

Notes:

See Figure 4 for sampling locations.

a Interval in feet below ground surface

b Composite of 7 samples collected from various intervals down to 24 feet bgs. See Boring log for sample intervals.

c Total of all 16 compounds. Non-detected compounds were assigned a value of one-half the reporting limit for this calculation.

bgs - Below ground surface

ft - feet

J - The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

D - The reported result is from a dilution.

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.

Table 14
South Plant Area Subsurface Soil Analytical Results

Parameter	Depth[a] ® Units	DP-12 9/24/2002 3 - 4	DP-13 9/24/2002 1.5 - 2	DP-14 9/24/2002 2 - 4	DP-18 9/24/2002 0 - 4	DP-19a 9/24/2002 1 - 2.5	DP-19b 9/24/2002 2.5 - 4	PZ-3 12/3/2002 2.5 - 4	PZ-4A 12/3/2002 3 - 6	PZ-4B 12/3/2002 12 - 13.5	B-21 11/25/2002 2.5 - 4.5
		Sampling Station, Date Collected and Depth Interval (ft bgs)									
Conventionals											
Solids, Total	Percent	59.5	87.3	76.3	83.8	81.9	81.1	80.7	64.8	72.6	64.2
Inorganics											
Cyanide, Total	mg/Kg	524	9	62	4	7	69	0.2	361	9.5	362
Cyanide, Weak Acid Dissociable (WAD)	mg/Kg	397	2	63	1.6 J	1.1 J	48	0.3	261	0.3	376
Fluoride	mg/Kg	1,220	216	1,320	166	295	899	65.1	1,070	1,410	1,720
Polycyclic Aromatic Hydrocarbons (PAH)											
Total PAHs[c]	µg/Kg	3,099,038	202,517	1,292,030	44,859	21,428	126,667	1,665	4,546,350	33,200	2,895,420
2-Methylnaphthalene	ug/Kg	330	16	140	7.6	6.1 U	22	2 J	1,700 D	10	320 D
Acenaphthene	ug/Kg	320	85	2,900 D	24	14	70	3 J	3,700 D	78	5,000 D
Acenaphthylene	ug/Kg	78	12	170	10	6.1 U	30	6.2 U	1,100 D	3.6 J	190 D
Anthracene	ug/Kg	61,000 D	1,800 D	29,000 D	710	350	1,700 D	59	290,000 D	1,800 D	120,000 D
Benz(a)anthracene	ug/Kg	110,000 D	12,000 D	91,000 D	1,600 D	900 D	5,400 D	75	140,000 D	1100	110,000 D
Benzo(a)pyrene	ug/Kg	5,800 D	2,300 D	20,000 D	580 D	330 D	1,100 D	35	32,000 D	300	30,000 D
Benzo(b)fluoranthene	ug/Kg	150,000 D	33,000 D	78,000 D	12,000 D	5,400 D	31,000 D	180	140,000 D	1,900 D	140,000 D
Benzo(g,h,i)perylene	ug/Kg	7,300 D	3,000 D	2,900 D	780 D	590 D	1,700 D	48	5,300 D	83	6,900 D
Benzo(k)fluoranthene	ug/Kg	57,000 D	15,000 D	31,000 D	3,200 D	2,200 D	13,000 D	64	42,000 D	370	42,000 D
Chrysene	ug/Kg	160,000 D	34,000 D	110,000 D	8,600 D	3,600 D	26,000 D	210	230,000 D	3,000 D	120,000 D
Dibenz(a,h)anthracene	ug/Kg	4,200 D	1,300 D	1,100 D	430 D	260 D	920 D	12	3,600 D	40	3,800 D
Dibenzofuran	ug/Kg	13,000 D	250	2,400 D	89	42	260	7.4	29,000 D	200	8,900 D
Fluoranthene	ug/Kg	900,000 D	26,000 D	270,000 D	7,600 D	3,100 D	19,000 D	340	1,300,000 D	8,700 D	940,000 D
Fluorene	ug/Kg	510 D	30	180 D	6.9	6.1 U	16	3.8 J	250 D	21	210 D
Indeno(1,2,3-cd)pyrene	ug/Kg	9,300 D	3,700 D	3,100 D	1,100 D	720 D	2,300 D	40	6300 D	84	7,800 D
Naphthalene	ug/Kg	200	24	140	21	13	49	2.5 J	1400 D	10	300 D
Phenanthrene	ug/Kg	1100,000 D	11,000 D	180,000 D	3,700 D	1,600 D	9,100 D	230	1,500,000 D	9,400 D	680,000 D
Pyrene	ug/Kg	520,000 D	59,000 D	470,000 D	4,400 D	2,300 D	15,000 D	350	820,000 D	6,100 D	680,000 D

Notes:

See Figure 4 for sampling locations.

a Interval in feet below ground surface

b Composite of 7 samples collected from various intervals down to 24 feet bgs. See Boring log for sample intervals.

c Total of all 16 compounds. Non-detected compounds were assigned a value of one-half the reporting limit for this calculation.

bgs - Below ground surface

ft - feet

J - The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.

D - The reported result is from a dilution.

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.

Table 15
South Groundwater Water Level Elevations

Monitoring Station Name	R1S	R1D	R4S	R4D	R2	R3	PZ-1	PZ-2	PZ-3	PZ-4	PZ-5	G-1A	G-1B	G-2	G-3A	G-3B	G-4A	G-4B	G-5	CDID Industrial Way
Monitoring Station Location	South Plant Area											SPL Ditch	SPL Ditch	Bridge over Ditch	004 Ditch				004 Pump Station	Pump Station
Station Type	Well	Well	Well	Well	Well	Well	Piez	Piez	Piez	Piez	Piez	SG	Mpiez	Ditch	SG	Mpiez	SG	Mpiez	Ditch	Ditch
Measuring Point Location	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC	SG	TOSC	PM	SG	TOSC	SG	TOSC	PM	SG
Date	Water Level Elevations (ft NAVD88)																			
7/26/2002																				1.6
8/1/2002	11.78	11.13	9.58	9.74		8.98														
8/2/2002					3.70															
8/5/2002		10.98		9.58																
8/9/2002																				1.50
8/27/2002	11.43	10.56	9.52	9.27	2.43	8.84						8.86	9.07	9.04	6.02	6.14	Dry	1.66	1.92	
8/30/2002																				1.20
9/25/2002	11.08	10.23	9.24	8.95	1.17	8.54						Dry	8.79	8.79	5.88	6.60	Dry	1.03	1.84	
9/27/2002																				1.00
10/29/2002	10.86	9.95	9.15	8.78	3.38	8.78						8.09	8.92	9.32	6.17	6.23	Dry	2.42	1.92	
11/1/2002																				1.00
11/12/2002	10.74	9.91	9.39	9.06	3.74	8.90														
11/25/2002	10.84	9.79	9.20	8.85	4.65	9.00						8.85	9.23	10.00	6.25	6.23	3.45	3.07	1.14	
12/2/2002							7.16	9.33	8.30	6.25	7.29									
12/27/2002	11.69	10.98	10.61	10.17	6.11	10.72	8.83	10.89	9.59	7.56	9.52	10.60	No Data	11.45	6.31	6.39	3.92	3.57	1.85	1.50
1/29/2003	12.44	11.49	10.87	10.53	6.23	10.48	8.67	10.76	9.48	7.59	8.43	10.65	No Data	10.63	6.34	6.38	3.98	3.64	1.45	
1/31/2003																				2.00
2/25/2003	12.95	12.20	11.00	10.99	6.17	10.83	8.79	10.90	9.33	7.70	8.88	10.55	No Data	10.86	6.29	6.41	3.93	3.75	1.82	
3/24/2003	13.52	12.39	11.74	11.42	6.34	11.23	9.22	11.31	9.72	7.95	9.16	10.85	No Data	11.90	6.37	6.52	4.13	4.04	3.94	
4/29/2003	13.33	12.75	12.07	11.52	6.34	11.06	9.03	11.12	9.53	7.96	9.15	9.29	11.57	11.02	6.31	6.59	4.10	3.84	1.88	
5/29/2003	12.81	12.25	11.55	10.98	5.99	10.58	7.83	10.48	8.63	7.42	8.66	9.51	11.24	10.62	6.24	6.53	3.95	3.64	1.45	
7/1/2003	12.29	11.64	10.83	10.19	4.87	9.88	6.69	9.62	7.94	6.51	7.95	8.95	10.84	10.05	6.23	6.44	3.55	3.34	1.92	

Notes:

All water levels are in feet NAVD88

No Data = Staff Gauge was not accessible by foot due to high surface water levels.

SP = South Plant

SPL Ditch = Spent Pot Liner Ditch

CDID Industrial Way PS = Pump station across Industrial Way near G5 - meaured by CDID on an irregular basis.

Piez = Piezometer

Mpiez = Mini Piezometer

SG = Staff Gauge

TOC = Top of PVC Casing

TOSC = Top of Steel Casing

PM = Paint Mark

Blank Cell = Not measured

Table 16
South Groundwater Vertical Gradients

Well Pair	R1S	R1D	R4S	R4D	PZ-1	PZ-2
Bottom of Screen (ft NAVD88)	**4.54**		**-1.38**		**-0.66**	
Top of Screen (ft bgs)		**-3.41**		**-5.27**		**-5.96**
8/1/2002						
Water Level Elevation (ft NAVD88)	11.78	11.13	9.58	9.74		
Vertical Gradient (ft/ft)	0.082		-0.041			
8/27/2002						
Water Level Elevation (ft NAVD88)	11.43	10.56	9.52	9.27		
Vertical Gradient (ft/ft)	0.109		0.064			
9/25/2002						
Water Level Elevation (ft NAVD88)	11.08	10.23	9.24	8.95		
Vertical Gradient (ft/ft)	0.107		0.075			
10/29/2003						
Water Level Elevation (ft NAVD88)	10.86	9.95	9.15	8.78		
Vertical Gradient (ft/ft)	0.114		0.095			
11/12/2002						
Water Level Elevation (ft NAVD88)	10.74	9.91	9.39	9.06		
Vertical Gradient (ft/ft)	0.104		0.085			
11/25/2003						
Water Level Elevation (ft NAVD88)	10.84	9.79	9.20	8.85		
Vertical Gradient (ft/ft)	0.132		0.090			
12/27/2002						
Water Level Elevation (ft NAVD88)	11.69	10.98	10.61	10.17	8.83	10.89
Vertical Gradient (ft/ft)	0.089		0.113		-0.389	
1/29/2003						
Water Level Elevation (ft NAVD88)	12.44	11.49	10.87	10.53	8.67	10.76
Vertical Gradient (ft/ft)	0.119		0.087		-0.394	
2/25/2003						
Water Level Elevation (ft NAVD88)	12.95	12.2	11.00	10.99	8.79	10.9
Vertical Gradient (ft/ft)	0.094		0.003		-0.398	
3/24/2003						
Water Level Elevation (ft NAVD88)	13.52	12.39	11.74	11.42	9.22	11.31
Vertical Gradient (ft/ft)	0.142		0.082		-0.394	
4/29/2003						
Water Level Elevation (ft NAVD88)	13.33	12.75	12.07	11.52	9.03	11.12
Vertical Gradient (ft/ft)	0.073		0.141		-0.394	
5/29/2003						
Water Level Elevation (ft NAVD88)	12.81	12.25	11.55	10.98	7.83	10.48
Vertical Gradient (ft/ft)	0.070		0.147		-0.500	
7/1/2003						
Water Level Elevation (ft NAVD88)	12.29	11.64	10.83	10.19	6.69	9.62
Vertical Gradient (ft/ft)	0.082		0.165		-0.553	

Notes:

Positive vertical gradient value = downward vertical gradient

Negative vertical gradient value = upward vertical gradient

Vertical Gradient (ft/ft) = (Water Level$_{\text{shallow well}}$ - Water Level$_{\text{deep well}}$)/(Bottom of Screen$_{\text{shallow well}}$ - Top of Screen$_{\text{deep well}}$)

Table 17
South Groundwater Hydraulic Calculations

Date	December 27, 2002		March 24, 2003		July 1, 2003	
South Groundwater	**Eastern Zone**	**Western Zone**	**Eastern Zone**	**Western Zone**	**Eastern Zone**	**Western Zone**
Estimated Average Hydraulic Conductivity (*K* : ft/day)	0.83	0.83	0.83	0.83	0.83	0.83
Calculated Average Horizontal Hydraulic Gradient (*i* ; ft/ft)	0.006	0.009	0.006	0.017	0.004	0.017
Effective Porosity (n_e; percent by volume)	35 - 45	35 - 45	35 - 45	35 - 45	35 - 45	35 - 45
Estimated Horizontal Groundwater Flow Velocity (*v* ; ft/day)	0.014 - 0.011	0.021 - 0.017	0.014 - 0.011	0.040 - 0.031	0.0095 - 0.0074	0.040 - 0.031

Notes:

Horizontal Groundwater Flow Velocity = v = $(K_h i)/n_e$)

K: obtained from aquifer test results performed by Reynolds and CH_2MHill (1991) for BMP Closure and Post Closure Plan

n_e: very fine - medium sands, sandy silt, silt: estimated from Table 5.1 in Groundwater and Wells (Driscoll, 1986)

Eastern Zone = East of Cryolite Plant and West of Covered Mud and Lime Ponds

Western Zone = Within and southwest of Former SPL Storage Area

Table 18
South Groundwater Surface Water/Groundwater Interaction

Monitoring Station Name	G-1A	G-1B	Surface Water Gaining or Losing	G-3A	G-3B	Surface Water Gaining or Loosing	G-4A	G-4B	Surface Water Gaining or Losing
Monitoring Station Location	SPL Ditch	SPL Ditch		004 Ditch	004 Ditch		004 Ditch	004 Ditch	
Station Type	SG	Mpiez		SG	Mpiez		SG	Mpiez	
Measuring Point Location	SG	TOSC		SG	TOSC		SG	TOSC	
Date	Water Level Elevations (ft NAVD88)								
8/27/2002	8.86	9.07	Gaining	6.02	6.14	Gaining	Dry	1.66	---
9/25/2002	Dry	8.79	---	5.88	6.60	Gaining	Dry	1.03	---
10/29/2002	8.09	8.92	Gaining	6.17	6.23	Gaining	Dry	2.42	---
11/25/2002	8.85	9.23	Gaining	6.25	6.23	Losing	3.45	3.07	Losing
12/27/2002	10.60	No Data	---	6.31	6.39	Gaining	3.92	3.57	Losing
1/29/2003	10.65	No Data	---	6.34	6.38	Gaining	3.98	3.64	Losing
2/25/2003	10.55	No Data	---	6.29	6.41	Gaining	3.93	3.75	Losing
3/24/2003	10.85	No Data	---	6.37	6.52	Gaining	4.13	4.04	Losing
4/29/2003	9.29	11.57	Gaining	6.31	6.59	Gaining	4.10	3.84	Losing
5/29/2003	9.51	11.24	Gaining	6.24	6.53	Gaining	3.95	3.64	Losing
7/1/2003	8.95	10.84	Gaining	6.23	6.44	Gaining	3.55	3.34	Losing

Notes:

Surface Water Gaining or Loosing: Surface water level is greater than groundwater = surface water is loosing water to groundwater; Surface water level is less than groundwater = surface water is gaining water from groundwater

All water levels are in feet NAVD88

No Data = Staff Gauge was not accessible by foot due to high surface water levels.

SPL Ditch = Spent Pot Liner Ditch

Piez = Piezometer

Mpiez = Mini Piezometer

SG = Staff Gauge

TOSC = Top of Steel Casing

Table 19
South Plant Area Sediment Analytical Results

	Units	Sampling Station and Date Collected					
		SD1	SD2	SD3	SD4	SD5	SD6
		7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002	7/29/2002
Conventionals							
Solids, Total	Percent	53.8	53.5	45.2	44.8	31.4	42.8
Inorganics							
Cyanide, Total	mg/Kg	27.5	16	78.5	25.7	213	3
Cyanide, Weak Acid Dissociable (WAD)	mg/Kg	18.4	10.3	26.3	4.3	35.5	0.4 U
Fluoride	mg/Kg	832	1,310	5,650	5,030	5,730	927
Polycyclic Aromatic Hydrocarbons (PAH)							
Total PAHs[a]	Percent	0.01	0.03	1.83	1.85	2.2	0.01
Acenaphthene	mg/Kg	0.92 U	2.9 U	30	52	49	2.4 U
Acenaphthylene	mg/Kg	0.92 UJ	2.9 UJ	3.4 UJ	3.4 UJ	4.8 UJ	2.4 UJ
Anthracene	mg/Kg	0.13 J	0.63 J	120 JD	84 JD	150 JD	0.55 J
Benz(a)anthracene	mg/Kg	3.2 D	18 D	1,100 D	1,500 D	1,500 D	6.9
Benzo(a)pyrene	mg/Kg	4 D	13 D	610 D	740 D	870 D	6.9
Benzo(b)fluoranthene	mg/Kg	12 D	41 D	2,300 D	2,100 D	2,100 D	20 D
Benzo(g,h,i)perylene	mg/Kg	8.1 J,D	16 J,D	570 J,D	560 J,D	720 J,D	7.3 J
Benzo(k)fluoranthene	mg/Kg	3.7 J,D	14 J,D	500 J,D	580 J,D	710 J,D	6.5 J
Chrysene	mg/Kg	12 D	54 D	1,300 D	1,900 D	2,100 D	18 D
Dibenz(a,h)anthracene	mg/Kg	0.86 UJ	1.9 UJ	55 UJ	55 UJ	67 UJ	0.87 UJ
Fluoranthene	mg/Kg	3.1 J,D	46 J,D	5,500 J,D	6,000 J,D	7,200 J,D	19 J,D
Fluorene	mg/Kg	0.19 U	0.57 U	23 D	17 D	18 D	0.47 U
Indeno(1,2,3-cd)pyrene	mg/Kg	5.6 D	9.8 D	310 D	380 D	450 D	6.3 D
Naphthalene	mg/Kg	0.92 UJ	2.9 UJ	3.4 UJ	3.4 UJ	4.8 UJ	2.4 UJ
Phenanthrene	mg/Kg	0.44	1.9	500 D	290 D	500 D	2.3
Pyrene	mg/Kg	2.3 J	34 J,D	5,400 J,D	4,300 J,D	5,700 J,D	17 J,D

Notes:

See Figure 4 for sampling locations.

a Total of all 16 compounds. Non-detected compounds were assigned a value of one-half the reporting limit for this calculation.

D - The reported result is from a dilution.

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.

J - Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.

UJ -Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

Table 20
South Groundwater One-Time Conventional and Inorganic Results

		R1D	R1S	R2	R3	R4D	R4S	DP1	DP2	DP4	DP5	DP6	DP7	DP8	DP9	DP10	DP12	DP13
	Date	8/5/2002	8/1/2002	8/2/2002	8/1/2002	8/5/2002	8/2/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/11/2002	9/12/2002	9/12/2002	9/24/2002	9/24/2002
Conventionals	**Units**																	
Alkalinity, Bicarbonate	mg/L	831	125	208	4,600	822	974	9	750	108	698	12	2 U	10	2,110	823	1,070	1,990
Alkalinity, Carbonate	mg/L	2 U	2 U	2 U	11,000	2 U	2 U	7	2 U	2 U	2 U	29	16	2 U	1,040	2 U	256	30
Alkalinity, Total	mg/L	831	125	208	15,600	822	974	3,080	750	108	698	8,280	4,400	2,180	3,150	823	1,320	2,020
Calcium, Dissolved	ug/L	130,000	12,900	33,400	1,010	82,600	108,000	2,880	68,700	4,910	81,700	32,700	3,090	8,070	200	59,300	3,480	21,700
Magnesium, Dissolved	ug/L	66,600	4,790	15,200	596	43,300	51,000	1,320	35,000	1,670	48,400	12,800	337	3,630	74	29,400	658	7,600
Potassium, Dissolved	ug/L	2,400	2000 U	2000 U	18,000	2,070	2,430	19,900	6,050	2,500	2,170	35,700	21,100	3,920	2000 U	2000 U	2000 U	5,230
Sodium, Dissolved	ug/L	104,000	59,600	32,500	9,180,000	116,000	269,000	1,410,000	242,000	39,400	164,000	6,140,000	2,510,000	1,300,000	179,000	257,000	835,000	969,000
Ammonia as Nitrogen	mg/L	7.4	1.72 J	0.43	372	1.34 J	3.18	NES	5.2	NES	5.5	142	13.1	6.3	12.2	4.6	2.07	10.5
Nitrate as Nitrogen	mg/L	0.2 U	0.2 UJ	0.2 U	0.4	0.2 UJ	0.2 U	3	1.3	1.3	1.2	24	1 U	1 U	0.5 U	0.5 U	5	0.2 U
Solids, Total Dissolved	mg/L	972	234	336	21,700	936	1,040	NES	980	476	700	11,800	7,080	3,440	NES	NES	2,520	2,160
Solids, Total Suspended	mg/L	240	12	120	10	192	292	NES	294,000	3,300	8,740	16,300	6,350	12,400	NES	NES	1,150	2,220
Chloride	mg/L	112	4.5	7.3	85.5	11	11.2	156	29	3	49	42	58	21	44	16	14	35
Sulfate	mg/L	0.3	0.4	1.3	210	0.2	0.2	37	2	4	2	36	408	19	45	1	80	0.5
Inorganics																		
Cyanide, Total	mg/L	0.03	0.09	0.003 U	307	0.02	0.04	9	3 J	0.9 J	2	36	5 J	4	3.6 J	0.5 J	2.37	1.16
Cyanide, WAD	mg/L	0.003 J	0.004 J	0.003 U	0.14 J	0.003 J	0.006 J	0.1	0.08 J	0.05 J	0.1	0.1	0.08 J	0.2	0.06	0.03	0.41	0.06
Fluoride	mg/L	0.8	21.5	0.4	2,160	1.5	5.1	336	17	25	19	1,910	296	180	320	17	238	63
Metals																		
Arsenic, Dissolved	ug/L	5 U	5 U	5 U	70.6 J	26.1	21.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Dissolved	ug/L	5 U	5 U	5 U	243	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, Dissolved	ug/L	10 U	10 U	10 U	20 UJ	10 U	10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, Dissolved	ug/L	20 U	20 U	20 U	40 U	20 U	20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note:

U = The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.

J = Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.

UJ = Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

NA = Not anlayzed in sample

NES = Not enough sample volume for this anlayasis

Table 21
South Groundwater One-Time PAH Results

Parameter	Units	DP-1	Q	DP-2	Q	DP-4	Q	DP-5	Q	DP-6	Q	DP-7	Q	DP-8	Q	DP-9	Q	DP-10	Q	DP-12	Q	DP-13	Q
		9/11/2002		9/11/2002		9/11/2002		9/11/2002		9/11/2002		9/11/2002		9/11/2002		9/12/2002		9/12/2002		9/24/2002		9/24/2002	
Acenaphthene	µg/L	96	UJ	0.96	UJ	1.2	UJ	0.096	UJ	1	UJ	0.96	U	1	U	0.96	U	9.9	U	48	U	9.6	U
Acenaphthylene	µg/L	96	U	0.96	U	1.2	U	0.096	U	1	U	0.96	U	1	U	0.96	U	9.9	U	48	U	9.6	U
Anthracene	µg/L	140		0.22		0.12	U	0.096	U	0.13		0.7		6.6		0.15		19		86		21	
Benz(a)anthracene	µg/L	370		0.6		0.34		0.14		1.1		0.93		9.1		0.096	U	12		340		25	
Benzo(a)pyrene	µg/L	500		0.68		0.77		0.096	U	0.1	U	0.91		14		0.096	U	3.6		68		16	
Benzo(b)fluoranthene	µg/L	530		1.1		1.5		0.58		1.8		2.4		39		0.3		10		530		40	
Benzo(g,h,i)perylene	µg/L	570		1.2		4.4		0.65		1.3		1.4		35		0.2	U	4.8		190		14	
Benzo(k)fluoranthene	µg/L	260		0.47		0.66		0.096	U	0.1	U	0.61		13		0.096	U	3.2		180		12	
Chrysene	µg/L	530		0.85		0.85		0.31		2.4		1.8		20		0.096	U	17		670		52	
Dibenz(a,h)anthracene	µg/L	100		0.2	U	3.1		0.2	U	0.2	U	1.2		22		0.2	U	3.1		24		2.1	
Fluoranthene	µg/L	880		1.9		0.94		0.28		3.7		4.4		26		0.55		110		2400		160	
Fluorene	µg/L	170		0.29		0.23	U	0.2	U	0.34		2.7		0.67		0.4		21		9.6	U	11	
Indeno(1,2,3-cd)pyrene	µg/L	290		0.55		1.6		0.38		0.55		0.59		18		0.096	U	0.99	U	66		5.9	
Naphthalene	µg/L	260	U	0.96	U	1.2	U	0.96	U	5.1		28		1	U	3.5	U	9.9	U	48	U	9.6	U
Phenanthrene	µg/L	790		1.6		0.24		0.17		0.97		13		8.3		1.7		180		2000		150	
Pyrene	µg/L	760		1.2		0.66		0.2		2.9		2.4		20		0.38	U	79		1500		120	

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.
PAH - Polycyclic Aromatic Hydrocarbons
J - Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.

UJ -Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

Table 21
South Groundwater One-Time PAH Results

Parameter	Units	PZ1	Q	PZ2	Q	PZ3	Q	PZ4	Q	PZ5	Q	R1D	Q	R1S	Q	R2	Q	R3	Q	R4D	Q	R4S	Q
		12/3/2002		12/3/2002		12/3/2002		12/3/2002		12/3/2002		8/2/2002		8/2/2002		8/1/2002		8/1/2002		8/5/2002		8/2/2002	
Acenaphthene	µg/L	7.3	J	1	UJ	40	J	11	J	1	UJ	1	U	0.99	U	0.99	U	0.96	U	1.1	U	1	U
Acenaphthylene	µg/L	0.99	U	1	UJ	9.6	UJ	27	J	1	UJ	1	U	0.99	U	0.99	U	0.96	U	1.1	U	1	U
Anthracene	µg/L	3		2.4		14		27		1.4		0.1	U	0.099	U	0.099	U	0.096	U	0.11	U	0.1	U
Benz(a)anthracene	µg/L	1.1		1.1		3.6		8.8		0.67		0.1	U	0.099	U	0.099	U	0.096	U	0.11	U	0.1	U
Benzo(a)pyrene	µg/L	0.099	U	0.14		1.1		1.8		0.57		0.1	U	0.099	U	0.099	U	0.096	U	0.11	U	0.1	U
Benzo(b)fluoranthene	µg/L	0.98		1.3		3.1		9.5		4.3	J	0.2	U	0.2	U	0.2	U	8.8		0.22	U	0.2	U
Benzo(g,h,i)perylene	µg/L	0.2	U	0.2	U	2	U	2.2	UJ	1.1		0.2	U	0.2	U	0.2	U	0.2	U	0.22	U	0.2	U
Benzo(k)fluoranthene	µg/L	0.099	U	0.24		1.2		2.1		0.42	J	0.1	U	0.099	U	0.099	U	0.096	U	0.11	U	0.1	U
Chrysene	µg/L	1.7		1.4		7.7		12		1.5		0.1	U	0.099	U	0.099	U	0.096	U	0.11	U	0.1	U
Dibenz(a,h)anthracene	µg/L	0.2	U	0.2	UJ	2	UJ	2.2	U	0.2	UJ	0.2	U	0.2	U	0.2	U	0.2	U	0.22	U	0.2	U
Fluoranthene	µg/L	13	J	19	J	44		130		7.8		0.2	U	0.2	U	0.2	U	0.2	U	0.22	U	0.2	U
Fluorene	µg/L	12	J	0.29	J	19		2.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.22	U	0.2	U
Indeno(1,2,3-cd)pyrene	µg/L	0.099	U	0.1	UJ	0.96	UJ	1.1	UJ	0.51		0.1	U	0.099	U	0.099	U	0.096	U	0.11	U	0.1	U
Naphthalene	µg/L	0.99	U	1	UJ	9.6	UJ	11	UJ	1	UJ	1	U	0.99	U	0.99	U	0.96	U	1.1	U	1	U
Phenanthrene	µg/L	42	J	37	J	140		260		11	J	0.1	U	0.099	U	0.099	U	0.096	U	0.11	U	0.1	U
Pyrene	µg/L	9.2	J	14	J	37	J	100	J	6	J	0.2	U	0.2	U	0.2	U	0.2	U	0.22	U	0.2	U

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.
PAH - Polycyclic Aromatic Hydrocarbons
J - Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.

UJ -Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

Table 22
South Groundwater Quarterly Piezometer Well Analytical Results

		General Water Chemistry												Inorganics			Field Parameters			
		Bicarbonate	Carbonate	Metals										Total	WAD					
		Alkalinity	Alkalinity	Calcium	Magnesium	Potassium	Sodium	Chloride	Sulfate	Ammonia[a]	Nitrate[a]	TSS[a]	TDS[a]	Cyanide	Cyanide	Fluoride	Conductivity	pH	Eh	DO
Well	Date	mg/L as $CaCO_3$	mg/L as $CaCO_3$	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L-N	mg/L	mg/L	mg/L	mg/L	mg/L	µmhos/cm	Std. Units	mV	% Sat.
PZ1	12/3/2002[b]	1,100	460	2,550	341	2,000 U	515,000	18	90	2.35	2 U	93	2,710	9	0.1	257	5,854	8.99	-15	37.9
	3/25/2003	NS1	NS1	NS1	NS1	NS1	NS1	NS1	NS1	NA	NA	NA	NA	NS1	NS1	NS1	NS1	NS1	NS1	NS1
	6/30/2003	1,170	490	5,840	620	2,000 U	1,170,000	14	106	NA	NA	NA	NA	5		265	ND	8.23	-152	58.4
	9/29/2003	1,040	462	9,180	2,700	3,820	1,110,000	14	98	NA	NA	NA	NA	14	0.41 J	270	2,611	9.81	113	39.2
PZ2	12/3/2002[b]	758	1,900	1,250	661	3,670	1,590,000	52	220	14	1 U	12	7,720	47	0.1	548	15,340	9.04	-179	32.6
	3/25/2003	2,530	2,220 J	2,010	1,280	5,120	2,790,000	57	205	NA	NA	NA	NA	47.7	0.08	542	6,917	9.45	-170	17.7
	6/30/2003	3,140	1,720	2,100	1,280	7,430	3,210,000	40	200	NA	NA	NA	NA	59		584	6,720	9.31	-187	66.3
	9/29/2003	3,290	1,710	2,210	1,360	6,950	16,200,000	36	184	NA	NA	NA	NA	65	0.75 J	579	6,786	9.12	-26	31.8
PZ3	12/3/2002[b]	940	40	1,980	759	2,000 U	303,000	22	3	5.6	0.5 U	67	1,290	0.6	0.02	111	2,472	7.54	-42	35.1
	3/25/2003	522	2 UJ	10,900	3,390	2,440	345,000	18	3	NA	NA	NA	NA	0.007 J	0.006 J	89	756	7.57	-172	23.9
	6/30/2003	1,630	2 U	16,800	6,990	5,160	970,000	38	1.5	NA	NA	NA	NA	0.5		176	2,444	7.91	-104	67.7
	9/29/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PZ4	12/3/2002[b]	3,930	2,720	3,510	1,650	3,290	2,020,000	126	117	44	2 U	107	9,650	74	0.01 U	1,030	19,740	9.12	-133	28.6
	3/25/2003	2,920	3,000 J	3,600	2,200	5,330	3,910,000	118	148	NA	NA	NA	NA	75	1.02	1,110	9,537	9.64	-208	18.1
	6/30/2003	3,280	2,920	3,740	2,000	6,610	4,600,000	92	101	NA	NA	NA	NA	89.5		1,200	9,231	9.46	-176	74
	9/29/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PZ5	12/3/2002[b]	244	7,920	545	211	6,350	3,440,000	68	556	267	5 U	22	17,100	302	0.03	2,840	31,550	10.07	-215	19.8
	3/25/2003	2 U	7,500 J	941	351	8,990	6,070,000	73	620	NA	NA	NA	NA	231	0.26	2,330	14,880	10.64	-237	29.9
	6/30/2003	176	8,140	798	307	13,600	7,350,000	85	632	NA	NA	NA	NA	277		2,960	14,590	10.39	-279	72.7
	9/29/2003	108	7,910	3,480	923	14,100	36,300,000	86	630	NA	NA	NA	NA	502	3 J	2,910	14,510	10.17	-79	33.8

Note:

a Analyzed for only during first round per Sampling and Analysis Plan
b Metal values for this date are totals; remaining dates are dissolved.
DO Dissolved Oxygen
Eh Red-Ox potential
NA Not Analyzed for during this sampling event.
ND No data, meter malfunction.
NS1 No Sample - Loose well casing prevented bailer from reaching water column.
TDS Total Dissolved Solids
TSS Total Suspended Solids
U The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.
J Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.
UJ Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.
WAD Weak-Acid Dissociable

Table 23
South Plant One-Time and Quarterly Surface Water Analytical Results

		SW-4				SW-5				SW-6			
	Units	9/10/2002	11/25/2002	3/24/2003	7/1/2003	9/10/2002	11/25/2002	3/24/2003	7/1/2003	9/10/2002	11/25/2002	3/24/2003	7/1/2003
General Water Chemistry													
Alkalinity, Total as CaCO3	mg/L	2,450	925	407	1,360	789	580	106	336	1,040	980	146	400
Bicarbonate Alkalinity as CaCO3	mg/L	1,450	781	329	806	254	554	106	336	666	654	146	284
Carbonate Alkalinity as CaCO3	mg/L	996	144	78	552	535	27	2 U	2 U	370	326	2U	116
Calcium, Dissolved[a]	ug/L	17,600	NA	NA	NA	7,870	NA	NA	NA	4,880	NA	NA	NA
Calcium, Total	ug/L	NA	7,120	9,460	10,600	NA	6,270	5,820	7,950	NA	3,690	5,350	5,330
Magnesium, Dissolved[a]	ug/L	5,480	NA	NA	NA	1,780	NA	NA	NA	3,090	NA	NA	NA
Magnesium, Total	ug/L	NA	3,980	3,680	3,590	NA	3,950	2,210	5,000	NA	2,960	1,780	2,250
Potassium, Dissolved[a]	ug/L	3,810	NA	NA	NA	4,830	NA	NA	NA	4,360	NA	NA	NA
Potassium, Total	ug/L	NA	4,230	1,670	3,320	NA	5,880	1,920	2,210	0	5,150	1,320	3,210
Sodium, Dissolved[a]	ug/L	1,410,000	NA	NA	NA	539,000	NA	NA	NA	813,000	NA	NA	NA
Sodium, Total	ug/L	NA	608,000	229,000	936,000	NA	401,000	58,100	229,000	NA	807,000	111,000	325,000
Chloride	mg/L	NA[c]	15	4	15	NA[c]	10	2.1	2.3	NA[c]	36	3.7	10
Sulfate	mg/L	57	44	22	41	5.2	30	5.4	1.9	312	271	22	69
Ammonia as Nitrogen[b]	mg/L	0.46	NA	NA	NA	0.12	NA	NA	NA	0.05 U	NA	NA	NA
Nitrate as Nitrogen[b]	mg/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Solids, Total Dissolved[b]	mg/L	3,330	NA	NA	NA	1,060	NA	NA	NA	1,810	NA	NA	NA
Solids, Total Suspended[b]	mg/L	97	NA	NA	NA	260	NA	NA	NA	23	NA	NA	NA
Inorganics													
Cyanide, Total	mg/L	3.0	3.4	1.42 J	4.94	0.5	0.49	0.03 J	0.15	0.3	0.08	0.02 J	0.04
Cyanide, WAD	mg/L	0.09	0.08	0.23 J	5 J	0.06	0.04	0.003 UJ	0.4 J	0.02	0.02	0.009 J	0.03 J
Fluoride	mg/L	299	125	47	207 J	175	112	14.7	61 J	177	165	36	87 J
PAHs[b]													
Acenaphthene	ug/L	1 U	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA
Acenaphthylene	ug/L	1 U	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA
Anthracene	ug/L	0.1 U	NA	NA	NA	0.1 U	NA	NA	NA	0.1 U	NA	NA	NA
Benz(a)anthracene	ug/L	0.17	NA	NA	NA	0.1 U	NA	NA	NA	0.62	NA	NA	NA
Benzo(a)pyrene	ug/L	0.18 J	NA	NA	NA	0.1 U	NA	NA	NA	0.66	NA	NA	NA
Benzo(b)fluoranthene	ug/L	0.87	NA	NA	NA	0.2 U	NA	NA	NA	2.90	NA	NA	NA
Benzo(g,h,i)perylene	ug/L	0.35 J	NA	NA	NA	0.2 U	NA	NA	NA	1.4	NA	NA	NA
Benzo(k)fluoranthene	ug/L	0.16 J	NA	NA	NA	0.1 U	NA	NA	NA	0.55	NA	NA	NA
Chrysene	ug/L	0.16 J	NA	NA	NA	0.1 U	NA	NA	NA	1.2	NA	NA	NA
Dibenz(a,h)anthracene	ug/L	0.3	NA	NA	NA	0.2 U	NA	NA	NA	0.2 UJ	NA	NA	NA
Fluoranthene	ug/L	1.10	NA	NA	NA	0.25	NA	NA	NA	0.2 U	NA	NA	NA
Fluorene	ug/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	ug/L	0.22 U	NA	NA	NA	0.1 U	NA	NA	NA	0.85	NA	NA	NA
Naphthalene	ug/L	1 U	NA	NA	NA	1 U	NA	NA	NA	1 U	NA	NA	NA
Phenanthrene	ug/L	0.41	NA	NA	NA	0.12	NA	NA	NA	0.18	NA	NA	NA
Pyrene	ug/L	0.74	NA	NA	NA	0.28	NA	NA	NA	2.8 J	NA	NA	NA

Notes:

a MFG followed the Plant's protocol while conducting the quarterly monitoring in the 3rd quarter of calendar year 2002. This protocol called for filtering the samples to be analyzed for metals.

b Analyzed for only during first round per Sampling and Analysis Plan

c Laboratory error : Marked for analysis on the chain of custody form but missed by laboratory.

J - Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable.

UJ - Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected.

NA - Sample not analyzed for this parameter.

D - The reported result is from a dilution.

U - The compound was analyzed for, but not detected ("Non-detect") at or above the given method reporting limit.

Table 23
South Plant One-Time and Quarterly Surface Water Analytical Results

	Units	SW-7 9/10/2002	SW-7 11/25/2002	SW-7 3/24/2003	SW-7 7/1/2003	SW-8 9/10/2002	SW-8 11/25/2002	SW-8 3/24/2003	SW-8 7/1/2003
General Water Chemistry									
Alkalinity, Total as CaCO3	mg/L	2,330	390	117	554	1,040	728	137	514
Bicarbonate Alkalinity as CaCO3	mg/L	1,100	283	117	406	672	492	137	334
Carbonate Alkalinity as CaCO3	mg/L	1,230	106	2U	148	366	236	2U	180
Calcium, Dissolved[a]	ug/L	2,920	NA	NA	NA	3,970	NA	NA	NA
Calcium, Total	ug/L	NA	1,500	3,540	5,350	NA	3,460	5,780	5,540
Magnesium, Dissolved[a]	ug/L	1,990	NA	NA	NA	3,030	NA	NA	NA
Magnesium, Total	ug/L	NA	756	932	2,230	NA	2,300	1,720	2,240
Potassium, Dissolved[a]	ug/L	7,980	NA	NA	NA	4,550	NA	NA	NA
Potassium, Total	ug/L	NA	2,230	923	3,020	NA	3,810	1,280	2,730
Sodium, Dissolved[a]	ug/L	1,560,000	NA	NA	NA	836,000	NA	NA	NA
Sodium, Total	ug/L	NA	387,000	111,000	476,000	NA	635,000	89,300	430,000
Chloride	mg/L	NA[c]	17	4	16	NA[c]	30	3.6	16
Sulfate	mg/L	476	119	25	106	325	217	22	105
Ammonia as Nitrogen[b]	mg/L	0.05 U	NA	NA	NA	0.05 U	NA	NA	NA
Nitrate as Nitrogen[b]	mg/L	0.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Solids, Total Dissolved[b]	mg/L	3,760	NA	NA	NA	1,900	NA	NA	NA
Solids, Total Suspended[b]	mg/L	78	NA	NA	NA	27	NA	NA	NA
Inorganics									
Cyanide, Total	mg/L	0.3	0.1	0.007 J	0.06	0.05	0.03	0.003 J	0.01
Cyanide, WAD	mg/L	0.05	0.03	0.003 U	0.05 J	0.01	0.004 J	0.003 U	0.01 J
Fluoride	mg/L	372	128	43.0	121 J	177	141	29	110 J
PAHs[b]									
Acenaphthene	ug/L	11 U	NA	NA	NA	1 U	NA	NA	NA
Acenaphthylene	ug/L	11 U	NA	NA	NA	1 U	NA	NA	NA
Anthracene	ug/L	1.1 U	NA	NA	NA	0.1 U	NA	NA	NA
Benz(a)anthracene	ug/L	3.3 D	NA	NA	NA	0.16	NA	NA	NA
Benzo(a)pyrene	ug/L	2.2 D	NA	NA	NA	0.2	NA	NA	NA
Benzo(b)fluoranthene	ug/L	18 D	NA	NA	NA	1.20	NA	NA	NA
Benzo(g,h,i)perylene	ug/L	6.1 D	NA	NA	NA	0.79	NA	NA	NA
Benzo(k)fluoranthene	ug/L	3.5 D	NA	NA	NA	0.29	NA	NA	NA
Chrysene	ug/L	7.8 D	NA	NA	NA	0.5	NA	NA	NA
Dibenz(a,h)anthracene	ug/L	2.2 UJ	NA	NA	NA	0.2 UJ	NA	NA	NA
Fluoranthene	ug/L	12 J,D	NA	NA	NA	0.2 U	NA	NA	NA
Fluorene	ug/L	2.2 U	NA	NA	NA	0.2 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	ug/L	3.1 D	NA	NA	NA	0.46	NA	NA	NA
Naphthalene	ug/L	11 U	NA	NA	NA	1 U	NA	NA	NA
Phenanthrene	ug/L	1.2 D	NA	NA	NA	0.1 U	NA	NA	NA
Pyrene	ug/L	11 D	NA	NA	NA	0.67 J	NA	NA	NA

Notes:

a MFG followed the Plant's protocol while conductin

b Analyzed for only during first round per Sampling

c Laboratory error : Marked for analysis on the chain

J - Indicates an estimated concentration; the result is co

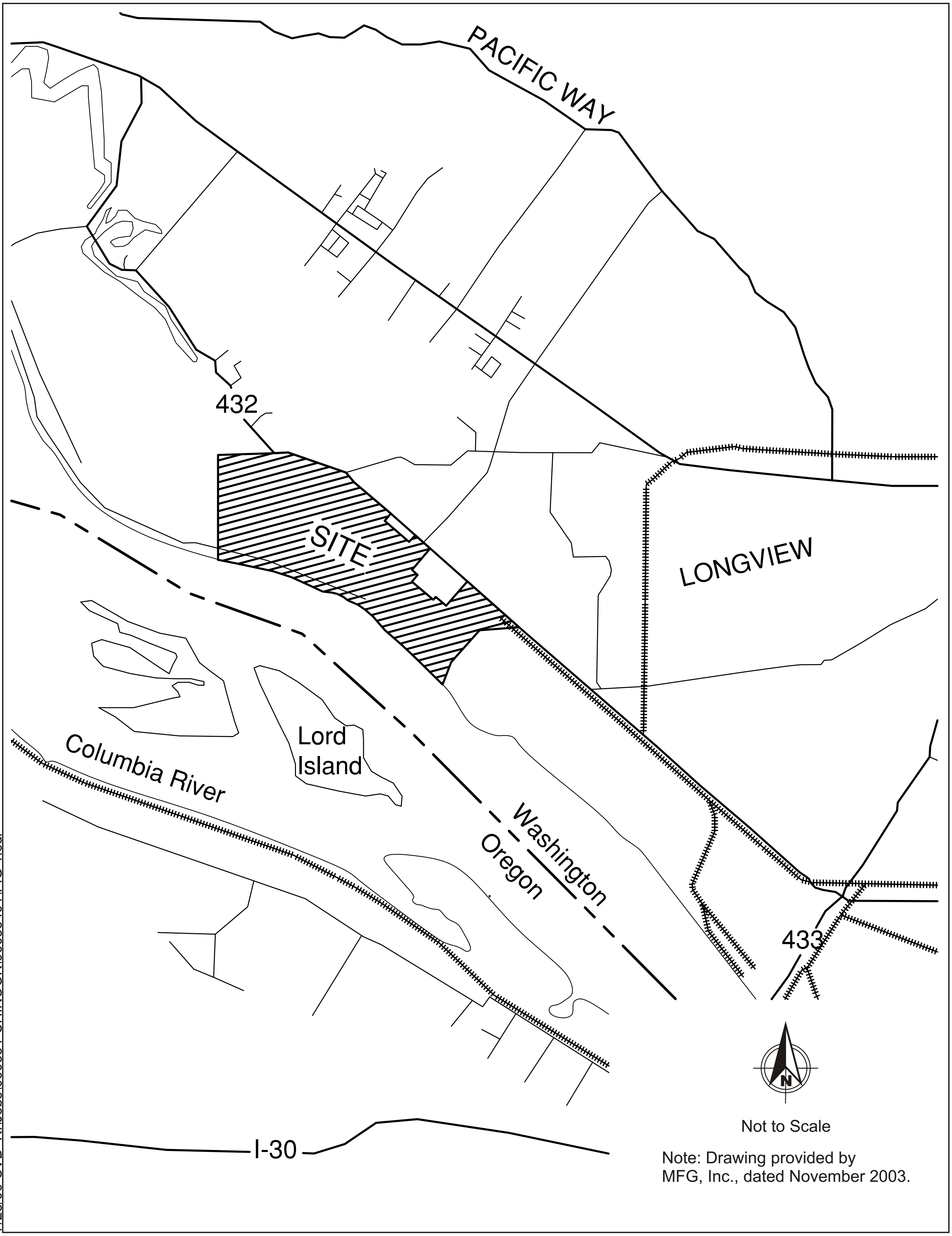
UJ - Indicates an estimated quantitation limit; the comp

NA - Sample not analyzed for this parameter.

D - The reported result is from a dilution.

U - The compound was analyzed for, but not detected

FIGURES

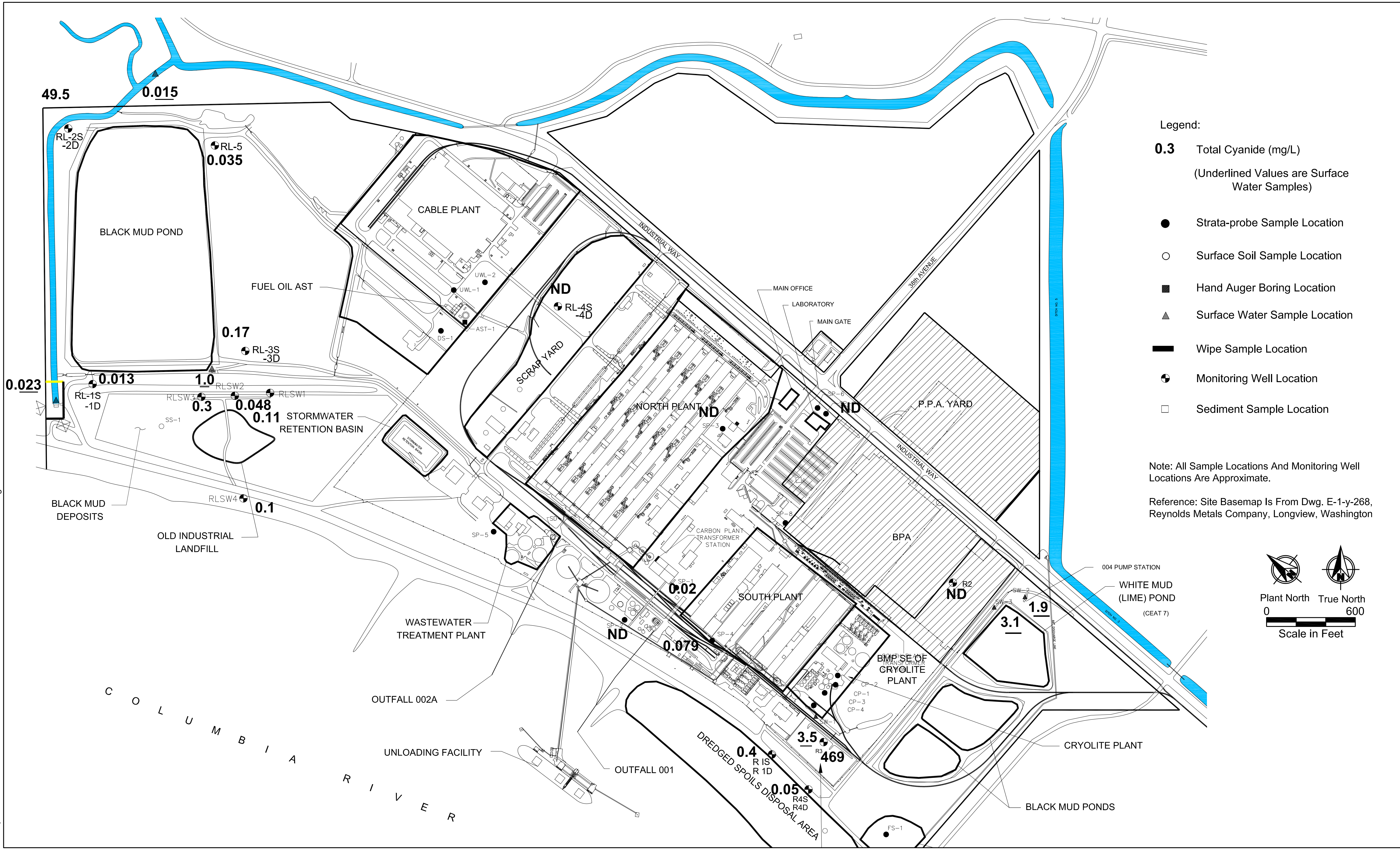


7/28/06 CVD K:\Jobs\060354-CHINOOK\06035401\FIG 1.cdr

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 1
Facility Site Location Map
Chinook Ventures
Longview Site

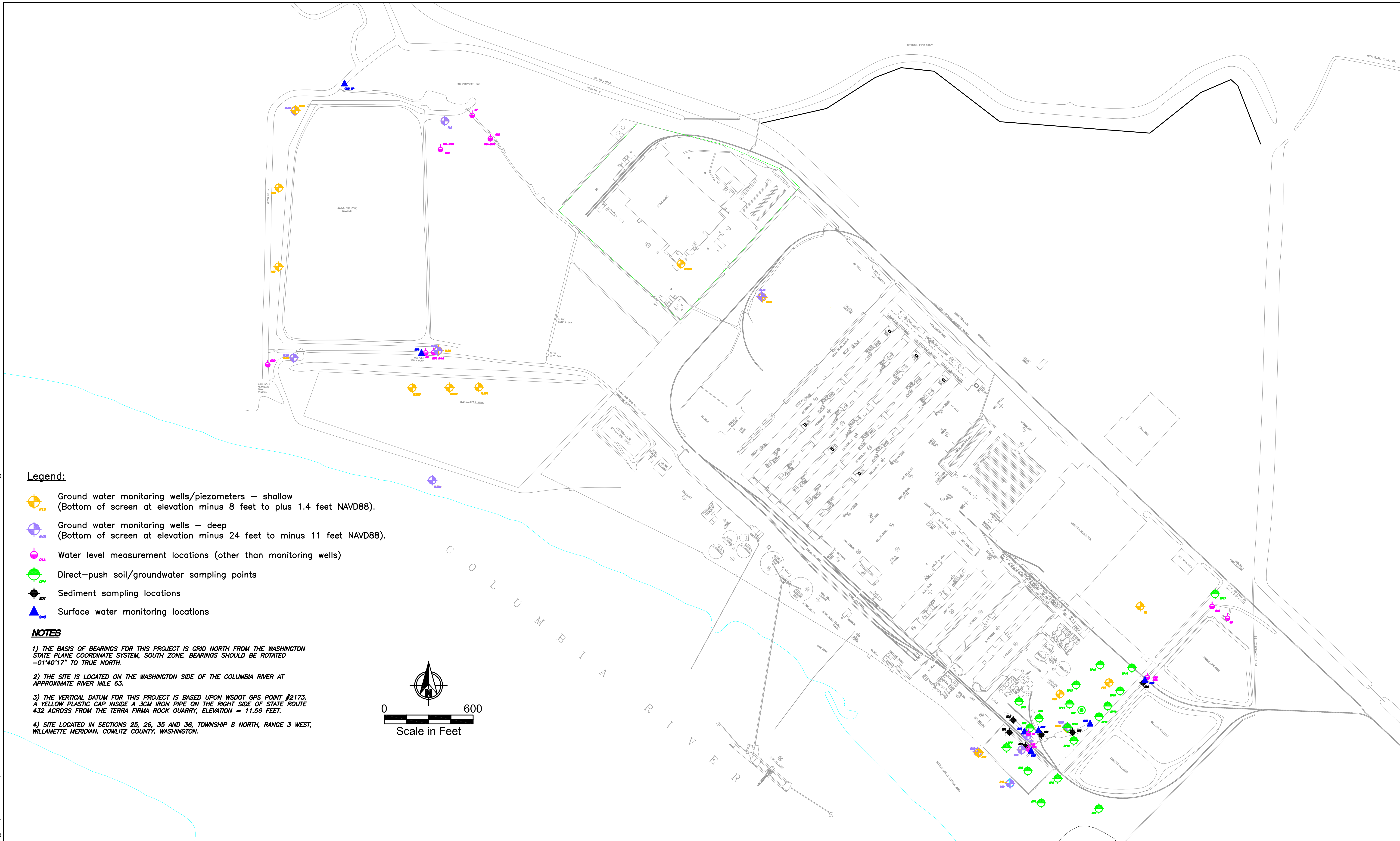
Jul 27, 2006 10:41am cdavidson K:\Jobs\060354-CHINOOK\060354011\06034501-001.dwg FIG 2



ANCHOR ENVIRONMENTAL, L.L.C.

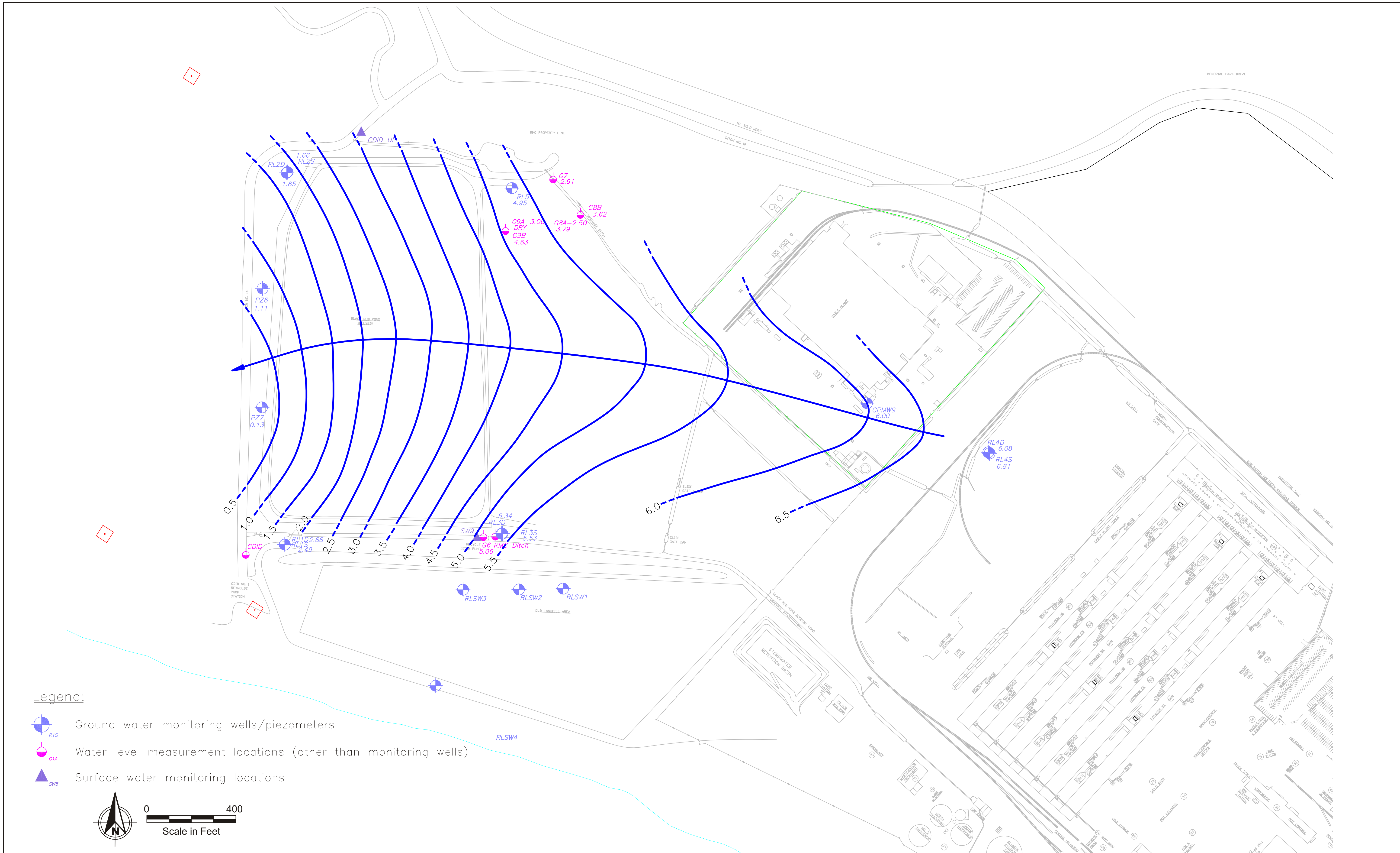
Figure 2
Site Plan
Chinook Ventures
Longview Site

Aug 02, 2006 3:44pm cdavidson K:\Jobs\060354-CHINOOK\06035401\06034501-004.dwg FIG 3



ANCHOR ENVIRONMENTAL, L.L.C.

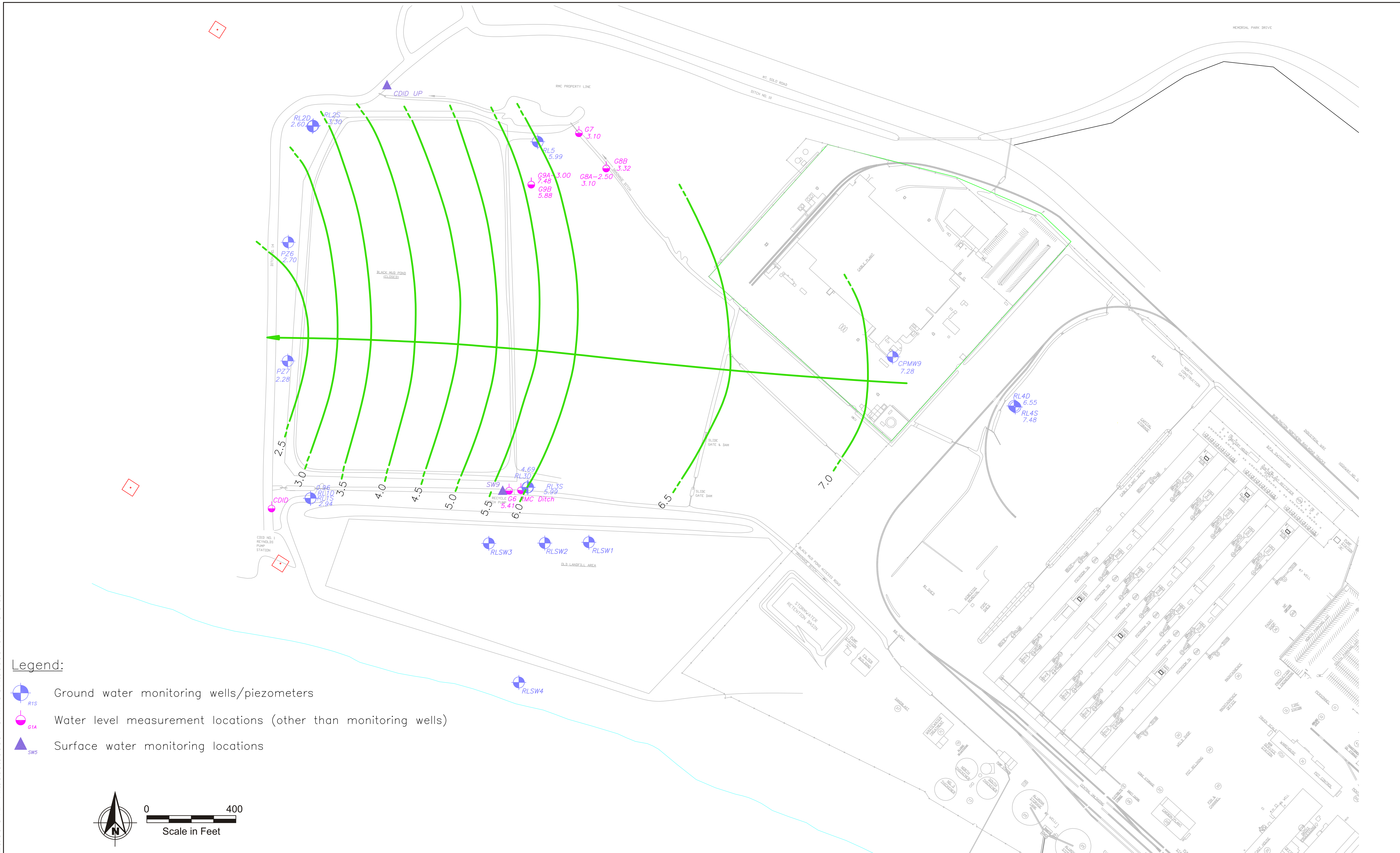
Figure 3
All Monitoring/Sampling Locations
Chinook Ventures
Longview Site



7/28/06 CVD K:\Jobs\060354-CHINOOK\06035401\FIG 5.cdr

ANCHOR ENVIRONMENTAL, L.L.C.

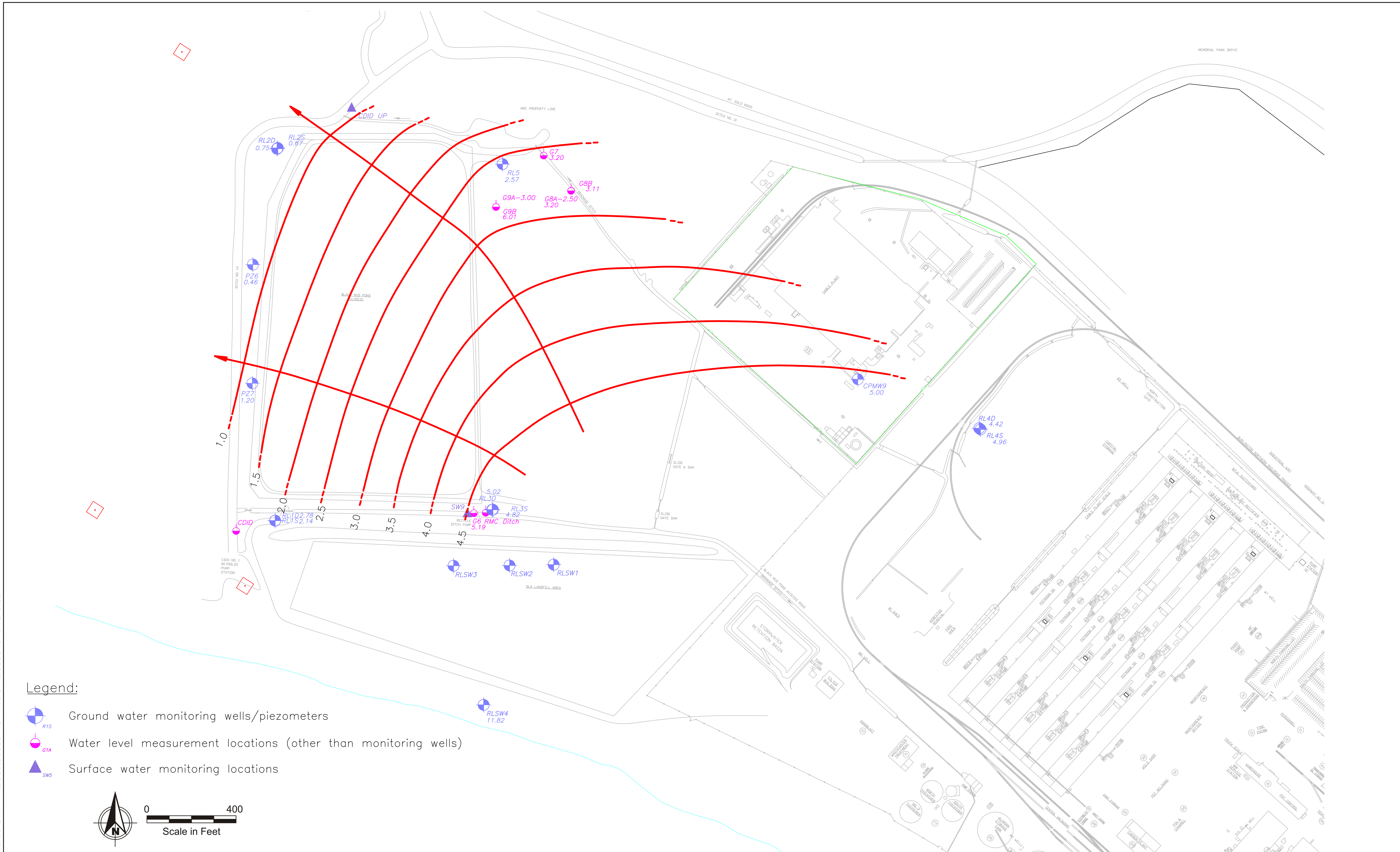
Figure 4
North Groundwater Potentiometric Surface Map - December 27, 2002
Chinook Ventures
Longview Site



7/28/06 CVD K:\Jobs\060354-CHINOOK\06035401\FIG 5.cdr

ANCHOR ENVIRONMENTAL, L.L.C.

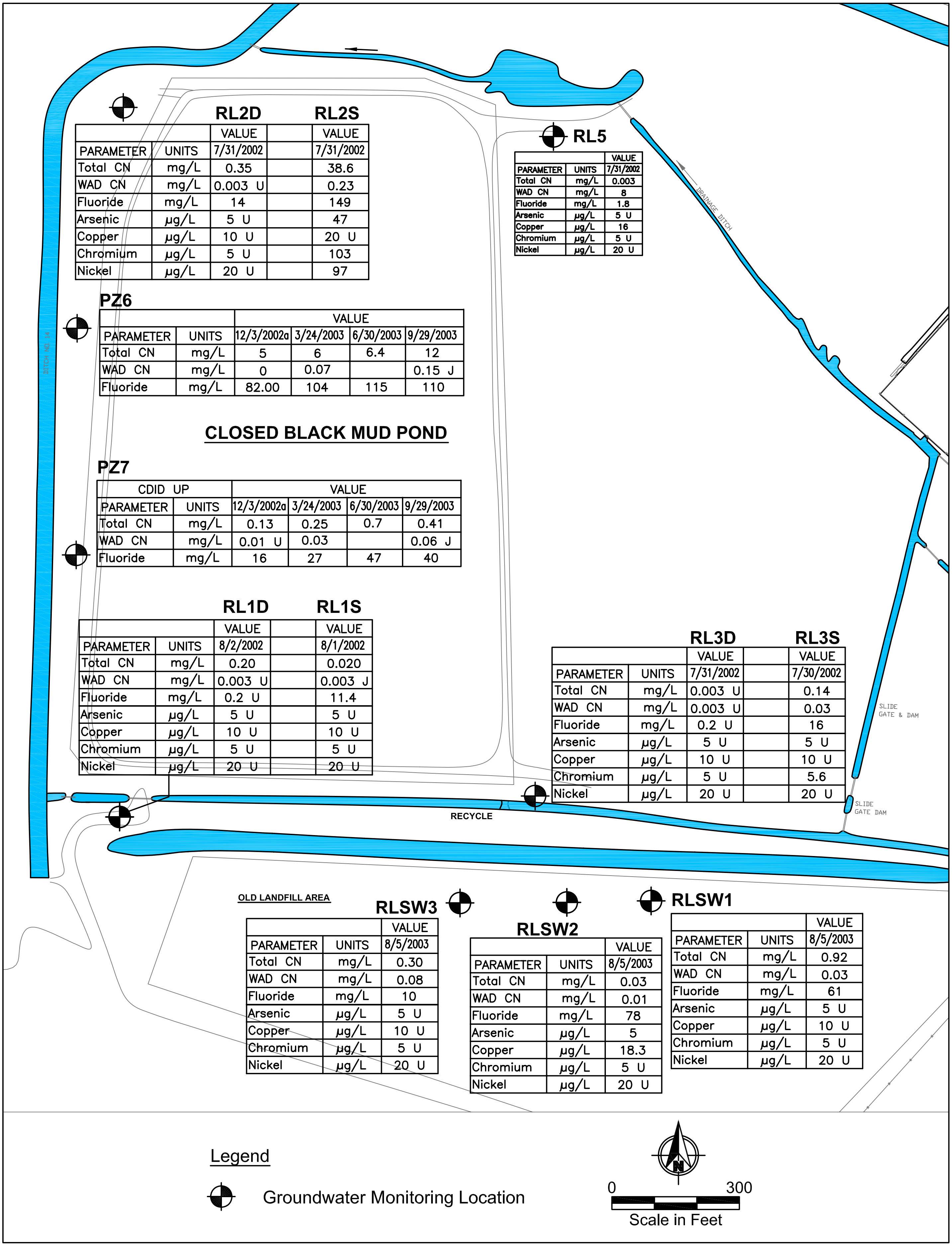
Figure 5
North Groundwater Potentiometric Surface Map - March 24, 2003
Chinook Ventures
Longview Site



7/28/06 CVD K:\Jobs\060354-CHINOOK\06035401\FIG 6.cdr

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 6
North Groundwater Potentiometric Surface Map - July 1, 2003
Chinook Ventures
Longview Site



RL2D / RL2S

PARAMETER	UNITS	RL2D VALUE 7/31/2002	RL2S VALUE 7/31/2002
Total CN	mg/L	0.35	38.6
WAD CN	mg/L	0.003 U	0.23
Fluoride	mg/L	14	149
Arsenic	µg/L	5 U	47
Copper	µg/L	10 U	20 U
Chromium	µg/L	5 U	103
Nickel	µg/L	20 U	97

RL5

PARAMETER	UNITS	VALUE 7/31/2002
Total CN	mg/L	0.003
WAD CN	mg/L	8
Fluoride	mg/L	1.8
Arsenic	µg/L	5 U
Copper	µg/L	16
Chromium	µg/L	5 U
Nickel	µg/L	20 U

PZ6

		VALUE			
PARAMETER	UNITS	12/3/2002a	3/24/2003	6/30/2003	9/29/2003
Total CN	mg/L	5	6	6.4	12
WAD CN	mg/L	0	0.07		0.15 J
Fluoride	mg/L	82.00	104	115	110

PZ7

CDID UP		VALUE			
PARAMETER	UNITS	12/3/2002a	3/24/2003	6/30/2003	9/29/2003
Total CN	mg/L	0.13	0.25	0.7	0.41
WAD CN	mg/L	0.01 U	0.03		0.06 J
Fluoride	mg/L	16	27	47	40

RL1D / RL1S

PARAMETER	UNITS	RL1D VALUE 8/2/2002	RL1S VALUE 8/1/2002
Total CN	mg/L	0.20	0.020
WAD CN	mg/L	0.003 U	0.003 J
Fluoride	mg/L	0.2 U	11.4
Arsenic	µg/L	5 U	5 U
Copper	µg/L	10 U	10 U
Chromium	µg/L	5 U	5 U
Nickel	µg/L	20 U	20 U

RL3D / RL3S

PARAMETER	UNITS	RL3D VALUE 7/31/2002	RL3S VALUE 7/30/2002
Total CN	mg/L	0.003 U	0.14
WAD CN	mg/L	0.003 U	0.03
Fluoride	mg/L	0.2 U	16
Arsenic	µg/L	5 U	5 U
Copper	µg/L	10 U	10 U
Chromium	µg/L	5 U	5.6
Nickel	µg/L	20 U	20 U

RLSW3

PARAMETER	UNITS	VALUE 8/5/2003
Total CN	mg/L	0.30
WAD CN	mg/L	0.08
Fluoride	mg/L	10
Arsenic	µg/L	5 U
Copper	µg/L	10 U
Chromium	µg/L	5 U
Nickel	µg/L	20 U

RLSW2

PARAMETER	UNITS	VALUE 8/5/2003
Total CN	mg/L	0.03
WAD CN	mg/L	0.01
Fluoride	mg/L	78
Arsenic	µg/L	5
Copper	µg/L	18.3
Chromium	µg/L	5 U
Nickel	µg/L	20 U

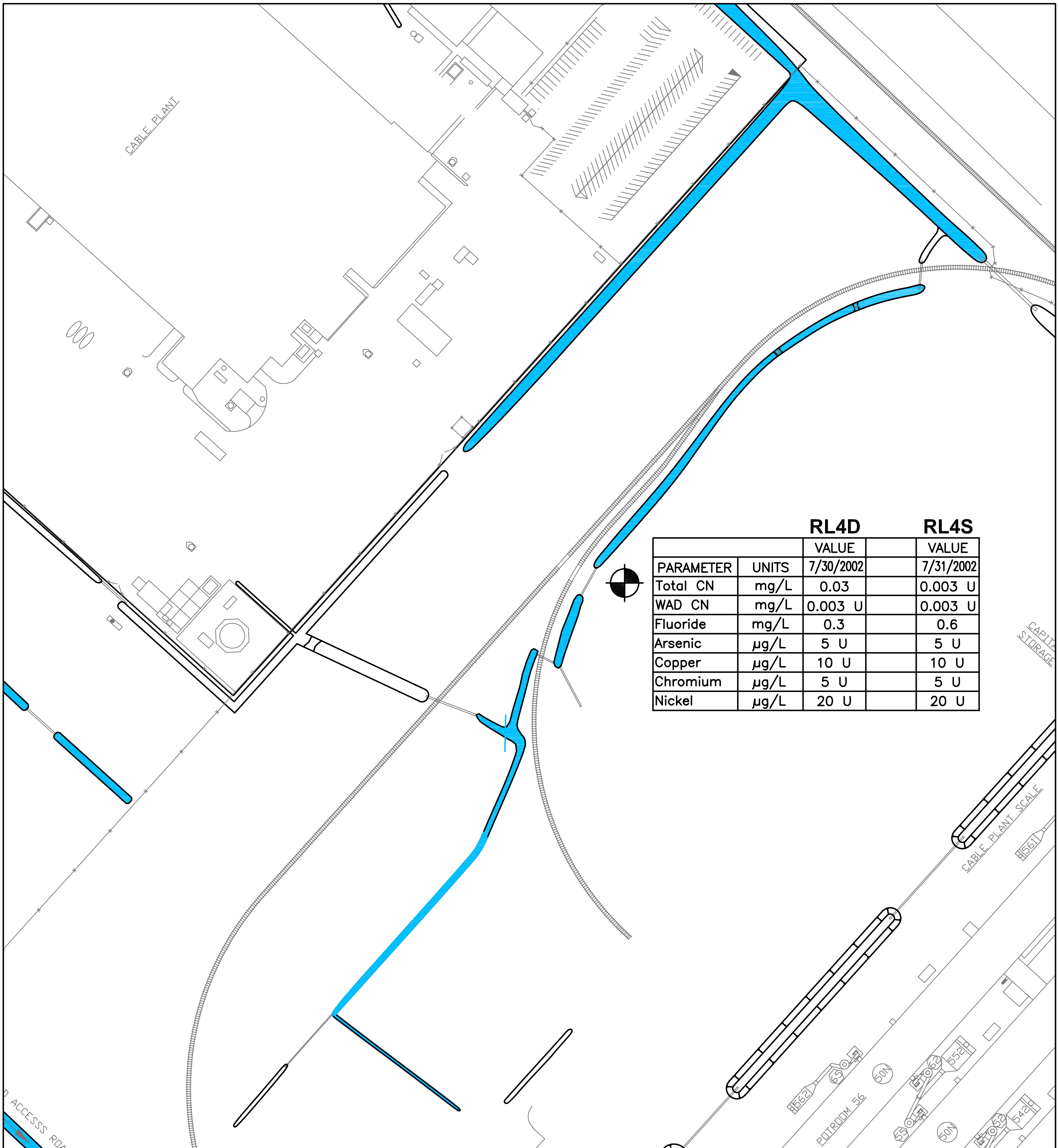
RLSW1

PARAMETER	UNITS	VALUE 8/5/2003
Total CN	mg/L	0.92
WAD CN	mg/L	0.03
Fluoride	mg/L	61
Arsenic	µg/L	5 U
Copper	µg/L	10 U
Chromium	µg/L	5 U
Nickel	µg/L	20 U

Aug 02, 2006 3:47pm cdavidson K:\Jobs\060354-CHINOOK\06035401\06034501-005.dwg FIG 7

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 7
North Plant Shallow Groundwater Results
Chinook Ventures
Longview Site



		RL4D	RL4S
		VALUE	VALUE
PARAMETER	UNITS	7/30/2002	7/31/2002
Total CN	mg/L	0.03	0.003 U
WAD CN	mg/L	0.003 U	0.003 U
Fluoride	mg/L	0.3	0.6
Arsenic	µg/L	5 U	5 U
Copper	µg/L	10 U	10 U
Chromium	µg/L	5 U	5 U
Nickel	µg/L	20 U	20 U

Legend

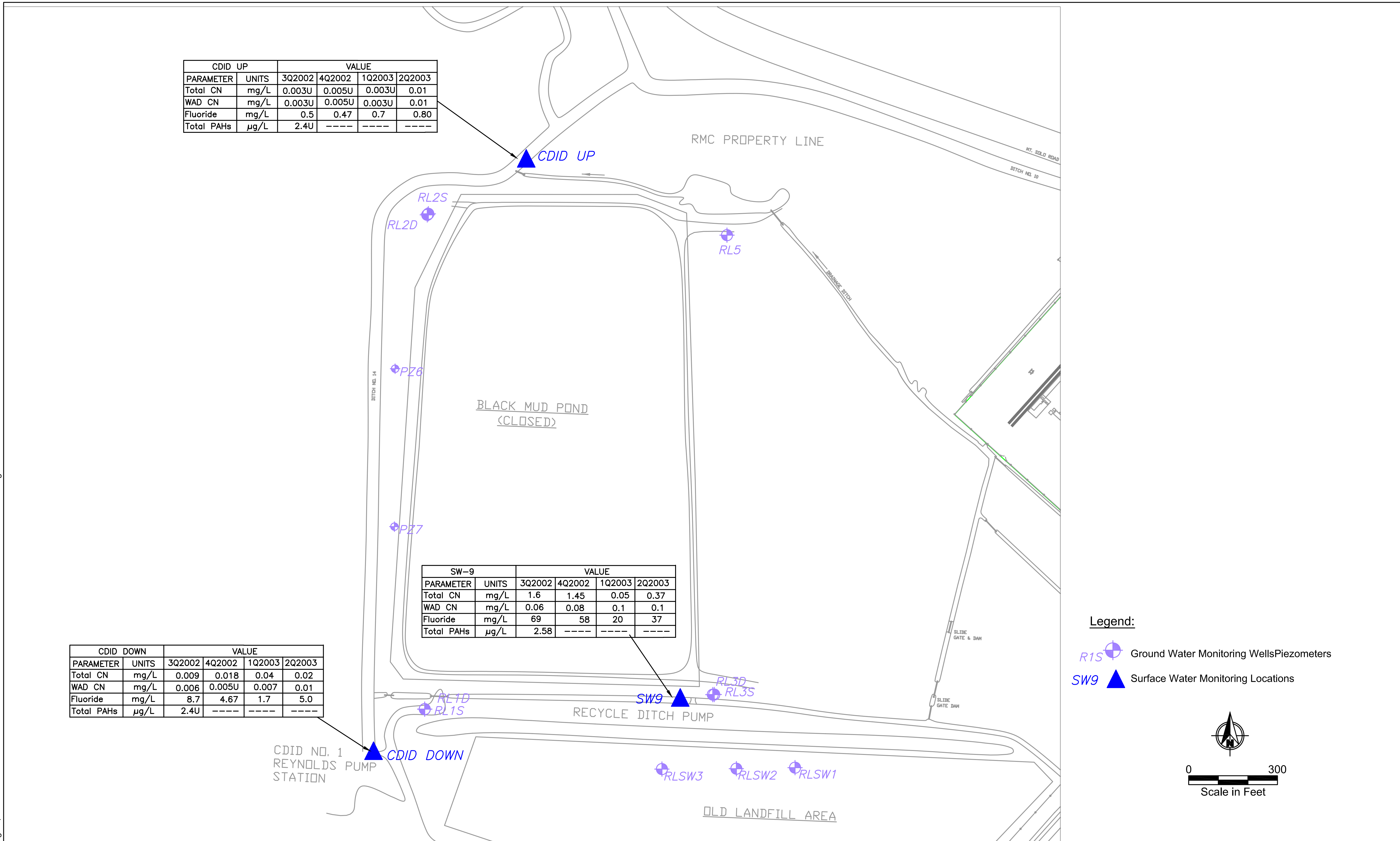
Groundwater Monitoring Location

0 200
Scale in Feet

Figure 8
North Plant Shallow Groundwater Results
Chinook Ventures
Longview Site

ANCHOR ENVIRONMENTAL, L.L.C.

Aug 02, 2006 3:48pm cdavidson K:\Jobs\060354-CHINOOK\06035401\06034501-005.dwg FIG 8



CDID UP		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	0.003U	0.005U	0.003U	0.01
WAD CN	mg/L	0.003U	0.005U	0.003U	0.01
Fluoride	mg/L	0.5	0.47	0.7	0.80
Total PAHs	µg/L	2.4U	----	----	----

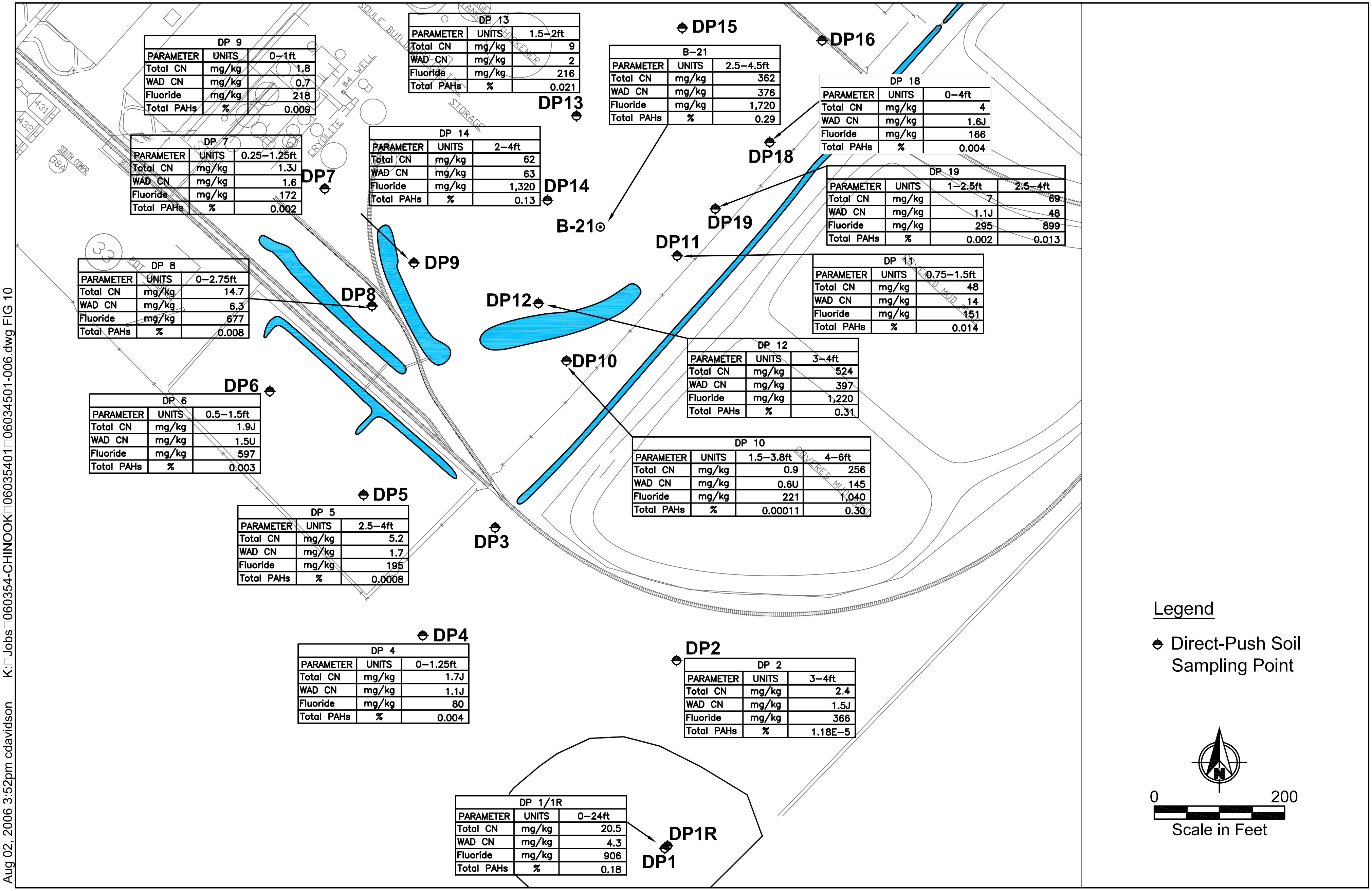
SW-9		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	1.6	1.45	0.05	0.37
WAD CN	mg/L	0.06	0.08	0.1	0.1
Fluoride	mg/L	69	58	20	37
Total PAHs	µg/L	2.58	----	----	----

CDID DOWN		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	0.009	0.018	0.04	0.02
WAD CN	mg/L	0.006	0.005U	0.007	0.01
Fluoride	mg/L	8.7	4.67	1.7	5.0
Total PAHs	µg/L	2.4U	----	----	----

Aug 03, 2006 9:54am cdavidson K:\Jobs\060354-CHINOOK\06035401\06034501-007.dwg FIG 9

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 9
North Plant Surface Water Sampling Results CN, F, and Total PAHs
Chinook Ventrues
Longview Site



DP 9

PARAMETER	UNITS	0–1ft
Total CN	mg/kg	1.8
WAD CN	mg/kg	0.7
Fluoride	mg/kg	218
Total PAHs	%	0.009

DP 13

PARAMETER	UNITS	1.5–2ft
Total CN	mg/kg	9
WAD CN	mg/kg	2
Fluoride	mg/kg	216
Total PAHs	%	0.021

B–21

PARAMETER	UNITS	2.5–4.5ft
Total CN	mg/kg	362
WAD CN	mg/kg	376
Fluoride	mg/kg	1,720
Total PAHs	%	0.29

DP 18

PARAMETER	UNITS	0–4ft
Total CN	mg/kg	4
WAD CN	mg/kg	1.6J
Fluoride	mg/kg	166
Total PAHs	%	0.004

DP 7

PARAMETER	UNITS	0.25–1.25ft
Total CN	mg/kg	1.3J
WAD CN	mg/kg	1.6
Fluoride	mg/kg	172
Total PAHs	%	0.002

DP 14

PARAMETER	UNITS	2–4ft
Total CN	mg/kg	62
WAD CN	mg/kg	63
Fluoride	mg/kg	1,320
Total PAHs	%	0.13

DP 19

PARAMETER	UNITS	1–2.5ft	2.5–4ft
Total CN	mg/kg	7	69
WAD CN	mg/kg	1.1J	48
Fluoride	mg/kg	295	899
Total PAHs	%	0.002	0.013

DP 8

PARAMETER	UNITS	0–2.75ft
Total CN	mg/kg	14.7
WAD CN	mg/kg	6.3
Fluoride	mg/kg	677
Total PAHs	%	0.008

DP 11

PARAMETER	UNITS	0.75–1.5ft
Total CN	mg/kg	48
WAD CN	mg/kg	14
Fluoride	mg/kg	151
Total PAHs	%	0.014

DP 12

PARAMETER	UNITS	3–4ft
Total CN	mg/kg	524
WAD CN	mg/kg	397
Fluoride	mg/kg	1,220
Total PAHs	%	0.31

DP 6

PARAMETER	UNITS	0.5–1.5ft
Total CN	mg/kg	1.9J
WAD CN	mg/kg	1.5U
Fluoride	mg/kg	597
Total PAHs	%	0.003

DP 10

PARAMETER	UNITS	1.5–3.8ft	4–6ft
Total CN	mg/kg	0.9	256
WAD CN	mg/kg	0.6U	145
Fluoride	mg/kg	221	1,040
Total PAHs	%	0.00011	0.30

DP 5

PARAMETER	UNITS	2.5–4ft
Total CN	mg/kg	5.2
WAD CN	mg/kg	1.7
Fluoride	mg/kg	195
Total PAHs	%	0.0008

DP 4

PARAMETER	UNITS	0–1.25ft
Total CN	mg/kg	1.7J
WAD CN	mg/kg	1.1J
Fluoride	mg/kg	80
Total PAHs	%	0.004

DP 2

PARAMETER	UNITS	3–4ft
Total CN	mg/kg	2.4
WAD CN	mg/kg	1.5J
Fluoride	mg/kg	366
Total PAHs	%	1.18E–5

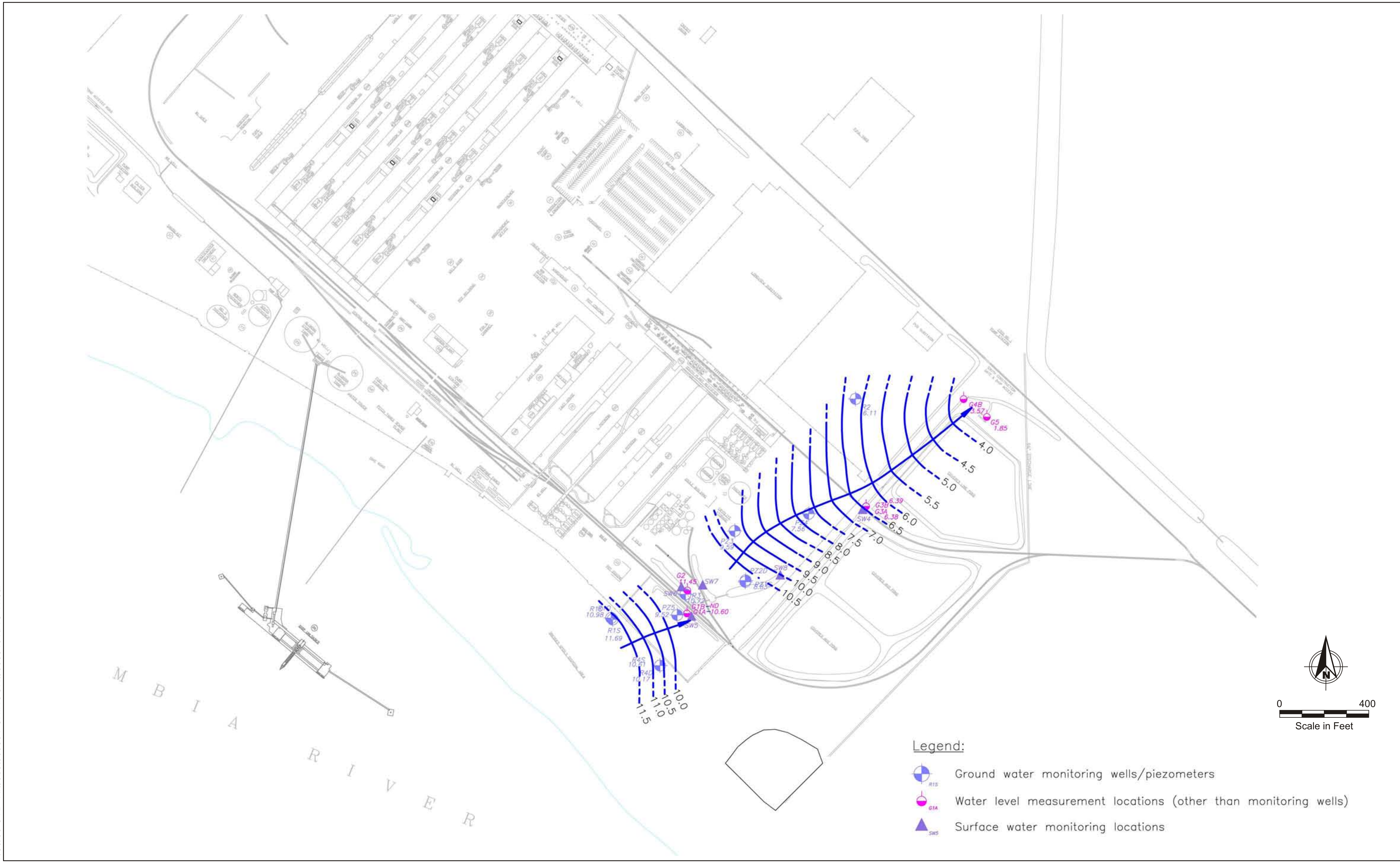
DP 1/1R

PARAMETER	UNITS	0–24ft
Total CN	mg/kg	20.5
WAD CN	mg/kg	4.3
Fluoride	mg/kg	906
Total PAHs	%	0.18

Aug 02, 2006 3:52pm cdavidson K:□Jobs□060354-CHINOOK□06035401□06034501-006.dwg FIG 10

ANCHOR ENVIRONMENTAL, L.L.C.

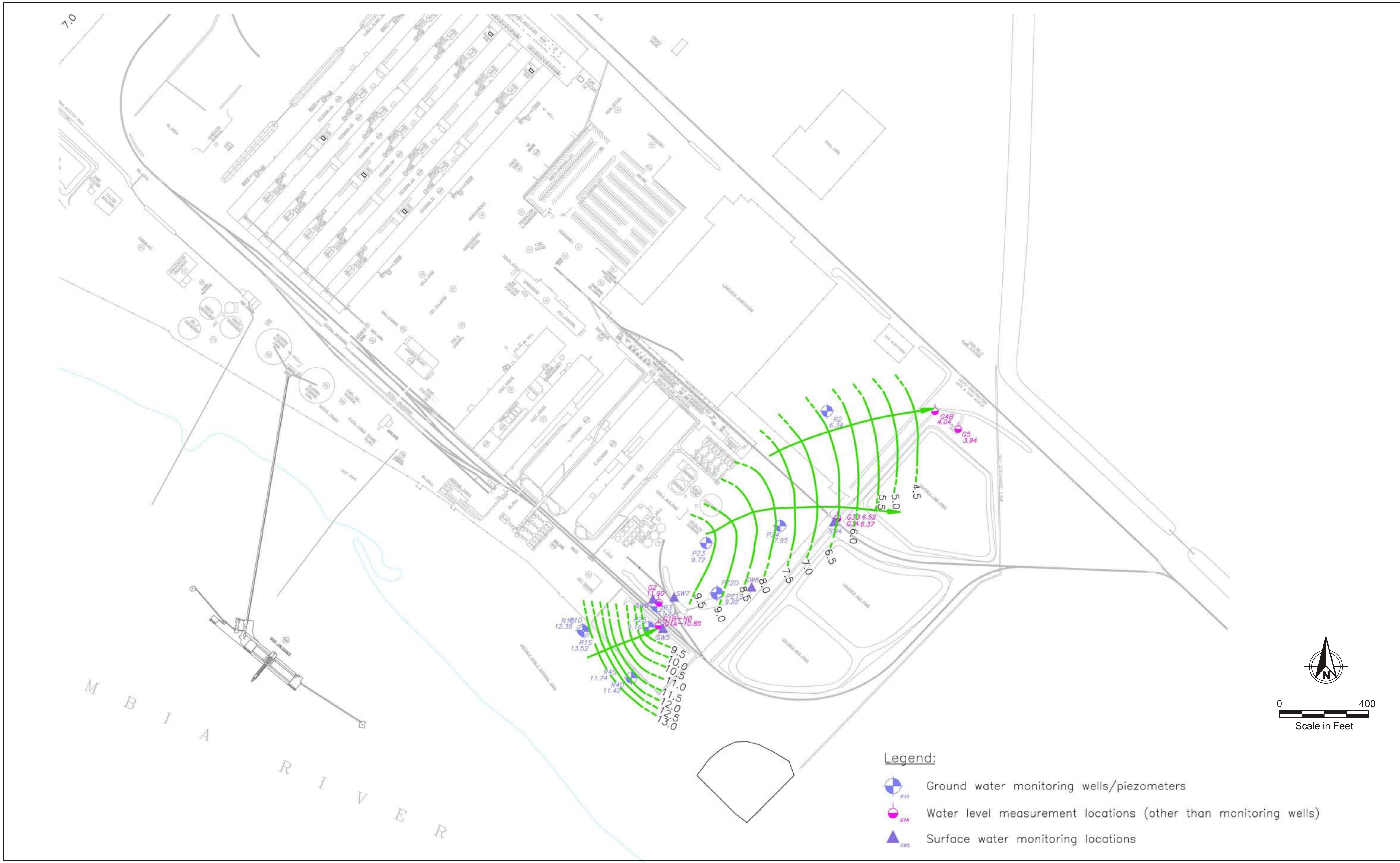
Figure 10
Direct Push Soil Sampling Results CN, F, and Total PAHs
Chinook Ventures
Longview Site



7/30/06 CVD K:\Jobs\060354-CHINOOK\06035401\FIG 11.cdr

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 11
South Groundwater Potentiometric Surface Map - December 27, 2002
Chinook Ventures
Longview Site



7/30/06 CVD K:\Jobs\060354-CHINOOK\06035401\FIG 12.cdr

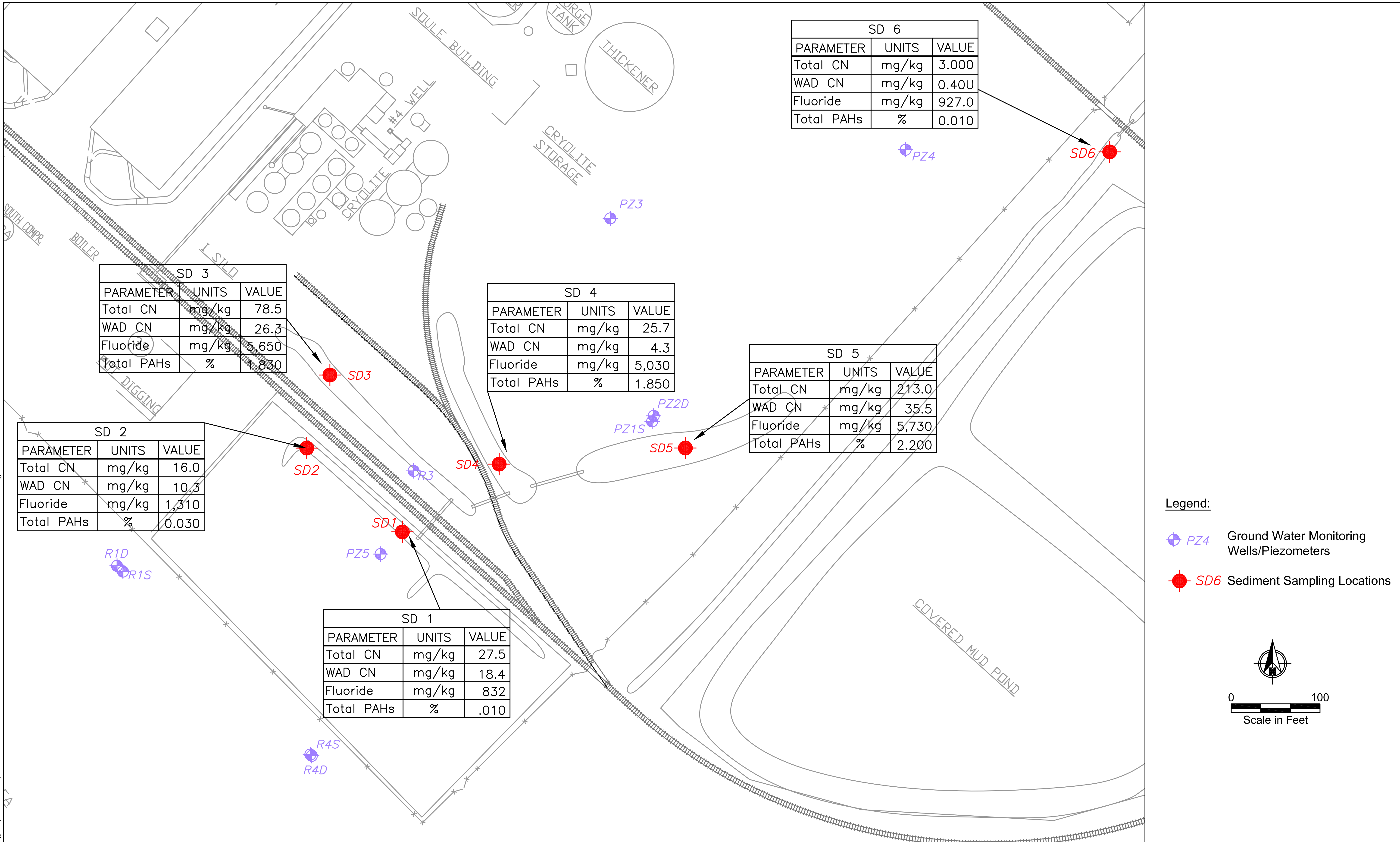
ANCHOR ENVIRONMENTAL, L.L.C.

Figure 12
South Groundwater Potentiometric Surface Map - March 24, 2003
Chinook Ventures
Longview Site

7/30/06 CVD K:\Jobs\060354-CHINOOK\06035401\FIG 13.cdr

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 13
South Groundwater Potentiometric Surface Map - July 1, 2003
Chinook Ventures
Longview Site



SD 6		
PARAMETER	UNITS	VALUE
Total CN	mg/kg	3.000
WAD CN	mg/kg	0.40U
Fluoride	mg/kg	927.0
Total PAHs	%	0.010

SD 3		
PARAMETER	UNITS	VALUE
Total CN	mg/kg	78.5
WAD CN	mg/kg	26.3
Fluoride	mg/kg	5,650
Total PAHs	%	1.830

SD 4		
PARAMETER	UNITS	VALUE
Total CN	mg/kg	25.7
WAD CN	mg/kg	4.3
Fluoride	mg/kg	5,030
Total PAHs	%	1.850

SD 5		
PARAMETER	UNITS	VALUE
Total CN	mg/kg	213.0
WAD CN	mg/kg	35.5
Fluoride	mg/kg	5,730
Total PAHs	%	2.200

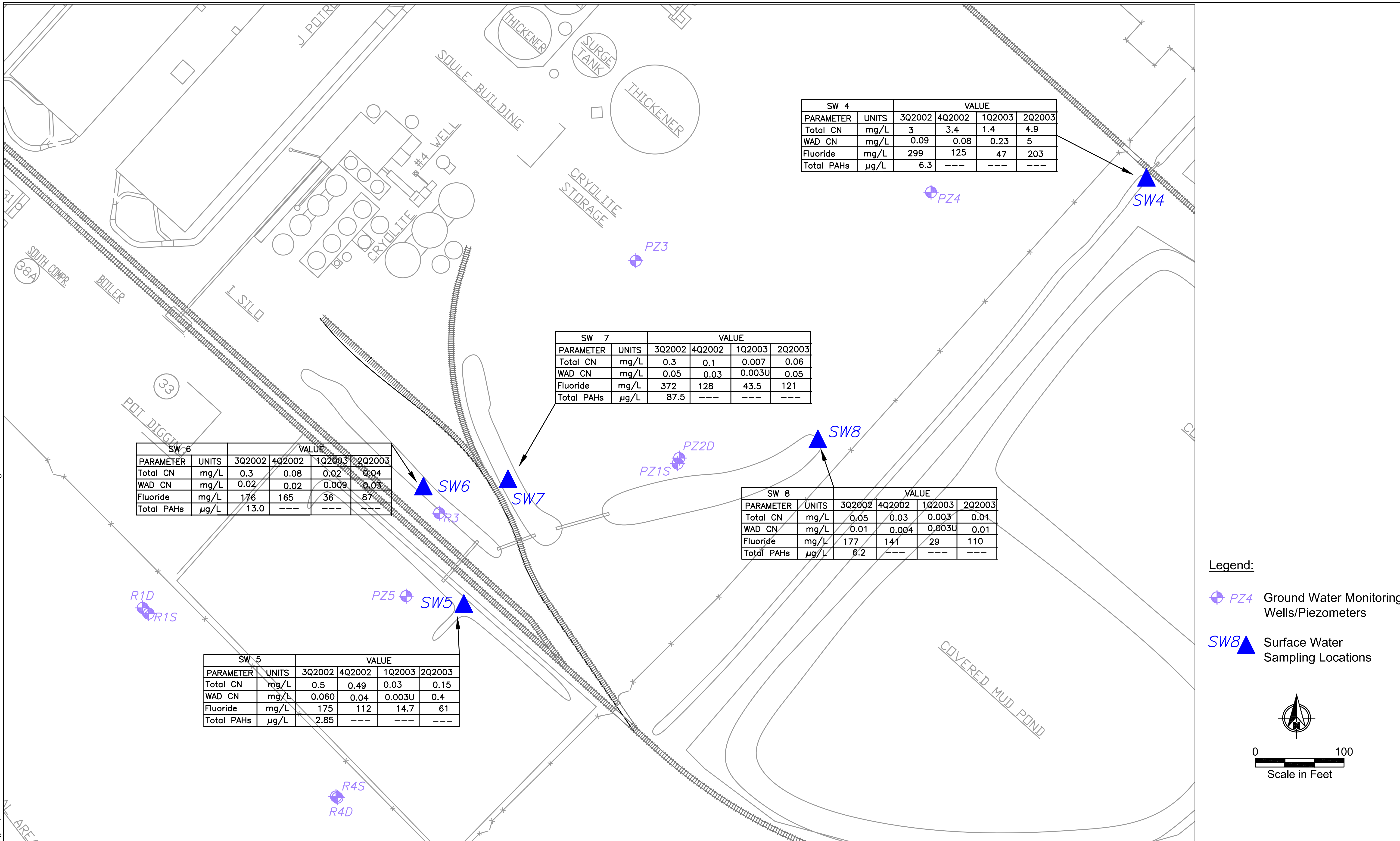
SD 2		
PARAMETER	UNITS	VALUE
Total CN	mg/kg	16.0
WAD CN	mg/kg	10.3
Fluoride	mg/kg	1,310
Total PAHs	%	0.030

SD 1		
PARAMETER	UNITS	VALUE
Total CN	mg/kg	27.5
WAD CN	mg/kg	18.4
Fluoride	mg/kg	832
Total PAHs	%	.010

Aug 02, 2006 3:54pm cdavidson K:\Jobs\060354-CHINOOK\06035401\06034501-007.dwg FIG 14

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 14
Sediment Sampling Results CN, F, and Total PAHs
Chinook Ventrues
Longview Site



SW 4		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	3	3.4	1.4	4.9
WAD CN	mg/L	0.09	0.08	0.23	5
Fluoride	mg/L	299	125	47	203
Total PAHs	µg/L	6.3	---	---	---

SW 7		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	0.3	0.1	0.007	0.06
WAD CN	mg/L	0.05	0.03	0.003U	0.05
Fluoride	mg/L	372	128	43.5	121
Total PAHs	µg/L	87.5	---	---	---

SW 6		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	0.3	0.08	0.02	0.04
WAD CN	mg/L	0.02	0.02	0.009	0.03
Fluoride	mg/L	176	165	36	87
Total PAHs	µg/L	13.0	---	---	---

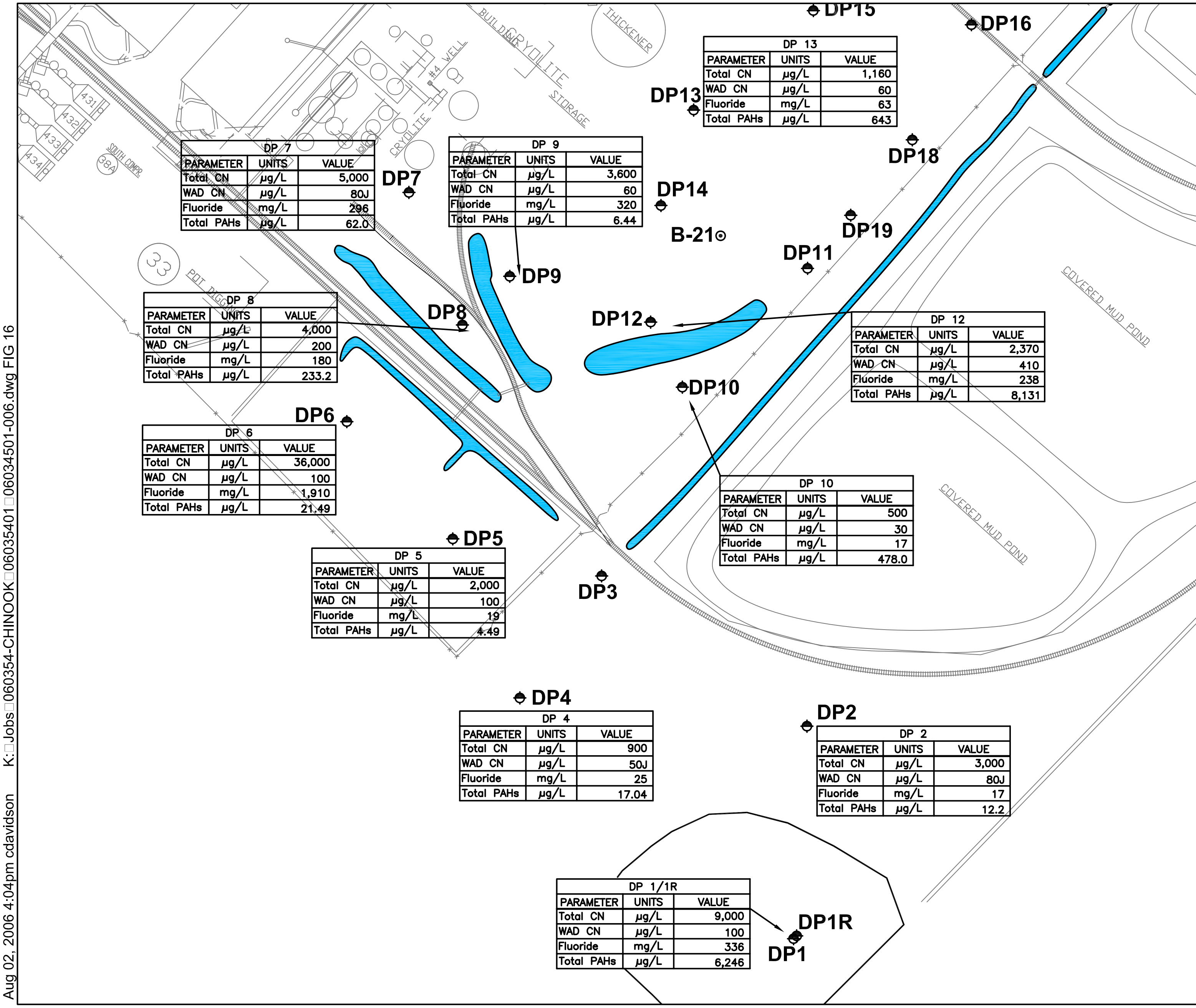
SW 8		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	0.05	0.03	0.003	0.01
WAD CN	mg/L	0.01	0.004	0.003U	0.01
Fluoride	mg/L	177	141	29	110
Total PAHs	µg/L	6.2	---	---	---

SW 5		VALUE			
PARAMETER	UNITS	3Q2002	4Q2002	1Q2003	2Q2003
Total CN	mg/L	0.5	0.49	0.03	0.15
WAD CN	mg/L	0.060	0.04	0.003U	0.4
Fluoride	mg/L	175	112	14.7	61
Total PAHs	µg/L	2.85	---	---	---

Aug 03, 2006 9:53am cdavidson K:\Jobs\060354-CHINOOK\06035401\06034501-007.dwg FIG 15

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 15
South Plant Surface Water Sampling Results CN, F, and Total PAHs
Chinook Ventrues
Longview Site



DP 7		
PARAMETER	UNITS	VALUE
Total CN	µg/L	5,000
WAD CN	µg/L	80J
Fluoride	mg/L	296
Total PAHs	µg/L	62.0

DP 9		
PARAMETER	UNITS	VALUE
Total CN	µg/L	3,600
WAD CN	µg/L	60
Fluoride	mg/L	320
Total PAHs	µg/L	6.44

DP 13		
PARAMETER	UNITS	VALUE
Total CN	µg/L	1,160
WAD CN	µg/L	60
Fluoride	mg/L	63
Total PAHs	µg/L	643

DP 8		
PARAMETER	UNITS	VALUE
Total CN	µg/L	4,000
WAD CN	µg/L	200
Fluoride	mg/L	180
Total PAHs	µg/L	233.2

DP 12		
PARAMETER	UNITS	VALUE
Total CN	µg/L	2,370
WAD CN	µg/L	410
Fluoride	mg/L	238
Total PAHs	µg/L	8,131

DP 6		
PARAMETER	UNITS	VALUE
Total CN	µg/L	36,000
WAD CN	µg/L	100
Fluoride	mg/L	1,910
Total PAHs	µg/L	21.49

DP 10		
PARAMETER	UNITS	VALUE
Total CN	µg/L	500
WAD CN	µg/L	30
Fluoride	mg/L	17
Total PAHs	µg/L	478.0

DP 5		
PARAMETER	UNITS	VALUE
Total CN	µg/L	2,000
WAD CN	µg/L	100
Fluoride	mg/L	19
Total PAHs	µg/L	4.49

DP 4		
PARAMETER	UNITS	VALUE
Total CN	µg/L	900
WAD CN	µg/L	50J
Fluoride	mg/L	25
Total PAHs	µg/L	17.04

DP 2		
PARAMETER	UNITS	VALUE
Total CN	µg/L	3,000
WAD CN	µg/L	80J
Fluoride	mg/L	17
Total PAHs	µg/L	12.2

DP 1/1R		
PARAMETER	UNITS	VALUE
Total CN	µg/L	9,000
WAD CN	µg/L	100
Fluoride	mg/L	336
Total PAHs	µg/L	6,246

Legend

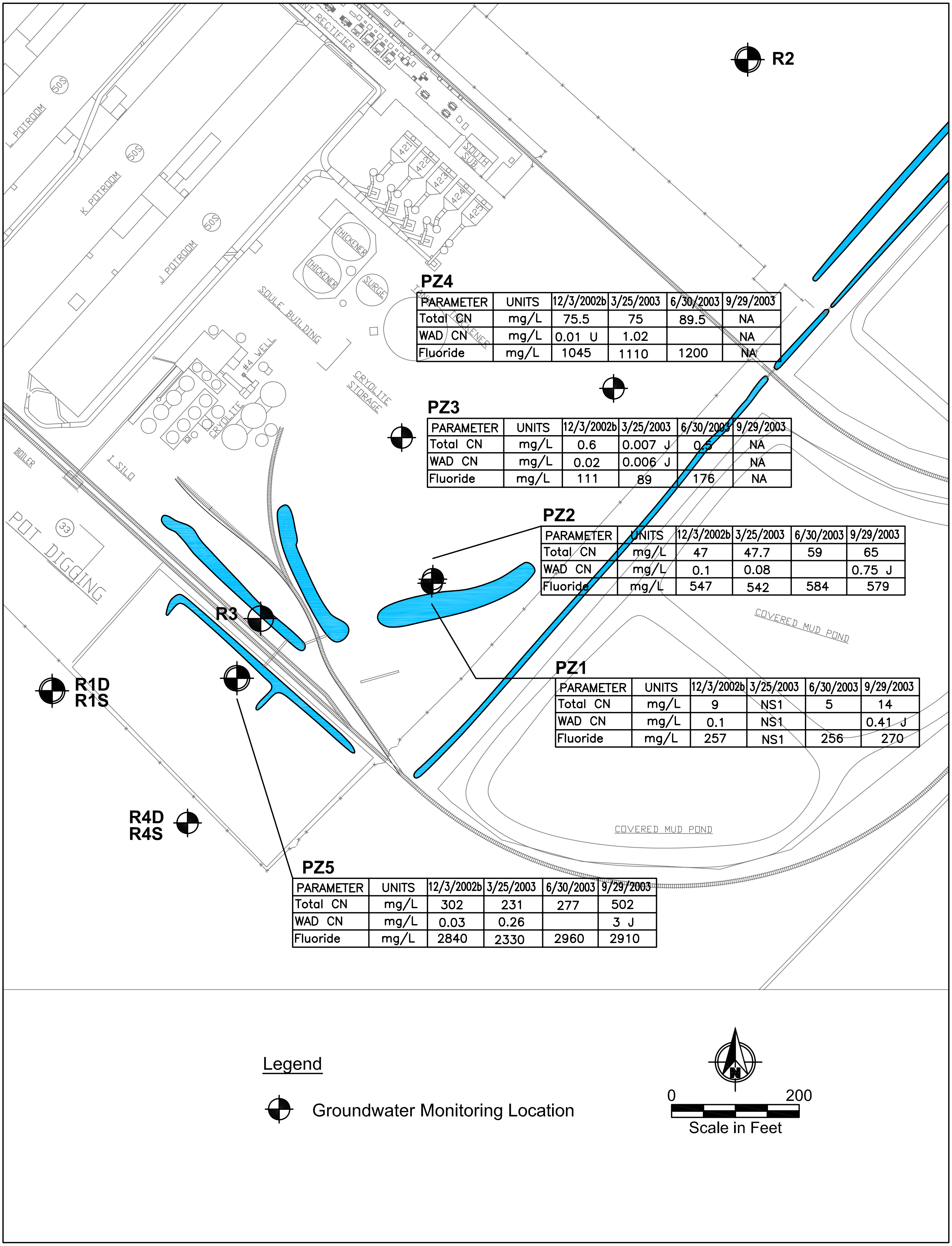
Direct-Push Groundwater Sampling Point

0 200
Scale in Feet

Aug 02, 2006 4:04pm cdavidson K:\Jobs\060354-CHINOOK\06035401\06034501-006.dwg FIG 16

ANCHOR ENVIRONMENTAL, L.L.C.

Figure 16
Direct Push Sampling Shallow Groundwater Results CN, F, and Total PAHs
Chinook Ventures
Longview Site



PZ4

PARAMETER	UNITS	12/3/2002b	3/25/2003	6/30/2003	9/29/2003
Total CN	mg/L	75.5	75	89.5	NA
WAD CN	mg/L	0.01 U	1.02		NA
Fluoride	mg/L	1045	1110	1200	NA

PZ3

PARAMETER	UNITS	12/3/2002b	3/25/2003	6/30/2003	9/29/2003
Total CN	mg/L	0.6	0.007 J	0.5	NA
WAD CN	mg/L	0.02	0.006 J		NA
Fluoride	mg/L	111	89	176	NA

PZ2

PARAMETER	UNITS	12/3/2002b	3/25/2003	6/30/2003	9/29/2003
Total CN	mg/L	47	47.7	59	65
WAD CN	mg/L	0.1	0.08		0.75 J
Fluoride	mg/L	547	542	584	579

PZ1

PARAMETER	UNITS	12/3/2002b	3/25/2003	6/30/2003	9/29/2003
Total CN	mg/L	9	NS1	5	14
WAD CN	mg/L	0.1	NS1		0.41 J
Fluoride	mg/L	257	NS1	256	270

PZ5

PARAMETER	UNITS	12/3/2002b	3/25/2003	6/30/2003	9/29/2003
Total CN	mg/L	302	231	277	502
WAD CN	mg/L	0.03	0.26		3 J
Fluoride	mg/L	2840	2330	2960	2910

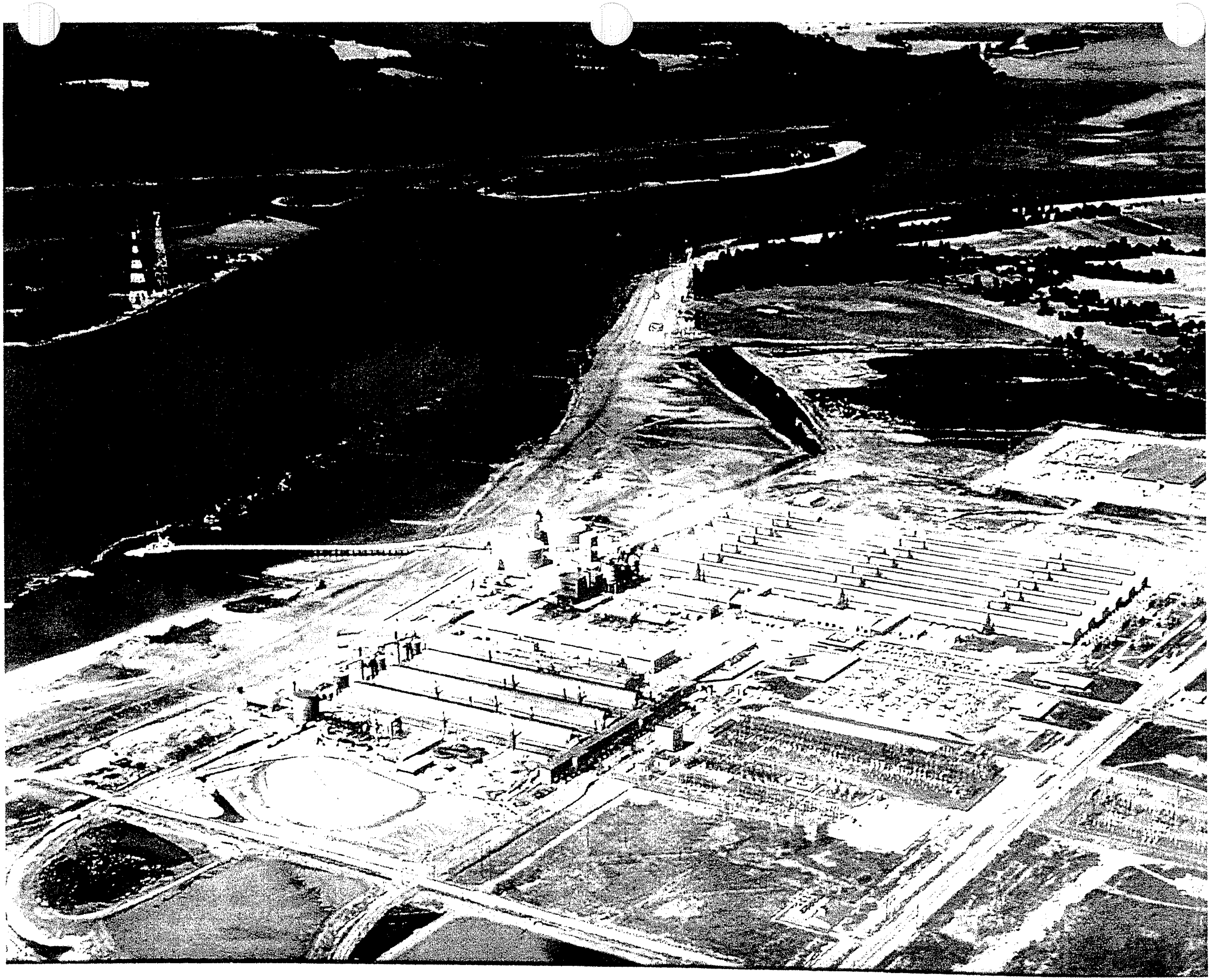
ANCHOR ENVIRONMENTAL, L.L.C.

Figure 17
South Plant Shallow Groundwater Results
Chinook Ventrues
Longview, Washington

APPENDICES

APPENDIX A

AUGUST 1970 COLOR ENCHANCED AERIAL PHOTOGRAPH OF PLANT



8-11-1970 photo c.bmp

APPENDIX B

DATA EVALUATION SUMMARIES

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2205088
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	December 1, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from six sediment samples, collected on July 29, 2002 at Alcoa RMC Longview site in Longview, Washington.

The soil samples arrived at Columbia Analytical Services, Inc. (CAS) on July 29, 2002. All of the samples were analyzed for the following inorganic compounds:

- Fluoride, by EPA Method 300.0M
- Total Cyanide by EPA Method 9010B
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I

All of the samples were analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310

Data were evaluated according to MFG's standard operating procedure (MFG 2000) Data were also reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for the soil samples.

MFG Field Sample Identification	Laboratory Sample Identifications
SPL-SD1	K2205088-001
SPL-SD2	K2205088-002
SD-3	K2205088-003
SD-4	K2205088-004
SD-5	K2205088-005
SD-6	K2205088-006

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.
-

3.0 DATA EVALUATION RESULTS

Six soil samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody.

3.2 Sample Holding Times and Preservatives

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Total Cyanide and Weak Acid Dissociable Cyanide: The control criteria for matrix spike recovery of Cyanide, Total and WAD, for sample SPL-SD1 is not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Laboratory Control Sample(LCS) exceptions: The spike recovery of Naphthalene (56%), Acenaphthylene (67%) and Anthracene (67%) for LCS Sample KWG0205543-3 was outside the EPA suggested lower criterion (70%).

Surrogate Exception: The control criteria for the surrogate p-Terphenyl in samples SPL-SD-2, SD-3, SD-4 and SD-5 are not applicable. The extracts were taken to a higher final volume due to their viscous nature, which resulted in a surrogate concentration below the Method Reporting Limit.

The control criteria were exceeded for the surrogate p-Terphenyl in samples SPL-SD1 and SD-6. Due to the presence of non-target background components that prevented adequate resolution of the surrogate, accurate quantitation was not possible. No further action was taken.

Matrix Spike Recovery Exceptions: The matrix spike recoveries of Pyrene, Benzo(k)fluoranthene and Indeno(1,2,3-cd)pyrene for sample KWG0205543-1 and the matrix spike recoveries of analytes Naphthalene, Acenaphthylene, Dibenz(a,h)anthracene, and Benzo(g,h,I)perylene for samples KWG0205543-1,2 were outside control criteria because of matrix interference. The chromatogram indicated the presence of non-target background components that prevented adequate resolution of the target analytes; as a result, accurate quantitation was not possible.

The matrix interference present in the Batch QC parent sample prevented adequate resolution of the analytes Benzo(K)fluoranthene and Dibenz(a,h)anthracene at the reporting limit.

The method reporting limit for the associated un-spiked and spiked samples is elevated above the background level. The results are flagged to indicate the matrix interference. No further corrective action was required.

Relative Percent Difference Exception: The relative percent difference criterion for the replicate analysis of Pyrene, and Indeno(1,2,3-cd)pyrene in samples KWG0205543-1,2 (batch QC) is not applicable. The presence of non-target background components that prevented adequate resolution of the target analytes prevented accurate quantitation. No further corrective action was required.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were submitted for analysis.

3.5 ACCURACY

Surrogate Spike Recoveries

All surrogate recoveries were outside the control limits except for the Laboratory Method blank sample (KWG0205543-4).

Matrix Spike And Matrix Spike Duplicate Samples

The matrix spike recoveries of Pyrene, Benzo(k)fluoranthene and Indeno(1,2,3-cd)pyrene for sample KWG0205543-1 and the matrix spike recoveries of analytes Naphthalene, Acenaphthylene, Dibenz(a,h)anthracene, and Benzo(g,h,I)perylene for samples KWG0205543-1,2 were outside control criteria because of matrix interference. The laboratory data sheets have been flagged with a "J" qualifier to indicate that the results are to be considered estimated.

Laboratory Control Samples

Laboratory Control Samples for Naphthalene, Acenaphthylene and Anthracene were outside the control criteria. The laboratory data sheets have been flagged with a "J" qualifier to indicate that the results are to be considered estimated.

3.6 PRECISION

Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. No field duplicates were taken with this batch of samples.

Reporting Limits

All samples required dilution do to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution. The reporting limit was elevated for Dibenz(a,h)anthracene in all samples. The chromatogram indicated the presence of non-target background components co-eluting with the target analyte on the U.V. detector. The interference prevented adequate resolution of the target compound at the reporting limit. The results are flagged to indicate the interference.

3.7 COMPLETENESS

The project completeness was 93%.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data are acceptable and usable without qualification. All organic data are acceptable and usable without qualification except for the following: Matrix spike recoveries of Pyrene, Benzo(k)fluoranthene and Indeno(1,2,3-cd)pyrene for sample KWG0205543-1 and the matrix spike recoveries of analytes Naphthalene, Acenaphthylene, Dibenz(a,h)anthracene, and Benzo(g,h,I)perylene for samples KWG0205543-1,2 were outside control criteria because of matrix interference. The matrix interference present in the Batch QC parent sample prevented adequate resolution of the analytes Benzo(K)fluoranthene and Dibenz(a,h)anthracene at the reporting limit. The spike recovery of Naphthalene (56%), Acenaphthylene (67%) and Anthracene (67%) for LCS Sample KWG0205543-3 was outside the EPA suggested lower criterion (70%). The above have all been flagged with "J" qualifiers, all associated data for all samples mentioned above are to be considered estimated.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2205135
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	November 26, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from six water samples including one field duplicate collected on July 30th and 31st, 2002 at Alcoa RMC Longview site in Longview, Washington.

The water samples arrived at Columbia Analytical Services, Inc. (CAS) on July 31, 2002. All or some of the samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0.
- Nitrate as Nitrogen by EPA Method 353.2
- Ammonia as Nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.4
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I.
- Dissolved Arsenic (by EPA Method 7060A) Calcium, Chromium, Copper, Magnesium, Nickel, Potassium and Sodium by EPA Method 6010B.
- Total Dissolved Solids by EPA Method 160.1.
- Total Suspended Solids by EPA Method 160.2.

All or some of the samples were analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310.

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field duplicates is 50% for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for both surface water and soil samples.

MFG Field Sample Identification	Type of Sample	Laboratory Sample Identifications
RL-4D (DUP)	Water	K2205135-001
AL-1 (DUP)	Water	K2205135-002
RL-3S	Water	K2205135-003
RL-4S (7/30)	Water	K2205135-004
RL-4S (7/31)	Water	K2205135-005
RL-5)	Water	K2205135-006

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Six water samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain Of Custody

There was no bottle received for sample RL-4S (7/31) for Alkalinity. The chain did not request testing for Alkalinity for RL-4S (7/30). No Alkalinity testing was performed on either sample.

3.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Matrix Spike (MS) Exceptions: The matrix spike recoveries for Nitrite as Nitrogen and Nitrate+Nitrite as Nitrogen for samples RL-4D were outside control criteria because of suspected matrix interference. A matrix spike duplicate (MSD) was also analyzed for each analyte, but produced similar results. The laboratory control samples were acceptable indicating the analysis was in control.

Polynuclear Aromatic Hydrocarbons by EPA Method 8310 (Water)

Relative percent Difference Exceptions: The relative percent difference for the analytes Naphthalene, Acenaphthylene, and Acenaphthene in the replicate laboratory control sample analyses (KWG0205621-2 and KWG0205621-3) were outside control criteria. Recoveries for the analytes were acceptable. Results reported for these analytes will exhibit a lower degree of accuracy. Since the field samples analyzed in this sequence did not contain the analyte in question, the data has not been affected.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. All field duplicate RPD's were within the control limits.

3.5 ACCURACY

3.5.1 Surrogate Spike Recoveries

All surrogate spike recoveries were within the control limits.

3.5.2 Matrix Spike And Matrix Spike Duplicate Samples

All Matrix spike Recoveries were within the control limits except for the Nitrite as Nitrogen and Nitrate+Nitrite as Nitrogen for sample RL-4D. The data is flagged to indicate the problem.

3.5.3 Laboratory Control Samples

All reported results were within the control limits.

3.6 PRECISION

3.6.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples AL-1 and RL-4D were collected as field duplicates and analyzed for all parameters. All duplicate RPD's were within control limits.

3.6.2 Laboratory Duplicate Results

All results were within the control limits.

3.7 Reporting Limits

No issues were found while reviewing the data.

3.8 COMPLETENESS

The project completeness was 97 %.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data except for Nitrate as Nitrogen are acceptable and usable without qualification. The aforementioned Nitrate as Nitrogen Matrix Spike recovery has been flagged with a "J" qualifier, as recovery was below the control criteria indicating results may be biased low.

All organic data are acceptable and usable without qualification.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2205200
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	December 2, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from nine water samples including one field duplicate that were collected between August 1 and August 2, 2002 at Alcoa RMC Longview site in Longview, Washington.

The water samples arrived at Columbia Analytical Services, Inc. (CAS) on August 2, 2002. All or some of the samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0.
- Nitrate as Nitrogen by EPA Method 353.2.
- Ammonia as Nitrogen by EPA Method 350.1
- Total Nitrate + Nitrite by EPA Method 353.2
- Total Cyanide by EPA Method 335.2
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I.
- Dissolved Arsenic (by EPA Method 7060A) Calcium, Chromium, Copper, Magnesium, Nickel, Potassium and Sodium by EPA Method 6010B.
- Total Dissolved & Suspended Solids by EPA Method 160.1.
- Total Suspended Solids by EPA Method 160.2.

All or some of the samples were analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310.

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field duplicates is 50% for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for surface water samples.

MFG Field Sample Identification	Type of Sample	Laboratory Sample Identifications
RL-1S(0755)	Water	K2205200-001
CD1DUP	Water	K2205200-002
RL-1S(1105)	Water	K2205200-002
R1S	Water	K2205200-004
R-3(DUP)	Water	K2205200-005
AL-2(DUP)	Water	K2205200-006
R-2	Water	K2205200-007
R-4S	Water	K2205200-008
R-1D(RL-1D)	Water	K2205200-009

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Six water samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain Of Custody

Some samples were received outside of the recommended temperature and some sample labels were changed per conversations with MFG.

3.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Nitrate Analysis Notes: The reported results so not make the necessary distinctions.

Nitrate as Nitrogen by method 353.2: The matrix spike recovery of Nitrate + Nitrite as Nitrogen for sample RL-1S (0755) was outside the control criteria because of suspected matrix interference. A matrix spike duplicate was also analyzed but produced similar results. The laboratory control sample was acceptable indicating the analysis was in control. No further corrective action was appropriate.

Ammonia as Nitrogen by Method 350.1: The matrix spike recovery of Ammonia as Nitrogen for sample RL-1S (0755) was outside control criteria because of suspected matrix interference. A matrix spike duplicate was also analyzed but produced similar results. The laboratory control sample was acceptable indicating the analysis was in control. No further corrective action was appropriate.

Polynuclear Aromatic Hydrocarbons by EPA Method 8310 (Water)

Sample Confirmation Notes: The confirmation comparison criterion of 40% difference for Benzo(b)fluoranthene was exceeded in samples R-3 and AL-2. The higher of the two values is reported because no evidence of matrix interference was observed.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.5 ACCURACY

3.5.1 Surrogate Spike Recoveries

All surrogate spike recoveries were within the control limits.

3.5.2 Matrix Spike And Matrix Spike Duplicate Samples

All Matrix spike Recoveries were within the control limits except for the Ammonia as Nitrogen and Nitrate+Nitrite as Nitrogen for sample RL-1S(0755). The data is flagged to indicate the problem.

3.5.3 Laboratory Control Samples

All results reported were within the control limits.

3.6 PRECISION

3.6.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples R-3 and AL-2 were collected as field duplicates and analyzed for all parameters. All duplicate RPD's were within control limits except for the Cyanide(WAD). The data sheets have been flagged to indicate the problem.

3.6.2 Laboratory Duplicate Results

All results were within the control limits.

3.7 Reporting Limits

No issues were found while reviewing the data.

3.8 COMPLETENESS

The project completeness was 93 %.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data except for sample RL-1S (and associated samples), for Nitrate as Nitrogen and Ammonia as Nitrogen are acceptable and usable without qualification. The aforementioned Nitrate as Nitrogen and Ammonia as Nitrogen Matrix Spike recoveries were outside the control criteria and have been flagged with "J" qualifiers. These recoveries are potentially biased low due to matrix effects, all associated data will be considered estimated. The field duplicates (AL-2 and R-3) for Cyanide (WAD) have been flagged with "J" qualifiers. The RPD for these two samples are outside the control limits therefore the results are to be considered estimated values.

All organic data are acceptable and usable without qualification.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2205168
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059741/059868
Report Date:	November 7, 2002

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from seven water samples collected on July 31, 2002 at Alcoa RMC Longview site in Longview, Washington.

The samples arrived at Columbia Analytical Services, Inc. (CAS) on August 2, 2002. The samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, Sulfate, and Nitrate-nitrogen by EPA Method 300.0
- Ammonia-nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.4
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I
- Total Dissolved Solids by EPA Method 160.1
- Total Suspended Solids by EPA Method 160.2
- Dissolved Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

And for the following organic compounds:

- Polynuclear aromatic hydrocarbons (PAH) by EPA Method 8310C

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field blanks is 50% or greater for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. These surface water samples and tie MFG and laboratory sample numbers are

MFG Field Sample Identification	Laboratory Sample Identifications
RL-3D	K2205168-001
RL2D	K2205168-002
RL-4S	K2205168-003
RL-5	K2205168-004
CDID Down	K2205168-005
RL-2S	K2205168-006
RL-4S	K2205168-007

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable (the compound may or may not be present) resampling and reanalysis is required if verification is needed

3.0 DATA EVALUATION RESULTS

Seven water samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 REPRESENTATIVENESS

3.1.1 Chain Of Custody

The bottle count for on the COC for CDID Down and RL-2S were different than what the lab found in the coolers. The COC was incorrect and the lab verified this with the MFG Project Manager.

3.1.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

The samples arrived at the laboratory slightly above the recommended 4 °C (4.8 °C). No qualifications were made based on this temperature. The samples were kept at the proper temperature in the laboratory prior to being analyzed.

The metals samples for RL-2D, RL-5, and RL-2S arrived without proper preservation. The appropriate acid volume was added at the laboratory. No qualifications were made based on this issue.

3.1.3 Review of Narrative

The PAH analyses had several data quality issues. The confirmation criterion of 40% difference was exceeded benzo(b) fluoranthene and phenanthrene in sample RL-2S.

3.1.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks was analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.2 ACCURACY

3.2.1 Surrogate Spike Recoveries

All surrogate spike recoveries for PAHs were within laboratory control limits.

3.2.2 Matrix Spike And Matrix Spike Duplicate Samples

For all EPA method 300.0 parameters (F, NO_3, and SO_4), ammonia-N, total and WAD cyanide, all MS recoveries and RPDs were within laboratory- and method-specified control limits. For PAH analyses, all MS/MSD recoveries and RPDs were within laboratory- and method-specified control limits.

3.2.3 Laboratory Control Samples

For PAH analyses, all LCS recoveries were within laboratory- and method-specified control limits except for naphthalene, acenaphthylene, and acenaphthene.

3.3 PRECISION

3.3.1 Field Duplicate Results

No field duplicates were collected in this batch of samples. The overall project goal of 10 percent has been achieved.

3.3.2 Laboratory Duplicate Results

All laboratory duplicate samples were within specified control limits for all analyses.

3.4 COMPARABILITY

3.4.1 Reporting Limits

No issues found during data review

3.5 REPRESENTATIVENESS

The project completeness goal of 90% was achieved. Completeness was 100%.

4.0 OVERALL ASSESSMENT OF THE DATA

All data except the PAH data are acceptable and usable without qualification.

The confirmation criterion of 40% difference was exceeded benzo(b) fluoranthene and phenanthrene in sample RL-2S. These results will be flagged with a "J" qualifier.

LCS recoveries were not within laboratory-specified control limits for naphthalene, acenaphthylene, and acenaphthene. Results for these compounds for all samples will be will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

All other PAH results are acceptable and usable without qualification.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2205318
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	December 3, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from ten water samples including one field duplicate that were collected between August 5 and August 6, 2002 at Alcoa RMC Longview site in Longview, Washington.

The water samples arrived at Columbia Analytical Services, Inc. (CAS) on August 7, 2002. All or some of the samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0.
- Nitrate as Nitrogen by EPA Method 353.2.
- Ammonia as Nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.2
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I.
- Dissolved Arsenic (by EPA Method 7060A) Calcium, Chromium, Copper, Magnesium, Nickel, Potassium and Sodium by EPA Method 6010B.
- Total Dissolved Solids by EPA Method 160.1.
- Total Suspended Solids by EPA Method 160.2.

All or some of the samples were analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310.

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field duplicates is 50% for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for surface water samples.

MFG Field Sample Identification	Type of Sample	Laboratory Sample Identifications
R4D	Water	K2205318-001
R1D	Water	K2205318-002
RLSW-2	Water	K2205318-002
RLSW-3	Water	K2205318-004
RLSW-4 (DUP)	Water	K2205318-005
AL-3 (DUP)	Water	K2205318-006
RLSW-1	Water	K2205318-007
R1D (1516)	Water	K2205318-008
RLSW-2 (1554)	Water	K2205318-009
RLSW-3 (1625)	Water	K2205318-010

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Six water samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain Of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody.

3.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Nitrate as nitrogen by method 353.2: The matrix spike recovery of Nitrate as Nitrogen for sample R4D was outside the control criteria because of suspected matrix interference. A matrix spike duplicate was also analyzed but produced similar results. The laboratory control sample was acceptable indicating the analysis was in control. No further corrective action was appropriate.

Ammonia as Nitrogen by Method 350.1: The matrix spike recovery of Ammonia as Nitrogen for sample R4D was outside control criteria because of suspected matrix interference. A matrix spike duplicate was also analyzed but produced similar results. The laboratory control sample was acceptable indicating the analysis was in control. No further corrective action was appropriate.

Dissolved Metals: The matrix spike recovery of Arsenic for the batch QC sample was outside control criteria. Recovery in the Laboratory Control Sample was acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential low bias in this matrix. No further action was appropriate. The matrix spike recovery of Copper for sample R4D was outside control criteria. Recovery in the Laboratory Control Sample was acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential low bias in this matrix. No further action was appropriate.

Polynuclear Aromatic Hydrocarbons by EPA Method 8310 (Water)

Continuing Calibration Verification Exceptions: The upper control criteria were exceeded for the analyte Dibenz(a,h)anthracene in Continuing Calibration Verifications (CCVs)KWG0205853-1,2,3. The field sample analyzed in this sequence did not contain the analyte in question. Since the apparent problem equates to a potential high bias, the data quality is not affected.

Surrogate exceptions: The control criterion was exceeded for the surrogate p-Terphenyl in samples RLSW-4 and AL-3. The sample produced excessive emulsion during extraction, which often leads to reduced recoveries for some analytes. No further corrective action was taken.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.5 ACCURACY

3.5.1 Surrogate Spike Recoveries

All surrogate spike recoveries were within the control limits.

3.5.2 Matrix Spike And Matrix Spike Duplicate Samples

All Matrix spike Recoveries were within the control limits except for the Nitrate as Nitrogen, Ammonia as Nitrogen and Copper for sample R4D and Arsenic for the batch QC. The data is flagged to indicate the problem.

3.5.3 Laboratory Control Samples

All results were within the control limits.

3.6 PRECISION

3.6.1 Field Duplicate Results

All field duplicate RPD's were within the control criterion. The RPD for samples RLSW-4 and AL-3 (Cyanide WAD) were not calculated due to one or both of the values is less than five times the reporting limit.

3.6.2 Laboratory Duplicate Results

All results were within the control limits.

3.7 Reporting Limits

No issues were found while reviewing the data.

3.8 COMPLETENESS

The project completeness was 95 %.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data except for sample R4D (and associated samples), for Nitrate as Nitrogen, Ammonia as Nitrogen and Copper and sample batch QC (all associated samples) for Arsenic are acceptable and usable without qualification. The aforementioned samples and parameters had Matrix Spike recoveries that were outside the control criteria and have been flagged with "J" qualifiers. These recoveries are potentially biased low due to matrix effects, all associated data will be considered estimated. All organic data are acceptable and usable without qualification.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2206307
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059741/059868
Report Date:	November 7, 2002

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from seven water samples, including one field duplicate, collected at Alcoa RMC Longview site in Longview, Washington.

The samples were collected on September 10, 2002, and analyzed by Columbia Analytical Services, Inc. (CAS). The samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, Sulfate, and Nitrate-nitrogen by EPA Method 300.0
- Ammonia-nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.4
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I
- Total Dissolved Solids by EPA Method 160.1
- Total Suspended Solids by EPA Method 160.2
- Dissolved Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

And for the following organic compounds:

- Polynuclear aromatic hydrocarbons (PAH) by EPA Method 8310C

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field blanks is 50% or greater for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. These surface water samples and tie MFG and laboratory sample numbers are

MFG Field Sample Identification	Laboratory Sample Identifications
SW-4	K2206307-001
SW-5	K2206307-002
SW-6	K2206307-003
SW-7	K2206307-004
SW-8	K2206307-005
SW-9	K2206307-006
AL-SW-1 (Field Duplicate)	K2206307-007

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable (the compound may or may not be present) resampling and reanalysis is required if verification is needed

3.0 DATA EVALUATION RESULTS

Seven water samples, including one field duplicate sample were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 REPRESENTATIVENESS

3.1.1 Chain Of Custody

The chain of custody form had all samples listed for chloride analysis. The lab did not perform this analysis on any sample.

3.1.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

The samples arrived at the laboratory above the recommended 4 °C recommended by some of the methods. This was, however, due to the samples being collect not more than 3 hours before arriving a at the laboratory. The samples were kept at the proper temperature in the laboratory prior to being analyzed.

The metals samples arrived without proper preservation. The appropriate acid volume was added at the laboratory. Since the sample were collected a few hours earlier this is not an issue.

3.1.3 Review of Narrative

The nitrate as nitrogen analyses had elevated reporting limits in all samples because the samples required dilution (2x). The chromatograms from the nitrate as nitrogen analyses indicated the presence of non-target background compounds. The samples contained high levels of chloride and sulfate that required dilution in order to prevent damage to the equipment.

The PAH analyses had several data quality issues. The primary evaluation verification for continuing calibration was exceeded for dibenz(a,h)anthacene. Per laboratory practice, the alternate criterion specified in the EPA method was used. This standard met the alternate criteria evaluation.

The confirmation criterion of 40% difference was exceeded for several PAHs in samples SW-4, SW-6, SW-7 and field duplicate AL-SW-1.

3.1.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks was analyzed with each analytical batch for all analyses, and no target compounds were detected.

3.2 ACCURACY

3.2.1 Surrogate Spike Recoveries

All surrogate spike recoveries for PAHs were within laboratory control limits.

3.2.2 Matrix Spike And Matrix Spike Duplicate Samples

For all EPA method 300.0 parameters (F, NO_3, and SO_4), ammonia-N, total and WAD cyanide, all MS recoveries and RPDs were within laboratory- and method-specified control limits. For PAH analyses, all MS/MSD recoveries and RPDs were within laboratory- and method-specified control limits.

3.2.3 Laboratory Control Samples

For PAH analyses, all LCS recoveries were within laboratory- and method-specified control limits.

3.3 PRECISION

3.3.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples ALSW-1 and SW-6 were collected as field duplicates and analyzed for all parameters. The PAH, pyrene, had an RPD greater than 50% based on field duplicate analyses (58%).

3.3.2 Laboratory Duplicate Results

All laboratory duplicate samples were within specified control limits for all analyses.

3.4 COMPARABILITY

3.4.1 Reporting Limits

The nitrate as nitrogen analyses had elevated reporting limits in all samples because the samples required dilution (2x). The chromatograms from the nitrate as nitrogen analyses indicated the presence of non-target background compounds. The samples contained high levels of chloride and sulfate that required dilution in order to prevent damage to the equipment.

Samples SW-7 required dilution (10X) due to the elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

The reporting limit for is elevated indeno(1,2,3,cd)pyrene in Sample SW-4. This was due to matrix interference.

3.5 REPRESENTATIVENESS

The project completeness goal of 90% was achieved for all analysis except chloride. The lab failed to perform the chloride analysis on ay samples.

4.0 OVERALL ASSESSMENT OF THE DATA

All data except the PAH data are acceptable and usable without qualification.

Sample SW-4 had confirmation criteria problems for pyrene, chrysene, benzo(k)fluoranthene, benzo(a)pyrene, and benzo(g,h,i)perylene. These results will be flagged with a "J" qualifier.

Sample SW-6 had a confirmation criteria problem for phenanthrene. Sample SW-7 had a confirmation criteria problem for fluoranthene. Sample ALSW-1 had a confirmation criteria problem for dibenz(a,h)anthacene. Results for these compounds for all samples will be will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

Pyrene had an RPD greater than 50% based on field duplicate analyses. Therefore, all sample results for this compound is flagged with a "J" qualifier.

All other PAH results are acceptable and usable without qualification.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2206762
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	November 20, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from two water samples and six soil samples, collected on September 11, 2002 at Alcoa RMC Longview site in Longview, Washington.

The water samples arrived at Columbia Analytical Services, Inc. (CAS) on September 12, 2002. These samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0 (SW-series samples only)
- Nitrate as Nitrogen by EPA Method 300.0
- Ammonia as Nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.4 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)
- Dissolved Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

The water samples were also analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310

The soil samples arrived at Columbia Analytical Services, Inc. (CAS) on September 12, 2002. These samples were analyzed for the following inorganic compounds:

- Fluoride by EPA Method 300.0 (SW-series samples only)
- Total Cyanide by EPA Method 9010B (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)

The soil samples were also analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field duplicates is 50% for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for both surface water and soil samples.

MFG Field Sample Identification	Type of Sample	Laboratory Sample Identifications
DP-12(3-4')	Soil	K2206762-001
DP-12	Water	K2206762-002
DP-13(1.5-2')	Soil	K2206762-003
DP-13	Water	K2206762-004
DP-14(2-4')	Soil	K2206762-005
DP-18(0-4')	Soil	K2206762-006
DP-19(1-2.5')	Soil	K2206762-007
DP-19(2.5-4')	Soil	K2206762-008

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Two water samples and six soil samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain Of Custody

Water samples arrived with insufficient preservatives.

3.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Nitrate as Nitrogen by EPA Method 300.0: The reporting limit is elevated for Nitrate in sample DP-13 because the sample required dilution. The chromatogram indicated the presence of non-target background components. The sample contained high levels of chloride that required dilution in order to prevent damage to the suppressor. The matrix interference prevented adequate resolution of the target compound at the reporting limit. The result is flagged to indicate the matrix interference.

Total Cyanide by EPA Method 9010B: The control criteria for matrix spike recovery of Cyanide for sample DP-12(3-4') is not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Cyanide, Weak Acid Dissociable by SM 4500-CN-I: The control criteria for matrix spike recovery of Cyanide for sample DP-12(3-4') is not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Polynuclear Aromatic Hydrocarbons by EPA Method 8310 (Water)

Sample Confirmation Notes: The confirmation comparison criteria of 40% difference for Naphthalene, Dibenz(a,h)anthracene and Benzo(g,h,I)perylene was exceeded in samples DP-12 and DP-13. The higher of the two values was reported for Benzo(g,h,I)perylene because no evidence of a matrix interference was observed. The lower of the two values was reported for Naphthalene and Dibenz(a,h)anthracene because of an apparent interference on the alternate detector that produced the higher value.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.5 ACCURACY

3.5.1 Surrogate Spike Recoveries

Samples DP-12 and DP-13 (water) were outside the control limits for p-Terphenyl. Samples DP-12, DP-13 and DP-14 (soil) were outside the control limits for Terphenyl-d14. Sample DP-14 (soil) was outside the control limit for Fluoranthene-d10.

3.5.2 Matrix Spike And Matrix Spike Duplicate Samples

All Matrix spike Recoveries were within the control limits except for the Cyanide for sample DP-12(3-4')and DP-13. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery. Matrix Spike Duplicates (MSD) were only analyzed for organic parameters. All MSD recoveries were within the control limits.

3.5.3 Laboratory Control Samples

All results were within the control limits.

3.6 PRECISION

3.6.1 Field Duplicate Results

No field duplicates were taken with this batch of samples.

3.6.2 Laboratory Duplicate Results

All results were within the control limits.

3.7 Reporting Limits

Samples DP-12 and DP-13 required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

3.8 COMPLETENESS

The project completeness was 95 %.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data except for WAD cyanide for soil samples DP-18 and DP-19(1-2.5') are acceptable and usable without qualification. The aforementioned cyanide results were less than the method reporting limit and have been flagged with a "J" qualifier.

All organic data are acceptable and usable without qualification except for the parameter sample pairs identified in the sample conformation notes that have been flagged with a "J" qualifier.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2206377
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	November 18, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from eight water samples, including one field duplicate and seven soil samples, collected on September 11, 2002 at Alcoa RMC Longview site in Longview, Washington.

The water samples arrived at Columbia Analytical Services, Inc. (CAS) on September 12, 2002. These samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0 (SW-series samples only)
- Nitrate as Nitrogen by EPA Method 300.0
- Ammonia as Nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.4 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)
- Dissolved Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

The water samples were also analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310

The soil samples arrived at Columbia Analytical Services, Inc. (CAS) on September 12, 2002. These samples were analyzed for the following inorganic compounds:

- Fluoride by EPA Method 300.0 (SW-series samples only)
- Total Cyanide by EPA Method 9010B (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)

The soil samples were also analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field duplicates is 50% for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for both surface water and soil samples.

MFG Field Sample Identification	Type of Sample	Laboratory Sample Identifications	MFG Field Sample Identification	Type of Sample	Laboratory Sample Identifications
DP-1	Soil	K2206377-001	AL-DP1 (FD)	Water	K2206377-009
DP-1	Water	K2206377-002	DP-6	Soil	K2206377-010
DP-2	Soil	K2206377-003	DP-6	Water	K2206377-011
DP-2	Water	K2206377-004	DP-7	Soil	K2206377-012
DP-4	Soil	K2206377-005	DP-7	Water	K2206377-013
DP-4	Water	K2206377-006	DP-8	Soil	K2206377-014
DP-5	Soil	K2206377-007	DP-8	Water	K2206377-015
DP-5	Water	K2206377-008			

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Eight water samples, including one field duplicate and seven soil samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain Of Custody

Water samples arrived with insufficient preservatives. Samples DP-1 and DP-2 were mis-labeled.

3.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Nitrate as Nitrogen by EPA Method 300.0: The sample contained high levels of chloride, fluoride and sulfate that required dilution in order to prevent damage to the suppressor. The matrix interference prevented adequate resolution of the target compound at the reporting limit. The results are flagged to indicate the martrix interference.

Total Cyanide by EPA Method 335.4: The Relative Percent Difference (RPD) criterion for the replicate analysis of cyanide in sample Batch QC (for the water matrix samples), is not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit.

The control criteria for matrix spike recovery of cyanide for sample DP-1 (composite) is not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM (Soils)

Surrogate Exceptions: The control criteria were exceeded for the following surrogate in sample DP-1 (composite) due to matrix interferences: Terphenyl-d14. 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.

Polynuclear Aromatic Hydrocarbons by EPA Method 8310 (Water)

Continuing Calibration Verification exception: The Primary evaluation criterion was exceeded for the analyte Dibenz(a,h)anthracene in Continuing Calibration Verifications KWG0207466-1 and 2. The primary evaluation criterion was exceeded for the analyte Benzo(a)pyrene in Continuing Calibration Verification KWG0207728-1. 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 standards. The standard meets the alternative evaluation criteria.

Surrogate Exception: The control criteria for the surrogate p-Terphenyl in sample DP-1 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.

Sample Confirmation Notes: The confirmation comparison criteria of 40% difference was exceeded for Naphthalene in samples DP-1, DP-6 and DP-7. The criteria of 40% was exceeded for Fluorene in DP-1, DP-4, DP-7 and DP-8. The Criteria of 40% was exceeded for Dibenz(a,h)anthracene in DP-1, DP-4, DP-7 and DP-8. The criteria of 40% was exceeded for Indeno(cd1,2,3)pyrene in samples DP-2, DP-4, DP-6 and DP-7. The laboratory data sheets have been flagged to indicate the results are to be considered estimated.

Elevated Method Reporting Limits: Samples DP-1, DP-7 and DP-8 required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

The reporting limit is elevated for Naphthalene in sample DP-1. The result is flagged to indicate the matrix interference.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.5 ACCURACY

3.5.1 Surrogate Spike Recoveries

All Surrogate Spike Recoveries were within the Method Reporting Limit (MRL) except for p-Terphenyl in sample DP-1.

3.5.2 Matrix Spike And Matrix Spike Duplicate Samples

All Matrix spike and Recoveries were within the control limits except for the Cyanide for sample DP-1. Matrix Spike Duplicates (MSD) were only analyzed for organic parameters. All MSD recoveries were within the control limits.

3.5.3 Laboratory Control Samples

All results were within the control limits.

3.6 PRECISION

3.6.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples DP-5 and AL-DP1 were collected as field duplicates and analyzed for all parameters. All duplicate RPD's were within the control limits except for the following. Ammonia as Nitrogen, Sulfate, Fluoride, Total Cyanide and Weak Acid Dissociable Cyanide. The following are to be considered estimated due to the difference between the samples is greater than 2Xs its reporting limit: Chrysene, Benzo(b)fluoranthene,Benzo(g,h,I)perylene and Indeno(1,2,3-cd)pyrene. The following did not have RPD's calculated due to one or both values being <5X's the reporting limit: Phenanthrene, Fluoranthene, Pyrene and Benzo(b)fluoranthene.

3.6.2 Laboratory Duplicate Results

All results were within the control limits.

3.7 Reporting Limits

The reporting limit is elevated for Nitrate as Nitrogen in samples AL-DP1, DP-7 and DP-8. Samples DP-1 DP-7 and DP-8 required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution. The reporting level is elevated for Naphthalene in Sample DP-1.

3.8 COMPLETENESS

The project completeness was 94%.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data except total cyanide for soil samples DP-4, DP-6, DP-7, total cyanide for water samples DP-2, DP-4, AL-DP1, DP-7 and WAD cyanide for soil samples DP-2 and DP-4 are acceptable and usable without qualification. The aforementioned cyanide results were less than the method reporting limit and have been flagged with a "J" qualifier.

All organic data for soil are acceptable and usable without qualification.

All organic data for water are acceptable and usable without qualification except for the parameter sample pairs identified in the sample confirmation notes that have been flagged with a "J" qualifier.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2206401
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	December 3, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from two water samples and four soil samples, collected on September 12, 2002 at Alcoa RMC Longview site in Longview, Washington.

The water samples arrived at Columbia Analytical Services, Inc. (CAS) on September 12, 2002. The water samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0 (SW-series samples only)
- Nitrate as Nitrogen by EPA Method 300.0
- Ammonia as Nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.2 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)
- Dissolved Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

The water samples were analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310

The soil samples arrived at Columbia Analytical Services, Inc. (CAS) on September 12, 2002. The soil samples were analyzed for the following inorganic compounds:

- Fluoride by EPA Method 300.0 (SW-series samples only)
- Total Cyanide by EPA Method 9010B (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)

The soil samples were analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field duplicates is 50% for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for both surface water and soil samples.

MFG Field Sample Identification	Type of Sample	Laboratory Sample Identifications
DP-9 (0-1')	Soil	K2206762-001
DP-9	Water	K2206762-002
DP-10 (1.5-3.8')	Soil	K2206762-003
DP-10 (4-6')	Soil	K2206762-004
DP-10	Water	K2206762-005
DP-11 (.75-1.50')	Soil	K2206762-007

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Two water samples and five soil samples were collected at the Alcoa RMC Longview Site. Two water samples and four soil samples were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain Of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody.

3.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Nitrate as Nitrogen by EPA Method 300.0: The reporting limit is elevated for Nitrate in samples DP-9 and DP-10 because the sample required dilution. The chromatogram indicated the presence of non-target background components. The sample contained high levels of Chloride and Sulfate that required dilution in order to prevent damage to the suppressor. The matrix interference prevented adequate resolution of the target compound at the reporting limit. The result is flagged to indicate the matrix interference.

Total Cyanide by EPA Method 335.2: The control criteria for matrix spike recovery of Cyanide for the batch QC is not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Cyanide, Weak Acid Dissociable by SM 4500-CN-I: The reporting limit is elevated for WAD in sample DP-10 (1.5-3.8'). The sample contained carbonation that interferes with the colorimetric determination. The sample required dilution to remove the interference resulting in an elevated detection limit. The result is flagged to indicate matrix interference.

Polynuclear Aromatic Hydrocarbons by EPA Method 8310 (Water)

Sample Confirmation Notes: The confirmation comparison criteria of 40% difference for Pyrene, Dibenz(a,h)anthracene, and Benzo-(g,h,i)perylene was exceeded in sample DP-10. The higher of the two values is reported for Dibenz(a,h)anthracene and Benzo-(g,h,i)perylene because no evidence of a matrix interference was observed. The lower of the two values was reported for Pyrene because of an apparent interference on the alternate column that produced the higher value.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM (Soil)

Surrogate exceptions: The control criteria were exceeded for the following surrogate in samples DP-10 (4-6') and DP-11 (0.75-1.50') due to matrix interferences: Terphenyl-d14. 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.

Matrix Spike Recovery and Relative Percent Difference Exceptions: The control criteria for matrix spike recoveries and relative percent difference of most analytes for sample DP-9 (0-1') are not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery and the associated RPD's. The matrix spike recoveries of Acenaphthene, Dibenzofuran and Fluorene for sample DP-9 (0-1') were outside control criteria. Recovery in the laboratory control sample was acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential low bias in this matrix. No further corrective action was appropriate.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.5 ACCURACY

3.5.1 Surrogate Spike Recoveries

The surrogate Terphenyl-d14 exceeded the control criteria for samples DP-10 (4-6') and DP-11 (0.75-1.50')

3.5.2 Matrix Spike And Matrix Spike Duplicate Samples

The matrix spike (batch QC) recovery for Total Cyanide is outside the control limits. The matrix spike recoveries of Acenaphthene, Dibenzofuran and Fluorene for sample DP-9 (0-1') are outside the control limit.

3.5.3 Laboratory Control Samples

All results were within the control limits.

3.6 PRECISION

3.6.1 Field Duplicate Results

No field duplicates were taken with this batch of samples.

3.6.2 Laboratory Duplicate Results

All results were within the control limits.

3.7 Reporting Limits

The reporting limits were elevated for Nitrate as Nitrogen (samples DP-9 and DP-10) and for Cyanide, Weak Acid dissociable (sample DP-10 1.5-3.8').

3.8 COMPLETENESS

The project completeness was 87.3 %.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data are acceptable and usable without qualification except for the following. The matrix spike (batch QC) recovery for Total Cyanide is outside the control limits. This result is potentially bias high due to matrix effects, all associated data is to be considered estimated. The data has been flagged with a "J" qualifier.

All organic data are acceptable and usable without qualification except for sample DP-9 (0-1'). The matrix spike recoveries for Acenaphthene, Dibenzofuran and Fluorene for sample DP-9 (0-1') are potentially bias low due to matrix effects, all associated data will be considered estimated. All other analytes except for Naphthalene, 2-Methylnaphthalene and Acenaphthylene for sample DP-9 (0-1') are to be considered estimated due to the values exceeding the instrument calibration range.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2208532
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059741/059868
Report Date:	January 13, 2003

1.0 INTRODUCTIÒN

This memorandum documents the data quality evaluation of data from nine water samples, including one filed duplicate, collected on November 25, 2002 at Alcoa RMC Longview site in Longview, Washington.

The samples arrived at Columbia Analytical Services, Inc. (CAS) on November 26, 2002. The samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0 (SW-series samples only)
- Total Cyanide by EPA Method 335.4 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)
- Total Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field blanks is 50% or greater for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. These surface water samples and tie MFG and laboratory sample numbers are:

MFG Field Sample Identification	Laboratory Sample Identifications
SW-4	K22008532-001
SW-5	K22008532-002
SW-6	K22008532-003
SW-7	K22008532-004
SW-8	K22008532-005
SW-9	K22008532-006
SW-10 (Field Duplicate)	K22008532-007
CDID Up	K22008532-008
CDID Down	K22008532-009

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable (the compound may or may not be present) resampling and reanalysis is required if verification is needed

3.0 DATA EVALUATION RESULTS

Nine water samples, including one duplicate sample were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic constituents listed in Section 1.0 of this report.

3.1 REPRESENTATIVENESS

3.1.1 Chain Of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody.

3.1.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.1.3 Review of Narrative

No anomalies other than those discussed below.

3.1.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks was analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.2 ACCURACY

3.2.1 Surrogate Spike Recoveries

No Surrogate spikes were required.

3.2.2 Matrix Spike And Matrix Spike Duplicate Samples

The control criteria for the matrix spike recovery of total cyanide for sample SW-4 is not applicable. The analyte concentration in the sample was greater than 4 times the added spike concentration. This prevents accurate evaluation of spike recovery, however, no qualification is applied to the detected values.

3.2.3 Laboratory Control Samples

No LCS were required

3.3 PRECISION

3.3.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples SW-8 and SW-10 were collected as field duplicates and analyzed for all parameters. All duplicate RPD were within control limits except for WAD cyanide. This parameter had an RPD of 86%. The sample values, however, for both the sample and duplicate was less than 5 times method detection limits. No qualification is applied to these values.

3.3.2 Laboratory Duplicate Results

No issues found during data review.

3.4 COMPARABILITY

3.4.1 Reporting Limits

No issues found during data review.

3.5 REPRESENTATIVENESS

The project completeness goal of 90% was achieved. Completeness was 100%.

4.0 OVERALL ASSESSMENT OF THE DATA

All data are acceptable and usable without qualification.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2302263
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059741/059868
Report Date:	July 31, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from seven water samples, including one field duplicate, collected on March 25, 2003 at Alcoa RMC Longview site in Longview, Washington.

The samples arrived at Columbia Analytical Services, Inc. (CAS) on March 25, 2003. The samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0 (SW-series samples only)
- Total Cyanide by EPA Method 335.4 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)
- Dissolved Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field blanks is 50% or greater for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. These surface water samples and tie MFG and laboratory sample numbers are

MFG Field Sample Identification	Laboratory Sample Identifications
PZ-2	K2302263-001
PZ-3	K2302263-002
PZ-4	K2302263-003
PZ-5	K2302263-004
PZ-6	K2302263-005
PZ-7	K2302263-006
PZ-8 (Field Duplicate)	K2302263-007

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable (the compound may or may not be present) resampling and reanalysis is required if verification is needed

3.0 DATA EVALUATION RESULTS

Seven water samples, including one duplicate sample were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic constituents listed in Section 1.0 of this report.

3.1 REPRESENTATIVENESS

3.1.1 Chain Of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody.

3.1.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.1.3 Review of Narrative

No anomalies were noted by the laboratory.

3.1.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks was analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.2 ACCURACY

3.2.1 Surrogate Spike Recoveries

No Surrogate spikes were required.

3.2.2 Matrix Spike And Matrix Spike Duplicate Samples

All results were within control limits.

3.2.3 Laboratory Control Samples

No LCS were required

3.3 PRECISION

3.3.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples PZ-6 and PZ-8 were collected as field duplicates and analyzed for all parameters. All duplicate RPD were within control limits except for bicarbonate alkalinity. This parameter that had a RPD of 82%. The values of the sample and the duplicate were greater than 5 times the method reporting limit.

3.3.2 Laboratory Duplicate Results

All results were with limits.

3.4 COMPARABILITY

3.4.1 Reporting Limits

No issues found during data review

3.5 REPRESENTATIVENESS

The project completeness goal of 90% was achieved. Completeness was 100%.

4.0 OVERALL ASSESSMENT OF THE DATA

All data except the bicarbonate alkalinity results are acceptable and usable without qualification.

The bicarbonate alkalinity results from the field duplicates had a RPD of 82%. Therefore, all bicarbonate alkalinity results will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2208601
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	December 1, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from four soil samples, collected on November 25, 2002 at Alcoa RMC Longview site in Longview, Washington.

The soil samples arrived at Columbia Analytical Services, Inc. (CAS) on November 27, 2002. All or some of the samples were analyzed for the following inorganic compounds:

- Fluoride, by EPA Method 300.0
- Total Cyanide by EPA Method 335.4 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)

The soil samples were also analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

Data were evaluated according to MFG's standard operating procedure (MFG 2000). Data were also reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for the soil samples.

MFG Field Sample Identification	Laboratory Sample Identifications
B21(2.5'-4.5')	K2208601-001
PZ-4(3'-6')	K2208601-002
PZ-4(12'-13.5)	K2208601-003
PZ-3(2.5'-4')	K2208601-004

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Four soil samples were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody.

3.2 Sample Holding Times and Preservatives

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.2 Review of Narrative

General Chemistry Parameters

Total Cyanide EPA Method 9010: The control criteria for matrix spike recovery of Total Cyanide for sample B-21(2.5'-4.5') is not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Fluoride by EPA Method 300.0: The matrix spike recovery of Fluoride for sample B-21 (2.5'-4.5') was outside the control criteria because of suspected matrix interference. A matrix spike duplicate was also analyzed, but produced similar results. The results of the original analysis are reported. No further corrective action was appropriate.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270 SIM

Surrogate Exceptions: The control criteria were exceeded for the surrogate in sample B-21(2.5'-4.5') and PZ-4(3'-6') due to high levels of target analytes interfering with resolution of the surrogate peak. No further corrective action was appropriate.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were submitted for analysis.

3.5 ACCURACY

Surrogate Spike Recoveries

Surrogate samples Fluorene-d10 (PZ-4 3'-6'), Fluoranthene-d10 (B-21 2.5'-4.5), and Terphenyl-d14 (B-21 2.5'-4.5' & PZ-4 3'-6') are outside the control criteria.

Matrix Spike And Matrix Spike Duplicate Samples

All Matrix spike and Recoveries were within the control limits except for Fluoride,Total Cyanide and WAD Cyanide for sample B-21(2.5'-4.5'). Matrix Spike Duplicates (MSD) were only analyzed for organic parameters. All MSD recoveries were within the control limits.

Laboratory Control Samples

All results were within the control limits.

3.6 PRECISION

Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. No field duplicates were completed with this batch of samples.

Reporting Limits

Samples B-21(2.5'-4.5'), PZ-4(12'-13.5') and PZ-4(3'-6') required dilution due to the presence of elevated levels of target analyte. The reporting limits are adjusted to reflect the dilution.

3.7 COMPLETENESS

The project completeness was 93%

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data are acceptable and usable without qualification except for the matrix spike recovery for Fluoride. The results for this analyte are to be considered estimated values and have been flagged with a "J" qualifier. All organic data are acceptable and usable without qualification except for sample PZ-3(2.5-4') for Naphthalene, 2-Methylnaphthalene, Acenaphthene and Fluorene and PZ-4(12-13.5') for Acenaphthylene. The sample results are flagged with "J" qualifiers, all associated data are to be considered estimated.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2208677
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059868
Report Date:	November 18, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from eight water samples, including one field duplicate, collected on December 03, 2002 at Alcoa RMC Longview site in Longview, Washington.

The water samples arrived at Columbia Analytical Services, Inc. (CAS) on December 03, 2002. These samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0 (SW-series samples only)
- Nitrate as Nitrogen by EPA Method 300.0
- Ammonia as Nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.4 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)
- Dissolved Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

The water samples were also analyzed for the following organic compounds:

- Polynuclear Aromatic Hydrocarbons by EPA Method 8310

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field duplicates is 50% for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. The following are the MFG and Laboratory identification numbers for the surface water samples.

MFG Field Sample Identification	Laboratory Sample Identifications
PZ-1	K2208677-001
PZ-2	K2208677-002
PZ-3	K2208677-003
PZ-4	K2208677-004
PZ-5	K2208677-005
PZ-6	K2208677-006
PZ-7	K2208677-007
PZ-8 (DUP)	K2208677-008

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Data precision or analytical error is assessed by determining the agreement among replicate measurements of the same sample and measurements of duplicate samples, which include MS/MSD samples, laboratory duplicate samples and field duplicate samples. The comparison is made by calculating the relative percent difference (RPD).

2.2 ACCURACY

Accuracy is a measure of the bias or error in a sample program. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy will be assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy will be measured by the percent bias of percent recovery. Evaluation of the laboratory's performance will be similar as for a laboratory control sample with the acceptable recovery range of 80% to 120%.

2.3 COMPLETENESS

Completeness is the percent of measurements made which are judged to be valid. The completeness of the data reflects that all the required samples have been taken and requisite analyses performed so as to generate an adequate database to successfully complete the remediation. Completeness values for analytical work will be 90 percent for demonstrated analytical techniques.

2.4 DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable, resampling and reanalysis is required if verification is needed.

3.0 DATA EVALUATION RESULTS

Eight water samples, including one field duplicate were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic and organic constituents listed in Section 1.0 of this report.

3.1 Chain of Custody

Not all of the preserved bottles were received with the appropriate pH.

3.2 Sample Holding Times and Preservatives

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.3 Review of Narrative

Nitrate as Nitrogen by EPA Method 300.0: The sample contained high levels of chloride and/or sulfate that required dilution in order to prevent damage to the suppressor. The matrix interference prevented adequate resolution of the target compound at the reporting limit. The results are flagged to indicate the matrix interference.

Polynuclear Aromatic Hydrocarbons by EPA Method 8310 (Water)

Lab Control Sample Exceptions: The spike recovery of Naphthalene, Acenaphthylene, and Acenaphthene for Duplicate Laboratory Control Sample KWG0210158-3 was outside the lower control criterion. The analytes in question were detected in the associated field samples. The error associated with reduced recovery equates to a potential low bias. All samples associated with this DLCS were re-extracted and re-analyzed with the exception of sample PZ-2and PZ-2MS. Additional analysis of these field samples could not be performed because insufficient sample remained for testing. The data is flagged to indicate the problem.

Relative Percent Difference exception: The spike recovery for Naphthalene, Acenaphthylene, and Acenaphthene for Duplicate Laboratory Control Sample KWG0210158-3 was outside the lower control criterion. This poor percent recovery in the duplicate analysis produced the unreasonably high RPD. All samples associated with this DLCS were re-extracted and re-analyzed with the exception of sample PZ-2 and PZ-2MS(insufficient sample amount). The data is flagged to indicate the problem.

Matrix Spike Recovery Exceptions: The matrix spike recoveries of Naphthalene, Acenaphthene, Fluorene, Dibenz(a,h)anthracene and Indeno(1,2,3-cd)pyrene for sample PZ-2MS was outside control criteria. The matrix spike outlier suggests a potential low bias in this matrix. Additional analysis could not be performed to due to an insufficient amount of sample. No further corrective action was feasible.

Continuing Calibration Verification exception: The primary evaluation criterion was exceeded for the analyte Benzo(k)fluoranthene in Continuing Calibration Verification KWG0210756-5. 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.

Sample Confirmation Notes: The confirmation comparison criteria of 40% difference was exceeded for Acenaphthene in samples PZ-1 and PZ-3. The confirmation comparison criteria of 40% difference was exceeded for Benzo(b)fluoranthene and Benzo(k)fluoranthene in sample PZ-5. The confirmation comparison criteria of 40% difference was exceeded for Fluoranthrene and Pyrene in samples PZ-1, PZ-2, PZ-3, PZ-5, and PZ-6. The confirmation comparison criteria of 40% difference was exceeded for Pyrene in samples PZ-4 and PZ-8. The laboratory data sheets have been flagged to indicate the results are to be considered estimated.

Elevated Method Reporting Limits: Sample PZ-1 required dilution due to the presence of elevated levels of Fluorene, Phenanthrene, Fluoranthene and Pyrene. Samples PZ-2 and PZ-5 required dilution due to the presence of elevated levels of Phenanthrene, Fluoranthene and Pyrene. The reporting limits are adjusted to reflect the dilution for analytes. Samples PZ-3, PZ-4 and PZ-8 required dilution due to the presence of elevated levels of target analytes.The reporting limits are adjusted to reflect the dilution for analytes. The reporting limit is elevated for Naphthalene in sample PZ-2 due to the presence of non-target background components. The result is flagged to indicate the matrix interference. The reporting limit is elevated for Acenaphthylene in sample PZ-8 due to the presence of non-target background components. The result is flagged to indicate the matrix interference.

3.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks were analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were submitted for analysis.

3.5 ACCURACY

Surrogate Spike Recoveries

All Surrogate Spike Recoveries were within the Recovery Control Limits.

Matrix Spike And Matrix Spike Duplicate Samples

All Matrix spike and Recoveries were within the control limits except for the Cyanide for sample PZ-1. Matrix Spike Duplicates (MSD) were only analyzed for organic parameters. All MSD recoveries were within the control limits.

Laboratory Control Samples

All results were within the control limits.

3.6 PRECISION

Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples PZ-4 And PZ-8 were collected as field duplicates and analyzed for all parameters. All duplicate RPD's were within the control limits.

Reporting Limits

See: Method Reporting Limit.

3.7 COMPLETENESS

The project completeness was 87.5%.

4.0 OVERALL ASSESSMENT OF THE DATA

All inorganic data are acceptable and usable without qualification. All organic data are acceptable and usable without qualification except for data from PZ-2 and the sample parameter pair identified in the sample confirmation notes that have been flagged with a "J" qualifier.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2302262
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059741/059868
Report Date:	July 31, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from nine water samples, including one field duplicate, were collected on March 24, 2003 at Alcoa RMC Longview site in Longview, Washington.

The samples arrived at Columbia Analytical Services, Inc. (CAS) on March 26, 2003. The samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0 (SW-series samples only)
- Total Cyanide by EPA Method 335.4 (SW-series samples only)
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I (SW-series samples only)
- Total Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field blanks is 50% or greater for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. These surface water samples and tie MFG and laboratory sample numbers are

MFG Field Sample Identification	Laboratory Sample Identifications
SW-4	K2302262-001
SW-5	K2302262-002
SW-6	K2302262-003
SW-7	K2302262-004
SW-8	K2302262-005
SW-9	K2302262-006
SW-10 (Field Duplicate)	K2302262-007
CDID Up	K2302262-008
CDID Down	K2302262-009

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable (the compound may or may not be present) resampling and reanalysis is required if verification is needed

3.0 DATA EVALUATION RESULTS

Nine water samples, including one duplicate sample were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic onstituents listed in Section 1.0 of this report.

3.1 REPRESENTATIVENESS

3.1.1 Chain Of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody.

3.1.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.1.3 Review of Narrative

The analysis of samples SW-4, SW-5, and SW-6 was initially performed on March 30, 2003. The MS was outside the CAS control criteria. The samples were supposed to be reanalyzed ASAP. However, the reanalysis was performed 9 days past the recommended holding time.

3.1.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks was analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.2 ACCURACY

3.2.1 Surrogate Spike Recoveries

No Surrogate spikes were required.

3.2.2 Matrix Spike And Matrix Spike Duplicate Samples

MS recoveries for total cyanide for sample SW-6 was outside of laboratory control criteria because of suspected matrix interference. A MSD was also analyzed, but produced similar results.

3.2.3 Laboratory Control Samples

No LCS were required

3.3 PRECISION

3.3.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples SW-7 and SW-10 were collected as field duplicates and analyzed for all parameters. All duplicate RPD were within control limits.

3.3.2 Laboratory Duplicate Results

The RPD for total cyanide was below the specified control limit. However, because the analyte concentration was not significantly greater than the method reporting limit, it will not be qualified for this issue.

3.4 COMPARABILITY

3.4.1 Reporting Limits

No issues found during data review

3.5 REPRESENTATIVENESS

The project completeness goal of 90% was achieved. Completeness was 100%.

4.0 OVERALL ASSESSMENT OF THE DATA

All data except the total cyanide and WAD cyanide data are acceptable and usable without qualification.

MS recoveries for total cyanide for sample SW-6 was outside of laboratory control criteria because of suspected matrix interference. A MSD was also analyzed, but produced similar results. All total cyanide values will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

The analysis of samples SW-4, SW-5, and SW-6 was initially performed on March 30, 2003. The MS was outside the CAS control criteria. The samples were supposed to be reanalyzed ASAP. However, the reanalysis was performed 9 days past the recommended holing time. All WAD cyanide values will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2304834
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059741/059868
Report Date:	August 31, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from seventeen water samples, including two field duplicates, collected on June 30, 2003 (PZ-series) and on July 1, 2003 (SW- and CDID-series) at Alcoa RMC Longview site in Longview, Washington.

The samples arrived at Columbia Analytical Services, Inc. (CAS) on July 1, 2003. The samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0
- Total Cyanide by EPA Method 335.4
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I
- Total Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B(Dissolved for PZ-series, total s for all others).

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field blanks is 50% or greater for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. These surface water samples and tie MFG and laboratory sample numbers areL

MFG Field Sample Identification	Laboratory Sample Identifications
PZ-1	K2304834-001
PZ-2	K2304834-002
PZ-3	K2304834-003
PZ-4	K2304834-004
PZ-5	K2304834-005
PZ-6	K2304834-006
PZ-7	K2304834-007
PZ-8 (Field Duplicate)	K2304834-008
SW-4	K2304834-009
SW-5	K2304834-010
SW-6	K2304834-011
SW-7	K2304834-012
SW-8	K2304834-013
SW-9	K2304834-014
SW-10 (Field Duplicate)	K2304834-015
CDID Up	K2304834-016
CDID Down	K2304834-017

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable (the compound may or may not be present) resampling and reanalysis is required if verification is needed

3.0 DATA EVALUATION RESULTS

Seventeen water samples, including two field duplicates, were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic listed in Section 1.0 of this report.

3.1 REPRESENTATIVENESS

3.1.1 Chain Of Custody

The samples arrived at the laboratory above the recommended 4 °C recommended by some of the methods. This was, however, due to the samples being collected not more than 3 hours before arriving at the laboratory. The samples were kept at proper temperature in the laboratory prior to analyses.

3.1.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

The metal samples for SW-4, SW9, and SW-10 required additional acid to get pH<2. The appropriate acid volume was added at the laboratory. No qualifications were made based on this issue.

3.1.3 Review of Narrative

Nothing noted other than described below.

3.1.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks was analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.2 ACCURACY

3.2.1 Surrogate Spike Recoveries

No Surrogate spikes were required.

3.2.2 Matrix Spike And Matrix Spike Duplicate Samples

MS recoveries for fluoride for sample SW-9 was outside of laboratory control criteria because of suspected matrix interference. A MSD was also analyzed, but produced similar results.

3.2.3 Laboratory Control Samples

No LCS were required

3.3 PRECISION

3.3.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples SW-4 and SW-10 were collected as field duplicates and analyzed for all parameters. Water samples PZ-5 and PZ-8 were collected as field duplicates and analyzed for all parameters. For the SW samples, the WAD cyanide analyses had a RPD of 195%, exceeding the project control criterion. For the PZ samples, the total cyanide analyses had a RPD of -108%, exceeding the project control criterion. All duplicate sample results were greater than 5 times the method detection limit.

3.3.2 Laboratory Duplicate Results

The WAD cyanide RPD was well below the specified control limit. However, because the analyte concentration was not significantly greater than the method reporting limit, it will not be qualified for this issue.

3.4 COMPARABILITY

3.4.1 Reporting Limits

No issues found during data review

3.5 REPRESENTATIVENESS

The project completeness goal of 90% was achieved. Completeness was 100%.

4.0 OVERALL ASSESSMENT OF THE DATA

All data except the total cyanide and WAD cyanide data are acceptable and usable without qualification.

For the SW samples, the WAD cyanide analyses had a RPD of 195%, exceeding the project control criterion. All WAD cyanide values will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

For the PZ samples, the total cyanide analyses had a RPD of -108%, exceeding the project control criterion. All total cyanide values for PZ-series samples will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

MS recoveries for fluoride for sample SW-9 was outside of laboratory control criteria because of suspected matrix interference. A MSD was also analyzed, but produced similar results. All SW-Series for fluoride ill be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

DATA QUALITY EVALUATION REPORT

Site Name:	Alcoa RMC Longview
Client:	Alcoa Remediation Management, Inc
Laboratory:	Columbia Analytical Services, Inc.
	Kelso, Washington
Lab Service No.	K2307535
Data Evaluator:	MFG, Inc.
MFG Project Number(s):	059741/059868
Report Date:	Ocober 30, 2003

1.0 INTRODUCTION

This memorandum documents the data quality evaluation of data from six water samples, including one filed duplicate, collected on September 30, 2003 at Alcoa RMC Longview site in Longview, Washington.

The samples arrived at Columbia Analytical Services, Inc. (CAS) on September 30, 2003. The samples were analyzed for the following inorganic compounds:

- Total Alkalinity by EPA Method 310.1, Bicarbonate and Carbonate Alkalinity by Standard Methods (SM) 2320B.
- Fluoride, Chloride, and Sulfate by EPA Method 300.0
- Ammonia-nitrogen by EPA Method 350.1
- Total Cyanide by EPA Method 335.4
- Weak-Acid Dissociable Cyanide by SM 4500-CN-I
- Total Calcium, Magnesium, Potassium and Sodium by EPA Method 6010B

Data were evaluated according to MFG's standard operating procedure (MFG 2000) except for the relative percent difference (RPD) criterion for field blanks is 50% or greater for water samples. Data also were reviewed in accordance with CAS precision and accuracy goals. All samples collected were submitted to the lab for analysis of all the aforementioned chemical parameters. These surface water samples and tie MFG and laboratory sample numbers are

MFG Field Sample Identification	Laboratory Sample Identifications
PZ-1	K2307535-001
PZ-2	K2307535-002
PZ-5	K2307535-003
PZ-6	K2307535-004
PZ-7	K2307535-005
PZ-8 (Field duplicate)	K2307535-006

Section 2.0 presents the quality control (QC) criteria evaluated and data qualifiers used. Section 3.0 presents data evaluation findings. Section 3.0 is organized in subsections that correspond to the QC criteria listed in Section 2.0. Criteria having met QC requirements are mentioned only briefly, while criteria with quality problems or needing qualification are discussed in detail. The data package reviewed included only summary forms, as requested, and appeared to be complete.

2.0 QUALITY CONTROL CRITERIA AND DATA QUALIFIERS

The following data qualifiers are used in this data validation report.

- **No qualifier.** Indicates that the data are acceptable both qualitatively and quantitatively
- **U.** Indicates that the compound was analyzed for but not detected above the concentration listed; the concentration listed is the sample quantitation limit
- **J.** Indicates an estimated concentration; the result is considered to be qualitatively acceptable, but quantitatively unreliable
- **UJ.** Indicates an estimated quantitation limit; the compound was analyzed for, but was considered to be nondetected
- **R.** The data are unusable (the compound may or may not be present) resampling and reanalysis is required if verification is needed

3.0 DATA EVALUATION RESULTS

Six water samples, including on field duplicate were collected at the Alcoa RMC Longview Site and were analyzed by CAS for the inorganic constituents listed in Section 1.0 of this report.

3.1 REPRESENTATIVENESS

3.1.1 Chain Of Custody

All samples arrived in good condition at the lab in accordance with the chain of custody (COC).

3.1.2 Sample Holding Times And Preservation

All samples for all analyses were extracted and analyzed within holding times, as specified by methods used for the analyses.

3.1.3 Review of Narrative

No anomalies other than those described below.

3.1.4 Field And Laboratory Blank Results

The appropriate number of laboratory blanks was analyzed with each analytical batch for all analyses, and no target compounds were detected. No field blanks were required.

3.2 ACCURACY

3.2.1 Surrogate Spike Recoveries

No surrogate spikes were required.

3.2.2 Matrix Spike And Matrix Spike Duplicate Samples

The control criteria for matrix spike recovery of total cyanide and for sample PZ-1 not applicable. The analyte concentration is greater than 4 times the spike added. This prevents accurate evaluation of spike recovery, however, no qualification is applied to the detected values.

The matrix spike recovery of WAD cyanide for sample PZ-1 was calculated by the laboratory using unrounded values and was within acceptance limits (120%, upper limit is 125%). However if the values are rounded, as reported, the percent recovery is 200%, well outside of control limits.

For PAH analyses, all MS/MSD recoveries and RPDs were within laboratory- and method-specified control limits.

3.2.3 Laboratory Control Samples

For PAH analyses, all LCS recoveries were within laboratory- and method-specified control limits except for naphthalene, acenaphthylene, and acenaphthene.

3.3 PRECISION

3.3.1 Field Duplicate Results

Field duplicates measure both field and laboratory precision and are considered to be indicators of overall precision. Water samples PZ-4 and PZ-8 were collected as field duplicates and analyzed for all parameters. All duplicate RPD were within control limits except for WAD cyanide. This parameter that had a RPD of -200%. The values of the sample and the duplicate were not, however, greater than 5 times the method reporting limit.

3.3.2 Laboratory Duplicate Results

All laboratory duplicate samples were within specified control limits for all analyses.

3.4 COMPARABILITY

3.4.1 Reporting Limits

No issues found during data review

3.5 REPRESENTATIVENESS

The project completeness goal of 90% was achieved. Completeness was 100%.

4.0 OVERALL ASSESSMENT OF THE DATA

All data except the WAD cyanide and PAH results are acceptable and usable without qualification.

The matrix spike recovery of WAD cyanide for sample PZ-1 was calculated by the laboratory using unrounded values and was within acceptance limits (120%, upper limit is 125%). However if the values are rounded, as reported, the percent recovery is 200%, well outside of control limits. Results for these compounds for all samples will be will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

The confirmation criterion of 40% difference was exceeded benzo(b) fluoranthene and phenanthrene in sample RL-2S. These results will be flagged with a "J" qualifier.

LCS recoveries were not within laboratory-specified control limits for naphthalene, acenaphthylene, and acenaphthene. Results for these compounds for all samples will be will be flagged with a "J" qualifier for detected values and "UJ" for non-detects.

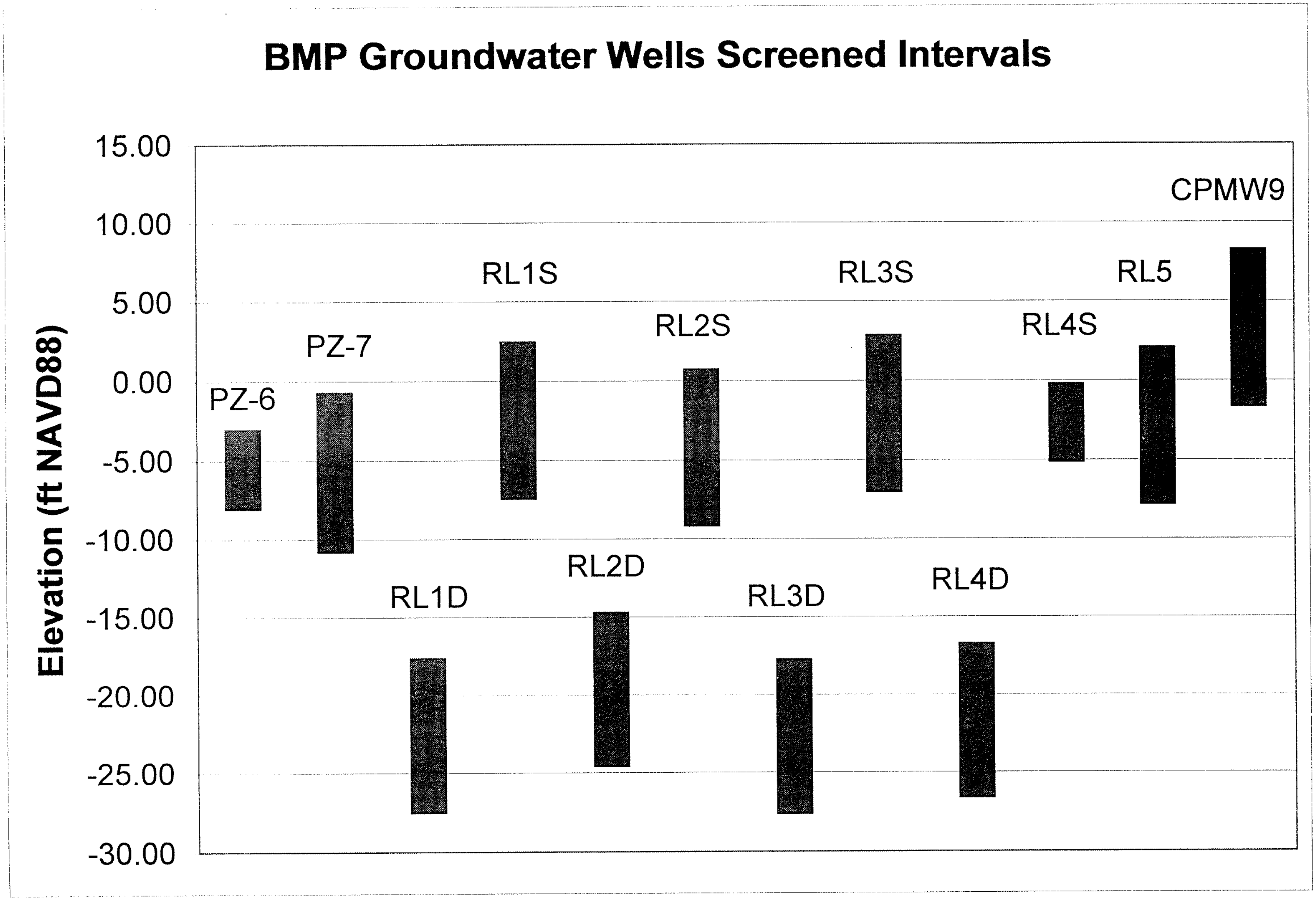
All other PAH results are acceptable and usable without qualification.

REFERENCE

MFG, Inc. 2000. Standard Operating Procedure No. 20, Data Evaluation. Rev. No. 0. August 2000.

APPENDIX C

BORING LOGS AND SCREENED INTERVALS FOR NORTH PLANT WELLS AND PIEZOMETERS


BMP Groundwater Wells Screened Intervals
Elevation (ft NAVD88)
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
-30.00
PZ-6
PZ-7
RL1S
RL1D
RL2S
RL2D
RL3S
RL3D
RL4S
RL4D
RL5
CPMW9

A TETRA TECH COMPANY

19203 36th Ave. W., Suite 101
Lynnwood, WA 98036-5707
(425) 921-4000
(425) 921-4040

LOG OF BORING PZ-6

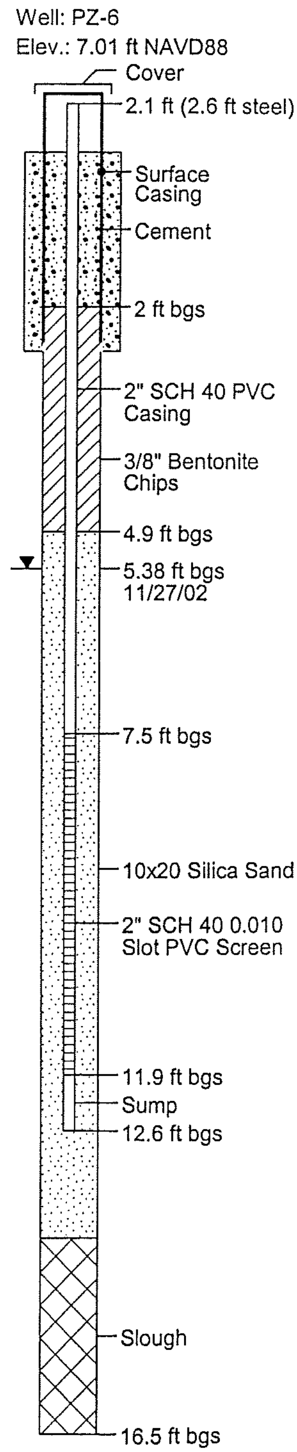
Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/26/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Top of Casing Elev.	: 7.01 ft NAVD88
Sample Method	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 306391.57
Sample Type	: 2.5 foot interval	Easting Coordinate	: 1002978.72

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Recovery (%)	REMARKS
0	SILTY SAND to SANDY SILT , brown to yellowish orange, few to some clay, moist.	SM-ML					Well casing measured from top of casing to top of concrete. Located in north plant area north of BMP; between BMP main access road and CDID ditch.
2.5	-yellowish orange to pale brown, very fine to fine sand, some iron oxide mottling, grades to yellowish orange to gray with minor iron oxide mottling, moist.			1	6, 4, 7	80	
5	SILTY SAND, medium gray, very fine to fine sand, grain size gradually decreases, minor wood pieces, sulfidic odor, very moist to wet.			2	2, 2, 2	90	
7.5	-very fine to fine sand, slight decrease in sulfidic odor, wet			3	3, 6, 19	90	
9	-increase in fine sand content, wet						
10	-several layers with higher fine sand content, wet			4	4, 7, 5	90	
12.5				5	1, 2, 4	100	
13.5	SILTY SAND TO SANDY SILT, brown, very fine to fine sand, very moist.						
14.5	SILT, greenish gray to gray, some to few very fine sand, very moist grades to moist to very moist.	ML		6	1, 3, 5	100	

Total depth of borehole = 16.5 feet bgs



A TETRA TECH COMPANY

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Lynnwood, WA 98036-5707
(425) 921-4000
(425) 921-4040

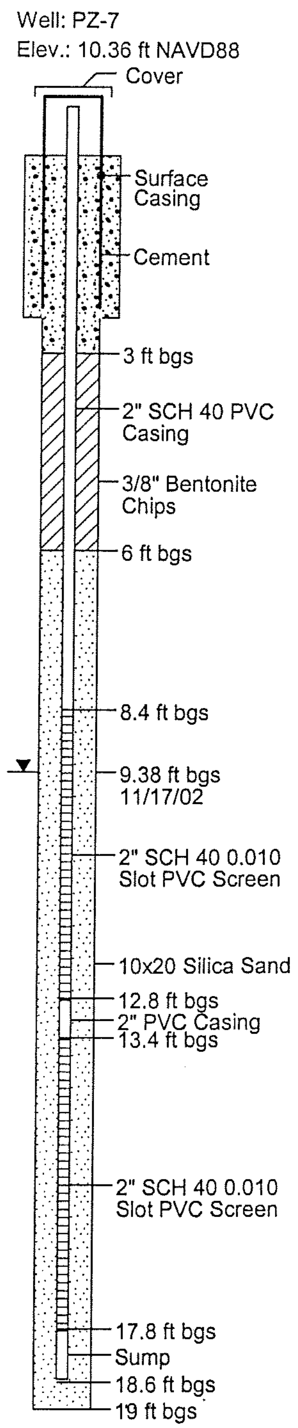
LOG OF BORING PZ-7

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/26/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Surface Elevation	: 10.36 ft NAVD88
Sample Method	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 305858.71
Sample Type	: 2.5 foot interval	Easting Coordinate	: 1002976.47

Depth ft bgs	DESCRIPTION	USCS	Samples	Blow Count	Recovery (%)	REMARKS
0–1	SILTY SAND, brown, fine to medium sand, few to some angular to subangular gravel up to 1/2-inch size, moist. Fill.	AR				Located in north plant area north of BMP; between BMP main access road and CDID ditch.
1.2	SAND, yellowish orange, iron oxide mottling, very fine to fine sand, few to some silt, moist.	SP				
3			1	4, 15, 13	10	
5	-light brown to light olive gray, slight increase in grain size to fine sand, few to minor medium sand, increase in iron oxide mottling, slightly moist to moist.		2	4, 3, 3	80	
7.5	-grades from very moist to wet to wet to saturated		3	4, 4, 7	90	
10	-wet to saturated		4	16, 13, 7	60	
13	-fine sand, few medium sand, sulfidic odor, wet to saturated		5	14, 15, 20	75	
15	-as above		6	2, 3, 4	75	
17.5	-decrease in moisture content very moist to wet					
18	SILTY SAND to SANDY SILT, very fine sand, few fine sand, dense, moist to very moist.	SP-ML	7	2, 6, 10	100	
19	Total depth of borehole = 19 feet bgs					



Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Reynolds

Page 1 of 1

Location Southwest of Black Mud Lagoon

Boring No. RL-1 (shallow)

Surface Elevation

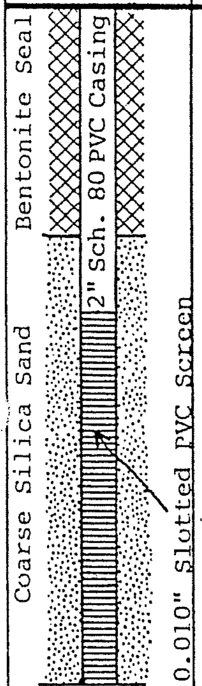
Drilling Method Auger

Total Depth 18 ft.

Drilled By Sweet, Edwards & Assoc.

Date Completed 6/28/83

Logged By J.E.Edwards



WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
							See Boring Log for RL-1 (deep).	350µs/cm DTW=11.8' 6/28,1200
								1050µs/cm DTW=10/7' 6/29,0900
		5						
		10			11.8' First Water			
		15						
		20						
		25						
		30						
		35						

SEA-300-02a

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Reynolds

Location S.W. black mud lagoon

Boring No. RL-1 (deep)

Surface Elevation

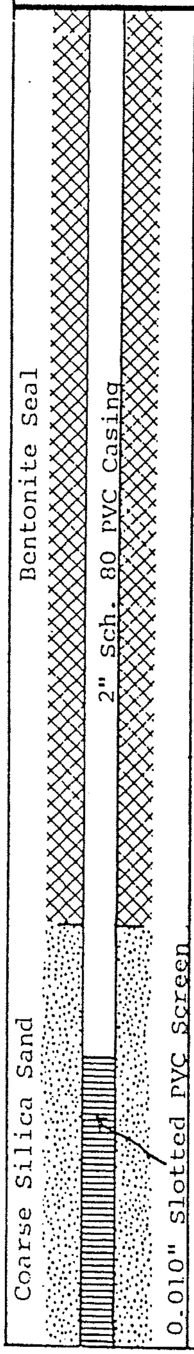
Drilling Method Auger

Total Depth 39.5

Drilled By Sweet, Edwards & Assoc.

Date Completed 6/29/83

Logged By J.E.Edwards

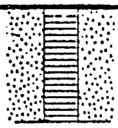
WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
								Cond.= 459μs/cm @23'
		5	1	Split Spoon		CL/ML	3'-4.5' <u>Silty Clay, Clayey Silt</u>- Grey, mottled red and brown, roots and organics, dry.	Cond.= 1350μs/cm 6/25/83 Time= 09:00am
							7' Drop in drill resistance.	
		10	2	Split Spoon		SP/SM	8'-9.5' <u>Sand</u>- Grey, very fine, with trace silt, soft, semi-saturated, massive, some roots.	
					8:00am 6/29/83			
		15	3	Split Spoon		SP/SM	13'-14.5' Same as above, no roots.	
		20	4	Split Spoon		SP	18'-19.5' <u>Sand</u>- Grey, fine grained, trace silt, saturated, massive.	
		25	5	Split Spoon		ML/CL	23'-24.5' <u>Silt</u>- Grey, trace to some sand, some clay, massive, slightly saturated.	
		30	6	Split Spoon		CL	28'-29.5' <u>Clay</u>- Grey, some wood fibers, firm, semi-saturated.	
		35	7	Split Spoon		SP	33'-34.5' <u>Sand</u>- Grey, fine to medium grained, clean, saturated.	

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT REYNOLDS

Boring No. RL-1 (deep)

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
								
		40	8	Split Spoon		CL	38'-39.5' Clay- Grey, organics, semi-saturated.	
		45						
		50						
		55						
		60						
		65						
		70						

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Reynolds

Location Northwest of Black Mud Lagoon

Boring No. RL-2 (shallow)

Surface Elevation

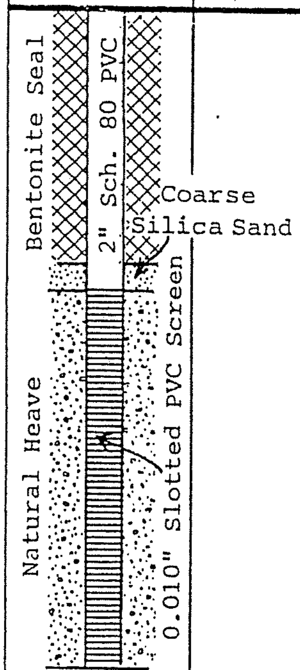
Drilling Method Auger

Total Depth 17.5 ft.

Drilled By Sweet, Edwards & Assoc.

Date Completed 6/29/83

Logged By J.E.Edwards



WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
								Cond.= 450µs/cm 6/29/83 Time-1200
		5					See Boring Log for RL-2 (deep).	Cond.= 1,300 µs/cm 6/29/83
		10						
		15						
		20						
		25						
		30						
		35						

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Reynolds

Page 1 of 1

Location Northwest of Black Mud Lagoon

Boring No. RL-2 (deep)

Surface Elevation

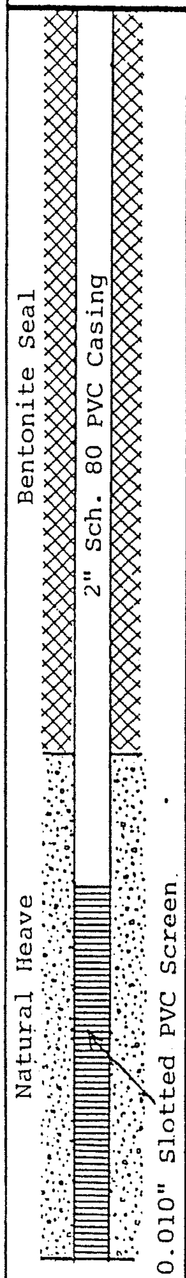
Drilling Method Auger

Total Depth 34.5 ft.

Drilled By Sweet, Edwards & Assoc.

Date Completed 6/30/83

Logged By J.E.Edwards



WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
								Cond.= 5600µs/cm 6/29/84 Time-1700
		5	1	Split Spoon		SP	3'-4.5' Sand- Grey to rust, fine to medium grained, clean, dry, roots.	
		10	2	Split Spoon		SP	8'-9.5' Sand- Grey, medium grained, clean, saturated.	
		15	3	Split Spoon		ML/SM	13'-14.5' Sandy Silt, Silty Sand- Grey, sand-very fine grained, soft, semi-saturated.	
		20	4	Split Spoon		SM/SC	18'-19.5' Sand- Grey, fine grained with some silt and clay, soft, semi-saturated.	
		25	5	Split Spoon		SP and SM/ML	23'-24.5' Sand and Silt- Interbedded, clean, medium grained sand or silty sand, saturated, chemical odor.	
		30	6	Split Spoon		SP	28'-29.5' Sand- Medium grained, clean, loose, saturated.	
		35	7	Split Spoon		SP/ML	33'-34.5' Sand and Silt- Grey, interbedded, medium grained, clean sand.	

SEA-300-02a

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT: REYNOLDS

Page 1 of 1

Location:

Boring No.: RL-3 (shallow)

Surface Elevation:

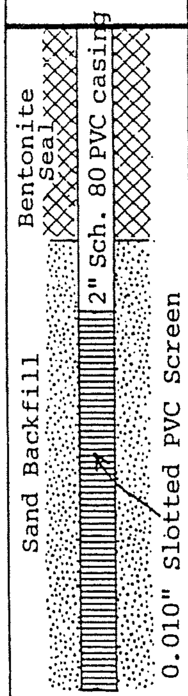
Drilling Method: Auger

Total Depth: 17.5 ft.

Drilled By: Sweet, Edwards & Ass...

Date Completed: 6/30/83

Logged By: J.J.Maul

WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
							See Boring Log for RL3 (deep).	

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Reynolds

Location ______

Boring No. RL-3 (deep)

Surface Elevation ______

Drilling Method ______

Total Depth 39 ft.

Drilled By Sweet, Edwards & Assoc.

Date Completed 6/30/83

Logged By J.J.Maul

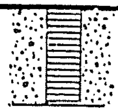
WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
Bentonite Seal; 2" Sch. 80 PVC Casing								Cond.= 680 s/cm 6/30/83 Time- 1937
		5						
		10	1	Split Spoon		SM	7.5'-9' Silty Sand- Tan to grey, medium to fine greined, saturated, hard push.	
		15	2	Split Spoon		SP	13.5'-14' Sand- Grey, medium to fine grained, clean saturated.	
		20	3	Split Spoon		ML	17.5'-19' Clayey Silt- Grey, medium plasticity, soft, trace sand organic.	
Natural Heave; 0.010" Slotted PVC Screen		25	4	Split Spoon		ML	23.5'-24' Clayey Silt- As above, stiff, non-plastic, 10 ft. heave.	
		30	5	Split Spoon		SP	27.5'-29' Sand- Grey, medium to fine grained, clean.	
		35	6	Split Spoon				

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Reynolds

Boring No. RL-3 (deep)

WELL DETAILS	PENETRATION TIME/ RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
								
			7	Split Spoon			37.5'-39' Clayey Silt- Grey, plastic, highly organic.	
		40						
		45						
		50						
		55						
		60						
		65						
		70						

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT Reynolds

Page 1 **of** 1

Location

Boring No. RL-4 (shallow)

Surface Elevation

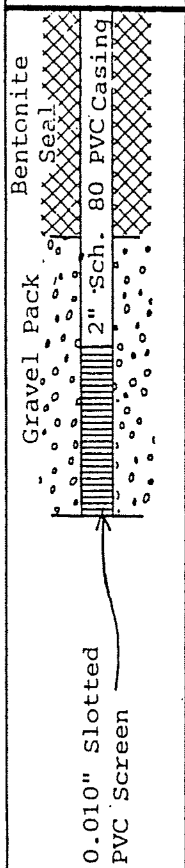
Drilling Method Auger

Total Depth 13.5 ft.

Drilled By Sweet, Edwards & Assoc.

Date Completed 9/30/83

Logged By J.J.Maul

WELL DETAILS	PENE-TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
							See Boring Log for RL-4 (deep).	

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BORING LOG

PROJECT Reynolds

Location

Boring No. RL-4 (deep)

Surface Elevation

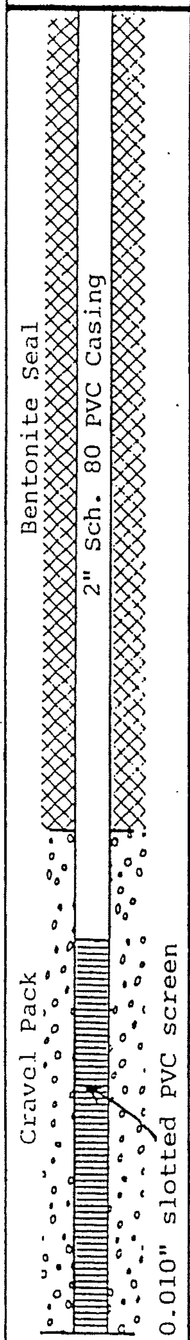
Drilling Method Auger

Total Depth 35 ft.

Drilled By Sweet, Edwards & Assoc.

Date Completed 9/30/83

Logged By J.J.Maul



WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
		5	1	SS		ML	3.5'-5' Clayey Silt- Grey, soft, roots, slightly plastic.	
		10	2	SS		ML	8.5'-10' Silty Clay- Grey-blue, soft.	
		15	3	SS		ML	13.5'-15' Silty Clay- Grey some silty sand at end of spoon.	
		20	4	SS		ML	18.5'-20' Silt- Grey, organics (roots, wood), trace very fine sand, some sandy lenses.	
		25	5	SS		ML	23.5'-25' Clayey Silt- Greyish green, organics, trace sands at end of spoon.	
		30	6	SS		ML	28.5'-30' Sandy Silt- Grey some very fine mica sand, massive.	
		35	7	SS		ML	33.5'-35' Sandy Silt- Same as above.	

SEA-300-02a

Sweat, Edwards & Associates, Inc.

BORING LOG

PROJECT REYNOLDS BLACK MUD LAGOON

Location NE corner of lagoon

Boring No. RL-5

Surface Elevation Top of PVC = 13.65 ft.

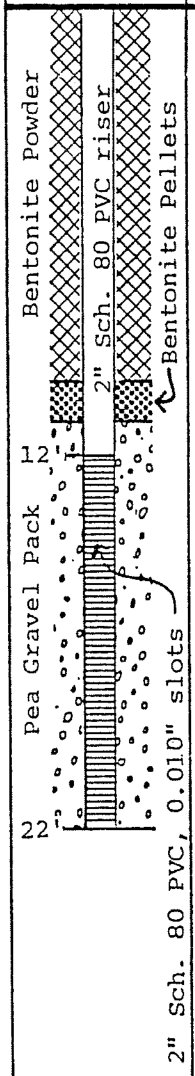
Drilling Method Hollow Stem Auger

Total Depth 40 ft.

Drilled By Sweet, Edwards & Assoc.

Date Completed 7/20/84

Logged By D.Dykes/J.Maul

WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
							0'-5' Fill	
		5					8'-9.5' Silt- Grey to tan mottling with some red staining, some clay and very fine sand, roots, cohesive, unsaturated. (ML)	
		10					10.5'-12' Silt- Tan to grey, mottled, some organics stained red; Grey, fine to very fine sand in tip of spoon (saturated). (ML)	
		15					13.5'-15' Silty Sand- Grey fine to very fine sand, saturated. (SM)	EC = 450 micro-mhos/cm
							15.5'-17' Sand- Grey, massive, fine to very fine sand, trace silt, saturated. (SM)	
		20					18.5'-20' Silty Sand- Grey fine to very fine sand, saturated. (SM)	
							20.5'-22' Sand- Grey, massive, some buried organics, very fine to fine sand, saturated. (SM)	
		25						
		30					28.5'-30' Silty Clay- Grey, organics. (CL)	
					32.5		33.5'-35' Silty Clay- Same as above. (CL)	
		35						

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT REYNOLDS BLACK MUD LAGOON

Boring No. RL-5

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		40					38.5'-40' Silty Clay- Same as above. (CL)	
		45					7/19/84 First borehole to 40' abandoned with bentonite slurry tremied from bottom of hole to surface.	
		50					7/20/84 Topped off with bentonite powder 12 to 0 feet. Moved over 5 ft. and installed RL-5. Drilled to 22 ft.	
		55					7/19/84 Depth to water - 11.5 ft., with hole to 40 ft.	
		60						
		65						
		70						

PACIFIC NORTHERN GEOSCIENCE

Monitoring Well Geologic & Construction Log

REYNOLDS CABLE PLANT
PRELIMINARY HYDROGEOLOGIC ASSESSMENT
4393 INDUSTRIAL WAY
LONGVIEW WASHINGTON

FIGURE A-8

Project Number 9333114

Well Number MW-9

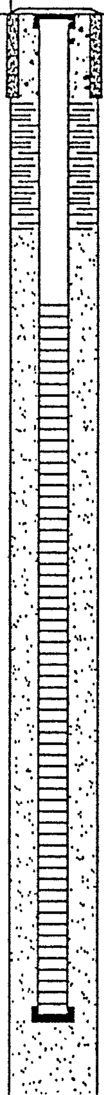
Sheet 1 of 1

Elevation (Top of Well Casing):
Water Level Elev:
Drilling Contractor: CASCADE DRILLING
Drilling Method: HSA, 140 lb.-30" DROP W/D&M 2" SAMPLER
Surface Elevation: NA
Start Date: 3/2/93 Start Time: 10:50
Finish Date: 3/2/93 Finish Time: 11:45

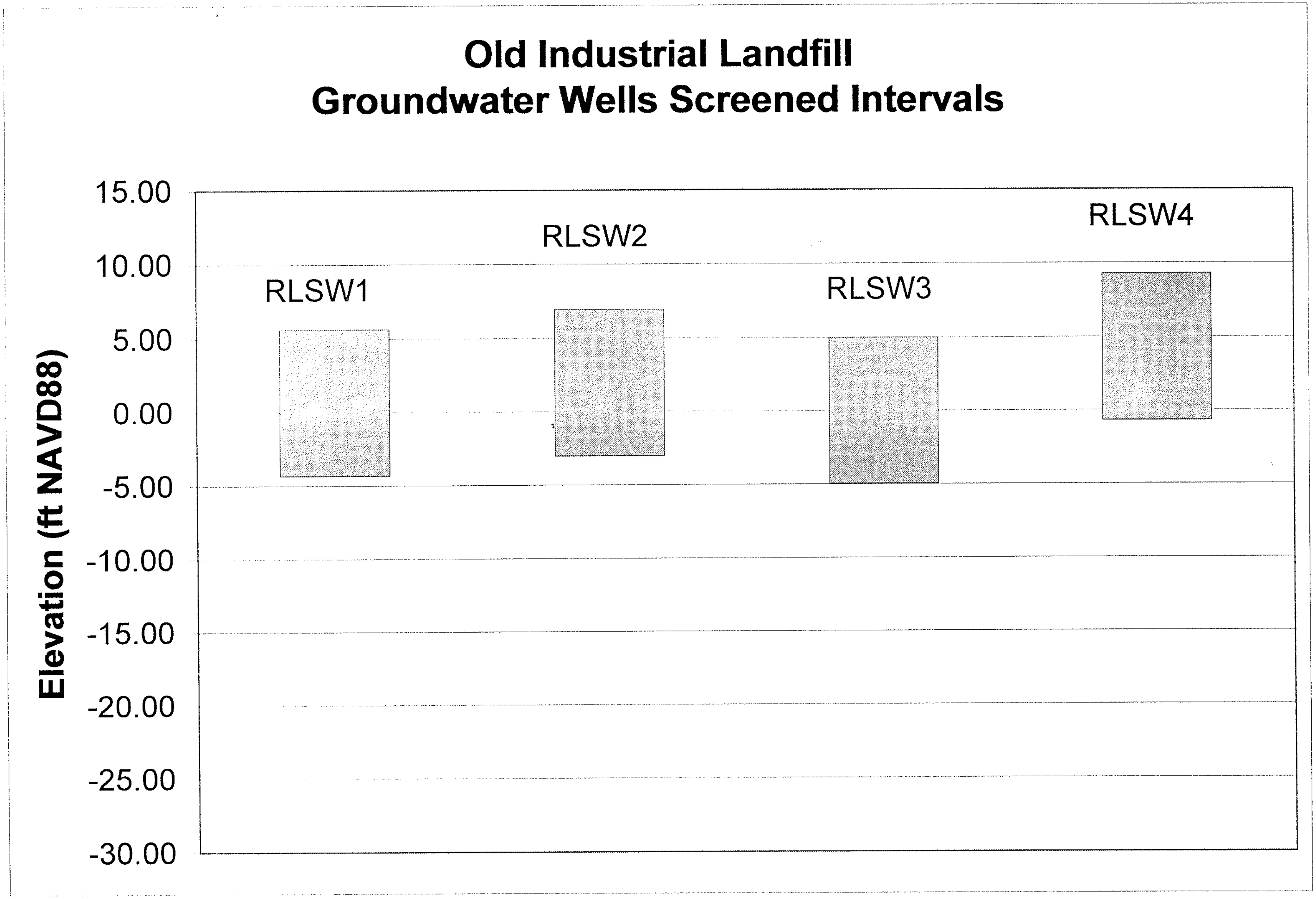
ST - Sampler Type:
- 2" OD Split Spoon
- Bulk Grab Sample
- Drive Barrel

Lab Tests:
- S - Soil Properties
- C - Chemical Properties
- Water Level At Time Of Drilling (ATD)

Logged By: RAL
Approved By: RAL



Depth In Feet	Well Construction	Description	Depth In Feet	Lab Tests	ST	Blows Per 6"	OVM Readin (PPM)
	Locking water tight, flush mounted monument concrete seal	Asphalt 3" 2' Sandy gravel blanket					
	Bentonite Seal	SAND, brown, medium-grained, medium dense				13 14 15	0
	2" ID Sch. 40 PVC Threaded Well Caseing	-Grades to SILT: at 6.0'					
5		SILT, gray, stiff, trace sand, trace organics, slight organic odor, slightly moist	5	C		6 11 15	0
	ATD		ATD				
		-SAND: at approx. 7.0'					
		SAND: gray, brown, fine-medium grain, loose, mottled, wet				3 4 5	
	2" ID Sch. 40 PVC Threaded Well Screen-.020 Slot	-Grades Less Silty					
10			10				
	10/20 Silica Sand Filter Pack	SILT: gray, firm, trace sand, trace organics, wet.				4 5 7	
	3" PVC Threaded End Plug						
15			15				
		Bottom of boring at 14', 10' schedule 40 PVC 2" .020 screen, 4' blank PVC.					
20			20				


Old Industrial Landfill
Groundwater Wells Screened Intervals
Elevation (ft NAVD88)
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
-30.00
RLSW1
RLSW2
RLSW3
RLSW4

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT REYNOLDS SOLID WASTE PILE INVESTIGATION

Location N.E. of landfill

Boring No. RLSW-1

Surface Elevation

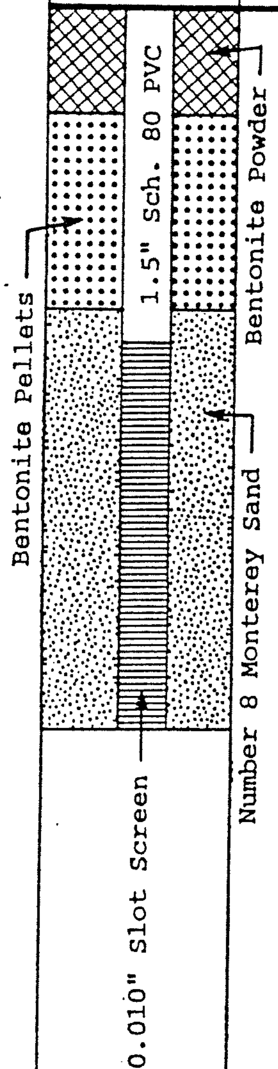
Drilling Method Hollow Stem Auger

Total Depth 20 feet

Drilled By Sweet, Edwards and Assoc., Inc.

Date Completed 5/6/85

Logged By J. Maul



WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
		0						
		5	1	SS			3.5-5.5' SILT, gray to tan, mottled, organic. ML	
		10	2	SS			8.5-10.0' SANDY SILT, gray to tan, very fine sand. Sharp contact in bottom 0.25' of spoon with gray fine sand, clean, saturated ML/SP	
		15	3	SS			13.5-15.0' SILTY SAND, gray, fine to very fine sand, trace of silt, saturated. SM	
		20	4	SS			18.5-20.0' SAND, same as above, except slightly coarser and cleaner. SP	
		25						

SEA-300-02a

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT REYNOLDS SOLID WASTE PILE INVESTIGATION

Page 1 **of** [illegible]

Location North of landfill

Boring No. RLSW-2

Surface Elevation

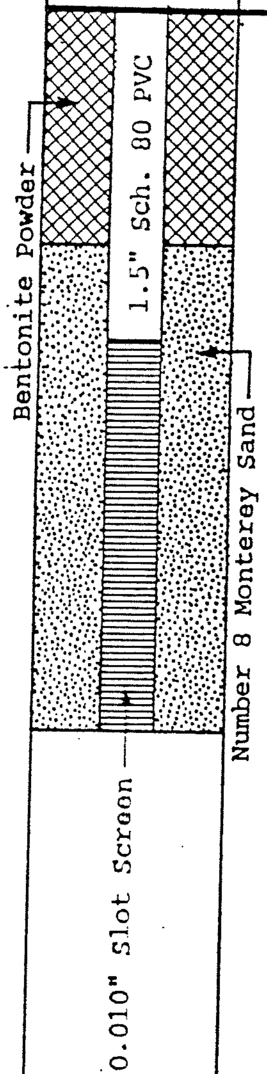
Drilling Method Hollow Stem Auger

Total Depth 18.5 feet

Drilled By Sweet, Edwards and Assoc., Inc.

Date Completed 5/7/85

Logged By J. Maul



WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
		0						
		5	1	SS			3.5-5.0' SILTY SAND/SILT, brown to black, appears to be road fill containing some black mud.	
		10	2	SS			8.5-10.0' SILT, grayish green, some orange streaks core is layered with black carbon laminae with some organics. Sharp contact in lower 0.25' of spoon with clean gray fine to very fine sand, saturated. ML/SP	
		15	3	SS			13.5-15.0' SAND, gray, fine to very fine in bottom of spoon grading upward to medium to fine sand, minor ants of wood fragments, clean, saturated. SP	
		20						

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT REYNOLDS SOLID WASTE PILE INVESTIGATION

Location N.W. of landfill

Boring No. RLSW-3

Surface Elevation

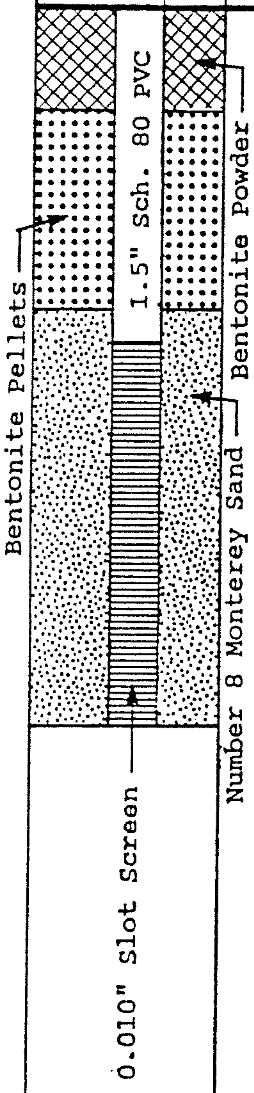
Drilling Method Hollow Stem Auger

Total Depth 20 feet

Drilled By Sweet, Edwards and Assoc., Inc.

Date Completed 5/8/85

Logged By J. Maul



WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
		0						
		5	1	SS			3.5-5.0' SANDY SILT, brown, medium to fine sand, some organics. ML	
		10	2	SS			8.5-10.0' SILTY CLAY, CLAYEY SILT, gray, inter-layered with abundant organics, saturated. ML/CL	
		15	3	SS			13.5-15.0' SILTY SAND, green, fine to medium sand, some organics, saturated. SM	
		20	4	SS			18.5-20.0' SILT, green, cohesive, some organics, saturated. ML	

Sweet, Edwards & Associates, Inc.

BORING LOG

PROJECT REYNOLDS SOLID WASTE PILE INVESTIGATION

Page 1 **of** 1

Location South of landfill

Boring No. RLSW-4

Surface Elevation

Drilling Method Hollow Stem Auger

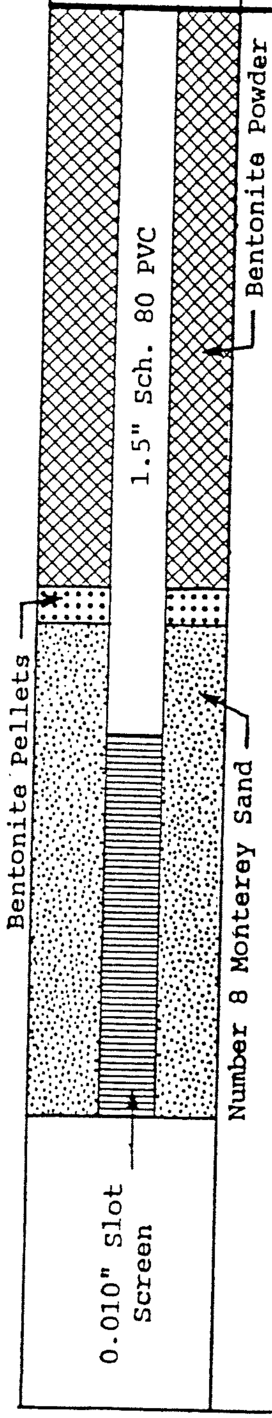
Total Depth 28.5 feet

Drilled By Sweet, Edwards and Assoc., Inc.

Date Completed 5/20/85

Logged By J. Maul

WELL DETAILS



PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE NO.	SAMPLE TYPE	PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
	0						
	5	1	SS			3.5-5.0' SANDY SILT, gray some white fibrous material, slight odor, some perched water. ML	
	10	2	SS			8.5-10.0' SILTY CLAY, gray, some medium fine sand and pea gravel, lenses moist to saturated Unsaturated medium to fine brown sand in tip of spoon.	
	15	3	SS			13.5-15.0' SAND, gray to light brown, some layer of coarse sand, moist. SP	
	20	4	SS			18.5-20.0' SAND, gray, medium to fine grained, saturated. SP	
	25	5	SS			23.5-25.0' 23.5-24.0' SAND, SILT, SILTY SAND, gray, some wood fragments. SP/ML 24.0-25.0' CLAYEY SILT, SILTY CLAY, gray, cohesive some wood fragments at contact with above, saturated. ML/CL	
	30						

SEA-300-02a

PACIFIC NORTHERN GEOSCIENCE

Monitoring Well Geologic & Construction Log

REYNOLDS CABLE PLANT
PRELIMINARY HYDROGEOLOGIC ASSESSMENT
4393 INDUSTRIAL WAY
LONGVIEW WASHINGTON

FIGURE A-8

Project Number 9333114
Well Number MW-9
Sheet 1 of 1

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Drilling Method: HSA, 140 lb.-30" DROP W/D&M 2" SAMPLER
Surface Elevation: NA
Start Date: 3/2/93 Start Time: 10:50
Finish Date: 3/2/93 Finish Time: 11:45

ST - Sampler Type:
- 2" OD Split Spoon
- Bulk Grab Sample
- Drive Barrel

Lab Tests:
- S - Soil Properties
- C - Chemical Properties
- Water Level At Time Of Drilling (ATD)

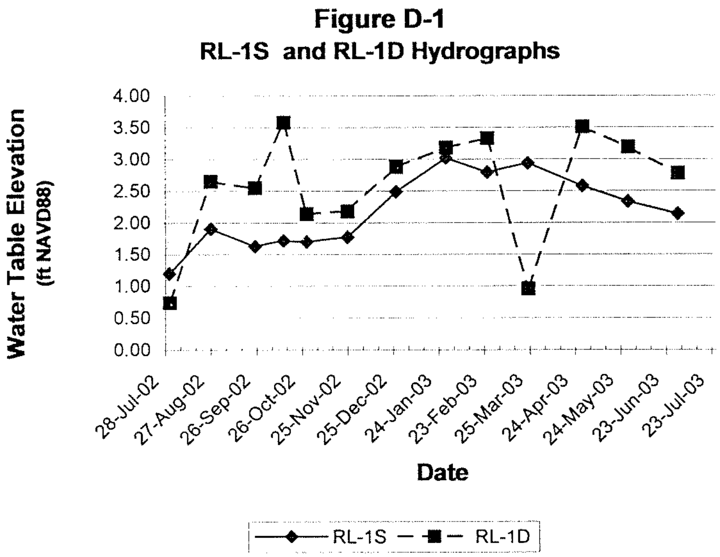
Logged By: RAL
Approved By: RAL

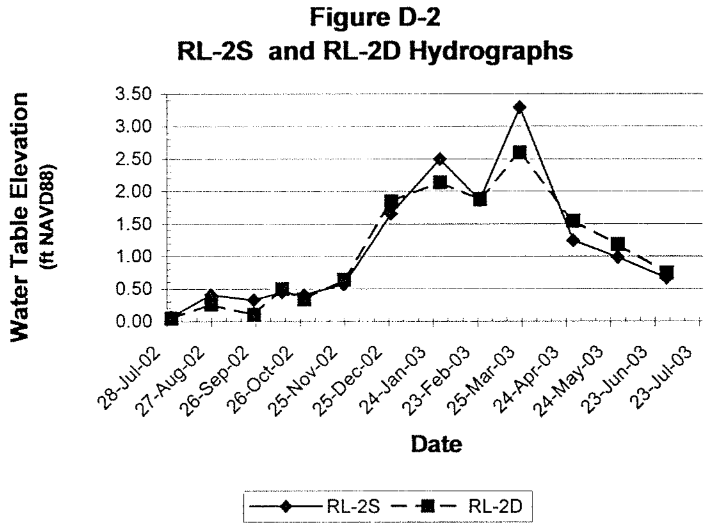
Depth In Feet	Well Construction	Description	Lab Tests	Blows Per 6"	OVM Reading (PPM)
0	Locking water tight, flush mounted monument concrete seal	Asphalt 3" 2' Sandy gravel blanket			
	Bentonite Seal	SAND, brown, medium-grained, medium dense		13 14 15	0
	2" ID Sch. 40 PVC Threaded Well Caseing	—Grades to SILT: at 6.0'			
5	ATD	SILT, gray, stiff, trace sand, trace organics, slight organic odor, slightly moist	C	6 11 15	0
		—SAND: at approx. 7.0'			
	2" ID Sch. 40 PVC Threaded Well Screen-.020 Slot	SAND: gray, brown, fine-medium grain, loose, mottled, wet —Grades Less Silty		3 4 5	
10					
	10/20 Silica Sand Filter Pack	SILT: gray, firm, trace sand, trace organics, wet.		4 5 7	
	3" PVC Threaded End Plug				
15		Bottom of boring at 14', 10' schedule 40 PVC 2" .020 screen, 4' blank PVC.			
20					

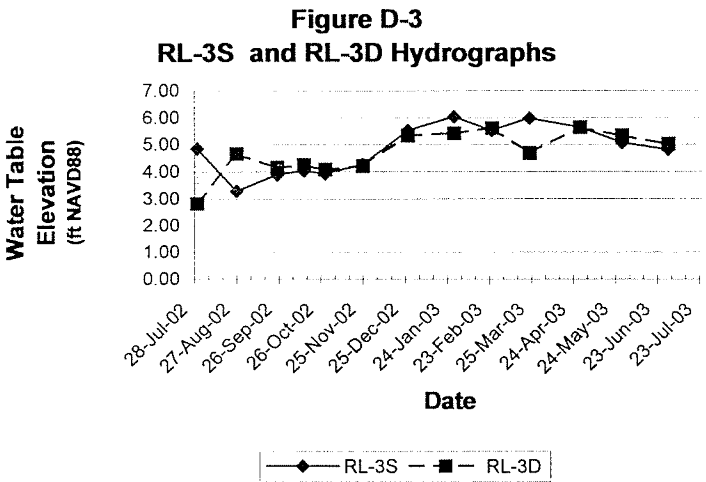
APPENDIX D

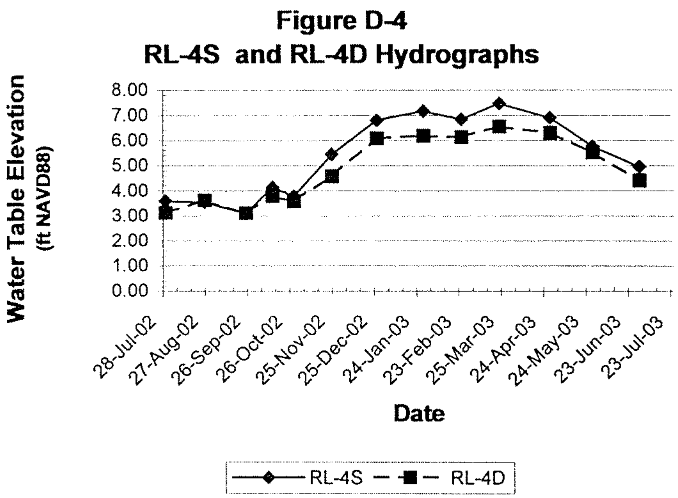
HYDROGRAPHS FOR BMP AREA WELLS, PIEZOMETERS, SURFACE WATER-GROUNDWATER PAIRS, AND SURFACE WATER BENCHMARKS

Black Mud Pond Area Hydrographs
Former RMC Longview
Longview, Washington

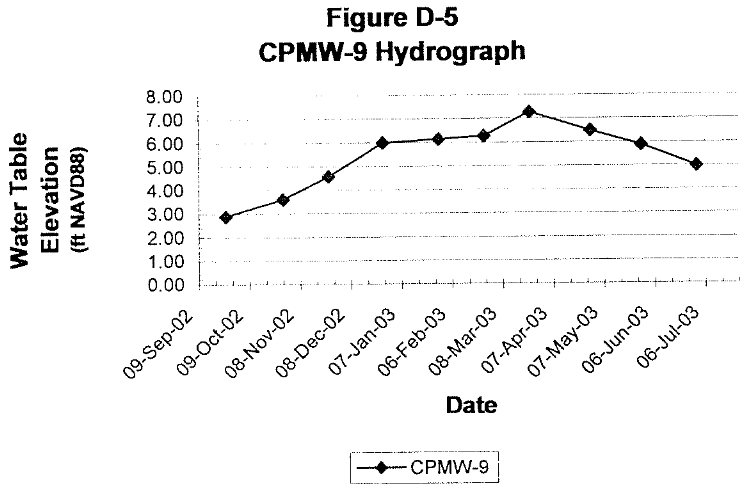


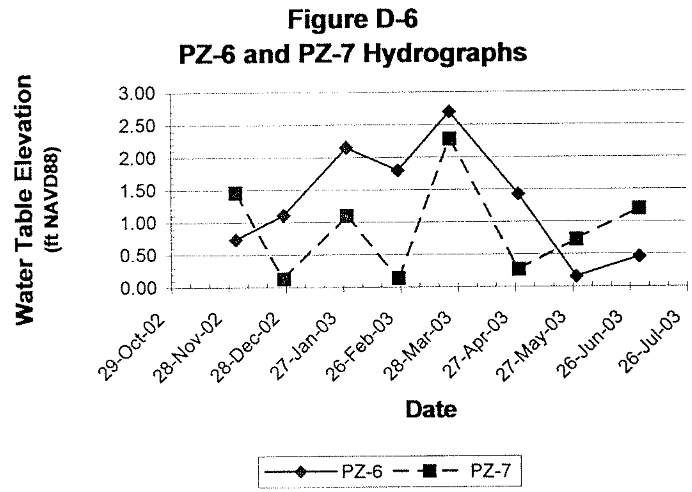


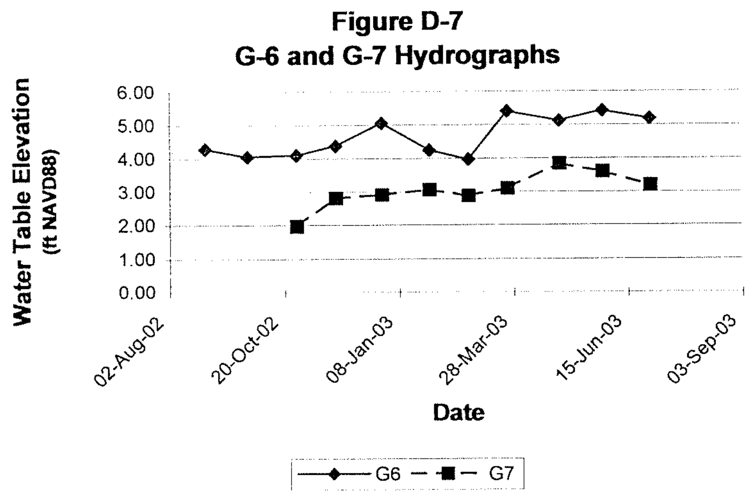


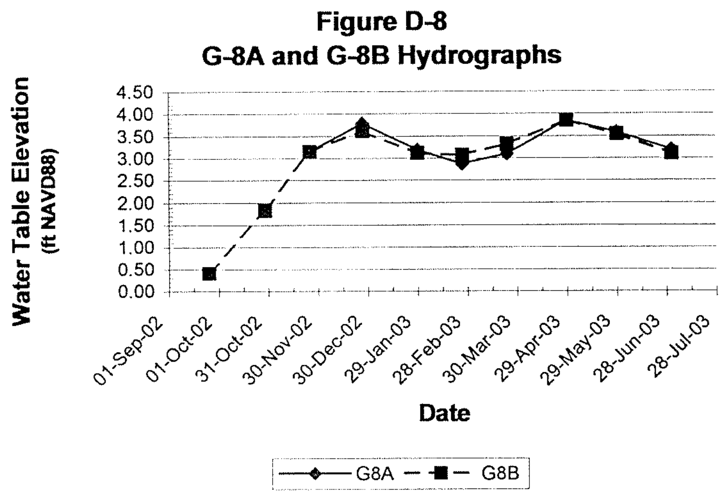


Black Mud Pond Area Hydrographs
Former RMC Longview
Longview, Washington

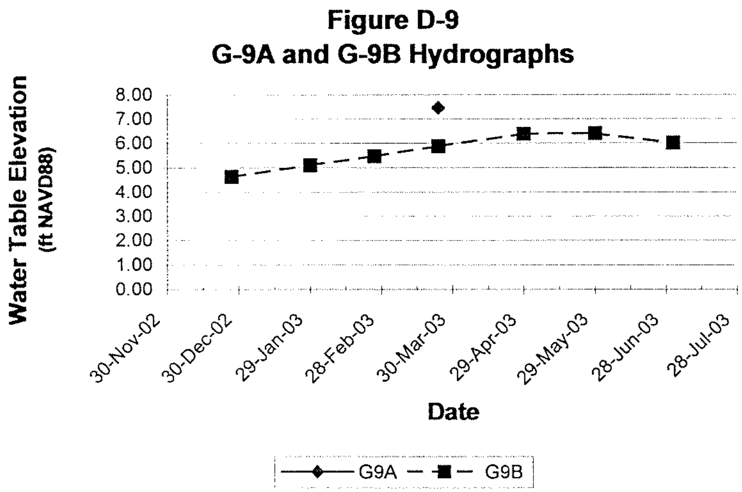


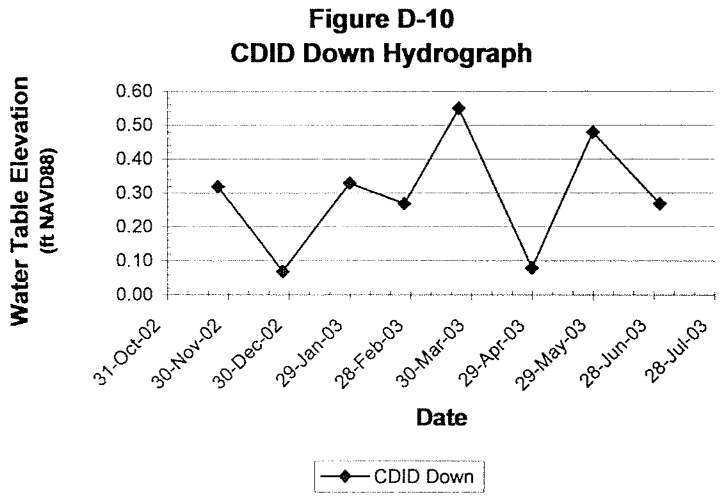


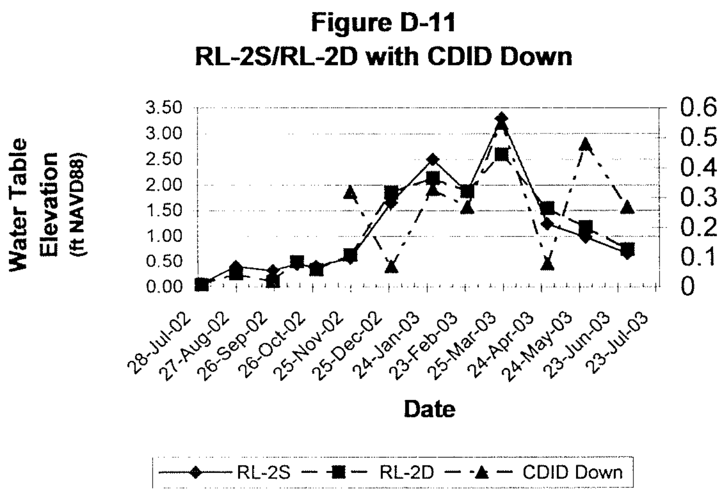


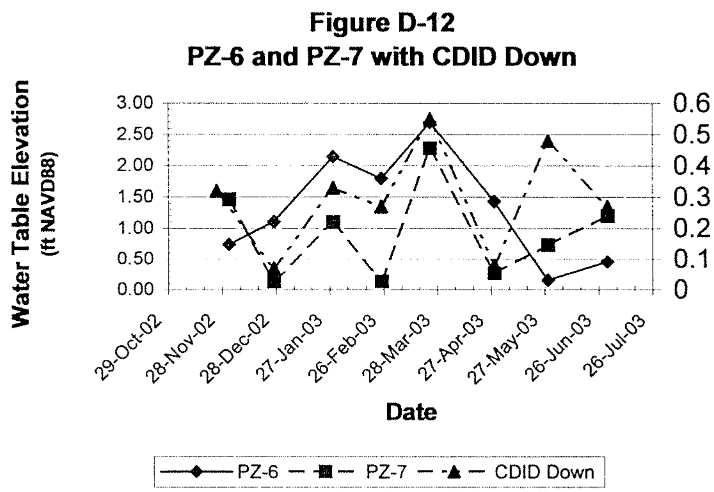


Black Mud Pond Area Hydrographs
Former RMC Longview
Longview, Washington



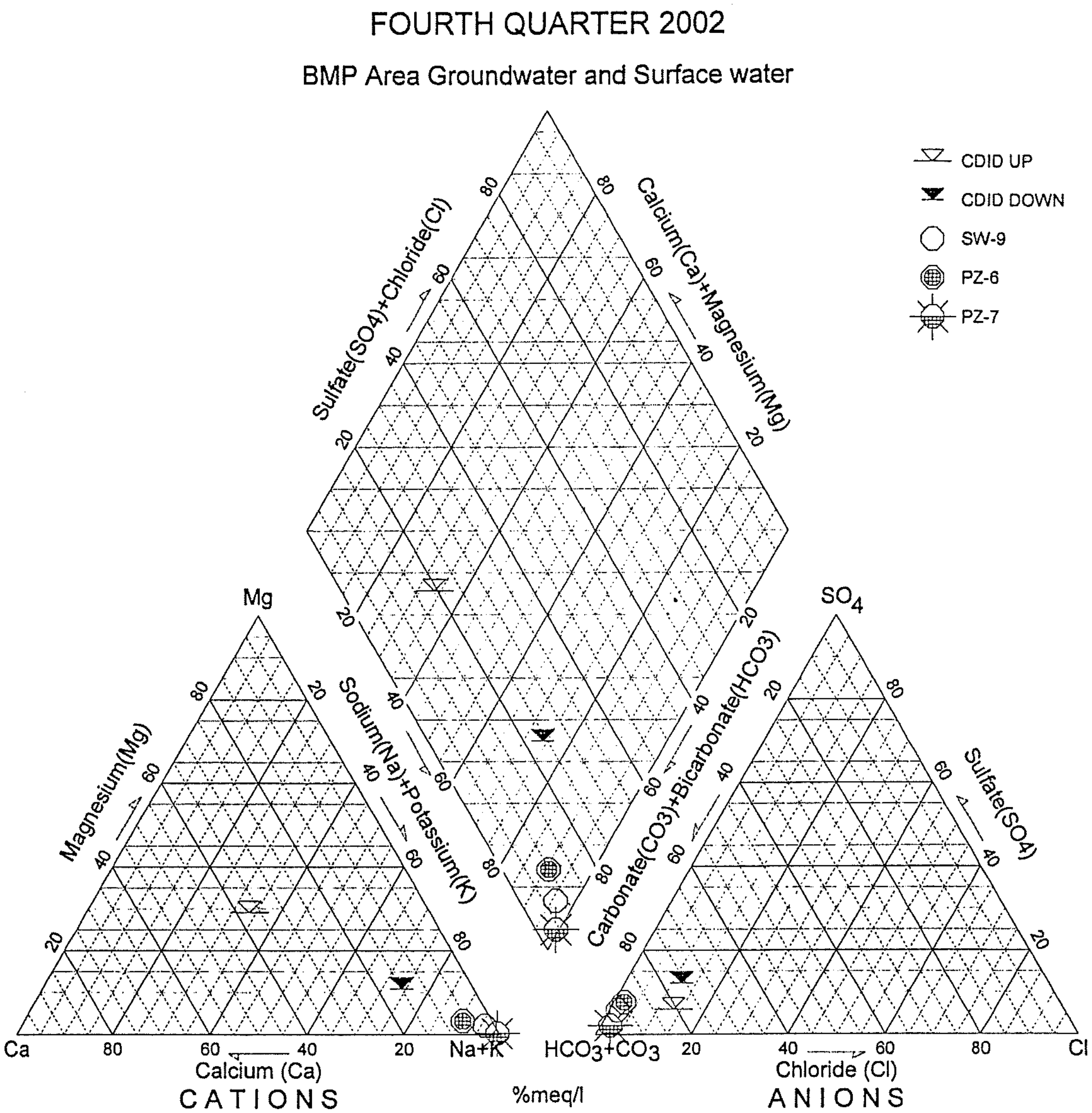




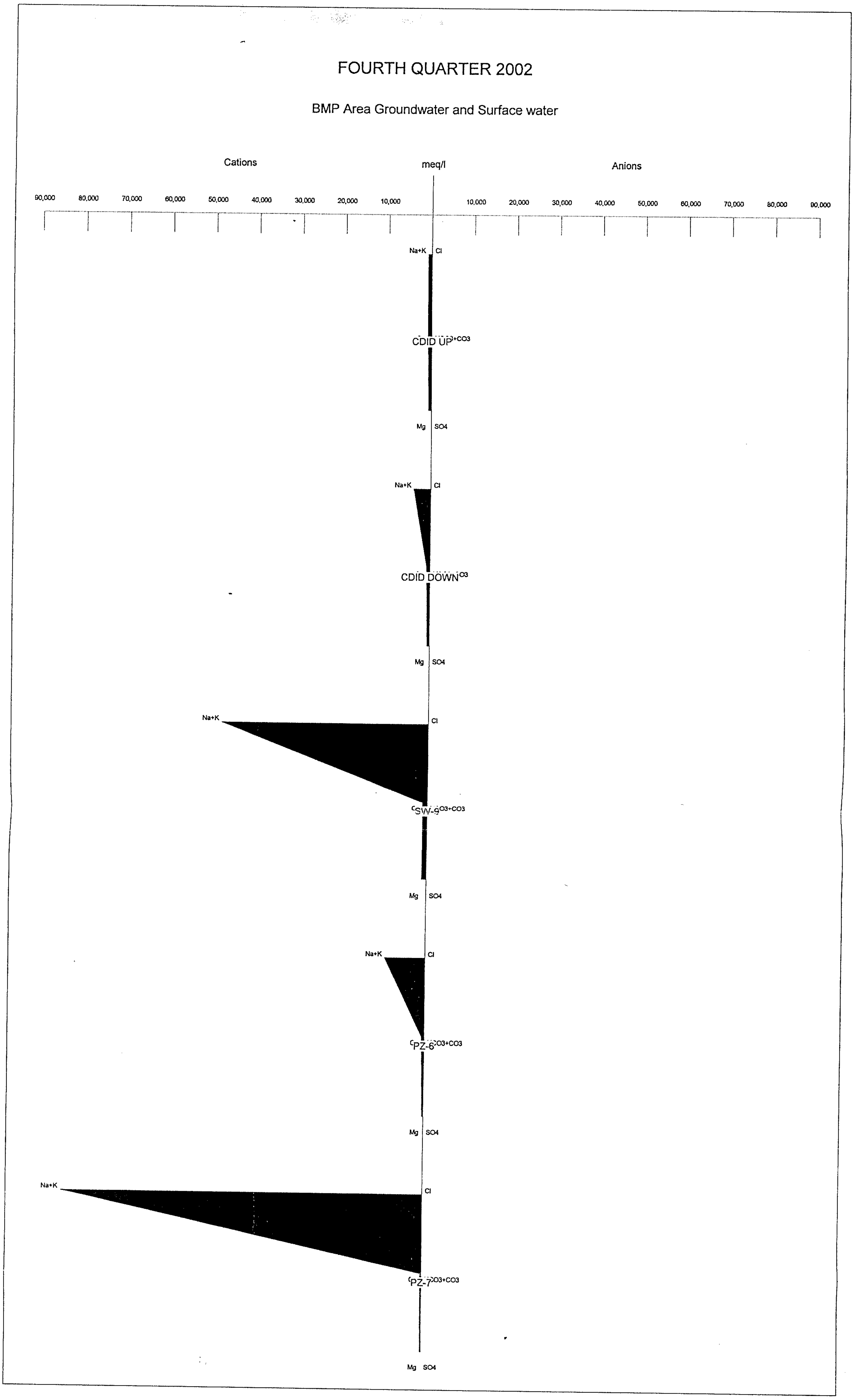


APPENDIX E

TRILINEAR AND STIFF DIAGRAMS



TRILINEAR DIAGRAM FOURTH QUARTER 2002 BMP AREA ALCOA RMC Longview, Washington	
Project No. 059868	By: J. Triolo
Date: 10/13/03	Checked: C. Spill
MFG, Inc. consulting scientists and engineers	



TRILINEAR DIAGRAM
FOURTH QUARTER 2002
BMP AREA

ALCOA RMC
Longview, Washington

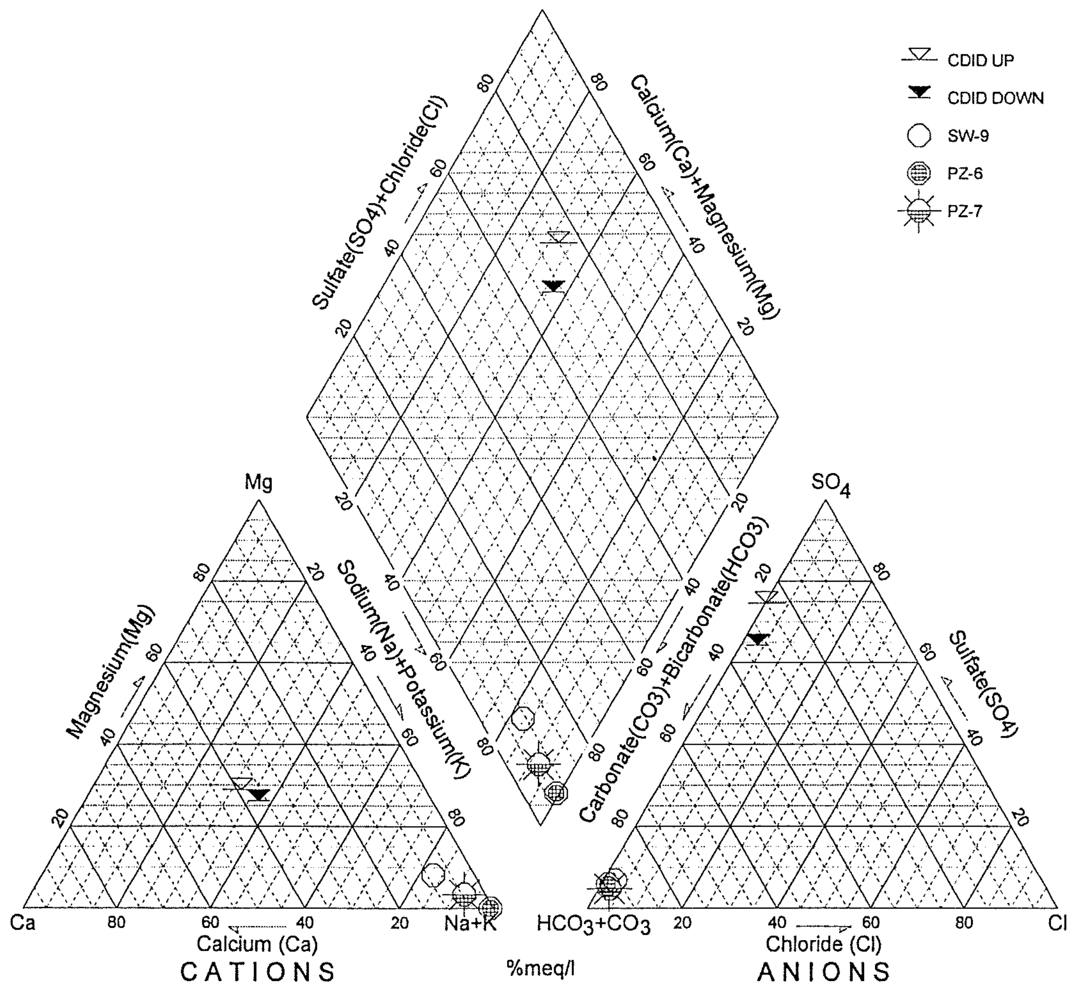
059868.3	By: J. Triolo
Date: 10/13/03	Checked:

MFG, Inc.
consulting scientists and engineers

J:/059863/1003TRI.DWG, PLOT SCALE: SCALE TO FIT

FIRST QUARTER 2003

BMP Area Groundwater and Surface water



TRILINEAR DIAGRAM
FIRST QUARTER 2003
BMP AREA

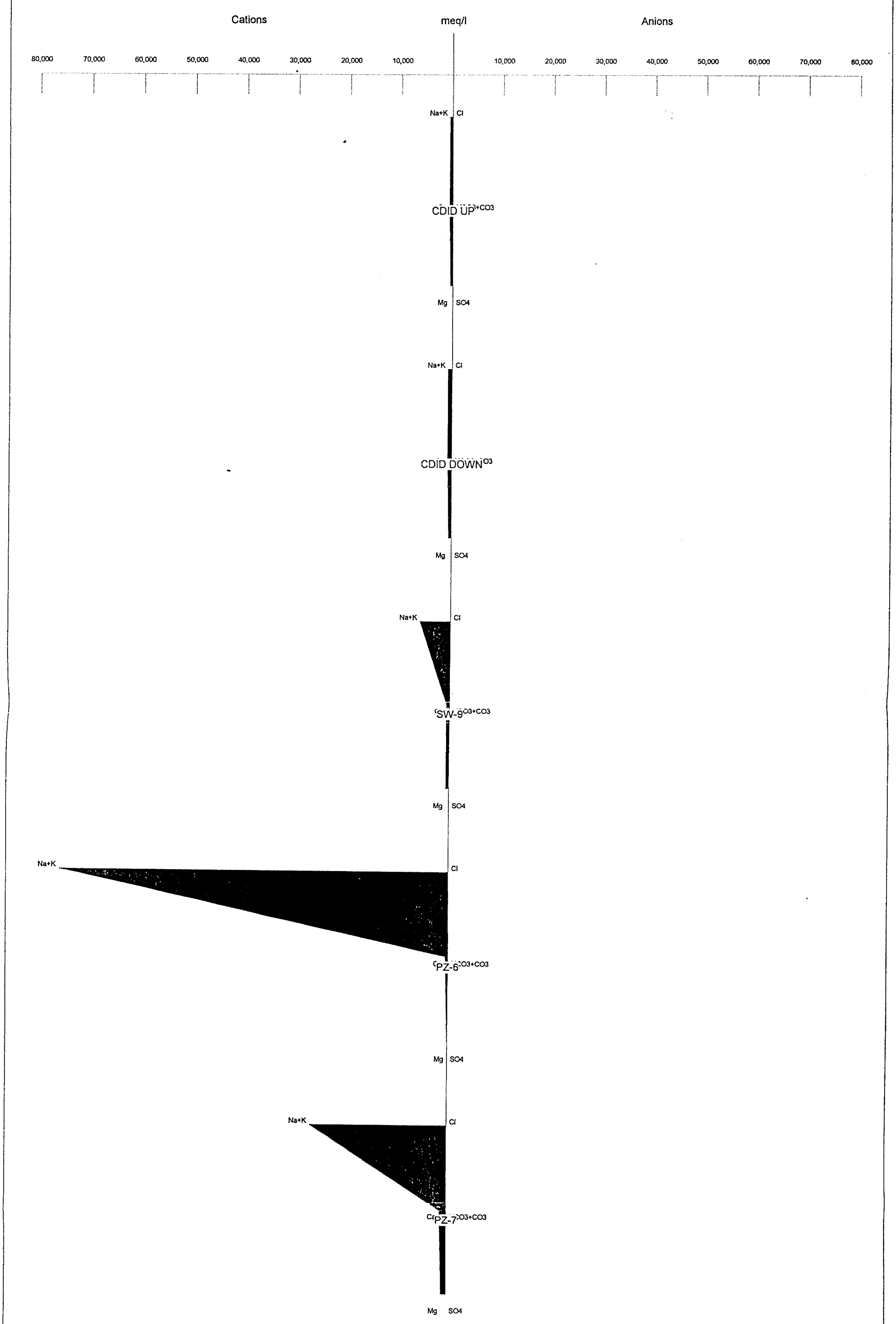
ALCOA RMC
Longview, Washington

Project No. 059868	By: J. Triolo
Date: 10/13/03	Checked: C. Spill

MFG, Inc.
consulting scientists and engineers

FIRST QUARTER 2003

BMP Area Groundwater and Surface water



TRILINEAR DIAGRAM
FIRST QUARTER 2003
BMP AREA

ALCOA RMC
Longview, Washington

059868.3	By: J. Triolo
Date: 10/13/03	Checked:

MFG, Inc.
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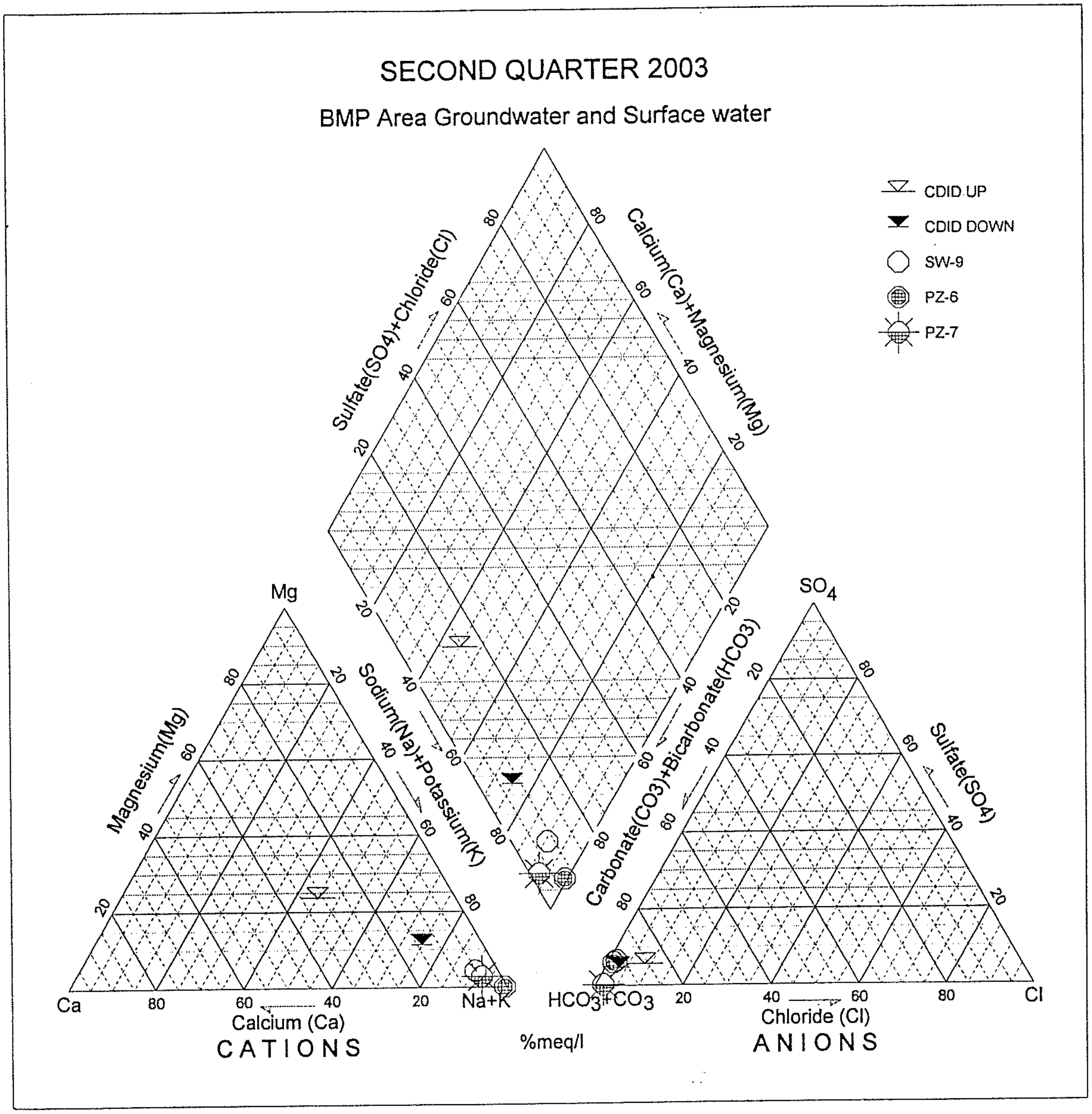
J:/059863/2003TRI.DWG, PLOT SCALE: SCALE TO FIT

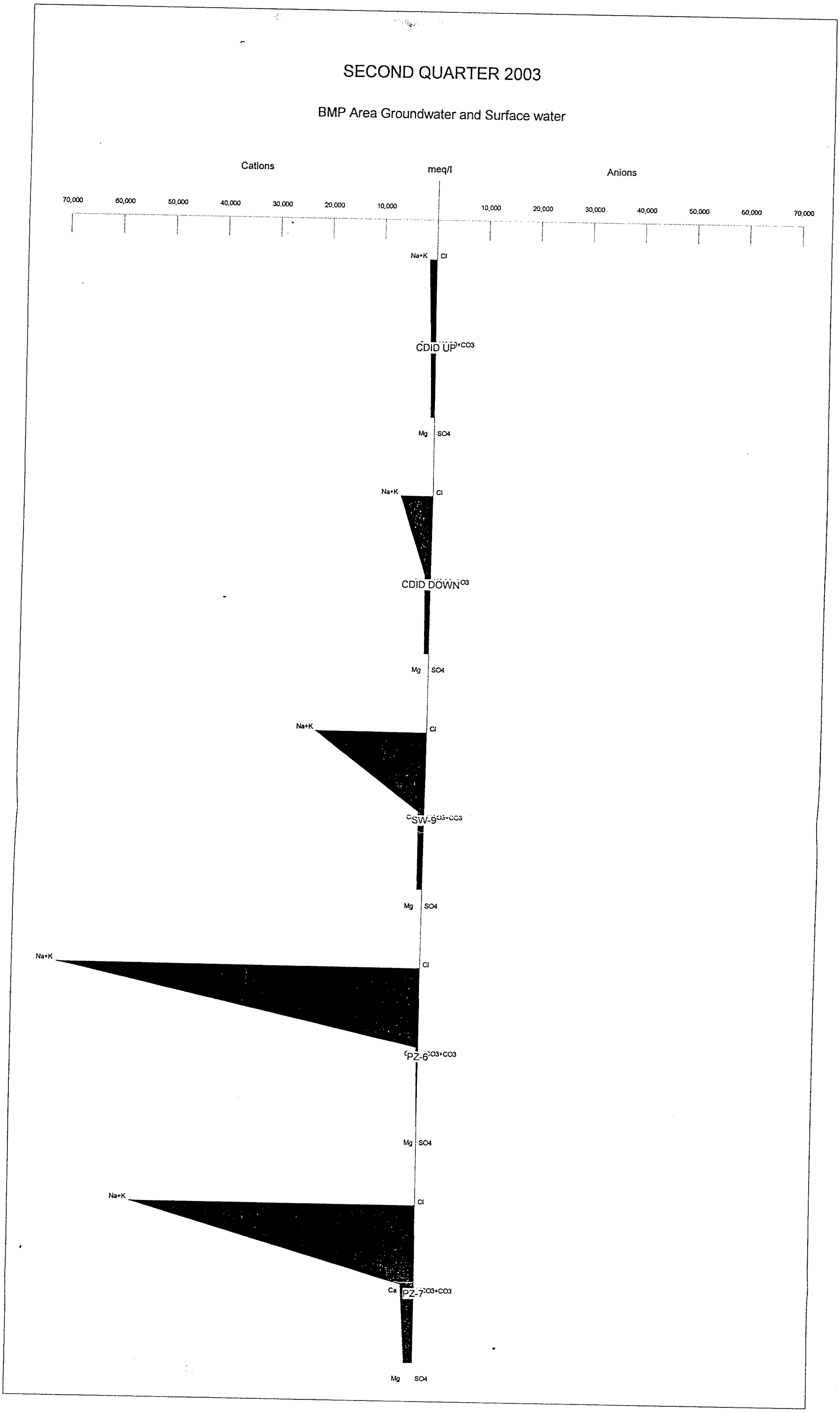


TRILINEAR DIAGRAM
SECOND QUARTER 2003
BMP AREA

ALCOA RMC
Longview, Washington

Project No. 059868	By: J. Triolo
Date: 10/13/03	Checked: C. Spill

MFG, Inc.
consulting scientists and engineers



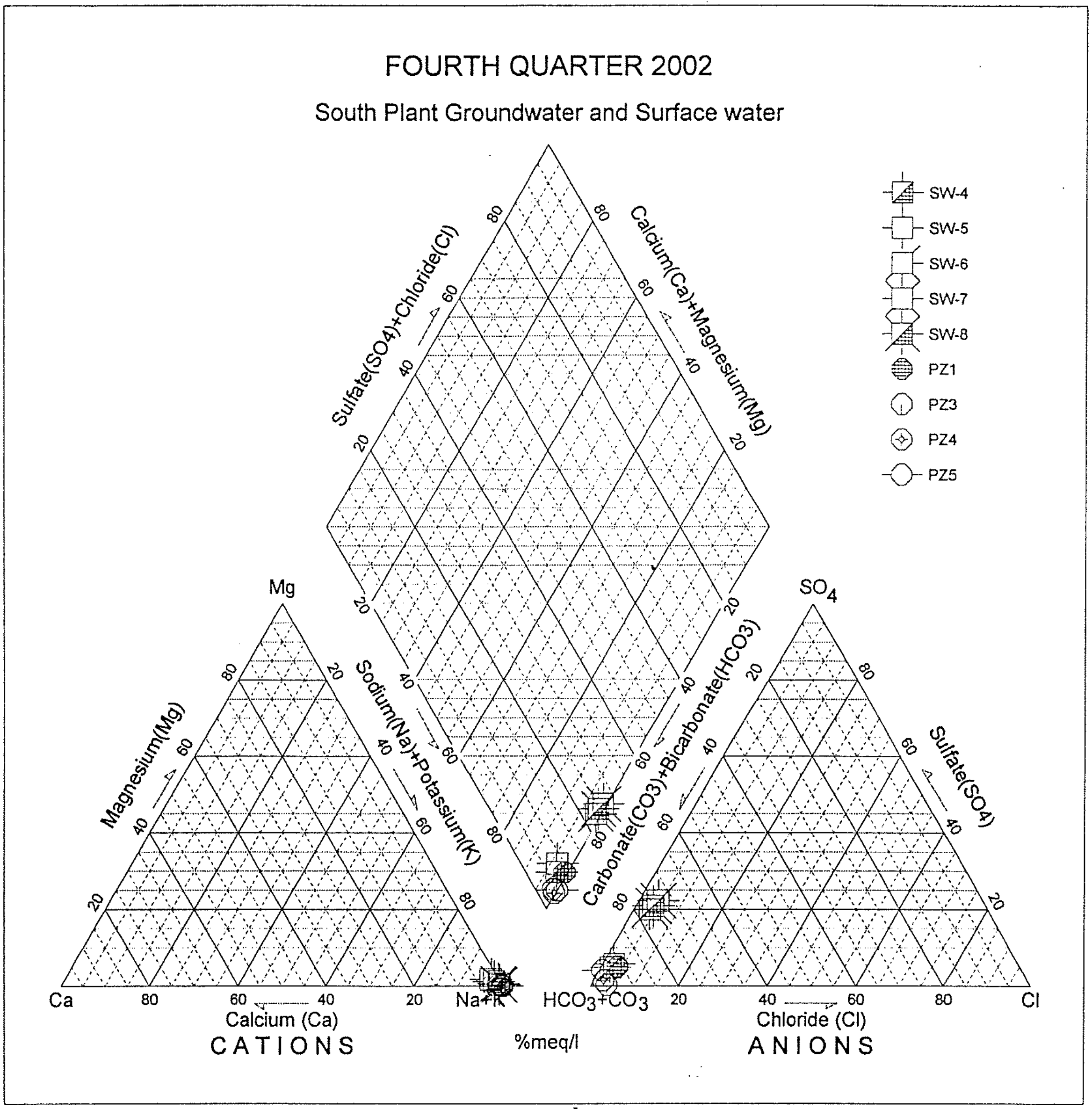
TRILINEAR DIAGRAM
SECOND QUARTER 2003
BMP AREA

ALCOA RMC
Longview, Washington

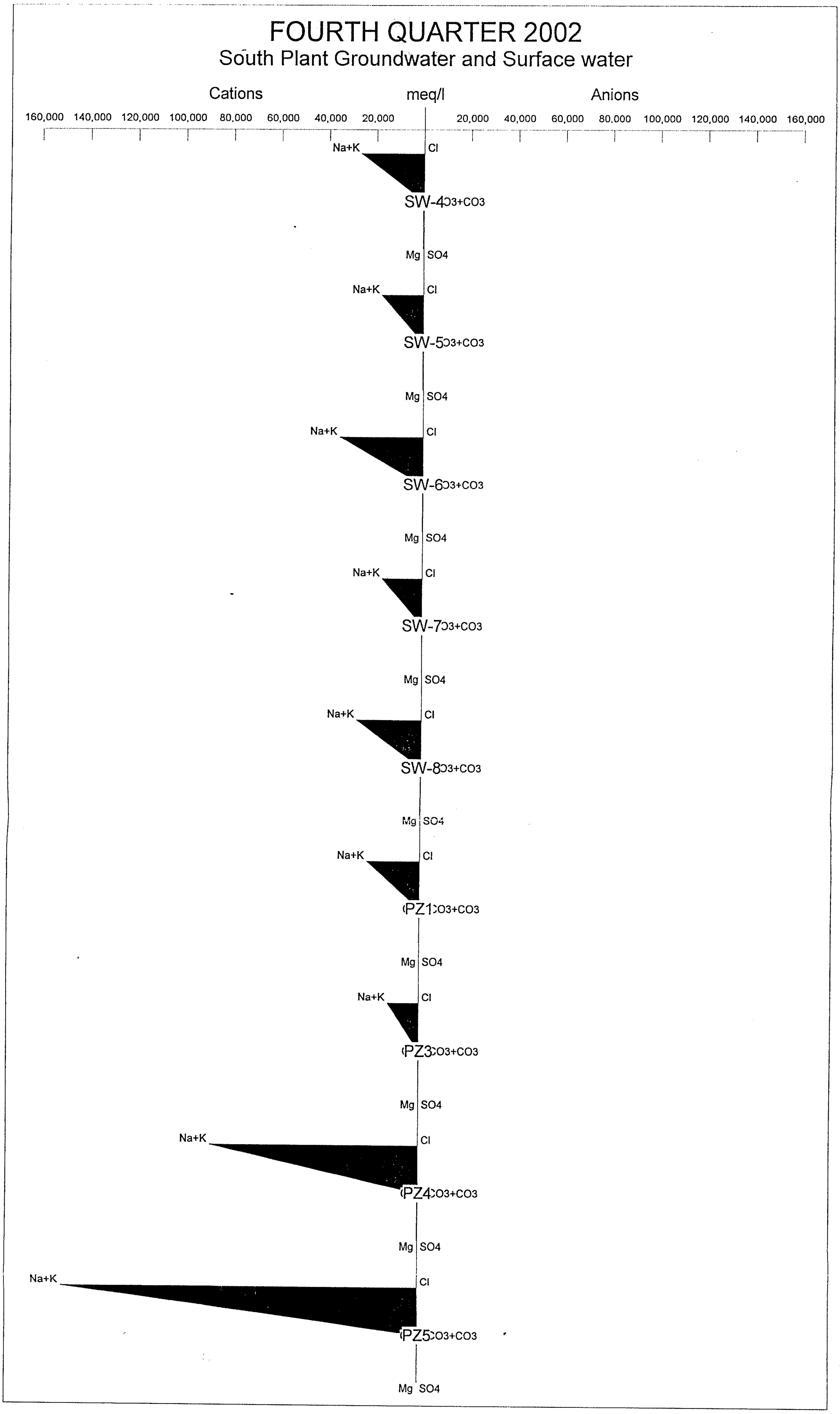
059868.3	By: J. Triolo
Date: 10/13/03	Checked:

MFG, Inc.
consulting scientists and engineers

J:/059863/2002TRI.DWG, PLOT SCALE: SCALE TO FIT



TRILINEAR DIAGRAM FOURTH QUARTER 2002 SOUTH PLANT AREA ALCOA RMC Longview, Washington	
Project No. 059868	By: J. Triolo
Date: 10/13/03	Checked: C. Spill
MFG, Inc. consulting scientists and engineers	



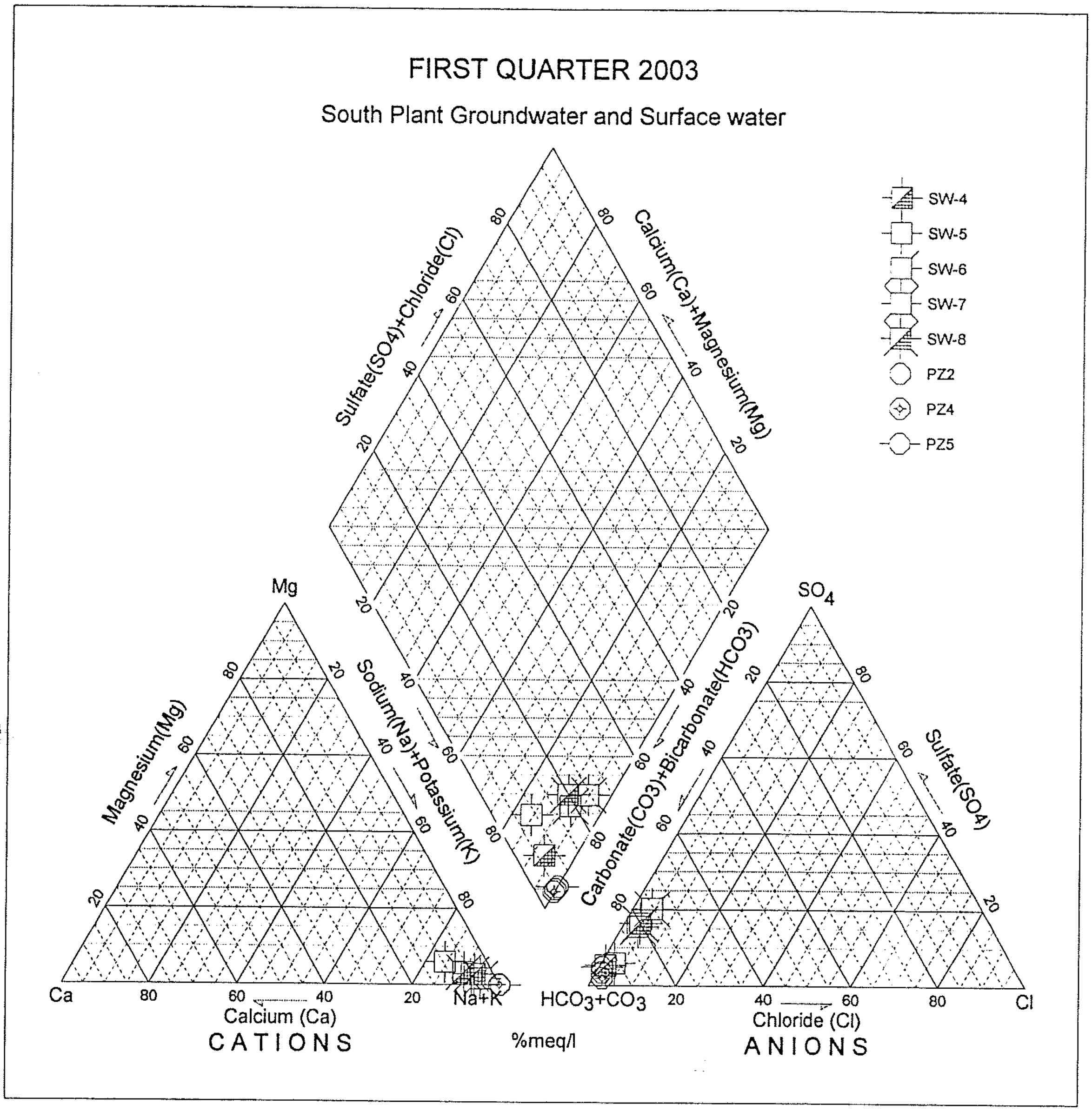
TRILINEAR DIAGRAMS
FOURTH QUARTER 2002
SOUTH PLANT AREA

ALCOA RMC
Longview, Washington

Project No. 059868.3	By: J. Triolo
Date: 10/13/03	Checked:

MFG, Inc.
consulting scientists and engineers

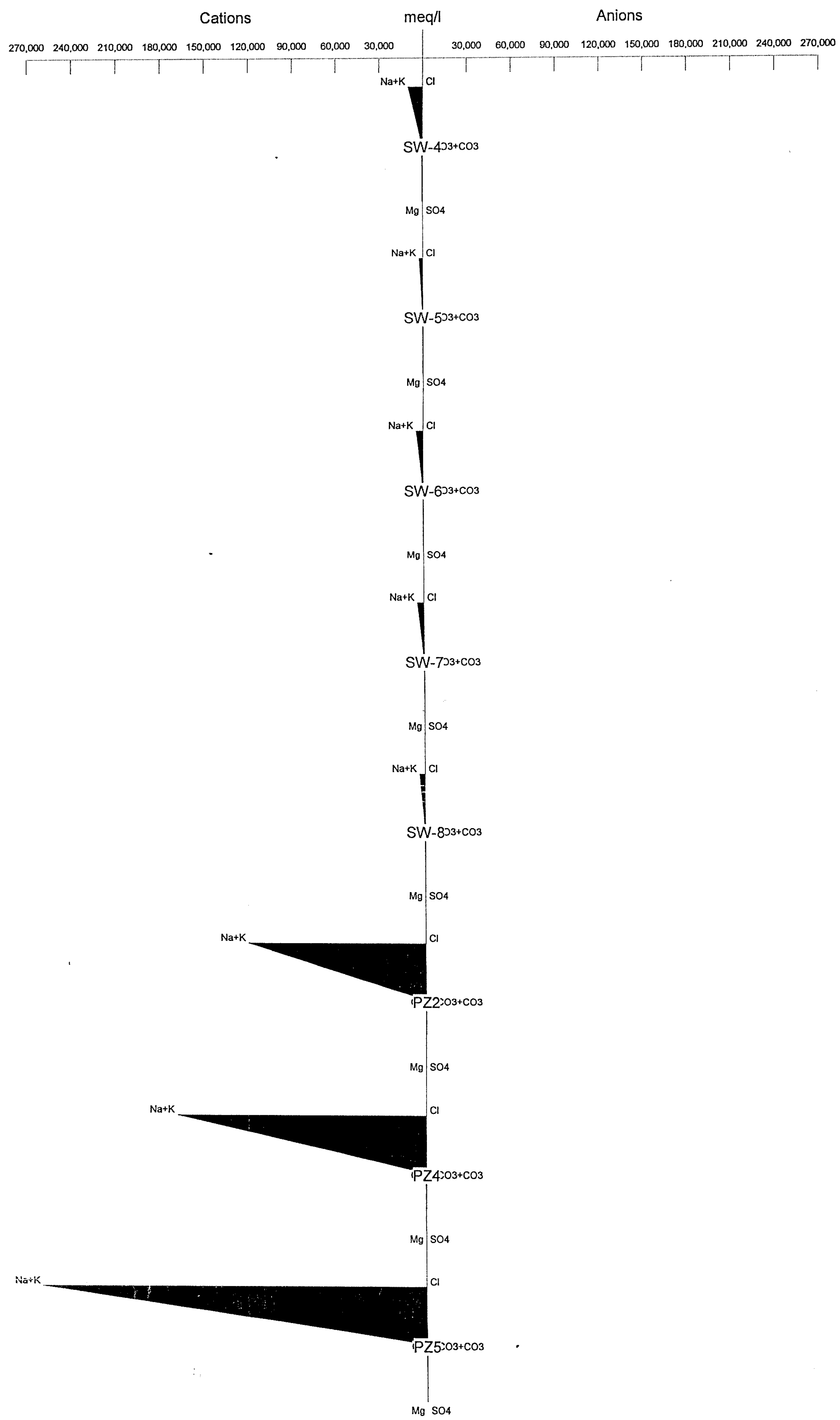
J:/059863/1Q03TRI.DWG, PLOT SCALE: SCALE TO FIT



TRILINEAR DIAGRAM FIRST QUARTER 2003 SOUTH PLANT AREA ALCOA RMC Longview, Washington	
Project No. 059868	By: J. Triolo
Date: 10/13/03	Checked: C. Spill
MFG, Inc. consulting scientists and engineers	

FIRST QUARTER 2003

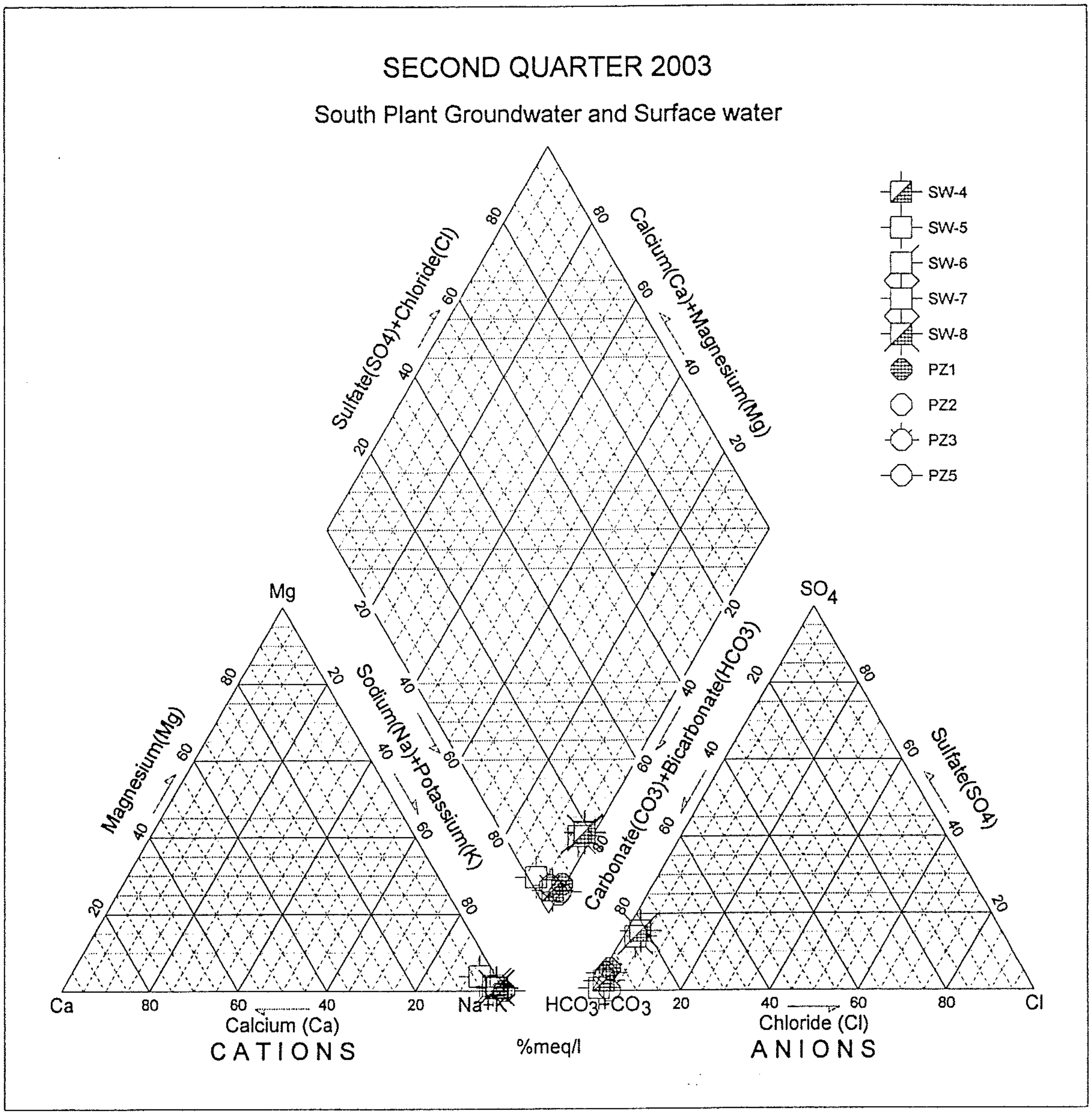
South Plant Groundwater and Surface water



TRILINEAR DIAGRAMS FIRST QUARTER 2003 SOUTH PLANT AREA ALCOA RMC Longview, Washington	
Project No. 059868.3	By: J. Triolo
Date: 10/13/03	Checked:

MFG, Inc.
consulting scientists and engineers

J:/059863/2Q03TRI.DWG, PLOT SCALE: SCALE TO FIT



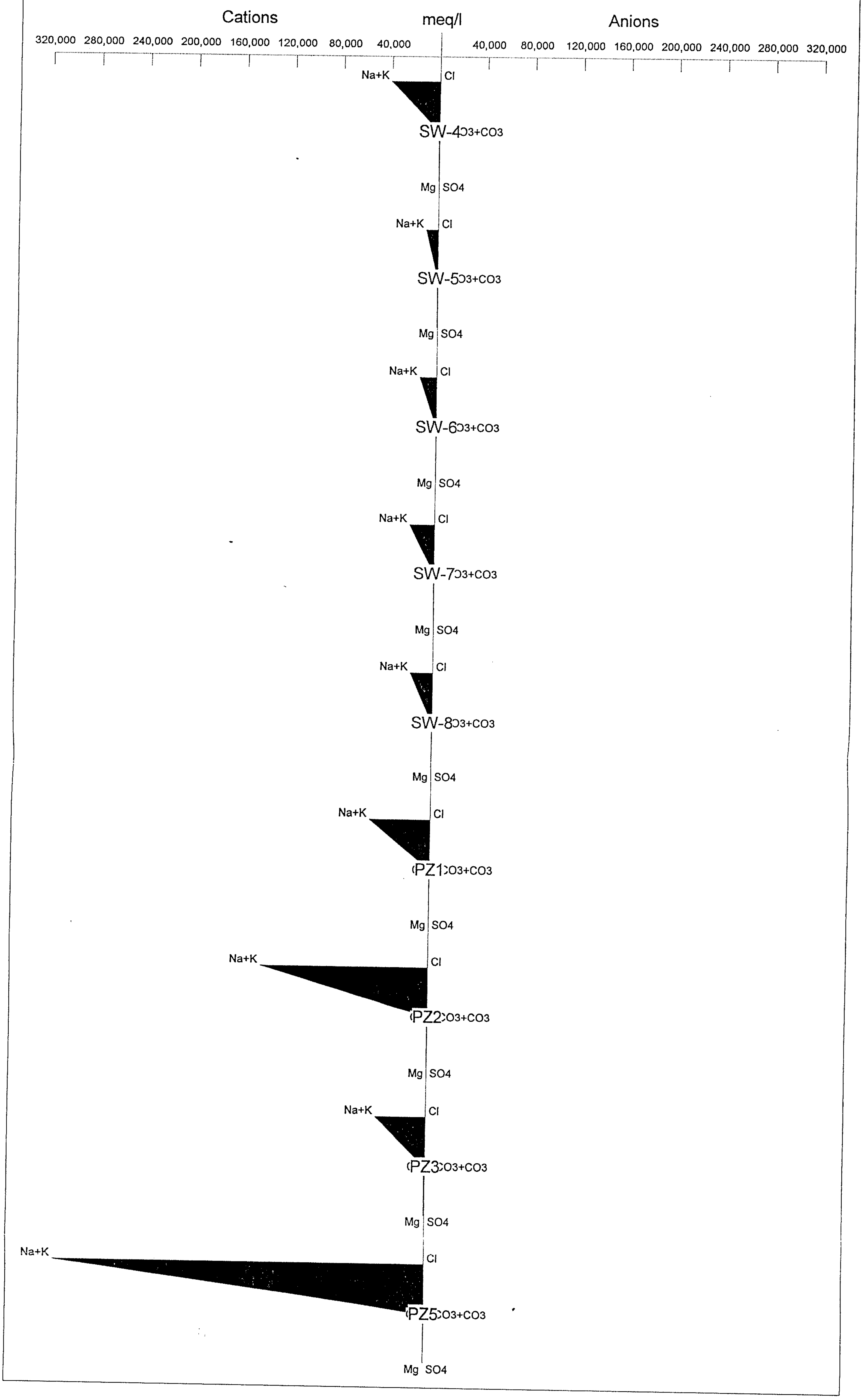
TRILINEAR DIAGRAM
SECOND QUARTER 2003
SOUTH PLANT AREA

ALCOA RMC
Longview, Washington

Project No. 059868	By: J. Triolo
Date: 10/13/03	Checked: C. Spill

MFG, Inc.
consulting scientists and engineers

SECOND QUARTER 2003
South Plant Groundwater and Surface water



TRILINEAR DIAGRAMS SECOND QUARTER 2003 SOUTH PLANT AREA ALCOA RMC Longview, Washington	
Project No. 059868.3	By: J. Triolo
Date: 10/13/03	Checked:

MFG, Inc.
consulting scientists and engineers

APPENDIX F

BORING LOGS FOR SOUTH PLANT DIRECT-PUSH AND HOLLOW STEM AUGER BORINGS

A TETRA TECH COMPANY
19203 36th Ave. W., Suite 101
Lynnwood, WA 98036-5707
(425) 921-4000
(425) 921-4040

LOG OF BORING DP-1

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 25.82 feet NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 301911.28
Sample Type	: Continuous Cores	Easting Coordinate	: 1008497.50
Date Completed	: 9/11/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 25.82 ft NAVD88
0	SAND, brown, medium sand, few grass roots, dry to slightly moist. Cap material.	AR/SP				AR = Artificial fill.	
	SAND, medium gray, medium sand, few gravel up to 1/4-inch size, dry to slightly moist. Waste.	AR/SP		1	50	Waste composite subsample collected: 0.25 to 4 feet bgs.	Medium Bentonite Chips
4	SILTY SAND to SANDY SILT, black, silt to very fine sand size material, some coarse sand size material, few gravel up to 1/4-inch size, slightly moist. Waste.	AR/SM		2	75	Waste composite subsample collected: 4 to 6 feet bgs. Refusal at approximately 6 feet bgs. Move approximately 5 feet east of DP-1 for DP-1R.	
6	Total depth of borehole = 6 feet bgs.						

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LOG OF BORING DP-1R

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 25.66 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 301915.05
Sample Type	: Continuous Cores	Easting Coordinate	: 1008501.69
Date Completed	: 9/11/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS
0	SAND, brown, medium sand, few grass roots, dry to slightly moist. Cap material.	AR/SP				AR = Artificial fill. Descriptions for 0 to 6 feet bgs obtained from DP-1 boring log.
1–4	SAND, medium gray, medium sand, few gravel up to 1/4-inch size, dry to slightly moist. Waste.	AR/SP		1	50	Waste composite subsample collected: 0.25 to 4 feet bgs from DP-1.
4–8	SILTY SAND to SANDY SILT, black, silt to very fine sand size material, some coarse sand size material, few gravel up to 1/4-inch size, slightly moist. Waste. -silt to fine sand size, black, few carbon fragments and gravel up to 1/2-inch size, carbon odor.	AR/SM		2	75	Waste composite subsample collected: 4 to 6 feet bgs from DP-1.
				3	80	Waste composite subsample collected: 6 to 8 feet bgs.
8	SAND, gray, medium sand. Waste.	AR/SP				Waste composite subsample collected: 8 to 12 feet bgs.
8.5–9.5	SILTY SAND, black to dark gray, silt to fine sand size material. Waste.	AR/SM				
9.5–10.5	SAND, gray to black, medium sand. Waste.	AR/SP		4	50	
11	Brick fragment, red to reddish-orange. Waste.	AR				
11–18.5	SILTY SAND, silt to fine sand size material, slightly moist. Waste. SILTY SAND, black, silt to medium sand size material, slightly moist to moist. -at 15 feet bgs some gravel/carbon fragments up to 1/2-inch size, saturated. -at 15.5 feet bgs silt to very fine sand size material, slightly moist. -at 16 feet bgs gravel and brick fragments up to 1-inch size, few wood pieces, saturated. SILTY SAND, black, silt to fine sand, saturated.	AR/SM		5	80	Waste composite subsample collected: 12 to 16 feet bgs.
				6	75	Waste composite subsample collected: 16 to 20 feet bgs.
18.5–20	SAND, black, fine to medium sand size material, wet to saturated.	AR/SP				
20–21.5	GRAVEL, black, angular gravel/carbon fragments up to 1/2-inch size, some fine sand and silt, saturated. Waste.	AR/GP				Waste composite subsample collected: 20 to 21.5 feet bgs.
21.5–23	SAND, dark gray to gray brown, medium to very coarse sand grades to fine to medium sand, moist to wet. Possibly native.	SP		7	100	Waste composite sample DP-1 collected at 0850.
23–24	SILT, dark gray to dark gray brown, some fine sand, few rootlets, moist to very moist. Native.	ML				Groundwater sample DP-1 collected at 0850.
24	Total depth of borehole = 24 feet bgs.					

Well:
Elev.: 25.66 ft NAVD88

Medium Bentonite Chips

15 ft bgs

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LOG OF BORING DP-2

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 12.48 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302199.37
Sample Type	: Continuous Cores	Easting Coordinate	: 1008515.62
Date Completed	: 9/11/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS
0–2.5	SAND, brown grades to gray between 1 to 2 feet bgs, medium sand, few grass roots, dry to slightly moist.	AR/SP		1	60	AR = Artificial fill.
2.5–3	SAND, dark gray to dark brown-gray, wet to saturated. Native.	SP				
3–4	SILT, dark gray to dark brownish gray, few fine sand, wet. Native.	ML				Collected soil sample DP-2 (3-4') at 0950. Groundwater sample DP-2 collected at 0950.
4–4.5	SAND, brown, medium sand, wet. Native.	SP				
4.5–8	SILT to CLAYEY SILT, gray to brown-gray, few fine to very fine sand, wet. Native.	ML		2	60	
8–8.5	SAND, brown, medium sand, few wood and rootlets. Native.	SP				
8.5–12	SILT, greenish gray to blue gray, few to minor very fine sand, few clay, somewhat crumbly, moist. Native.	ML		3		

Total depth of borehole = 12 feet bgs.

Well:
Elev.: 12.48 ft NAVD88

3.3 ft bgs

Medium Bentonite Chips

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LOG OF BORING DP-3

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 15.00 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302403.09
Sample Type	: Continuous Cores	Easting Coordinate	: 1008237.26
Date Completed	: 9/11/02		

Depth ft bgs	DESCRIPTION	USCS	Samples	Recovery (%)	REMARKS	Well: Elev.: 15.00 ft NAVD88
0	SILT, dark brown, few fine sand and rootlets, dry. Fill	AR/ML			AR = Artificial fill.	
1–4	GRAVEL, broken gravel up to 1-inch size, few to minor brown silt, few to minor fine sand, dry. Fill.	AR/GP	1	35	No recovery in soil interval, no sample collected. No groundwater sample collected, dry hole.	
4–8	Brick stuck in shoe, red to red-orange brick, some black silt and sand around brick, moist. Non-native.	AR	2	10		
8–12	SILT to CLAYEY SILT, greenish gray, some iron mottling, minor fine sand, very moist -grades to gray-brown, few very fine to fine sand, few rootlets, very moist to wet. Native.	ML	3	90		Medium Bentonite Chips
12–16		ML	4	0		
16–20	-greenish gray -brown to gray, very moist to wet, minor very fine sand	ML	5	75		
20	Total depth of borehole = 20 feet bgs.					

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LOG OF BORING DP-4

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.
Drilling Rig & Method	: Direct Push Technology
Sample Method	: 4 foot Macrocore w/liners
Sample Type	: Continuous Cores
Date Completed	: 9/11/02
Logged By	: N. Morrow
Surface Elevation	: 15.49 ft NAVD88
Northing Coordinate	: 302237.70
Easting Coordinate	: 1008126.29

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS
0	SAND, dark brown to black, 1-inch size broken gravel piece at 1.5 feet bgs. Non-native.	AR/SP				AR = Artificial fill. Collected soil sample DP-4 (0-1.25') at 1200. Collected water sample DP-4 at 1200.
1	SAND, black to brown medium sand. Non-native.					
2	SAND, brown to dark brown, medium to coarse grained, very moist to wet. Native.	SP		1	80	
4	-brown, medium sand, saturated					
6	SILT, gray to dark gray, few to some very fine sand, wet.	ML		2	75	
8	Total depth of borehole = 8 feet bgs.					

Well:
Elev.: 15.49 ft NAVD88

3.68 ft bgs

Medium Bentonite Chips

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LOG OF BORING DP-5

Alcoa Longview Site
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Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 11.76 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302453.30
Sample Type	: Continuous Cores	Easting Coordinate	: 1008035.38
Date Completed	: 9/11/02		

Depth ft bgs	DESCRIPTION	USCS	Samples	Recovery (%)	REMARKS
0	SILTY SAND to SANDY SILT, brown, very fine to fine sand, few gravel up to 1/4-inch size, dry. Fill.	AR/SM			AR = Artificial fill.
0.5–5	SANDY GRAVEL, brown, iron staining, few black waste portions, few gravel with green staining/coating, broken gravel up to 3/4-inch size, fine sand, few medium sand and silt, dry. Non-native.	AR/GP	1	75	Collected soil sample DP-5 (2.5-4') at 1425 Collected groundwater sample DP-5 at 1425
5–8	SAND, dark gray, medium sand, very moist. Native. -fine sand, few medium sand, few to some silt, minor clay, grades to sandy silt, very moist to wet	SP	2	75	
8–16	SILT, dark gray to greenish gray, few fine sand, few clay, minor rootlets, very moist to wet. (12) SANDY SILT, light gray to dark gray, moist to wet. -grades to greenish gray, some white mottling, minor very fine sand, moist	ML	3 (8–12) 4 (12–16)	50 80	
16	Total depth of borehole = 16 feet bgs.				

Well:
Elev.: 11.76 ft NAVD88

Medium Bentonite Chips

11 ft bgs

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LOG OF BORING DP-6

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 13.14 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302612.24
Sample Type	: Continuous Cores	Easting Coordinate	: 1007891.73
Date Completed	: 9/11/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 13.14 ft NAVD88
0	SAND, brown, medium grained, dry. Non-nativel. -fine to medium sand, some to few angular broken gravel up to 1/2-inch size, slightly moist	AR/SP				AR = Artificial fill. Collected soil sample DP-6 (0.5-1.5') at 1610 Collected groundwater sample DP-6 at 1610	
1.5	SAND, dark grayish brown, fine to medium sand, some iron oxide mottling, few wood pieces. Native.	SP		1	90		
4.2	SAND WITH GRAVEL, light brown, broken gravel. SAND to SILTY SAND, brown to grayish brown, some iron oxide mottling, very fine to fine sand, minor rootlets, sulfidic odor, very moist grades to wet at 6 feet bgs then grades back to moist.	SP		2	100		5 ft bgs; Medium Bentonite Chips
8	SAND WITH GRAVEL, angular gravel up to 1/2-inch size, fine to very fine sand, few medium sand, some silt, few clay, saturated.	SP					
9.5	SILT, brownish gray to greenish gray, some very fine sand, minor clay, few to some rootlets and woody plant matter, wet.	ML		3	100		
12	Total depth of borehole = 12 feet bgs.						

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LOG OF BORING DP-7

Alcoa Aluminum
Former Reynolds Aluminum Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 12.65 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302923.03
Sample Type	: Continuous Cores	Easting Coordinate	: 1007975.93
Date Completed	: 9/11/02		

Well:
Elev.: 12.65 ft NAVD88

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well
0	SAND, brown, fine to medium, some rootlets.	AR/SP				AR = Artificial fill.	
1	SANDY GRAVEL, brown, broken gravel up to 1/2-inch size, fine sand, some to few medium sand, few to some silt, few small rootlets, dry to slightly moist. Non-native.	AR/GP				Collected soil sample DP-7 (0.25-1.25') at 1705	
2	SAND, brownish gray to gray, medium sand, some to few fine sand, few subrounded gravel up to 1-inch size, moist. Native.	SP		1	75	Collected groundwater sample DP-7 at 1705	
3							3.2 ft bgs
4	-dark gray, medium to coarse grained sand, minor gravel, wet to saturated						
6				2	75		Medium Bentonite Chips
8	-grades to fine to medium sand, few silt, minor to few clay, saturated						
10	SILT, dark gray, some very fine to fine sand, moist.	ML		3	100		
11	-dark brown, few fine sand, few rootlets, sulfidic odor						
12	Total depth of borehole = 12 feet bgs						
13							

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LOG OF BORING DP-8

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 13.70 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302743.34
Sample Type	: Continuous Cores	Easting Coordinate	: 1008048.45
Date Completed	: 9/11/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 13.70 ft NAVD88
0	SAND, light gray grades to dark gray, fine sand, some silt, few gravel up to 1-inch size, few very small red to red-orange brick fragments, dry.					AR = Artificial fill.	
1		AR/SP					
2				1	60	Collected soil sample DP-8 (0-2.75') at 1750 Collected groundwater sample DP-8 at 1750	
	-at 2.75 ft bgs white						
3	SANDY SILT, yellowish brown, some iron oxide mottling, very fine to fine sand, dry to slightly moist. Non-native. -3 feet to 4 feet bgs wet, fine sand, few to some clay	AR/ML					
4	SILT, greenish gray, few brown to black mottling, some very fine sand, some clay, sulfidic odor, wet to saturated.						
5							
6				2	50		6 ft bgs Medium Bentonite Chips
7							
8	-some to few fine sand, iron oxide and black mottling, minor rootlets, wet to saturated	ML					
9							
10				3	90		
	-moist						
11							
12	Total depth of borehole = 12 feet bgs						
13							

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LOG OF BORING DP-9

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 13.51 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302809.29
Sample Type	: Continuous Cores	Easting Coordinate	: 1008112.62
Date Completed	: 9/12/02		

Well:
Elev.: 13.51 ft NAVD88

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS
0	SAND, black to dark gray, fine grained, some cemented-like fragments of waste with iron oxide staining, dry. Non-native.	AR/SP				AR = Artificial fill.
1	SAND, light brown, fine grained, few silt, slightly moist grades to moist. Native.					
2	-grades to fine to medium sand, light brown to light gray brown, moist			1	75	Collected soil sample DP-9 (0-1') at 0735 Collected groundwater sample DP-9 at 0735
4	-dark gray, fine to medium sand, grades to medium sand with few to some fine sand, sulfidic odor, saturated	SP				
6				2	75	
7	SILT, dark gray, some fine sand, some clay, very moist to wet.	ML				
8	CLAYEY SILT to SILTY CLAY, dark gray to dark greenish gray, very moist to wet grades to moist to very moist.					
10		ML/CL		3	100	
12	Total depth of borehole = 12 feet bgs					

Well: 4 ft bgs
Medium Bentonite Chips

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LOG OF BORING DP-10

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 11.98 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302659.01
Sample Type	: Continuous Cores	Easting Coordinate	: 1008346.66
Date Completed	: 9/12/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS
0	SAND, light brown, fine to very coarse sand, few gravel up to 1/4-inch size, dry.	AR/SW				AR = Artificial fill.
1.5	White, very fine grained, sticky, wet. Non-native.	AR		1	40	Collected soil sample DP-10 (1.5-3.8') at 0842
4	Black, very fine grained, sticky, wet. Non-native. -some very fine to fine sand, wet to saturated.	AR				Collected soil sample DP-10 (4-6') at 0840 Collected groundwater sample DP-10 at 0840
6	SILTY CLAY, brownish gray to brown, few very fine to fine sand, very moist to wet. Native.	CL		2	75	
8	-brownish gray to grayish green, few rootlets	CL		3	85	
12	Total depth of borehole = 12 feet bgs					

Well:
Elev.: 11.98 ft NAVD88

4.7 ft bgs

Medium Bentonite Chips

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LOG OF BORING DP-11

Alcoa Longview Site
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Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 12.22 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302820.10
Sample Type	: Continuous Cores	Easting Coordinate	: 1008516.44
Date Completed	: 9/12/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 12.22 ft NAVD88
0	SILTY SAND, brown, fine to medium sand, few rootlets.	AR/SP				AR = Artificial fill.	
1	SAND, black, fine grained. Non-native.	AR/SP				Collected soil sample DP-11 (0.75-1.50') at 1227	
2	SILTY SAND, yellowish brown, iron oxide staining throughout, few black sand size waste fragments. Fill / Waste.	AR/SP		1		No groundwater sample collected, not enough recovery.	
4	SILTY SANDY GRAVEL, brown to yellowish brown, angular gravel up to 1/2-inch size, fine to medium sand, few clay. Non-native.	AR/GP					4 ft bgs
5	CLAYEY SILT TO SILTY CLAY, dark gray, few to some very fine to fine sand, saturated. Native.	ML/CL					
5.5	SILT, greenish gray to gray, some brown mottling, some to few very fine to fine sand, wet to saturated.	ML		2	75		Medium Bentonite Chips
8	-moist						
9.5	SAND, gray to dark gray, very fine to fine sand, saturated grades to wet.	SP		3	90		
12	Total depth of borehole = 12 feet bgs						

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LOG OF BORING DP-12

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 14.69 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302747.22
Sample Type	: Continuous Cores	Easting Coordinate	: 1008303.71
Date Completed	: 9/24/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 14.69 ft NAVD88
0	SAND, light brown, very fine to fine sand, some subrounded gravel up to 1-inch size, dry.	AR/SP				AR = Artificial fill.	
1	GRAVEL, dark brown to dark gray, broken gravel up to 1-inch size, some fine sand, dry. Non-native.	AR/GP				Collected soil sample DP-12 (3-4') at 0730.	
	CLAYEY GRAVEL, dark brown to dark gray, gravel up to 1/4-inch size, moist. Non-native.	AR/GC				Groundwater sample DP-12 collected at 0740.	
2	SANDY SILT, yellowish brown, some very fine to fine sand, moist. At 2 feet bgs grades to yellowish brown sandy silt and black mixture. Non-native	AR/ML		1	75		
		AR/ML					
3	SANDY SILT, black, very fine to fine sand size, crumbly, moist. Non-native						
	Grades to saturated clay size black non-native at approximately 3 feet bgs. Non-native.	AR/CL					
5	-as above						
6	SILT to CLAYEY SILT, greenish gray, few iron oxide and light brown mottling, few rootlets, saturated. Native.			2	75		Medium Bentonite Chips
7							6.8 ft bgs
8	-saturated, grades to very moist with increase in iron oxide mottling						
9		ML					
10				3	100		
12	Total depth of borehole = 12 feet bgs						

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LOG OF BORING DP-13

Alcoa Longview Site
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MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 12.30 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 303034.70
Sample Type	: Continuous Cores	Easting Coordinate	: 1008362.01
Date Completed	: 9/24/02		

Well: Elev.: 12.30 ft NAVD88

Depth ft bgs	DESCRIPTION	USCS	Samples	Recovery (%)	REMARKS	Well
0–1.5	SANDY GRAVEL to SAND with GRAVEL, light brown subangular gravel up to 1/2-inch size, roots in top 0.25-feet, dry. Non-native.	AR/GP	1	75	AR = Artificial fill. Collected soil sample DP-13 (1.5-2') at 0850. Groundwater sample DP-13 collected at 0855.	Medium Bentonite Chips
1.5–2	SILTY SAND to SANDY SILT, black, few 1/4-inch size gravel, slight carbon odor, moist. Non-native.	AR/SM				
2–3.5	SILTY GRAVEL, yellowish brown, same sand, moist grades to dry with increase in broken gravel up to 1-inch size. Non-native.	AR/GM				
3.5–6	SAND, medium gray to dark gray, fine to medium sand, few silt, one piece of wood-woody plant material, rootlets, moist to very moist. Native.	SP	2	50		5 ft bgs
6–8	SILTY SAND, medium gray to dark gray, fine to medium sand, some rootlets, very moist.	SM				
8–10	SAND, as above, saturated.	SP	3	80		
10–10.8	SILTY SAND, dark gray, few laminations of medium gray, very fine to fine sand, grades from saturated to very moist.	SM				
	SAND, medium to dark gray, fine to medium sand, few to some silt, very moist.	SP				
	PEAT, organic rich layer of wood/woody plant matter, very moist.	PT				
	SILTY SAND, medium gray to dark gray, fine to medium sand, very moist.	SM				
	SILT, dark brown to dark brownish gray, few rootlets, very moist.	ML				
12	Total depth of borehole = 12 feet bgs					

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LOG OF BORING DP-14

Alcoa Longview Site
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Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 12.72 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302905.31
Sample Type	: Continuous Cores	Easting Coordinate	: 1008317.62
Date Completed	: 9/24/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 12.72 ft NAVD88
0–2	SAND, light brown, fine to coarse sand, minor gravel up to 1/4-inch size, slightly moist. Non-native.	AR/SW		1	50	AR = Artificial fill. Collected soil sample DP-14 (2-4') at 0930. No groundwater sample collected, not producing enough water for collection of sample or field parameter monitoring.	Medium Bentonite Chips
2–4	SAND to SILTY SAND, black, few light gray laminations scattered throughout core, very fine to fine sand and silt size waste, slightly moist to moist. Non-native. -SANDY SILT TO SILTY SAND, very fine sand, laminations as above.	AR/SP					
4–4.25	SILT, medium gray to brownish gray, few very fine to fine sand. Native.	ML		2	40		
4.25–7.25	SAND, dark gray, medium sand, wet to saturated.	SP					
7.25–7.5	SILT, as above at 3.75 to 4.25 feet bgs.	ML					
7.5–7.75	SAND, as above at 4.25 to 7.25 feet bgs.	SP					
7.75–12	SILT, as above, few very fine sand. -at 8 feet bgs, SILT, greenish gray to brownish gray, some clay, few very fine sand, minor rootlets, very moist to wet. -light brown to brown, very moist to wet, grades to moist with iron mottling and minor rootlets	ML		3	90		

Total depth of borehole = 12 feet bgs.

LOG OF BORING DP-15

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Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 11.03 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 303169.56
Sample Type	: Continuous Cores	Easting Coordinate	: 1008524.31
Date Completed	: 9/24/02		

Depth ft bgs	DESCRIPTION	USCS	Samples	Recovery (%)	REMARKS
0–4.5	SAND, light brown, medium sand, few coarse sand, minor fine sand and subrounded gravel up to 1/4-inch size, roots in top 0.25 feet, moist. -grades to medium to coarse sand, wet. (at 4)	AR/SP	1	50	AR = Artificial fill. No soil sample collected. No non-native material found. No groundwater sample collected, not producing enough water for sample collection or field parameter monitoring.
4.5–6.5	SAND, dark gray, very fine to fine sand, minor medium sand, few silt, odor, wet. Native. -very fine, some to few fine and medium sand, ordor, wet to saturated. (at 6)	SP	2	75	
6.5–7	SANDY SILT to SILTY SAND, very fine sand, dense, somewhat crumbly, moist.	SP/SM			
7–7.75	SAND, dark gray, medium sand, some to few fine sand, very moist to moist.	SP			
7.75–8.25	SILTY SAND, dark gray, fine to medium sand, some plant matter, very moist to moist.	SM			
8.25–12	SILT to SANDY SILT, light brown to reddish brown, some clay, few roots, increases to some roots and wood at 10 to 12 feet bgs, one 1-inch size subrounded gravel at 8.25 feet bgs, very moist.	ML/SM	3	25	

Total depth of borehole = 12 feet bgs

Well:
Elev.: 11.03 ft NAVD88

Medium Bentonite Chips (0–12 ft)

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LOG OF BORING DP-16

(Page 1 of 1)

Alcoa Longview Site
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Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 9.21 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 303150.41
Sample Type	: Continuous Cores	Easting Coordinate	: 1008738.70
Date Completed	: 9/24/02		

Depth ft bgs	DESCRIPTION	USCS	Samples	Recovery (%)	REMARKS
0	SANDY SILT, brown, dry, some to few rootlets, few gravel up to 1/4-inch size, dry. Fill. SANDY SILT to SILTY SAND, dark gray to dark brown, few broken gravel up to 1/2-inch size with green coating, dry. Fill.	AR/SM			AR = Artificial fill. No soil sample collected.
1.25	SILTY GRAVEL, yellowish brown to dark brown, some iron oxide staining, broken gravel up to 1-inch size, some to few fine sand, dry to slightly moist. Fill. -dark brown to dark gray mixed with yellowish brown, dark material is fine to medium sand, minor subrounded gravel up to 1-inch size. Fill.	AR/GM	1	50	No groundwater sample collected, not producing enough water for sample collection or field parameter monitoring.
4	SAND, greenish gray, fine to medium sand, few subrounded to rounded gravel up to 1/4-inch size, very moist to wet. Native.	SP			
4.25	SANDY SILT, medium gray to brownish gray, very fine sand, few to some clay, minor rootlets, moist. -grades to gray to dark reddish brown, some rootlets, peat-like. -SILTY SAND as above	ML	2	50	gradational change from silt to clay at approximately 10 feet bgs
10	SILTY CLAY, light brown grades to gray, few to minor very fine sand, very moist to wet.	CL	3	50	
12	Total depth of borehole = 12 feet bgs				

Well:
Elev.: 9.21 ft NAVD88

Medium Bentonite Chips

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LOG OF BORING DP-17

Alcoa Longview Site
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Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 7.69 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 303648.93
Sample Type	: Continuous Cores	Easting Coordinate	: 1009300.37
Date Completed	: 9/24/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 7.69 ft NAVD88
0–4.5	SILTY SANDY GRAVEL, light brown grades to yellowish brown and back to light brown, subangular gravel and broken gravel up to 1-inch size, dry. Fill	AR/GM		1	50	AR = Artificial fill. No waste sample collected. No groundwater sample collected, not producing enough water for sample collection or field parameter monitoring.	Medium Bentonite Chips
4.5–5.2	SAND, greenish gray, fine to medium sand, few silt, few to some subrounded gravel up to 1/4-inch size. Native.	SP		2	50		
5.2–7.5	SILT, dark reddish brown, few to some very fine sand, few to some clay, some rootlets, moist.	ML					
7.5–8	PEAT, dark reddish brown, roots and plant matter, very moist to wet.	PT					
8–12	SILTY CLAY, light gray, few to minor very fine sand, sticky, wet to very moist.	CL		3	10		

Total depth of borehole = 12 feet bgs

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LOG OF BORING DP-18

Alcoa Longview Site
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Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Logged By	: N. Morrow
Drilling Rig & Method	: Direct Push Technology	Surface Elevation	: 11.29 ft NAVD88
Sample Method	: 4 foot Macrocore w/liners	Northing Coordinate	: 302994.31
Sample Type	: Continuous Cores	Easting Coordinate	: 1008658.51
Date Completed	: 9/24/02		

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS	Well: Elev.: 11.29 ft NAVD88
0	SANDY GRAVEL, yellowish brown to black, some iron oxide staining, waste material is somewhat cemented fine sand, few rootlets. Non-native.	AR/GP		1	30	AR = Artificial fill. Collected soil sample DP-18 (0-4') at 1215. No groundwater sample collected, not producing enough water for sample collection or field parameter monitoring.	Medium Bentonite Chips
4.3	SILTY CLAY TO CLAY, medium gray to dark gray with black and yellowish brown waste, waste is very fine sand to silt size, moist to very moist. Non-native / native mixture.	AR/CL		2	30		
5.3	CLAY to SILTY CLAY, medium to dark gray, moist to very moist. Native.	CL					
7	-gray to greenish gray, some iron mottling, minor rootlets						
8	SILTY CLAY to CLAYEY SILT, medium gray, minor iron oxide mottling, few very fine sand grades to some to few very fine sand, very moist to wet.	CL/ML		3	30		
12	Total depth of borehole = 12 feet bgs						

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LOG OF BORING DP-19

(Page 1 of 1)

Alcoa Longview Site
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Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.
Drilling Rig & Method	: Direct Push Technology
Sample Method	: 4 foot Macrocore w/liners
Sample Type	: Continuous Cores
Date Completed	: 9/24/02
Logged By	: N. Morrow
Surface Elevation	: 12.02 ft NAVD88
Northing Coordinate	: 302892.07
Easting Coordinate	: 1008574.97

Well:
Elev.: 12.02 ft NAVD88

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS
0–2	SAND to SILTY SAND, gray black, and yellowish brown, silt to sand size non-native material, few rootlets, crumbly, dry. SILTY SAND to SANDY SILT, light brown, yellowish brown mottling, some small white flecks, dry. Non-native.	AR/SP		1	50	AR = Artificial fill. Collected soil sample DP-19 (1-1.5') at 1240 and DP-19 (2.5-4') at 1240. No groundwater sample collected, not producing enough water for sample collection or field parameter monitoring.
2–4.5	SAND, dark gray to black, few areas of yellowish brown and white, few iron mottling, very fine to fine sand size waste, dry. Non-native.	AR/SP				
4.5–6.5	SANDY SILT, black, very fine sand size waste, minor angular gravel up to 3/4-inch size, dry to slightly moist. Non-native.	SM		2	40	
6.5–6.75	GRAVEL, yellowish brown, some to few silt and fine sand, dry to slightly moist. Fill.	GP				
6.75–8	SAND, medium gray to dark gray, fine sand, moist. Native.	SP				
8–10	SANDY SILT, medium gray, very fine sand, very moist to wet. Native.	SM		3	40	
10–12	SAND, medium gray, fine sand, wet to saturated. -very fine to fine sand, wet grades to very moist	SP				

Total depth of borehole = 12 feet bgs

Well: Medium Bentonite Chips (0–12 ft)

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LOG OF BORING DP-20

Alcoa Longview Site
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Longview, Washington

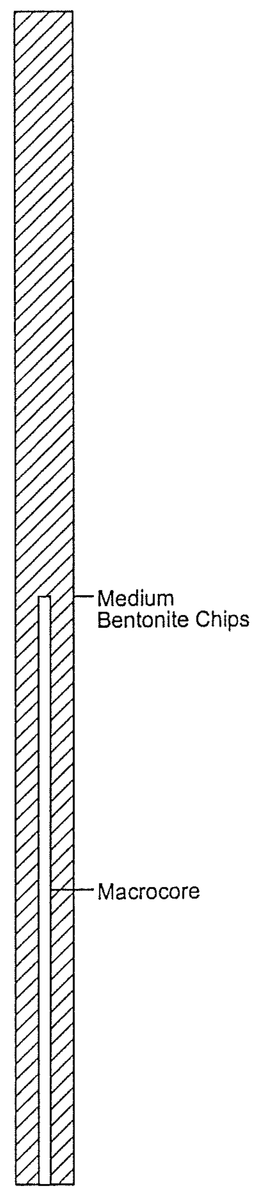
MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.
Drilling Rig & Method	: Direct Push Technology
Sample Method	: 4 foot Macrocore w/liners
Sample Type	: Continuous Cores
Date Completed	: 9/24/02
Logged By	: N. Morrow
Surface Elevation	: Not Surveyed
Northing Coordinate	: Not Surveyed
Easting Coordinate	: Not Surveyed

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Recovery (%)	REMARKS
0	SANDY GRAVEL, brown, broken gravel up to 1-inch size, unbroken gravel up to 1/4-inch size, fine sand, few medium sand, few to some silt, dry. Fill.	AR/GM				AR = Artificial fill.
1						No soil sample collected, no non-native material encountered.
	SAND, fine to medium, few to minor silt, dry. Fill.	AR/SP		1	75	No groundwater sample collected, no groundwater encountered.
2–3	GRAVEL, light gray, broken gravel up to 1-inch size, few fine sand, few to some rock flour, dry. Fill.	AR/GP				
3	SAND, brown, fine to medium snad, few angular broken gravel up to 1/4-inch size, few silt, dry. Fill.	AR/SP				
4–8	No recovery.			2	0	Macrocore locked up in subsurface. Abandoned Macrocore and borehole.

Total depth of borehole = 8 feet bgs

Well:
Elev.:



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LOG OF BORING B-21

Alcoa Aluminum
Former Reynolds Aluminum Facility
Longview, Washington

MFG Project# 059741

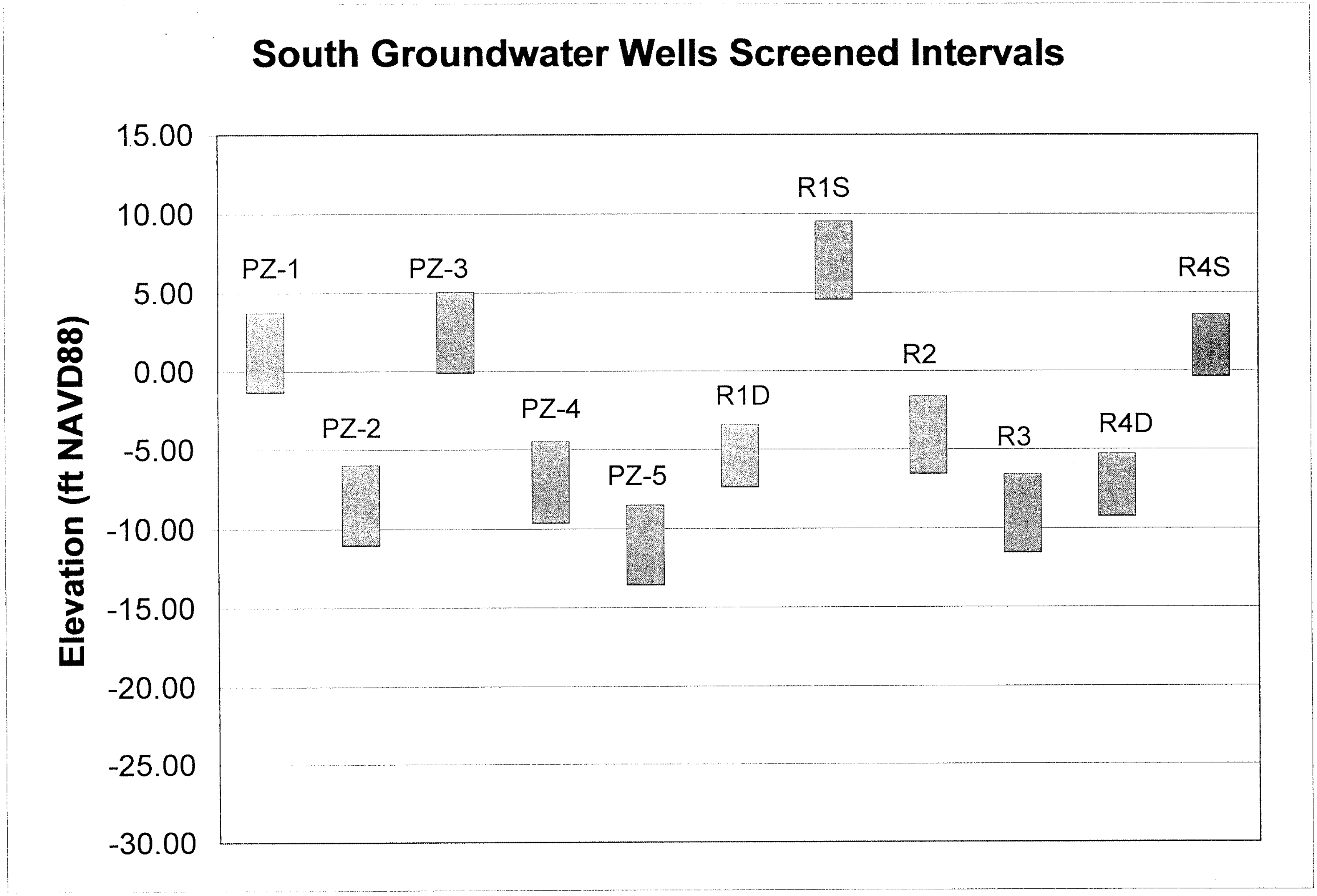
Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/26/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Surface Elevation	: 12.23 NAVD
Sample Method	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 302864.28
Sample Type	: Continuous	Easting Coordinate	: 1008398.55

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Recovery (%)	REMARKS
0	SAND, light brown, medium to very coarse grained. Cap material.	AR		1	7		Located in south plant area between PZ-1 and PZ-4 and DP-11 and DP-13.
1					9		
	-fine to very coarse sand, wet to saturated				11		
2				2	4		
	SAND to SILTY SAND, black, wet to saturated. Waste.	AR			3		Soil sample: B-21(2.5'-4.5')
3	-as above				7		
				3	4		
4					4		
	-fine sand size black waste, very moist				4		
5	SILT, light gray to light brown, moist. Fill.			4	1		
					1		
6	SILT to SANDY SILT, black, approximately 10% angular black shiny fragments, very moist to wet. -wet				4		
				5	1		
7	SILT to CLAYEY SILT, olive gray, iron oxide mottling, moist to very moist. Native.	ML			4		
					5		
8	Total depth of borehole = 7.5 feet bgs.						

Well:
Elev.: 12.23 ft NAVD88

3/8" Bentonite Chips

APPENDIX G
BORING LOGS AND SCREENED INTERVALS FOR SOUTH PLANT WELLS AND PIEZOMETERS


South Groundwater Wells Screened Intervals
Elevation (ft NAVD88)
15.00
10.00
5.00
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
-30.00
PZ-1
PZ-2
PZ-3
PZ-4
PZ-5
R1D
R1S
R2
R3
R4D
R4S

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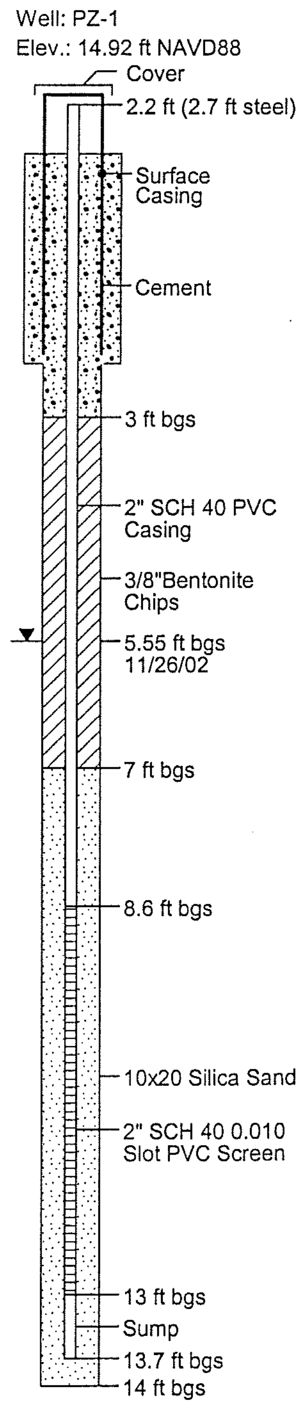
LOG OF BORING PZ-1

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/25/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Top of Casing Elev.	: 14.92 ft NAVD88
Sample Method	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 302744.72
Sample Type	: 2.5 foot interval	Easting Coordinate	: 1008299.05

Depth ft bgs	DESCRIPTION	USCS	Samples	Blow Count	Recovery (%)	REMARKS
0	SILTY SAND, dark brown, moist. Fill.	AR				Well stickups were measured from top of casing to top of concrete. Located in south plant area adjacent to DP-12, PZ-2, and surface water ditch.
1.2	SAND, black, fine sand size material, very moist to wet. Waste. -yellowish orange with iron oxide mottling, few to minor gravel up to 1/8-inch size, slightly moist to moist. -silt size waste	AR	1	10, 5, 5	50	
3.5	SANDY SILT, light brown to light gray, few to minor iron oxide mottling, very fine to fine sand, moist. Native.	ML				
4.5	CLAYEY SILT to SILTY CLAY, gray to greenish gray, minor sand, sulfidic odor, moist to very moist.		2	2, 2, 1	100	
7	SANDY SILT to SANDY CLAY, olive gray, wet. CLAYEY SILT TO SILT CLAYEY, olive gray, iron oxide mottling, few to minor fine to coarse sand, minor rootlets, slightly moist to moist.	ML-CL	3	4, 3, 3	100	
9.5	SILT, greenish gray to gray, iron oxide mottling, few clay, moist, minor saturated intervals with fine to very coarse sand up to 0.25 and 0.5 feet thick.	ML	4	4, 8, 8	100	
12.5	-greenish gray, iron oxide mottling -SANDY SILT, saturated, fine sand, few medium to very coarse sand, few to minor clay		5	4, 7, 9	100	
13.5	SANDY CLAY to CLAYEY SAND, wet to saturated.	CL				
13.8	SILT, greenish gray, iron oxide mottling, moist.	ML				
14	Total depth of borehole = 14 feet bgs.					



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LOG OF BORING PZ-2

Alcoa Longview Site
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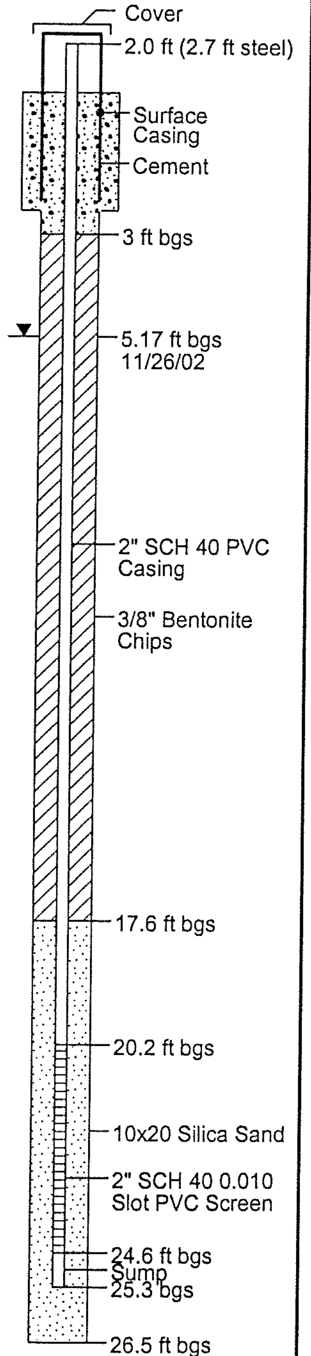
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/25/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Top of Casing Elev.	: 16.72 ft NAVD88
Sample Method.	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 302751.01
Sample Type	: 2.5 foot interval	Easting Coordinate	: 1008300.80

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Recovery (%)	REMARKS
0–1	SAND, dark brown, medium grained, minor gravel up to 3-inch size, moist.	AR					Well stickups were measured from top of casing to top of concrete.
1–5	SILT grades to SILTY SAND, black, very fine to fine sand size material, very moist to wet grades to moist to very moist. Waste.	AR		1	4 5 3	100	Located in south plant area adjacent to DP-12 and PZ-1.
5–8.5	CLAYEY SILT to SILTY CLAY, gray, few to some iron oxide mottling, very moist to wet. Native.	ML		2	1 1 1	100	
8.5–10	SILTY SAND to CLAYEY SAND, dark gray, fine to very coarse sand, saturated.	SM		3	5 4 3	15	
10–12.5	CLAYEY SILT to SILTY CLAY, gray, iron oxide mottling, very moist to wet grades to moist to very moist with no iron oxide mottling.	ML-CL		4	2 5 4	100	
12.5–13.5	SAND, gray to greenish gray, wet to saturated.	SP					
13.5–17	SILT to SANDY SILT, light brownish gray, few to ne grai, modera mottling, minor very fine to fine sand, very moist. -light brownish gray, wet to saturated	ML		5 6	5 10 14 5 10 17	100 5	
17–26.5	SAND, gray, very fine to fine grained, moderately dense, wet to saturated. -fine to medium sand -as above -very fine to fine sand, gradual increase to SILTY SAND.	SP		7 8 9 10	27 50/ 5.5" 11 28 32 7 15 9 4 4 2	30 20 10 20	

Total depth of borehole = 26.5 feet bgs



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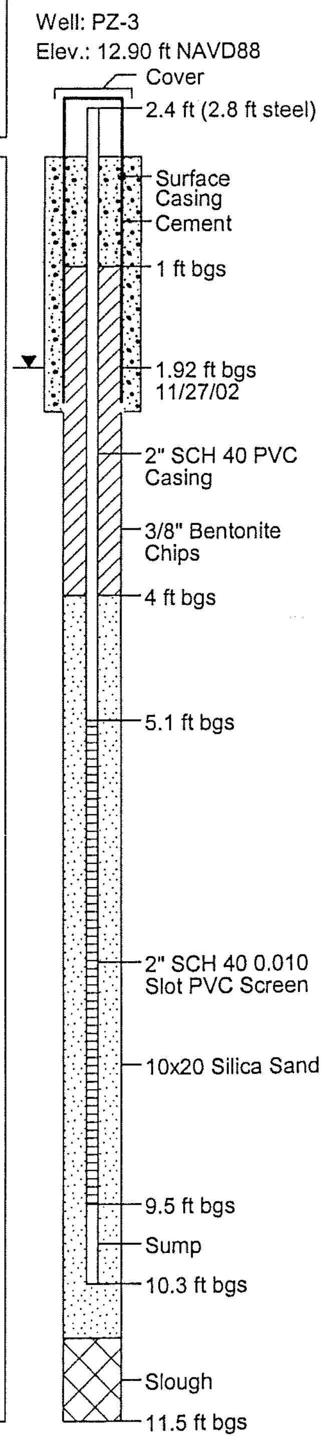
LOG OF BORING PZ-3

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/26/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Top of Casing Elev.	: 12.90 ft NAVD88
Sample Method	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 302972.98
Sample Type	: 2.5 foot interval	Easting Coordinate	: 1008251.97

Depth ft bgs	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Recovery (%)	REMARKS
0	SAND, brown, few gravel 3/4-inch size, fine to medium grained, some to few silt, wet. Fill. SAND, brown, fine to medium grained, minor silt. Fill.	AR		1	20, 14, 14	40	Well stickups were measured from top of casing to top of concrete.
1	SILT to SANDY SILT, black, dry to slightly moist. Waste.	AR					Located in south plant area on south side of cryolite storage building, adjacent to road.
2	SAND, gray, medium grained, some to few fine to coarse sand, wet. Native.	SP		2	10, 9, 7	50	Soil Sample: PZ-3(2.5'-4")
5	-saturated			3	4, 5, 6	75	
7	-slight increase in coarseness, sulfidic odor, 0.25-foot silt layer at approximately 8 feet bgs.			4	2, 3, 3	100	
9	SILT to CLAYEY SILT, olive gray, minor very fine to fine sand, very moist to wet, grades to wet.	ML		5	1, 1, 2	75	
11.5	Total depth of borehole = 11.5 feet bgs						



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LOG OF BORING PZ-4

Alcoa Longview Site
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Longview, Washington

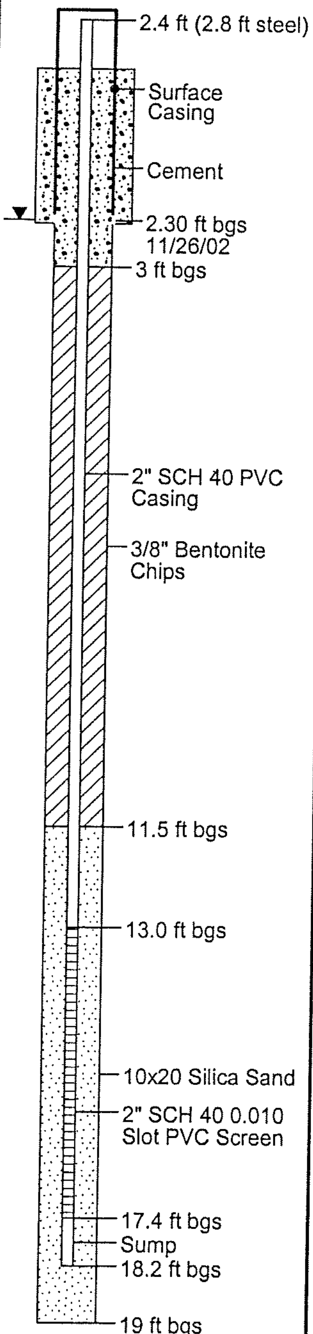
MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/25/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Top of Casing Elev.	: 11.27 ft NAVD88
Sample Method	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 303050.14
Sample Type	: Continuous	Easting Coordinate	: 1008584.21

Depth ft bgs	DESCRIPTION	USCS	Samples	Blow Count	Recovery (%)	REMARKS
0–0.8	SAND, brown, fine to coarse grained, roots, very moist to wet. Cap material.	AR	1	2, 4, 6	50	Well casings measured from top of casing to top of concrete.
0.8–6.3	SAND to SILTY SAND, black, fine sand and silt size material, few to some rootlets, very moist. Waste. -gray, fine to very coarse sand and silt size waste, very moist to wet -as above (3) -wet (4) -as above (6)	AR	2	6, 10, 10	50	Located in south plant area on south side of cryolite storage building, adjacent to road.
			3	1, 2, 3	80	
			4	1, 1/12"	75	Soil Sample: PZ-4(3'-6')
6.3–11.8	SILT, light brown, iron oxide mottling, moist. -greenish gray, iron oxide mottling, slightly moist to moist (7.5) -wet (9) -slightly moist (9.5) -wet to very moist (10.5) -slightly moist (11)	ML	5	6, 5, 5	100	
			6	2, 7, 12	100	
			7	10, 10, 8	100	
			8	4, 4, 11	100	
12–19	SAND, to SILTY SAND, greenish gray, fine grained, very moist to wet. -moist (12.5) -SAND, greenish gray, fine grained, wet to saturated (13.5) -as above (15) -wet (16.5)	SP-SM	9	---		Soil Sample: PZ-4(12'-13.5')
			10	---	10	
			11	2, 4, 9	10	
			12	6, 9, 13		

Total depth of borehole = 19 feet bgs

Well: PZ-4
Elev.: 11.27 ft NAVD88



A TETRA TECH COMPANY

19203 36th Ave. W., Suite 101
Lynnwood, WA 98036-5707
(425) 921-4000
(425) 921-4040

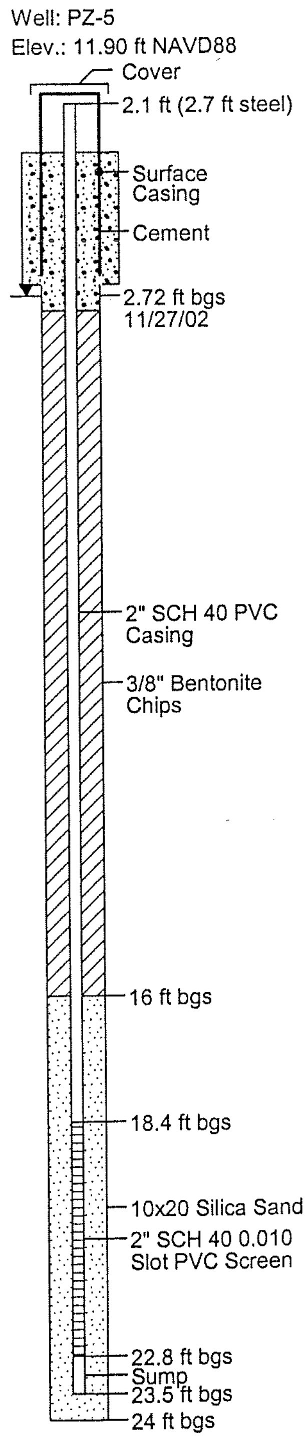
LOG OF BORING PZ-5

Alcoa Longview Site
Former Reynolds Metals Facility
Longview, Washington

MFG Project# 059741

Drilling Agency	: Cascade Drilling, Inc.	Date Completed	: 11/26/02
Drill Rig	: CME 85 Track Rig	Logged By	: N. Morrow
Drilling Method	: Hollow Stem Auger/9" O.D.	Top of Casing Elev.	: 11.90 ft NAVD88
Sample Method	: 1.5"x1.5' Split Spoon	Northing Coordinate	: 302595.68
Sample Type	: 2.5 foot interval	Easting Coordinate	: 1007993.58

Depth ft bgs	DESCRIPTION	USCS	Samples	Blow Count	Recovery (%)	REMARKS
0	SAND, brown, medium grained, wet. Cap material.	AR				Well casings measured from top of casing to top of concrete. Located in south plant area near surface water gaging station G1; south side of ditch/pond.
1	SILTY SAND, gray-brown, very fine to medium sand, few coarse sand, few gravel up to 3/4-inch size, minor rootlets, wet. Fill.	AR	1	3 14 16	60	
3	SILTY SAND to SANDY SILT, yellowish brown, slightly moist to moist. Fill.	AR				
4.5	SILTY SAND to SANDY SILT, gray, very fine to fine sand, minor rootlets, crumbly, ammonia-like odor, moist.	SP-SM	2	6 6 7	100	
7.5	-few small fractures with brown silt, ammonia-like odor		3	5 7 13	100	
10	-gray to olive gray, ammonia-like odor		4	17 27 27	100	
12.5	SAND, gray to olive gray, sulfidic to ammonia-like odor, saturated. SAND, light gray to black, very fine to fine sand, few medium sand, wet to saturated.		5	1 3 5	80	
14.5	SILT, sulfidic to ammonia-like odor, moist to very moist.	SM-ML	6	6 8 9	80	
16	SAND, dark gray with black laminations, wet to saturated.	SP				
17.5	-gray, very fine to fine grained, saturated.		7	11 15 14	75	
20	-fine to medium grained, few to minor silt		8	5 11 18	10	
21.5	-as above, ammonia-like odor		9	4 5 16	10	
24	Total depth of borehole = 24 feet bgs					

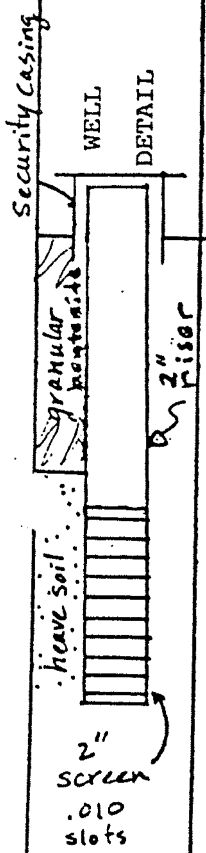


Sweet, Edwards & Associates, Inc.

BORING LOG R-1S

Project: REYNOLDS LONGVIEW
Client: REYNOLDS
Feature: POTLINER STORAGE PILE
Location: WEST OF POTLINER PILE; TOE OF DIKE see map
Depth to Water: see log.., well R-1D
Date: October 4, 1982

Sheet 2 of 2
Drilled By: CEW
Logged By: JEE
Date Logged: 10/4/82
Surf Elev.:
Total Depth: 12 feet

WELL DETAIL	UNIFIED CLASS	DEPTH (ft)	ELEVATION (ft)	SAMPLE RECORD: Sample No	Blows per 6 inches	Recovery w/n 0.1 ft	Sample Type	DESCRIPTION
		5, 10, 15, 20						Elevation Top PVC = 14.87 feet SEE LOG, WELL R-1D

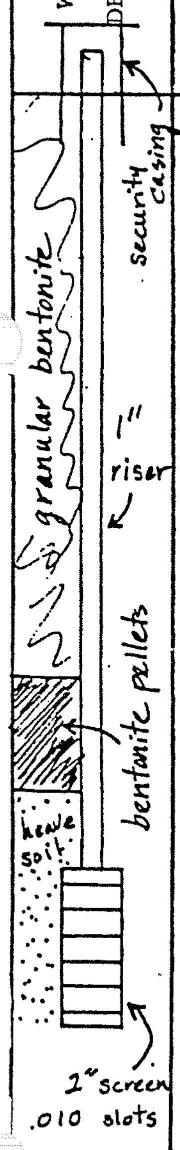
REMARKS:

Sweet, Edwards & Associates, Inc.

BORING LOG R-1D

Project	REYNOLDS LONGVIEW	Sheet	1 of 2
Client	Reynolds	Drilled By	CEW
Feature	POTLINER STORAGE PILE	Logged By	JEE
Location	WEST OF POTLINER PILE: Toe of Dike, see map	Date Logged	10/4/82
Depth to Water	5.5 feet	Surf Elev.	
Date	October 4, 1982	Total Depth	26 feet

WELL DETAIL



Elevation Top PVC = 15.38 feet.

DEPTH (ft)	UNIFIED CLASS	ELEVATION (ft)	Sample No	Blows per 6 inches	Recovery w/n 0.1 ft	Sample Type	DESCRIPTION
4.5'-6.0'			1		100	SS Push	Spoils, sand, medium to coarse grained, clean, scattered fine gravel (SP) dry.
9.5'-11-0'			2		100	SS Push	Silty, v. fine sand to fine sandy-silt (SM-ML), dark gray, saturated, roots & organics, rotten smell, water sample #1 (D-T-W. 5.4 pumped 2 gallons prior to taking sample).
14.5'-16'			3		100	SS Push	Same as above w/less sand (ML) saturated, roots, rotten odor, water sample #2 (D-T-W. 10.0', pumped 2 gal prior to laking sample)
19.5'-21.0'			4		100	SS Push	Same as above with clay, organics and wood fragments (ML-CL)
24.5'-26.0'			5		100	SS Push	Silt, gray, w/4" peat layer moist, not saturated (ML) water sample #3 (D-T-W. 17', pumped 7 gallons prior to taking sample).

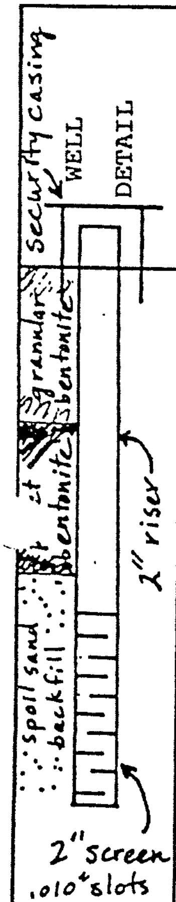
REMARKS: Analysis of ground water samples taken during drilling by Reynolds, Longview. Redrilled twice due to heaving of upper sand.

Sweet, Edwards & Associates, Inc.

BORING LOG R-2

Project	REYNOLDS LONGVIEW	Sheet	1 of 1
Client	REYNOLDS	Drilled By	CEW
Feature	POTLINER STORAGE PILE - BACKGROUND WELL	Logged By	JEE
Location	WEST OF INDUSTRIAL WAY; SOUTH OF IP SWITCHYARD	Date Logged	10/5/82
Depth to Water	2.4 feet	Surf Elev.	
Date	October 5, 1982	Total Depth	15 feet

WELL DETAIL



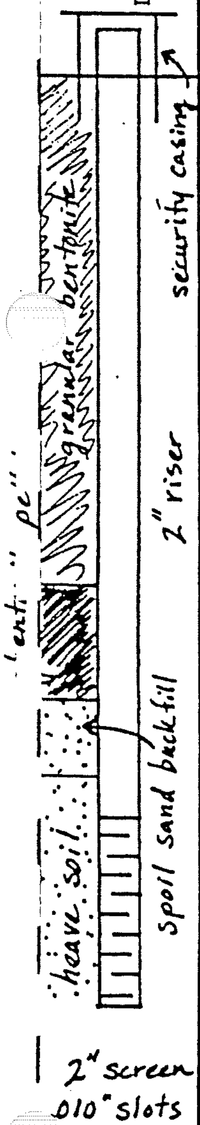
UNIFIED CLASS	DEPTH (ft)	ELEVATION (ft)	Sample No	Blows per 6 inches	Recovery w/n 0.1 ft	Sample Type	Depth	DESCRIPTION
								Elevation Top PVC = 6.53 feet
							0-2'	Thick mat of marsh grass and peat.
▽							3.5'-5.0'	Spoon blocked
	5					SS		
			1		100	Push	6.0'-7.5'	Interbedded silt, clay and fine sand, w/iron staining, roots and other organics, partially saturated; water sample #1 (D-T-W. 2.4', pumped 4 gal. prior to taking sample).
	10					S1		
			2		100	Push	8.5'-10.0'	Silt, gray, soft, partially saturated (ML), fine sand lense from 8.5'-8.7'.
							13.5'-15.0'	Very fine sand, gray, saturated soft, with interbedded silt (SM-ML), water sample #2 (D-T-W. 7.0', pumped 5 gal. prior to taking sample)
	15							
			3		100	Push		

REMARKS: Analysis of ground water samples taking during drilling by Reynolds, Longview.

Sweet, Edwards & Associates, Inc.

BORING LOG R-3

Project	REYNOLDS LONGVIEW	Sheet	1 of 1
Client	REYNOLDS	Drilled By	CEW
Feature	POTLINER STORAGE PILE	Logged By	JEE
Location	EAST OF PILE, WEST EDGE OF DITCH, ADJACENT TO (RR TRACKS)	Date Logged	10/5/82
Depth to Water		Surf Elev.	
Date		Total Depth	25 feet



Elevation Top PVC = 11.15 feet

UNIFIED CLASS	DEPTH (ft)	ELEVATION (ft)	Sample No	Blows per 6 inches	Recovery w/n 0.1 ft	Sample Type	DESCRIPTION	
							0' - 2'	Railroad ballast
							3.5'-5.0'	Clayey-silt to silty-clay (ML-CL), brown w/iron staining & wood fragments, moist soft.
	5		1		100	SS Push		
							8.5'-10.0'	Clay, brown and gray (CL) some silt and very fine sand, soft, partially saturated.
	10		2		100	SS Push		
							13.5'-15.0'	Fine sandy-silt (ML) w/clay, cohesive, v. soft, partially saturated, water sample #1 (D-T-W. 9.5' bailed sample)
	15		3		100	SS Push		
							18.5'-20.0'	Very fine sand, heaved into the auger, chemical odor.
	20		4		100	SS Push		
							22' - 25'	Clay, light green, moderately stiff (CL), auger bit sample.
	25		5					

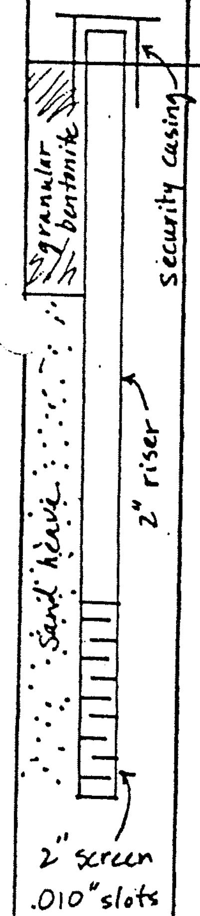
REMARKS: Analysis of ground water samples taken during drilling by Reynolds, Longview

Sweet, Edwards & Associates, Inc.

BORING LOG R-4S

Project REYNOLDS LONGVIEW
Client REYNOLDS
Feature POTLINER STORAGE PILE
Location WEST OF POTLINER PILE: TOE OF DIKE, SEE MAP
Depth to Water SEE LOG WELL R-4D
Date October 6, 1982

Sheet 2 of 2
Drilled By JJM
Logged By JEE
Date Logged 10/6/82
Surf Elev.
Total Depth 19 feet

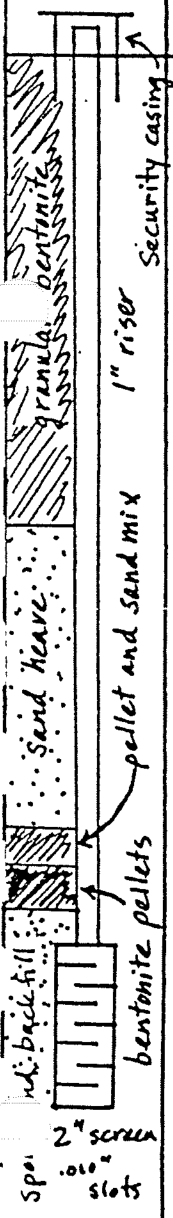
WELL DETAIL	UNIFIED CLASS	DEPTH (ft)	ELEVATION (ft)	SAMPLE RECORD: Sample No	Blows per 6 inches	Recovery w/n 0.1 ft	Sample Type	Elevation Top PVC = 16.57' DESCRIPTION
		5 10 15 20						SEE LOG WELL R-4D

REMARKS:

Sweet, Edwards & Associates, Inc.

BORING LOG R-4D

Project: REYNOLDS LONGVIEW | Sheet 1 of 2
Client: REYNOLDS | Drilled By: JJM
Feature: POTLINER STORAGE PILE | Logged By: JEE
Location: WEST OF POTLINER PILE: TOE OF DIKE, SEE MAP | Date Logged: 10/6/82
Depth to Water: 11.5 | Surf Elev.:
Date: 10/6/82 | Total Depth:



Elevation Top PVC = 16.71 feet

WELL DETAIL	UNIFIED CLASS	DEPTH (ft)	ELEVATION (ft)	Sample No	Blows per 6 inches	Recovery w/n 0.1 ft	Sample Type	DESCRIPTION
		5		1		100	SS Push	3.5'-5.0' Spoils, sand, clean, loose (SP)
	▽	10		2		100	SS Push	8.5'-10.0' Sand, dark gray, v. fine gravel, some silt, saturated v. soft (SM-SP), water sample #1 (D-T-W. 11.5' pumped 4 gallons prior to taking sample).
		15						Severe Sand Heave at 13.5 prevented sampling
				4				16' - 18' Silty-clay, gray, v. soft (CL-ML), auger bit sample
		20						
		25						
								27.5' Clay, auger bit sample
		30						

REMARKS: Drilled with wooden plug in hollow stem to prevent sand heave at depth.

APPENDIX H
HYDROGRAPHS FOR SOUTH PLANT WELLS, PIEZOMETERS, SURFACE WATER-GROUNDWATER PAIRS, AND SURFACE WATER BENCHMARKS

South Plant Area Hydrographs
Former RMC Longview
Longview, Washington

Figure H-1
R-1S and R-1D Hydrographs

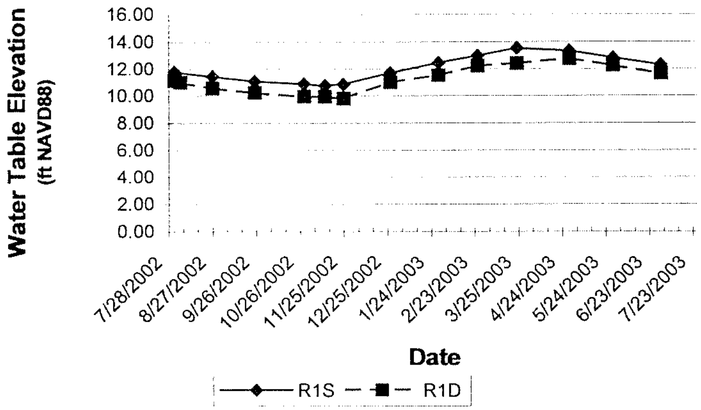


Figure H-2
R-4S and R-4D Hydrographs

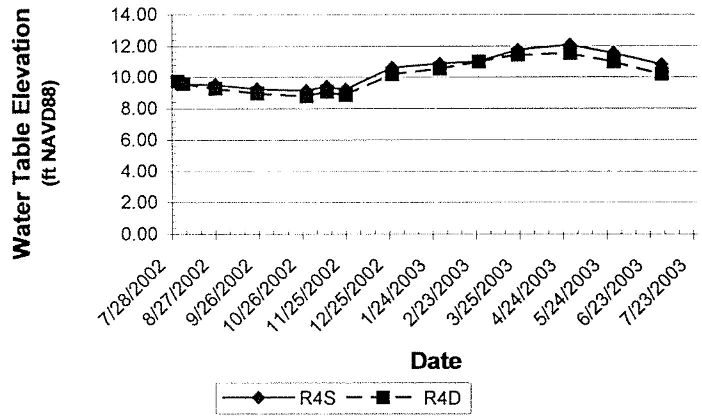


Figure H-3
R-2 and R-3 Hydrographs

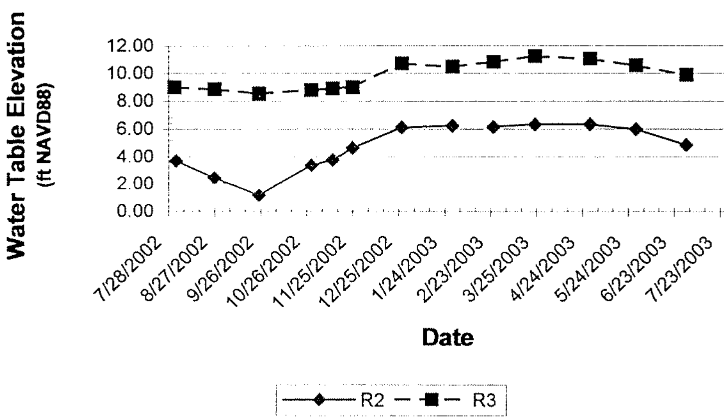
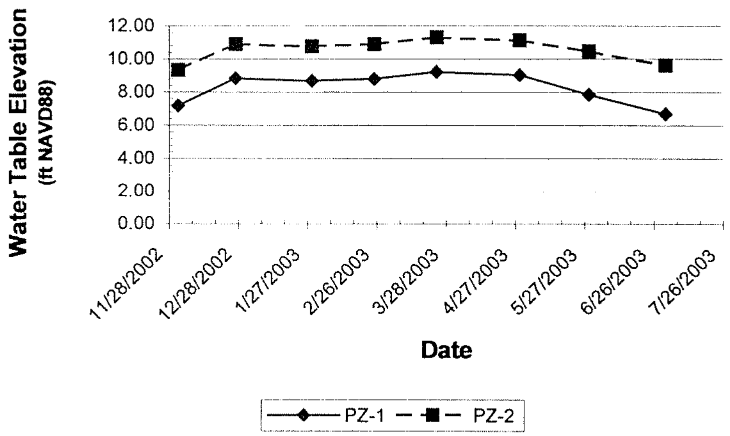


Figure H-4
PZ-1 and PZ-2 Hydrographs



South Plant Area Hydrographs
Former RMC Longview
Longview, Washington

Figure H-5
PZ-3, PZ-4, PZ-5 Hydrographs

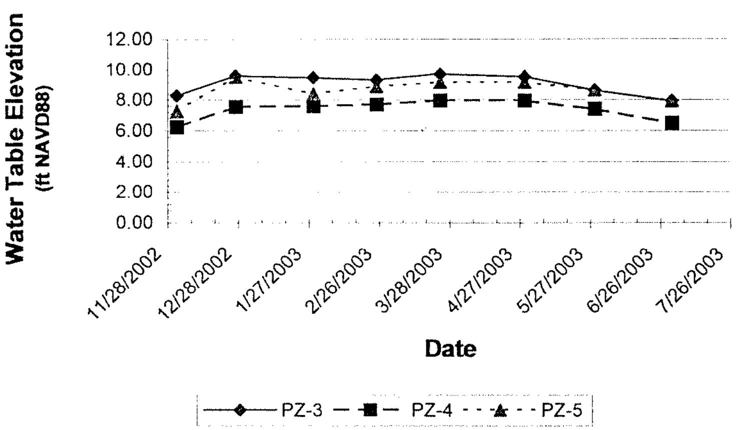


Figure H-6
G-1A and G-1B Hydrographs

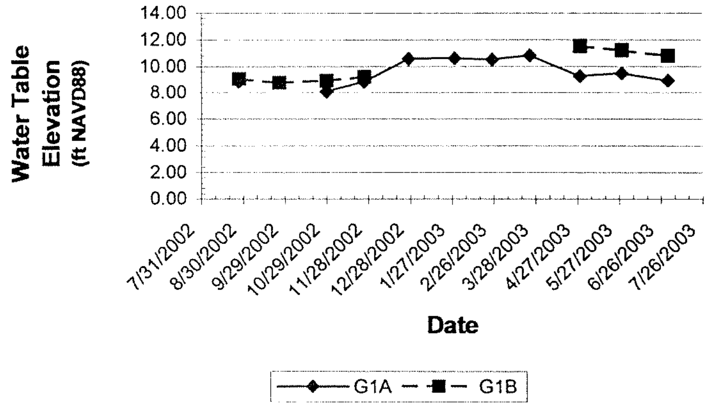


Figure H-7
G-2 Hydrograph

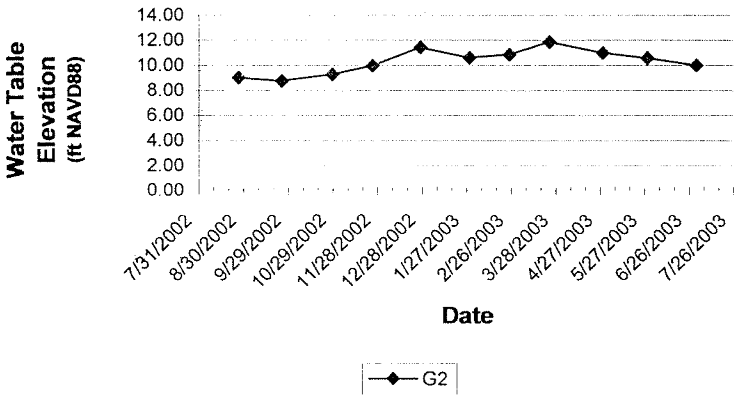
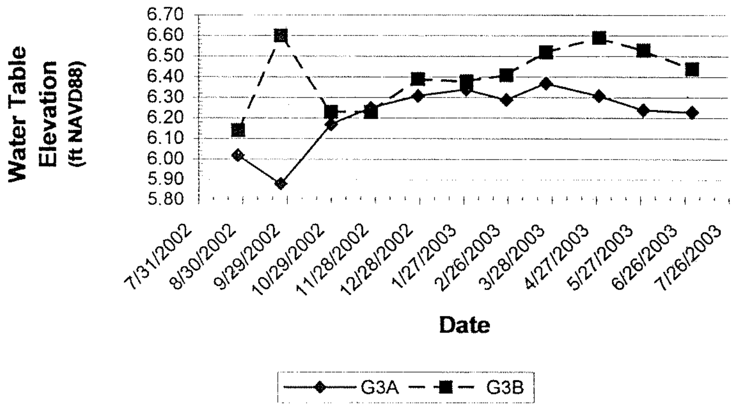
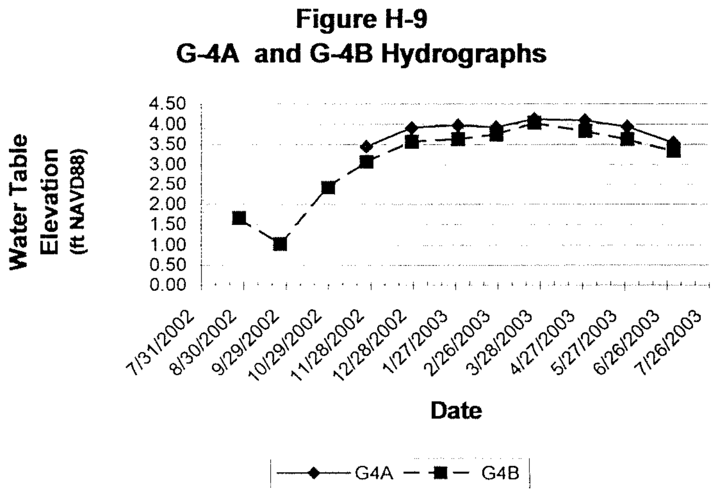
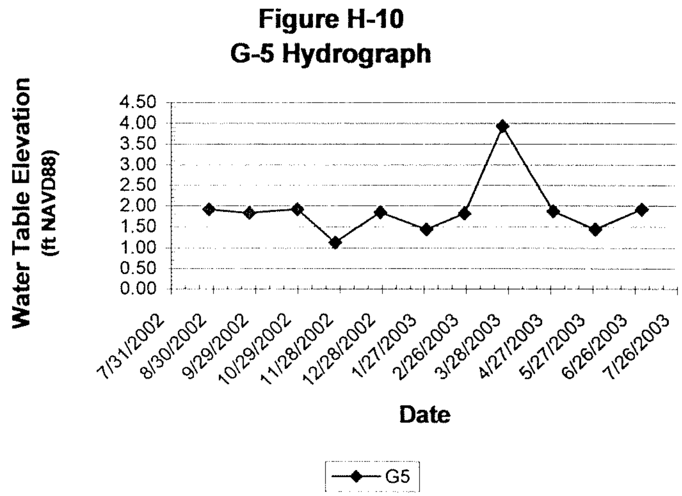


Figure H-8
G-3A and G-3B Hydrographs



South Plant Area Hydrographs
Former RMC Longview
Longview, Washington





Voluntary Cleanup Report – Underground Gasoline Tank – Former Reynolds Longview Cable Plant

Anchor Environmental, L.L.C. Prepared for Washington State Department of Ecology. January 2003.

Voluntary Cleanup Report
Underground Gasoline Tank
Former Reynolds Longview Cable Plant

Longview, Washington

Prepared for
Alcoa Inc.

Prepared by
Anchor Environmental, LLC
Portland, Oregon

January 9, 2003

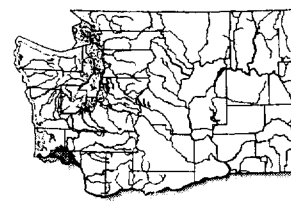
ANCHOR
ENVIRONMENTAL, L.L.C.

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

February 19, 2003



Your address is in the **Grays-Elochoman** watershed

Mr. Thomas D. Dickey, Technical Superintendent
Longview Aluminum
4029 Industrial Way
Longview, WA 98632

Dear Mr. Dickey:

Thank you for submitting the results of your independent remedial action for review by the Washington State Department of Ecology (Ecology). Ecology appreciates your initiative in pursuing this administrative option under the Model Toxics Control Act (MTCA).

Ecology's Toxics Cleanup Program has reviewed the following information regarding cleanup activities at 4029 Industrial Way, Longview, WA 98632:

- Anchor Environmental, LLC, **Voluntary Cleanup Report Underground Gasoline Tank Former Reynolds Lonview Cable Plant**, January 9, 2003.

- Archived **BICC Cable Corp** file, and associated correspondence.

The above-listed reports will be kept in Central Files of the Southwest Regional Office (SWRO) of Ecology for review by appointment only. Appointments can be made by calling the SWRO Resource Person at (360) 407-6365.

Based upon the above listed information, Ecology has determined that, at this time, the release of Total Petroleum Hydrocarbons as gasoline into the soil and groundwater no longer poses a threat to human health or the environment.

Therefore, Ecology is issuing this determination that no further remedial action is necessary at this site under MTCA, Chapter 70.105D RCW. However, please note that because your actions were not conducted under a consent decree with Ecology, this letter is written pursuant to RCW 70.105D.030(1)(i) and does not constitute a settlement by the state under RCW 70.105D.040(4) and is not binding on Ecology.

Ecology's no further action determination is made only with respect to the releases identified in the reports listed above and applies only to the area of the property affected by the release of gasoline, as identified in the reports. It does not apply to any other release or potential release at the property, any other areas on the property, nor any other properties owned or operated by Longview Aluminum, BICC Cable Corp, or Thomas Dickey.

At the conclusion of this process, Ecology will update its databases and your site will not appear in future publications of the Confirmed and Suspected Contaminated Sites List (previously known as the Affected Media and Contaminants Report).

The State, Ecology, and its officers and employees are immune from all liability and no cause of action of any nature may arise from any act or omission in providing this determination.

If you have any questions about any of the information presented in this letter, please contact me at (360) 407-6261.

Sincerely,

Lisa Pearson
Project Engineer
Toxics Cleanup Program
Southwest Regional Office

LP/lp

cc: Charles Cline, Department of Ecology
Patty Martin, Department of Ecology

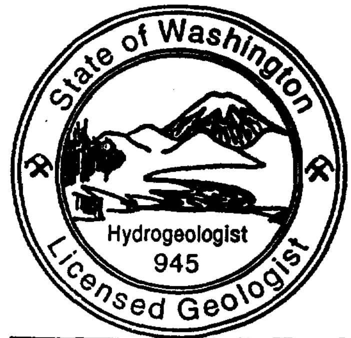
Voluntary Cleanup Report
Underground Gasoline Tank
Former Reynolds Longview Cable Plant

Longview, Washington

Prepared for
Alcoa Inc.

Prepared by
Anchor Environmental, LLC
Portland, Oregon

January 9, 2003



JOHN E. EDWARDS

John E Ed 1/9/03

Table of Contents

List of Tables

List of Figures

List of Attachments

1.0 Cable Plant and UST Background

In 1968 Reynolds Metals Co. began construction of the Longview Cable Plant to take advantage of aluminum produced at the neighboring Longview Aluminum Reduction Plant. The plant was completed in 1970 and is situated on 27 acres with 327,000 square feet under roof including main production buildings, office buildings, and ancillary storage and equipment buildings. The plant produced a full range of insulated and noninsulated aluminum cables for electrical transmission in addition to continuous aluminum rod.

In 1992 the Electrical Division of Reynolds Metals Co. was sold to BICC Cables Corporation. BICC subsequently decided to discontinue operations at the Longview facility, and the plant was closed in May, 1993. The property reverted back to Reynolds Metals Co. In May, 2000 Reynolds Metals Co. merged with Alcoa, Inc. (Alcoa). Alcoa subsequently sold the business to Michigan Avenue Partners. The plant was renamed Longview Aluminum, LLC. Alcoa currently owns the land under the facility. The land was leased to Longview Aluminum, LLC in February, 2001.

In 1974 Reynolds Metals Co. Longview Cable Plant installed a 1000-gallon underground gasoline storage tank. The cable plant location is shown on Figure 1. In 1991 rather than upgrade a 17-year-old tank to meet new regulatory requirements, Reynolds decided to remove the tank. Removal began in November, 1991. When the tank was removed, a small (approximately 1/16 inch) hole was noted. Soil and groundwater appeared to be contaminated with gasoline.

Notification of the leaking underground gasoline storage tank was made to the Department of Ecology (Ecology) as required by WAC 173-340, the Model Toxics Control Act (MTCA). The notification was acknowledged by Ecology in a response dated December 10, 1991, from Patricia L. Martin, LUST Site Manager, Toxic Cleanup Program. Reynolds conducted an independent cleanup of the site. The details and results of the independent cleanup are described in the following sections.

2.0 Purpose

Alcoa wishes to close this former UST site under Ecology's Voluntary Cleanup Program. Along with this Voluntary Cleanup Report, Alcoa is submitting the following documents required under the Voluntary Cleanup Program.

- Voluntary Cleanup Program Application to Request Assistance
- Voluntary Cleanup Program Site Summary
- Voluntary Cleanup Program Terrestrial Ecological Evaluation Exclusion

There were a number of technical reports generated by Reynolds' consultants during this project. The reports done by Pacific Northern Geoscience during the period December 6, 1991 through October 4, 1993 were submitted to Ecology during that time period. Ecology has requested that those documents not be resubmitted with this Voluntary Cleanup Report. Those reports are referenced herein.

Consultant reports, relevant information from Alcoa project files, and lab reports not already submitted to Ecology, are attached to this report.

This Voluntary Cleanup Report is divided into five sections. Section 3 summarizes the investigation and cleanup that occurred as the tank was decommissioned. Section 4 is divided into subsections that cover subsequent cleanup activities, remedial investigation, feasibility study, and groundwater monitoring. Section 5 covers summary conclusions and a recommendation for site closure.

3.0 Initial Investigation/Cleanup

The tank was transported to the Pacific Northern Environmental shop in Longview, Washington where it was decommissioned. The sludge and residual liquid were transported to a licensed facility for disposal. The tank was recycled as scrap metal. Details of the initial removal and remediation are included in a report titled Underground Storage Tank Decommissioning Site Assessment prepared by Pacific Northern Environmental dated December 16, 1991. This report was submitted to Ms. Patricia Martin at Ecology' Southwest Regional Office and is in Ecology's file for this site. The information in this section is summarized from the 1991 report.

Following tank removal, soil with the appearance of petroleum contamination was excavated. The soil was removed down to the soil/water interface. Soil was not excavated horizontally outside the existing excavation. Soil samples were collected from the walls of the excavation and from the soil stockpile. The samples were delivered to Columbia Analytical Services in Kelso, Washington. The soil samples were analyzed using Washington Method WTPH-HCID for hydrocarbons; EPA Method 5030/8020 for benzene, toluene, ethylbenzene, and total xylenes (BTEX); and by EPA Method 7420 for total lead. Samples which indicated that gasoline was present using Method WTPH-HCID were further analyzed for gasoline by Washington Method WTPH-G. MTCA Method A Cleanup Levels were exceeded for gasoline and BTEX in some samples.

On December 4, 1991 a water sample was taken from the excavation and analyzed using EPA Method 7420 for total lead, EPA Methods 3550/8015 for total petroleum hydrocarbons, and by EPA Methods 5030/8020 Modified for BTEX. The testing results indicated that lead, gasoline, oil, benzene, toluene, and total xylenes were above Ecology's Method A Cleanup Levels for groundwater.

On December 9, 1991 additional soil was removed from the bottom and sides of the tank excavation. Soil samples were then taken from the walls of the excavation and from the soil stockpile. Using the above referenced methods for soils, laboratory testing of the soil samples from the excavation walls showed concentrations of gasoline, benzene, toluene, ethylbenzene, and total xylenes below Method A Cleanup Levels. Gasoline concentrations in the stockpile soil samples exceeded Method A Cleanup Levels.

4.0 Soil and Groundwater Remediation

4.1 Initial Soil and Groundwater Removal

Beginning January 2, 1992 Pacific Northern GeoSciences conducted some additional soil and groundwater cleanup in the tank excavation area. Those activities were described in the Independent Interim Cleanup Status Report for Reynolds Metals Company, March 20, 1992. That report was prepared by Pacific Northern Environmental and submitted to Ms. Patricia Martin at Ecology's Southwest Regional Office. The March report describes the site activities that are summarized in this subsection. The report is currently in Ecology's file for this site.

Following removal of the UST, soil impacted with petroleum hydrocarbons was observed below the groundwater level in the tank excavation. On January 2, 1992 Pacific Northern Environmental removed soil below the water surface until the soil with field detectable hydrocarbon concentrations had been removed. A soil sample was taken from the soil stockpile for laboratory testing. Soil was not sampled below the water surface in the excavation. The gasoline concentration of the stockpile soil sample was above the Method A Cleanup Level.

Following removal of the soil below the excavation water level, Pacific Northern Environmental pumped the excavation dry on January 6, 1992 and again on January 15, 1992. Approximately 4500 gallons of water were removed. This material was collected and disposed offsite by Cowlitz Clean Sweep.

The groundwater in the excavation was sampled on 1/6/92 and 1/15/92 following each recharge. Analyses of both samples showed contaminants above Ecology's Method A Cleanup Levels. Pacific Northern Environmental then filled the excavation with pea gravel and installed a 4-inch monitoring/extraction well (MW-1) in the excavation. This was done as a contingency, to provide a potential groundwater recovery well, if needed. Tacoma Pump and Drilling provided oversight of the well installation. Upon completion of the well, a well diagram was constructed by Tacoma Pump and Drilling and submitted to Ecology. On March 5, 1992 Pacific Northern Environmental developed and sampled the well. Analytical results indicated a decrease in constituent concentrations compared with earlier sampling events, but the concentrations still exceeded Ecology's Method A Cleanup Levels. The location of well MW-1 is shown on Figure 2.

The soil stockpile was covered with polyethylene sheeting. In June, 1992 the soil was shipped to Oregon Hydrocarbon, Inc. for thermal treatment. Details of the offsite soil treatment were provided in a June 16, 1992 letter to Ms. Patricia Martin of Ecology's Southwest Regional Office (Attachment A).

4.2 Installation of Groundwater Monitoring System

A groundwater monitoring system was installed at the site to determine the extent of groundwater contamination beyond the former tank location. Five monitoring wells were installed on October 13, 1992 (MW-2, MW-3, MW-4, MW-5, and MW-6). That work was completed by Cascade Drilling Company, Woodinville, Washington. The well logs, construction details, and water quality data described in this section are from the report Preliminary Hydrogeologic Assessment Reynolds Metals Co. Cable Plant Longview, Washington (Pacific Northern Geoscience, January 4, 1993). That report was submitted to Ms. Patricia Martin and is in Ecology files.

At each monitoring well boring location one soil sample was collected from the vadose zone immediately above the watertable, and one groundwater sample was collected from each of the six monitoring wells (including well MW-1 installed in the tank excavation). The soil and groundwater samples were submitted for testing of total petroleum hydrocarbons as gasoline (WTPH-G), BTEX by EPA method 5030/8020, and total lead by EPA method 7421. Gasoline was detected in the soil from location MW-2 at a concentration exceeding Ecology's Method A Cleanup Level. Benzene was detected at concentrations above cleanup levels in the soil samples from MW-2 and MW-3. The total xylene cleanup concentration was exceeded for soil from MW-2. Toluene, ethylbenzene, and lead were also detected in the soil at various locations but the concentrations were below Method A Cleanup Levels.

Groundwater from well MW-2 exceeded the MTCA Method A TPH gasoline concentration limit. The benzene MTCA Method A concentration limit was exceeded in groundwater from wells MW-1, 2, 3, 4.. Other BTEX constituent concentrations exceeded MTCA Method A limits in the groundwater samples from wells MW-2 and 3.

4.3 Remedial Investigation

Because the preliminary groundwater investigation showed that contamination extended beyond the tank excavation, Reynolds Metals Co. began a focused remedial investigation and feasibility study (RI/FS). The information in this subsection and subsection 4.4 is summarized from the report Focused Remedial Investigation and Feasibility Study, Reynolds Metals Cable Plant, Longview, Washington (Pacific Northern GeoScience, October 14, 1993). That report is in Ecology files.

The purpose of the RI/FS was to develop sufficient information to select an appropriate cleanup action to prevent further contamination of groundwater and soil. The RI focused on characterizing the distribution and concentrations of petroleum constituents in soil and groundwater. The FS focused on evaluation of alternative cleanup methods and selection of an action that would protect human health and the environment.

The groundwater investigation described in subsection 4.2 was considered to be Phase 1 of the RI. Phase two was performed in March, 1993 and consisted of four additional soil borings, three of which were completed as monitoring wells. These were labeled SB-1, MW-7, MW-8, and MW-9.

The soil borings described in subsection 4.2 were located based on limited subsurface information available from previous work at the site. They were located in a radial pattern and in the apparent down-gradient direction from the former tank location. Soil borings completed during the second phase were located to establish the horizontal extent of contamination based on analytical data collected in phase one.

Results of soil analytical testing indicated that the zone of soil contamination was limited to the area immediately downgradient and next to the former tank location, specifically toward SB-1 and MW-2. The extent and volume of soil containing petroleum hydrocarbons at concentrations exceeding MTCA cleanup standards was determined by computer modeling, evaluation of soil quality data, and visual observations made while conducting the investigation. Estimated volumes of contaminated soil were calculated by contouring contaminant concentration data collected from the borings. Using an average impacted soil thickness of 3 to 5 feet gave an estimated volume of 1082 to 1805 cubic yards of soil exceeding MTCA cleanup standards.

A new round of groundwater samples was taken from the nine monitoring wells on March 29, 1993. All groundwater samples were analyzed for total petroleum hydrocarbons as gasoline (method WTPH-G), BTEX by EPA method 5030/8020, and total lead by EPA method 7421. Both filtered and unfiltered samples were tested for total lead. Concentrations exceeding MTCA Method A cleanup standards were found in several of the monitoring wells. The highest concentrations were found at MW-2 and MW-3. Benzene was the most detected volatile organic compound, and total lead was identified in unfiltered samples but was not detected in the filtered samples. The groundwater quality data are in Table 1.

4.4 Feasibility Study

The RI results showed that soil and groundwater concentrations near the former UST exceeded MTCA Method A limits, triggering the need for a feasibility study. Technologies considered for soil remediation included: 1) no action; 2) in-situ treatment using soil vapor venting; 3) excavation and treatment by on-site or off-site thermal desorption; 4) excavation and off-site landfill disposal; and 5) excavation and on-site biological treatment. Groundwater treatment alternatives considered included: 1) no action; 2) groundwater extraction and on-site treatment by activated carbon; and 3) groundwater extraction and on-site treatment by air stripping.

Each alternative was evaluated individually considering the factors of; overall protection of human health and the environment, compliance with ARARs, long term effectiveness, long term performance, reduction of toxicity, mobility, or volume of waste, short term effectiveness, implementability, and cost. Two integrated cleanup scenarios met all of the criteria: 1) Contaminated soil excavation and on-site bioremediation, with monitored natural attenuation of the groundwater contaminants; and 2) Contaminated soil excavation and on-site bioremediation, with groundwater pump and treat. Integrated cleanup scenario 1 was selected. This scenario was considered best because the source of the contamination was located in relatively low permeability soils which would be difficult to cleanup using vapor extraction. After removing the source, the groundwater quality would improve through natural attenuation of the dissolved contaminants. Ecology was notified that the soils would be excavated and biotreated onsite in a May 26, 1994 letter to Ms. Patricia Martin.

4.5 Integrated Remediation Program

Integrated remediation began in the summer of 1994. On July 18, 1994 additional asphalt pavement was removed and shipped offsite for recycle. Concrete and overburden soils were removed and stored on site. Over the next several days additional concrete and overburden were removed and the excavation of contaminated soils began.

The excavation was expanded as needed to follow gas odors. A photoionization detector (PID) was used to detect gasoline contamination and trenches were dug outward from the excavation to determine more precisely the extent of the contamination. The excavation was expanded laterally to encompass the trenches where contamination was found, and deepened to approximately 2 feet below water level. Monitoring wells MW-1, MW-2, and MW-3 were removed and closed in the process. Excavation continued through August 1, 1994. The final excavation boundary is shown on Figure 2. Soil samples were obtained from the excavation walls on August 1, 1994 and analyzed for BTEX using EPA Methods 5030/8020 and gasoline by method WTPH-G. BTEX and gasoline were detected in soil samples from the north wall, but at concentrations below Ecology's Method A Cleanup Levels. The soil lab testing report is shown in Table 2 and included in Attachment B.

After the confirmation sample testing results showed that Method A Cleanup Levels had been achieved for the remaining soils (see Table 2), the excavation was backfilled. At this point it was decided to install air sparging and vapor extraction (AS/VE) pipes in the excavation backfill material as a contingency should Method A Cleanup Levels for groundwater not be achievable using monitored natural attenuation. A hand drawing of the AS/VE piping layout is shown in Attachment C. The piping was installed in beds of gravel. The rest of the backfill consisted of clean sand, which was watered, compacted, and installed in layers of approximately 12 inches. The excavation was covered with plastic sheeting at a depth of 2 feet below original grade. This sheeting was installed to provide a seal for the VE piping so that they would draw air from the underlying soil rather than short circuit to the atmosphere. The sheeting was covered with sand and the area finished with gravel. The excavation backfill completion date was August 17, 1994.

The excavated soil was placed in biological treatment cells (biocells). The biocells were constructed of 10-mil plastic sheeting placed on top of 6 inches of clean sand. The cells were surrounded with straw bales and the plastic sheeting was draped over the bales. The contaminated soil was spread to a thickness of approximately 12 inches. The total area covered was approximately 50,000 square feet, which equates to approximately 1850 cubic yards of contaminated soil. Water accumulated during the process or pumped from the excavation was sprayed over the soil in the biocells to keep the soil moist and aid the biotreatment process. The biocells were divided into seven grids for testing.

The seven biological treatment cell grids were labeled G1 through G7. The soil was kept moist and rototilled on a regular basis. When the soil reached the condition where there were no detectable gasoline odors, composite samples were taken from the grid(s) and submitted to Columbia Analytical Services (CAS) for BTEX and gasoline testing. When the concentrations fell below Model A Cleanup Levels, the upper six inches of treated soil was skimmed off the cell and the remaining six-inch layer remained in treatment. Biotreatment continued until late-September. On October 3, 1994 the analytical report from CAS indicated that all of the soil in each grid met Method A Cleanup Levels with all samples non-detect (ND) for both BTEX and gasoline. The confirmation soil quality data are in the lab reports in Attachment D and are shown in Table 3. The treated soil was used as general fill on site.

4.6 Post Remediation Groundwater and Surface Water Monitoring

In late 1994, EMCON Northwest, Inc. was hired to monitor groundwater quality and evaluate shallow groundwater conditions near the former UST. Emcon conducted quarterly sampling of monitoring wells MW- 4 through 9, including hydrology monitoring. The groundwater quality data are in Table 1. Groundwater samples were analyzed for BTEX by EPA Method 5030A/8020 and for gasoline by Method WTPH-G. The data are in the 1995 Annual Groundwater Monitoring Report (EMCON Northwest, January 25, 1996), located in Attachment E.

The data in the 1995 annual report showed that toluene, ethylbenzene, total xylenes, and gasoline were not detected in any of the samples from any of the wells at concentrations above the method reporting limits (MRLs). Benzene was detected in samples from MW-4, MW-6, and MW-7. The groundwater flow direction beneath the site was found to be consistently south-southwest. The benzene water quality data and watertable contours for December 1995 are shown on Figure 2.

Groundwater sampling continued quarterly until 1997. Documentation of the final groundwater monitoring is included in Attachment G: Groundwater Monitoring Report, Reynolds Cable Plant dated January 14, 1998. For each of the 1996 and 1997 sampling events toluene, ethylbenzene, total xylenes, and gasoline continued to be below MRLs.

Following the 1994 removal of the gasoline impacted soils, the groundwater benzene concentrations in wells MW-4, 6, and 7 rapidly declined, as shown on Table 1. The 1995 and early 1996 water quality data show a consistent decrease in benzene concentrations. For the June 21, 1996 sampling event, the benzene concentration in MW-4 was below the MRL, 1.3 µg/l in MW-6, and 4.3 µg/l in MW-7. Benzene concentrations for the December 13, 1996 sampling event were below MRLs for all site wells. Benzene concentrations in MW-7 remained below the MRL when this well was resampled on April 9, 1997. The benzene water quality data and watertable contours for December 1996 are shown on Figure 3. These data show that the plan to remediate the groundwater contamination using a combination of source soil removal and monitored natural attenuation was successful.

The site is located within a heavy industrial zoned facility and the shallow groundwater discharges into a surface water drainage ditch located approximately 100 feet southwest and downgradient of MW-7. This ditch was monitored by NPDES permit #WA000039-6 as outfall 009. The lab reports of priority pollutant VOC and total metals testing of ditch water samples taken at outfall 009 from March, 1995 to March, 1998 are shown in Attachment F. Those data show no dectections for VOCs and no dectections for lead during the period of the cleanup.

5.0 Summary and Closure Recommendation

Gasoline contamination found during the 1991 decommissioning of the 1000-gallon underground gasoline tank at the Reynolds Metals Co. Longview Cable Plant confirmed that a release of gasoline had occurred. Analyses of soil samples taken from the initial excavation showed contaminant concentrations above MTCA Method A Cleanup Levels. Additional contaminated soil was removed and biotreated onsite between late-1991 and October, 1994. The remaining soils in the excavation met MTCA Method A Cleanup Levels. Monitoring data show that natural attenuation has resulted in groundwater quality that meets MTCA Method A cleanup levels. Annual NPDES surface water quality data indicate that groundwater contamination did not impact the water quality in the ditch downgradient of the former UST location. Impacted soil and groundwater near the former gasoline UST have been successfully cleaned up and no further action is required.

Tables

TABLE 1

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-1	10/19/92	71.4	2	29	9	550
	3/11/93	1	ND	10	ND	190
	Well abandoned on July 28, 1994.					
MW-2	10/19/92	1840	46	136	222	1910
	3/11/93	1500	41	200	271	2100
	Well abandoned on July 28, 1994.					
MW-3	10/19/92	718	7	28	75	738
	3/11/92	1400	15.0	49.0	114.0	1400
	Well abandoned on July 28, 1994.					
MW-4	10/19/92	55.1	ND	ND	1	ND
	3/11/93	110	ND	ND	ND	ND
	3/27/95	65.5	ND	ND	ND	ND
(Duplicate)	3/27/95	63.5	ND	ND	ND	ND
	6/29/95	41[d]	ND[d]	ND[d]	ND[d]	ND
	9/15/95	64.4	ND	ND	ND	ND
(Duplicate)	9/15/95	66.6	ND	ND	ND	ND
	12/15/95	9.7	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	ND	ND	ND	ND	ND
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS

TABLE 1

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-5	10/19/92	ND	2	1	7	ND
	3/11/93	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	NS	NS	NS	NS	NS
	9/15/95	ND	ND	ND	ND	ND
	12/15/95	ND	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	NS	NS	NS	NS	NS
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS
MW-6	10/19/92	ND	ND	ND	ND	ND
	3/11/93	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	ND	ND	ND	ND	ND
	9/15/95	1.0	ND	ND	ND	ND
	12/15/95	3.0	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	1.3	ND	ND	ND	NS
	9/24/96	NS	NS	NS	ND	ND
	12/13/96	ND	ND	NS	NS	NS
	4/9/97	NS	NS	ND	ND	ND

TABLE 1

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-7	3/11/93	2	ND	ND	ND	ND
	3/27/95	121	ND	ND	ND	ND
	6/29/95	78[d]	ND[d]	ND[d]	ND[d]	ND
(Duplicate)	6/29/95	72[d]	ND[d]	ND[d]	ND[d]	ND
	9/15/95	60.5	ND	ND	ND	ND
	12/15/95	150	ND	ND	ND	ND
(Duplicate)	12/15/95	148	ND	ND	ND	ND
	3/28/96	38.3	ND	ND	ND	ND
	6/21/96	4.3	ND	ND	ND	ND
	9/24/96	0.7	ND	ND	ND	ND
	12/13/96	ND	ND	ND	ND	ND
	4/09/97	ND	ND	ND	ND	ND
MW-8	3/11/93	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	ND	ND	ND	ND	ND
	9/15/95	ND	ND	ND	ND	ND
	12/15/95	ND	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	NS	NS	NS	NS	NS
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS

TABLE 1

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-9	3/11/95	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	NS	NS	NS	NS	NS
	9/15/95	ND	ND	ND	ND	ND
	12/15/95	NS	NS	NS	NS	NS
	3/28/96	NA	NA	NA	NA	NA
	6/21/96	NS	NS	NS	NS	NS
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS

NOTE: ND = Not detected at or above laboratory method reporting limit.
NS = Not sampled
NA = Not analyzed for particular analyte.
µg/L = Micrograms per liter (parts per billion).
Shaded values exceed MTCA Method B Cleanup levels.

[a] BTEX by USEPA Method 5030A/8020.
[b] Total petroleum hydrocarbons as gasoline by Ecology Method WTPH-G.
[c] Chapter 173-340 WAC, "The Model Toxics Control Act Cleanup Regulations, Method B Cleanup Levels." Amended January 1996. Cleanup levels based on protection of surface water. Includes federal water quality criteria to protect humans eating aquatic organisms (WQA, 40 CFR 131.36).
[d] There are no Method B cleanup levels based on protection of surface water for total xylenes and dissolved lead.
[e] Ecology, 1987. Discharges containing oil and grease of mineral origin. Water Quality 9, September.
[f] BTEX by USEPA Method 8260.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	8/1/94
Project:	Ostrander/Reynolds/#0542-002.01	**Date Received:**	8/1/94
Sample Matrix:	Soil	**Date Extracted:**	8/5/94
		Date Analyzed:	8/6/94
		Service Request:	K944608

TABLE 2

Gasoline Range Organics
Total Petroleum Hydrocarbons as Gasoline
Washington DOE method WTPH-G
Units: mg/Kg (ppm)

Sample Name	Lab Code	MRL	Result
South Wall-1-4.5	K944608-001	5	47(a)
South Wall-2-4.5	K944608-002	5	<10(b)
East Wall-1-4.5	K944608-003	5	<10(b)
North Wall-1-4.5	K944608-004	5	<10(b)
North Wall-2-4.5	K944608-005	5	34
West Wall-1-4.5	K944608-006	5	<10(b)
Method Blank	K940805-SB	5	ND
Cleanup level			100

a Quantified as gasoline. The sample contained components that eluted in the gasoline range, but the chromatogram did not match the typical gasoline fingerprint.

b MRL is elevated because of the low percent solids in the sample as received.

Approved By ______________________ Date ____________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Northwest
Project: Ostrander/Reynolds/#0542-002.01
Sample Matrix: Soil

Date Collected: 8/1/94
Date Received: 8/1/94
Date Extracted: 8/5/94
Service Request: K944608

TABLE 2

BTEX
EPA Methods 5030/8020

			Benzene	Toluene	Ethyl-benzene	Total Xylenes
		Analyte:	Benzene	Toluene	Ethyl-benzene	Total Xylenes
		Units:	mg/kg(ppm)	mg/kg(ppm)	mg/kg(ppm)	mg/kg(ppm)
		Method Reporting Limit:	0.05	0.1	0.1	0.1
Sample Name	Lab Code	Date Analyzed				
South Wall-1-4.5 SW	K944608-001	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
South Wall-2-4.5 SE	K944608-002	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
East Wall-1-4.5 E	K944608-003	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
North Wall-1-4.5 NW	K944608-004	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
North Wall-2-4.5 NE	K944608-005	8/6/94	0.1	<0.2(a)	0.4	1.2
West Wall-1-4.5 W	K944608-006	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
Method Blank	K940805-SB	8/6/94	ND	ND	ND	ND
Cleanup			0.5	40	20	20

a MRL is elevated because of the low percent solids in the sample as received.

Approved By ______________________ Date ____________

S4608B.XLS 8/7/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K944825
Project:	Reynolds Cable Plant	**Date Collected:**	8/10/94
Sample Matrix:	Soil	**Date Received:**	8/10/94
		Date Extracted:	8/15/94
		Date Analyzed:	8/16,18/94

TABLE 3

BTEX
EPA Methods 5030/8020
mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**
	Method Reporting Limit:	0.05	0.1	0.1	0.1
Sample Name	**Lab Code**				
G1-810 1-6"	K944825-001	ND	ND	ND	ND
G2-810	K944825-002	ND	ND	ND	ND
G3-810	K944825-003	ND	ND	ND	ND
G4-810	K944825-004	ND	ND	ND	ND
G5-810	K944825-005	ND	ND	ND	ND
Method Blank	K940815-SB	ND	ND	ND	ND

Approved By: *[signature]* Date: 8/24/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Date Collected:**	08/10/94
Project:	Reynolds Cable Plant	**Date Received:**	08/10/94
Sample Matrix:	Soil	**Date Extracted:**	08/15/94
		Date Analyzed:	08/16,18/94
		Work Order No.:	K944825

TABLE 3

Total Petroleum Hydrocarbons as Gasoline
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name 1-6"	**Lab Code**	**MRL**	**Result**
G1-810	K944825-001	5	ND
G2-810	K944825-002	5	ND
G3-810	K944825-003	5	ND
G4-810	K944825-004	5	ND
G5-810	K944825-005	5	ND
Method Blank	K940815-SB	5	ND

Approved by Ami Apuelman Date 8/24/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K945245
Project:	Reynolds Cable Plant	**Date Collected:**	8/29/94
Sample Matrix:	Soil	**Date Received:**	8/29/94
		Date Extracted:	8/31/94
		Date Analyzed:	8/31,9/1/94

TABLE 3

BTEX and Total Petroleum Hydrocarbons (TPH) as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH as Gasoline
	Method Reporting Limit:	0.05	0.1	0.1	0.1	5
G6-829 1–6"	K945245-001	ND	ND	ND	ND	ND
G7-829	K945245-002	ND	ND	ND	ND	ND
Method Blank	K940831-SB	ND	ND	ND	ND	ND

Approved By: Lynda Huckestein   Date: 9/8/94

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K945760
Project:	Reynolds Cable Plant	**Date Collected:**	9/21/94
Sample Matrix:	Soil	**Date Received:**	9/21/94
		Date Extracted:	9/21/94
		Date Analyzed:	9/22,23/94

TABLE 3

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.0.5	0.1	0.1	0.1	5
Sample Name	**Lab Code**					
G1-9 6-12"	K945760-001	ND	ND	ND	ND	ND
G2-9	K945760-002	ND	ND	ND	ND	ND
G3-9	K945760-003	ND	ND	ND	ND	ND
G4-9	K945760-004	ND	ND	ND	ND	ND
G5-9	K945760-005	ND	ND	ND	ND	ND
Method Blank	K940921-SB	ND	ND	ND	ND	ND

Approved By: _____________ Date: 9/28/94

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company		
Project:	Reynolds Metals Co. Cable Plant	**Service Request:**	K945844
Sample Matrix:	Soil	**Date Collected:**	9/23/94
		Date Received:	9/23/94
		Date Extracted:	9/26/94
		Date Analyzed:	9/27/94

TABLE 3

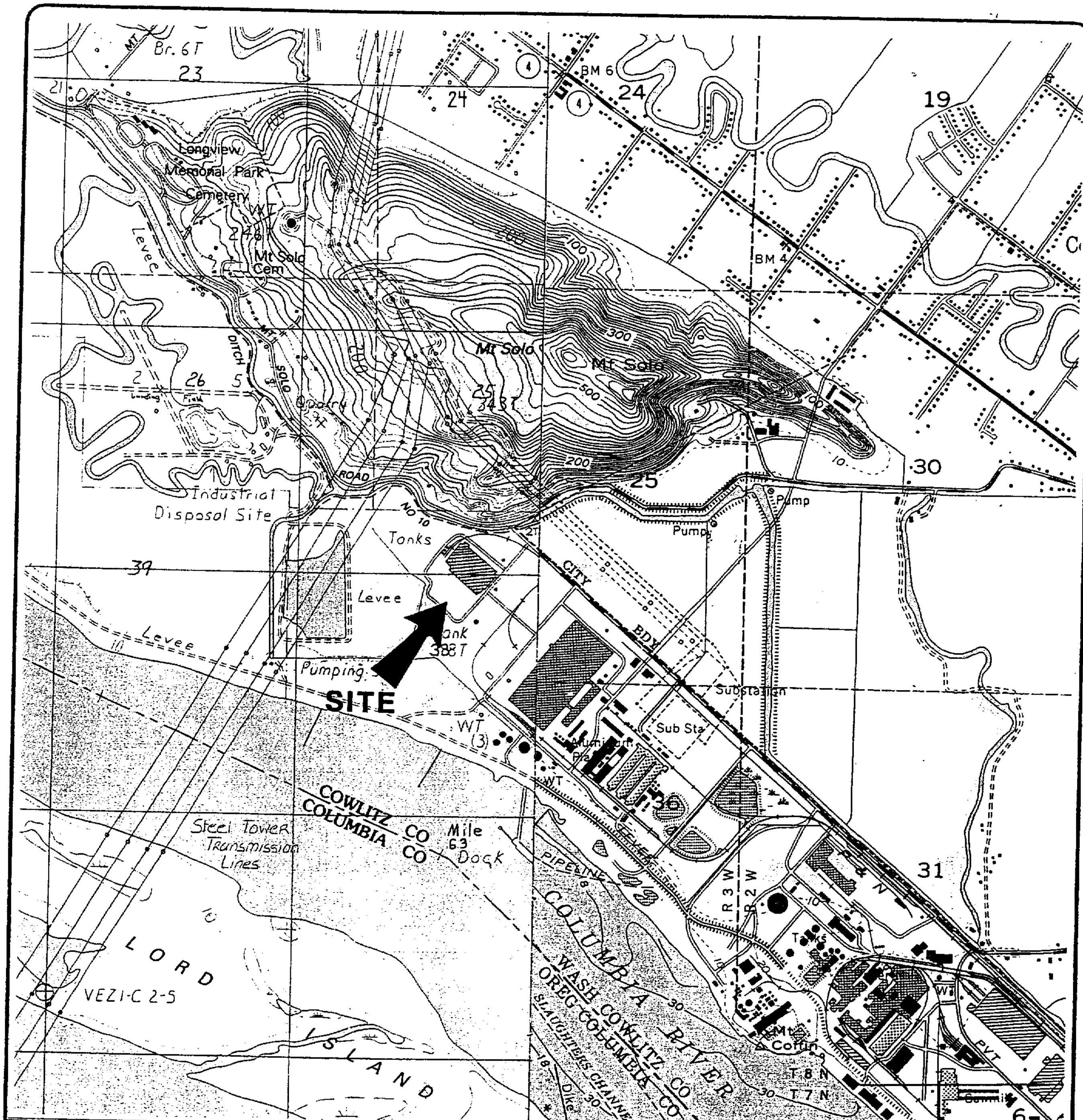
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.05	0.1	0.1	0.1	5
Sample Name	**Lab Code**					
G6-923 6-12"	K945844-001	ND	ND	ND	ND	ND
G7-923	K945844-002	ND	ND	ND	ND	ND
Method Blank	K940926-SB	ND	ND	ND	ND	ND

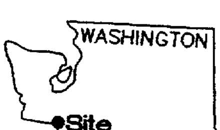
Approved By: ____________________ Date: 10/3/94

5A/061694
5844GBTX.XLS - 5A 10/3/94

Figures



Base Map From: U.S.G.S. 7.5 minute topographic quadrangles Kelso, Washington, 1970 and Coal Creek, Washington, 1985.



0 2000 4000

SCALE IN FEET

N

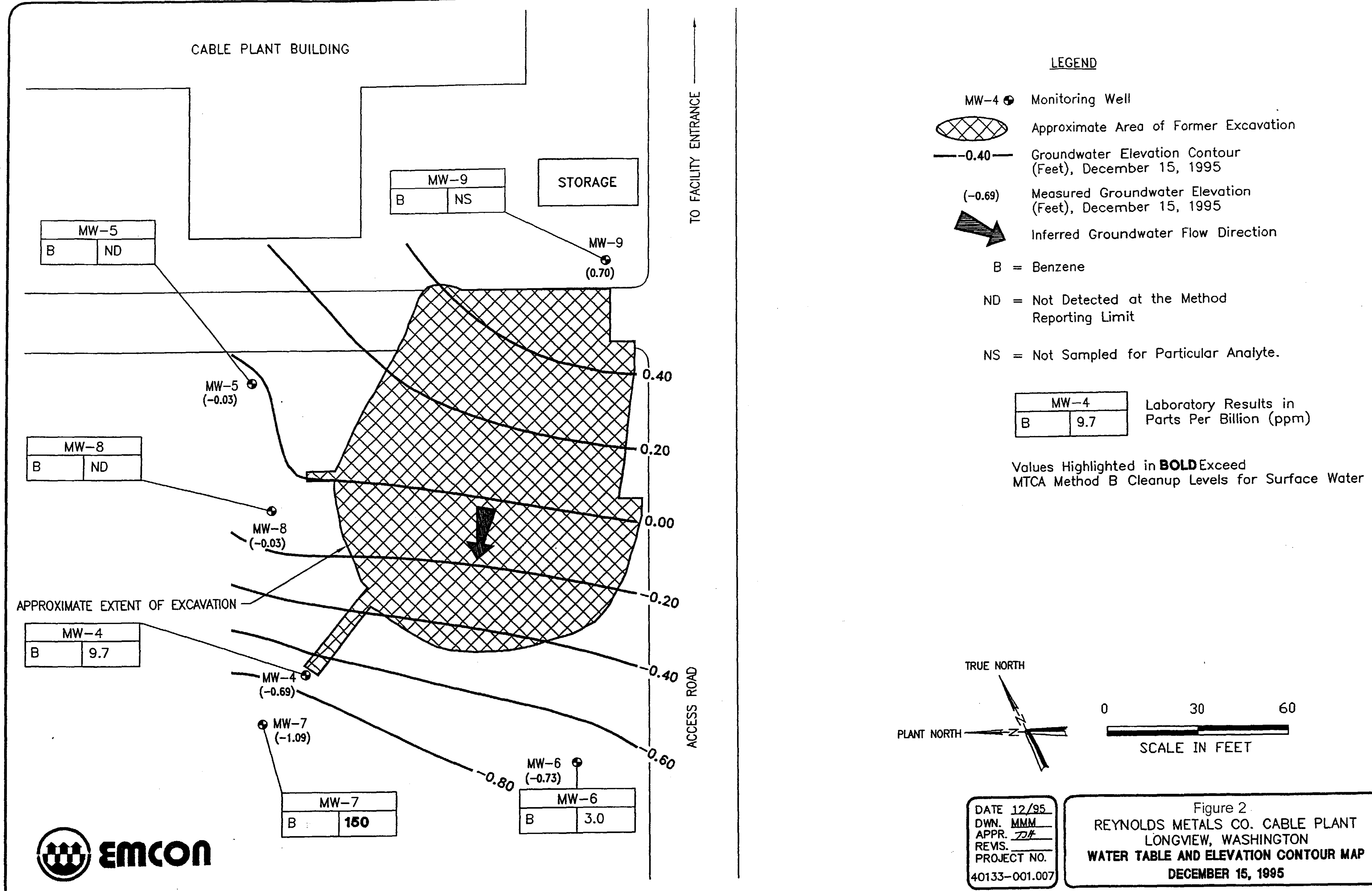
EMCON

DATE 12/95
DWN. MMM
APPR. TJH
REVIS.
PROJECT NO.
40133-001.007

Figure 1
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON

SITE LOCATION MAP

PLOT 1=1 G:\DWG\0133\001\007\KE007G06.dwg 1-3-95



DATE 12/95
DWN. MMM
APPR. TDH
REVIS.
PROJECT NO.
40133-001.007

Figure 2
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE AND ELEVATION CONTOUR MAP
DECEMBER 15, 1995

PLOT 1=30 G:\DWG\0133\001\007\KE007G05.dwg 1-9-95

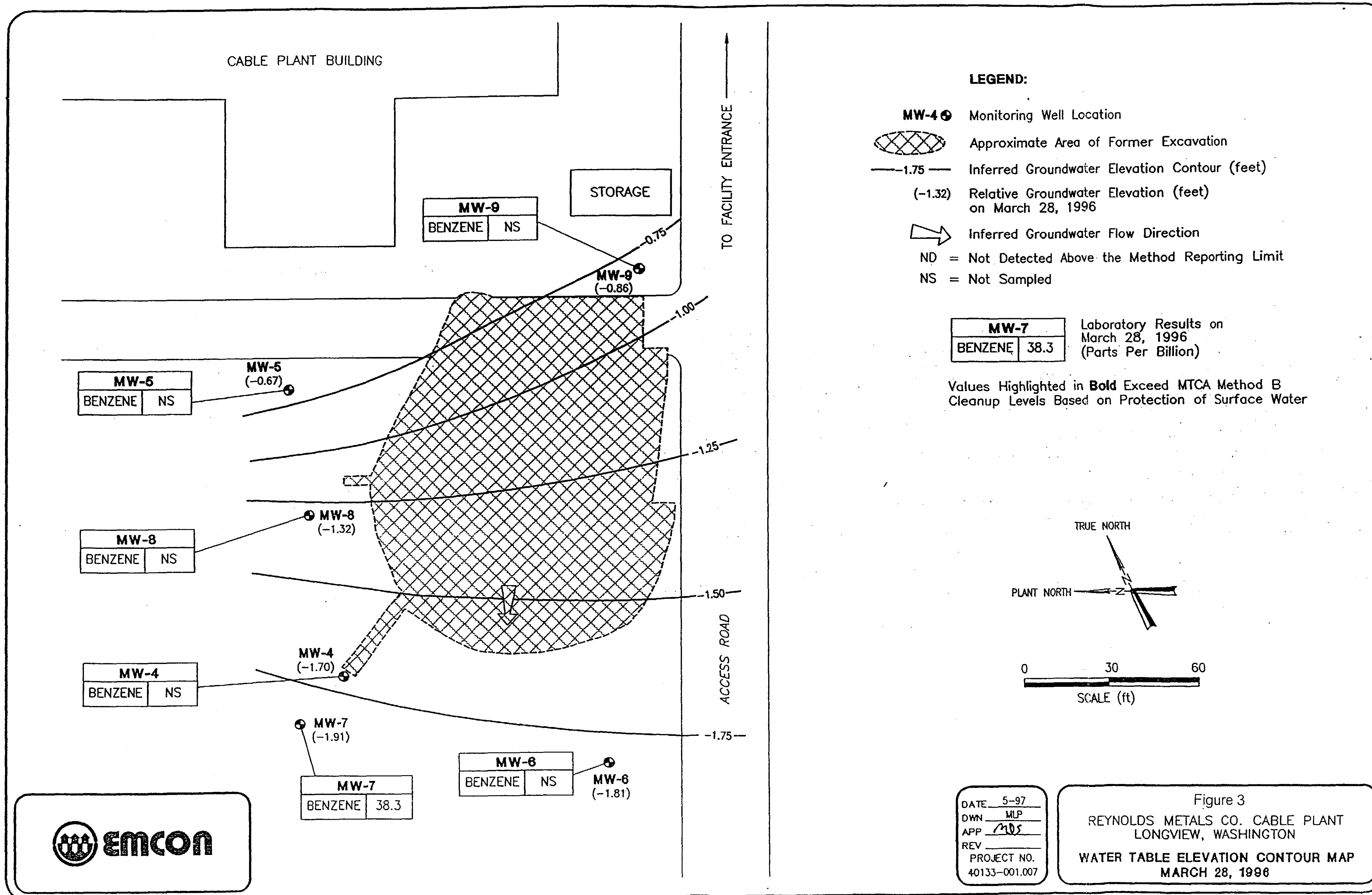


Figure 3
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE ELEVATION CONTOUR MAP
MARCH 28, 1996

Scale: 1 = 30.00 DimScale: 1 = 30.00 Date: 5/13/97 Time: 9:10 AM Operator: MLP

Attachment A

Pacific Northern Environmental
dba Petroleum Services Unlimited

P N E

June 16, 1992

Ms. Patricia Martin
Southwest Region Office
7272 Cleanwater lane, LU-11
Olympia, WA 98504-6811

RE: Reynolds Metals Company, Longview, Washington, UST I.D. Number 002452

Dear Ms. Martin:

Pacific Northern Environmental (PNE) has conducted independent interim cleanup of soil at the Reynolds Metals Company site referred to above. A report dated March 20, 1992 was submitted to your office outlining site progress. Approximately 100 cubic yards of gasoline contaminated soil was stockpiled on site. Prior laboratory analyses indicted that stockpiled soil contains levels of gasoline above Method A Cleanup Levels as outlined in Chapter 173-340-740 of the *Washington Administrative Codes.*

On June 9, 1992, a registered site assessor from PNE was at the project site to observe and document gasoline contaminated soil being loaded onto trucks. The soil was transported to Oregon Hydrocarbons, Inc. of Portland, Oregon for treatment. The soil was treated in a rotary thermal desorption unit. The soil was sampled subsequent to treatment and submitted for laboratory analysis. PNE will forward a copy of the laboratory analytical results to you upon our receipt.

Gasoline and BTEX contamination above groundwater Method A Cleanup Levels was observed in previous analytical testing of groundwater at the project site. PNE is working

MAIN OFFICE
1081 Columbia Boulevard • Longview, Washington 98632
(206) 423-2245 FAX (206) 423-2272

BRANCH OFFICE
7900 NW St. Helens Road • Portland, Oregon 97210
(503) 285-7819 FAX (503) 285-7826

with Reynolds Metals Company to investigate the project site. PNE will update Ecology as the site investigation progresses.

If you have any questions or require further information, please do not hesitate to call me at (503) 285-7819.

Sincerely,

PACIFIC NORTHERN ENVIRONMENTAL

Joseph A. Sturza
Environmental Engineer

cc: Tim Mace / Reynolds Metals Company

JAS/c:\letters\reynsoil.wp

Pacific Northern Environmental

dba Petroleum Services Unlimited

P N E

July 27, 1992

Patricia Martin
Southwest Regional Office
7272 Cleanwater Lane, LU-11
Olympia, WA 98504-6811

Subject: **Analytical Results of Treated Soil at Reynolds Metals Company of Longview, Washington.**

Dear Ms. Martin:

The purpose of this letter is to verify the treatment of petroleum contaminated soil generated at the subject site. Pacific Northern Environmental (PNE), on behalf of its client, Reynolds Metals Company, presents analytical results of soil treated at Oregon Hydrocarbon, Inc. (OHI). The petroleum contaminated soil was generated at the Reynolds Metals Company UST site.

Analytical results indicate that petroleum hydrocarbons were not detected in soil samples collected from the treated soil. The attached letter from OHI describes the analyses and includes the associated laboratory data sheets.

If you have any questions or require further information, please feel free to contact me at (503) 240-3478.

Sincerely,

PACIFIC NORTHERN ENVIRONMENTAL

Joseph A. Sturza
Environmental Engineer

Wayne M. Coppel
Portland Branch Manager

enclosures

cc: Tim Mace / Reynolds Metals Company

JAS/C:\letters\ryndoea.wp

OREGON HYDROCARBON, INC.
9333 NORTH HARBORGATE STREET • P.O. BOX 83685 PORTLAND, OR 97283 (503) 735-9525 FAX (503) 240-1712

RECEIVED
JUL 27 1992

July 13, 1992

REYNOLDS METALS CO.
P.O. BOX 1238
LONGVIEW, WA 98632

Dear Mr. MACE,

This letter is to certify that all contaminated soil shipped to Oregon Hydrocarbon, Inc. on Bill of Lading number(s) W2BVT-1 through W2BVT-7 have been thermally treated.

Analysis of the treated soil was conducted by an independent laboratory using Oregon DEQ TPH-HCID test. The enclosed certificate of analysis shows total petroleum hydrocarbon (TPH) in milligrams per kilogram (mg/kg), which approximates parts per million.

As determined by the Oregon Department of Environmental Quality, the Oregon action level for hydrocarbon contaminated soil is 40 mg/kg TPH for gasoline and 100 mg/kg TPH for diesel and other heavier chains of hydrocarbons. Any soil contaminated with hydrocarbons below these state levels is considered environmentally safe. The Oregon Hydrocarbon Inc. standard of treatment consistently exceeds Oregon's state action level.

We thank you for this opportunity to be of service to you. Should you have any further questions, please feel free to call me at any time.

Sincerely,

Lexus E. Johnson
General Manager

enclosure

AMTEST

AmTest Inc.
Professional Analytical Services
8205 S.W. Nimbus
Beaverton, OR 97008
Tel: 503 292 0654

ANALYSIS REPORT

C
L Myron Banek
I Oregon Hydrocarbon, Inc.
E P.O. Box 83686
N Portland OR 97283
T

Date Revised: 7/13/92
Date Received: 6/24/92
Date Analyzed: 6/24/92
Date Reported: 6/25/92
Job Number: 17603-4

Sample Type - Soil

Analysis - TPH-HCID

Lab Number	Client Identification	Results Gasoline	Diesel	Other*	Surrogate** % Recovery
17603	12-W2BVT02BWF02BUF	ND	ND	ND	- /117
17604	13-02BQT	ND	ND	ND	81/114
Lab Blank	6/24/92	ND	ND	ND	80/81

ND = None Detected

Detection Limits: Gasoline - 20 mg/Kg; Diesel - 50 mg/Kg
*Higher boiling petroleum products
**Trifluorotoluene/p-terphenyl

Reported By ____

QA Check ____

for Greg Bolt
Laboratory Manager

Attachment B

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Northwest
Project: Ostrander/Reynolds/#0542-002.01
Sample Matrix: Soil

Date Collected: 8/1/94
Date Received: 8/1/94
Date Extracted: 8/5/94
Service Request: K944608

BTEX
EPA Methods 5030/8020

						Ethyl-	Total
			Analyte:	Benzene	Toluene	benzene	Xylenes
			Units:	mg/kg(ppm)	mg/kg(ppm)	mg/kg(ppm)	mg/kg(ppm)
			Method Reporting Limit:	0.05	0.1	0.1	0.1
Sample Name		**Lab Code**	**Date Analyzed**				
South Wall-1-4.5	SW	K944608-001	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
South Wall-2-4.5	SE	K944608-002	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
East Wall-1-4.5	E	K944608-003	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
North Wall-1-4.5	NW	K944608-004	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
North Wall-2-4.5	NE	K944608-005	8/6/94	0.1	<0.2(a)	0.4	1.2
West Wall-1-4.5	W	K944608-006	8/6/94	<0.1(a)	<0.2(a)	<0.2(a)	<0.2(a)
Method Blank		K940805-SB	8/6/94	ND	ND	ND	ND
Cleanup				0.5	40	20	20

a MRL is elevated because of the low percent solids in the sample as received.

Approved By ______________________ Date ____________

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	8/1/94
Project:	Ostrander/Reynolds/#0542-002.01	**Date Received:**	8/1/94
Sample Matrix:	Soil	**Date Extracted:**	8/5/94
		Date Analyzed:	8/6/94
		Service Request:	K944608

Surrogate Recovery Summary
BTEX
EPA Methods 5030/8020

Sample Name	**Lab Code**	**Spike Level** Units: µg/L (ppb)	**Percent Recovery** 4-Bromofluorobenzene
South Wall-1-4.5	K944608-001	3.7	75
South Wall-2-4.5	K944608-002	4.6	71
East Wall-1-4.5	K944608-003	4.2	60
North Wall-1-4.5	K944608-004	3.7	66
North Wall-2-4.5	K944608-005	3.8	67
West Wall-1-4.5	K944608-006	3.8	52(a)
Method Blank	K940805-SB	2.5	87

CAS Acceptance Limits: 59-137

a Outside of acceptance limits due to matrix affects.

Approved By ______________________ Date __________

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	8/1/94
Project:	Ostrander/Reynolds/#0542-002.01	**Date Received:**	8/1/94
Sample Matrix:	Soil	**Date Extracted:**	8/5/94
		Date Analyzed:	8/6/94
		Service Request:	K944608

Gasoline Range Organics
Total Petroleum Hydrocarbons as Gasoline
Washington DOE method WTPH-G
Units: mg/Kg (ppm)

Sample Name	Lab Code	MRL	Result
South Wall-1-4.5	K944608-001	5	47(a)
South Wall-2-4.5	K944608-002	5	<10(b)
East Wall-1-4.5	K944608-003	5	<10(b)
North Wall-1-4.5	K944608-004	5	<10(b)
North Wall-2-4.5	K944608-005	5	34
West Wall-1-4.5	K944608-006	5	<10(b)
Method Blank	K940805-SB	5	ND
Cleanup level			100

a Quantified as gasoline. The sample contained components that eluted in the gasoline range, but the chromatogram did not match the typical gasoline fingerprint.

b MRL is elevated because of the low percent solids in the sample as received.

Approved By ______________________ Date __________

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	8/1/94
Project:	Ostrander/Reynolds/#0542-002.01	**Date Received:**	8/1/94
Sample Matrix:	Soil	**Date Extracted:**	8/5/94
		Date Analyzed:	8/6/94
		Service Request:	K944608

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Gasoline
Washington DOE method WTPH-G

Sample Name	**Lab Code**	**Spike Level** Units: mg/Kg (ppm)	**Percent Recovery** 4-Bromofluorobenzene
South Wall-1-4.5	K944608-001	3.7	87
South Wall-2-4.5	K944608-002	4.6	78
East Wall-1-4.5	K944608-003	4.2	64
North Wall-1-4.5	K944608-004	3.7	76
North Wall-2-4.5	K944608-005	3.8	81
West Wall-1-4.5	K944608-006	3.8	57
Method Blank	K940805-SB	2.5	94

CAS Acceptance Limits: 52-140

Approved By ______________________ Date __________

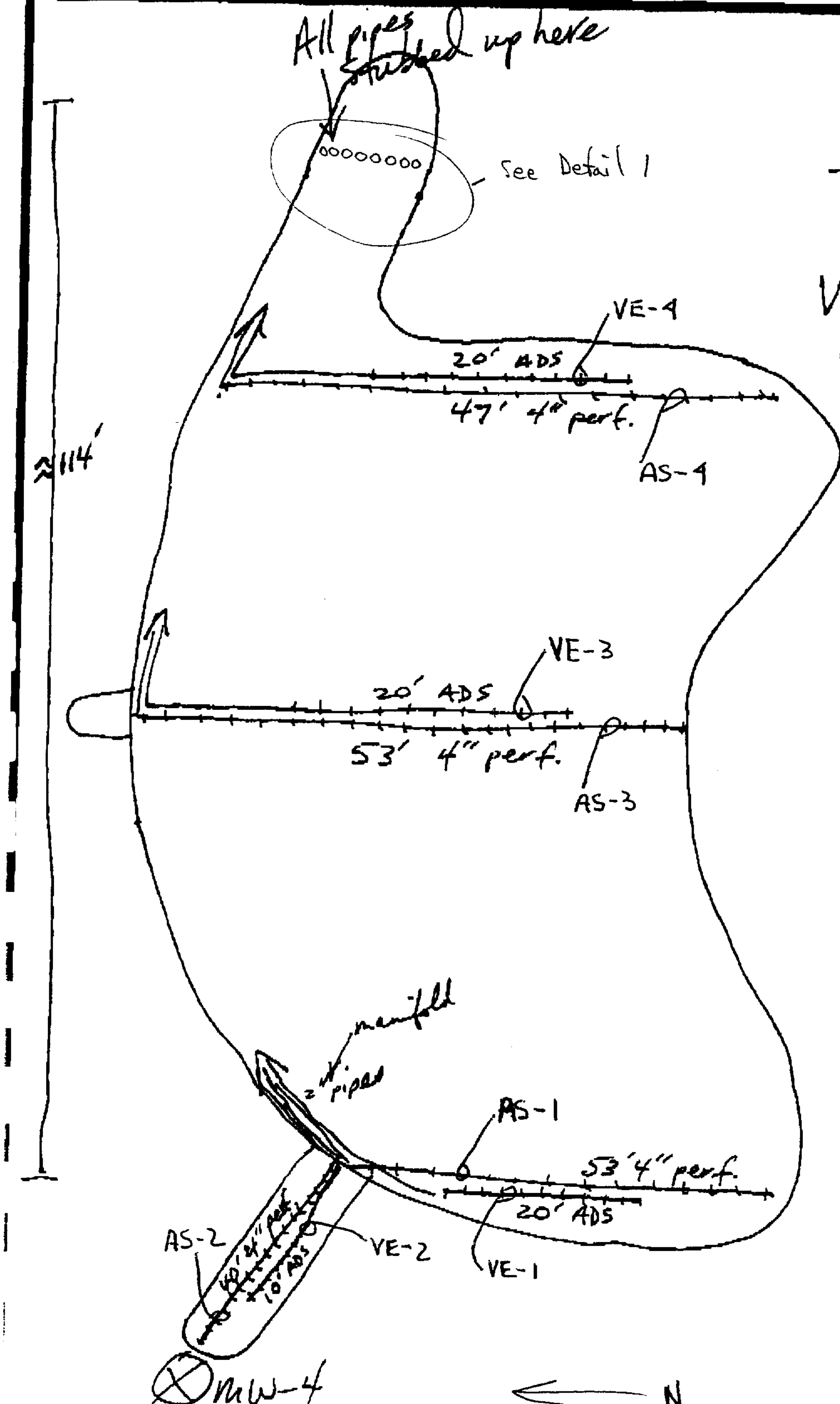
Attachment C

COMPUTATION SHEET

PROJECT TITLE: Reynolds site PROJECT NO: ______

DESCRIPTION: Installation comp. N 8-11-94 SHEET ____ OF ____

PREP. BY: MDS DATE: 7/28/94 CHKD BY: ______ DATE: ______

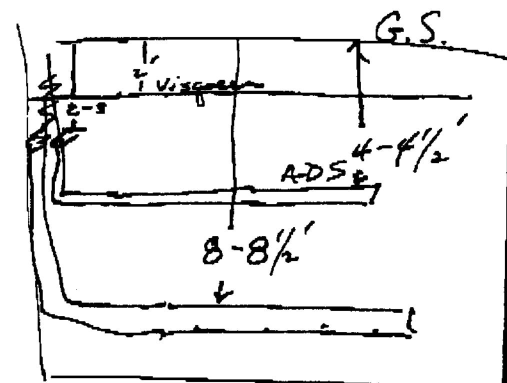


all the way to where it stubs out.

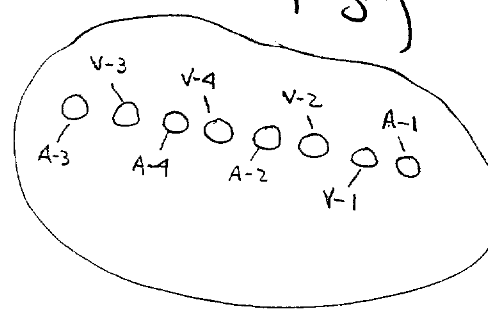
1° slope back to ADS lines to allow condensate drainage

Visqueen at 2' bgs (above all piping)

Label each pipe (VE-1, AS-1, VE-2, AS-2, etc.)



VE = Vapor Extraction
AS = Air Sparging



Detail 1

Attachment D

Columbia Analytical Services Inc.

August 24, 1994

Service Request No.: K944825

Tim Mace
Reynolds Metals Company
Reduction Plant
4029 Industrial Way
P. O. Box 999
Longview, WA 98632

Re: **Reynolds Cable Plant Project**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on August 10, 1994. Preliminary results were transmitted via facsimile on August 23, 1994. For your reference, these analyses have been assigned our service request number K944825.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Athie Spielman for

Lynda A. Huckestein
Project Chemist

LAH/sam

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

Acronyms

ASTM	American Society for Testing and Materials
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
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Date Received:**	08/10/94
Project:	Reynolds Cable Plant	**Date Analyzed:**	08/16/94
Sample Matrix:	Soil	**Work Order No.:**	K944825

Solids, Total
EPA Method Modified 160.3
Percent (%)

Sample Name	**Lab Code**	**Result**
G1-810	K944825-001	82.7
G2-810	K944825-002	74.8
G3-810	K944825-003	76.6
G4-810	K944825-004	83.3
G5-810	K944825-005	83.5
G5-810	K944825-005Dup	85.5

Approved by Alvi Spielman Date 8/24/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K944825
Project:	Reynolds Cable Plant	**Date Collected:**	8/10/94
Sample Matrix:	Soil	**Date Received:**	8/10/94
		Date Extracted:	8/15/94
		Date Analyzed:	8/16,18/94

BTEX
EPA Methods 5030/8020
mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**
	Method Reporting Limit:	0.05	0.1	0.1	0.1
Sample Name	**Lab Code**				
G1-810	K944825-001	ND	ND	ND	ND
G2-810	K944825-002	ND	ND	ND	ND
G3-810	K944825-003	ND	ND	ND	ND
G4-810	K944825-004	ND	ND	ND	ND
G5-810	K944825-005	ND	ND	ND	ND
Method Blank	K940815-SB	ND	ND	ND	ND

Approved By: allie Apruma   Date: 8/24/94

4A/061694
K944825.XLS - 4A 8/24/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Date Collected:**	08/10/94
Project:	Reynolds Cable Plant	**Date Received:**	08/10/94
Sample Matrix:	Soil	**Date Extracted:**	08/15/94
		Date Analyzed:	08/16,18/94
		Work Order No.:	K944825

Total Petroleum Hydrocarbons as Gasoline
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name	**Lab Code**	**MRL**	**Result**
G1-810	K944825-001	5	ND
G2-810	K944825-002	5	ND
G3-810	K944825-003	5	ND
G4-810	K944825-004	5	ND
G5-810	K944825-005	5	ND
Method Blank	K940815-SB	5	ND

Approved by Ami Apiebno Date 8/24/94

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Reynolds Metals Company	**Date Collected:**	08/10/94
Project:	Reynolds Cable Plant	**Date Received:**	08/10/94
Sample Matrix:	Soil	**Date Extracted:**	08/15/94
		Date Analyzed:	08/16,18/94
		Work Order No.:	K944825

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Gasoline
Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Spike Level** μg/L (ppb)	**Percent Recovery** 4-Bromofluorobenzene
G1-810	K944825-001	62	79
G2-810	K944825-002	62	74
G3-810	K944825-003	62	80
G4-810	K944825-004	62	81
G5-810	K944825-005	62	86
Method Blank	K940815-SB	62	107

CAS Acceptance Criteria 52-140

Approved by athé Apielma Date 8/24/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Reynolds Metals Company	**Date Collected:**	08/10/94
Project:	Reynolds Cable Plant	**Date Received:**	08/10/94
Sample Matrix:	Soil	**Date Extracted:**	08/15/94
		Date Analyzed:	08/16,18/94
		Work Order No.:	K944825

Surrogate Recovery Summary
BTEX
EPA Methods 5030/8020

Sample Name	**Lab Code**	**Spike Level** μg/L (ppb)	**Percent Recovery** 4-Bromofluorobenzene
G1-810	K944825-001	62	70
G2-810	K944825-002	62	66
G3-810	K944825-003	62	74
G4-810	K944825-004	62	72
G5-810	K944825-005	62	75
Method Blank	K940815-SB	62	92

CAS Acceptance Criteria 59-137

Approved by alli Spielman Date 8/24/94

Columbia Analytical Services inc.

1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

K4825

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 8-10-94 PAGE 1 OF 1

000009

PROJECT NAME Reynolds Cable Plant

PROJECT MNGR. T. R. Mace

COMPANY/ADDRESS 4029 Industrial Way
Longview, WA 98632

PHONE 636-8288

SAMPLERS SIGNATURE T.R. Mace

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐ Oregon 418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH - HCID	TCLP Metals ☐ VOA ☐ Semi VOA ☐ Pest/Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO4, PO4, F, Br NO2, NO3 (circle)	NH3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020			REMARKS
G1-810	8-10-94	1:40pm	K4825-1	Soil	1						X											
G2-810	"	1:45pm	2	"	"						X											
G3-810	"	1:47pm	3	"	"						X											
G4-810	"	1:53pm	4	"	"						X											
G5-810	"	1:56pm	5	"	"						X											

RELINQUISHED BY:	RECEIVED BY:
Signature T.R. Mace	Signature D Storms
Printed Name T. R. Mace	Printed Name D Storms
Firm RMC	Firm CAS
Date/Time	Date/Time 8/10/94 1435

TURNAROUND REQUIREMENTS:

___ 24 hr ___ 48 hr X 5 day

___ Standard (~ 10-15 working days)

___ Provide Verbal Preliminary Results

___ Provide FAX Preliminary Results

Requested Report Date ___

REPORT REQUIREMENTS

X I. Routine Report

___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)

___ III. Data Validation Report (includes All Raw Data)

___ IV.CLP Deliverable Report

INVOICE INFORMATION:

P.O. # 5819 WA

Bill to: Reynolds Metals

SAMPLE RECEIPT:

Shipping VIA: ___

Shipping #: ___

Condition: ___

Lab No.: K94-4825

RELINQUISHED BY:	RECEIVED BY:
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

Columbia Analytical Services inc.

September 7, 1994

Service Request No.: K945245

Tim Mace
Reynolds Metals Company
Reduction Plant
4029 Industrial Way
P. O. Box 999
Longview, WA 98632

Re: **Reynolds Cable Plant Project**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on August 29, 1994. Preliminary results were transmitted via facsimile on September 6, 1994. For your reference, these analyses have been assigned our service request number K945245.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,
Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Project Chemist

LAH/rr

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
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
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K945245
Project:	Reynolds Cable Plant	**Date Collected:**	8/29/94
Sample Matrix:	Soil	**Date Received:**	8/29/94
		Date Extracted:	8/31/94
		Date Analyzed:	8/31,9/1/94

BTEX and Total Petroleum Hydrocarbons (TPH) as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.05	0.1	0.1	0.1	5
Sample Name	**Lab Code**					
G6-829	K945245-001	ND	ND	ND	ND	ND
G7-829	K945245-002	ND	ND	ND	ND	ND
Method Blank	K940831-SB	ND	ND	ND	ND	ND

Approved By: Lynda Huckestein Date: 9/8/94

5A/061694
5245GBTX.XLS - 5A 9/7/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Reynolds Metals Company	**Service Request:**	K945245
Project:	Reynolds Cable Plant	**Date Collected:**	8/29/94
Sample Matrix:	Soil	**Date Received:**	8/29/94
		Date Extracted:	8/31/94
		Date Analyzed:	8/31,9/1/94

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons (TPH) as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
G6-829	K945245-001	75	81
G7-829	K945245-002	73	75
Method Blank	K940831-SB	76	86
CAS Acceptance Limits:		59-137	52-140

Approved By: Lynda Huckestein Date: 9/8/94

SUR2/060194
5245GBTX.XLS - SUR2 9/7/94

Columbia Analytical Services inc.

1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 8-29-94 PAGE 1 OF 1

PROJECT NAME Reynolds Cable Plant

PROJECT MNGR. T. R. Mace

COMPANY/ADDRESS 4029 Industrial Way Longview, WA 98632

PHONE 636-8288

SAMPLERS SIGNATURE T. R. Mace

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐ Oregon 418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH - HCID	TCLP Metals ☐ VOA ☐ Semi ☐ VOA ☐ Pest/Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO4, PO4, F, Br, NO2, NO3 (circle)	NH3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020			REMARKS
G6-829	8-29-94	11:25am	K945-1	Soil	1						X											
G7-829	8-29-94	11:30am	-2	"	1						X											

RELINQUISHED BY:
Signature: T. R. Mace
Printed Name: T. R. Mace
Firm:
Date/Time:

RECEIVED BY:
Signature: [illegible]
Printed Name: [illegible]
Firm: CAS
Date/Time: 8/29/94 1210

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr X 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP, MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. # 5819 WA
Bill to: Reynolds Metals

SAMPLE RECEIPT:
Shipping VIA:
Shipping #:
Condition:
Lab No.: K945245

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:
Pls. FAX results 636-8197

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

400-05

Columbia Analytical Services Inc.

October 3, 1994

Service Request No.: K945760

Tim Mace
Reynolds Metals Company
Reduction Plant
4029 Industrial Way
P. O. Box 999
Longview, WA 98632

Re: **Reynolds Cable Plant Project**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on September 21, 1994. For your reference, these analyses have been assigned our service request number K945760.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,
Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Project Chemist

LAH/rr

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
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
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K945760
Project:	Reynolds Cable Plant	**Date Collected:**	9/21/94
Sample Matrix:	Soil	**Date Received:**	9/21/94
		Date Extracted:	9/21/94
		Date Analyzed:	9/22,23/94

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.0.5	0.1	0.1	0.1	5
Sample Name	**Lab Code**					
G1-9	K945760-001	ND	ND	ND	ND	ND
G2-9	K945760-002	ND	ND	ND	ND	ND
G3-9	K945760-003	ND	ND	ND	ND	ND
G4-9	K945760-004	ND	ND	ND	ND	ND
G5-9	K945760-005	ND	ND	ND	ND	ND
Method Blank	K940921-SB	ND	ND	ND	ND	ND

Approved By: _________________ Date: 9/28/94

5A/061694
5760PHC.JW1 - 5A 9/29/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Reynolds Metals Company	**Service Request:**	K945760
Project:	Reynolds Cable Plant	**Date Collected:**	9/21/94
Sample Matrix:	Soil	**Date Received:**	9/21/94
		Date Extracted:	9/21/94
		Date Analyzed:	9/22,23/94

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 1,4-DFB (PID - BTEX)	**Percent Recovery** 1,4-DFB (PID - BTEX)
G1-9	K945760-001	81	82
G2-9	K945760-002	82	83
G3-9	K945760-003	78	83
G4-9	K945760-004	74	78
G5-9	K945760-005	78	83
G2-9	K945760-002D	82	83
G5-9	K945760-005MS	85	110
Laboratory Control Sample	K940921-SL	100	120
Method Blank	K940921-SB	100	102
	CAS Acceptance Limits:	51-133	51-133

Approved By: ____________ Date: 9/28/94

SUR2/060194
5760PHC.JW1 - SUR2 9/29/94

Columbia Analytical Services inc.
1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 9-21-94 PAGE 1 OF 1

PROJECT NAME Reynolds Cable Plant #
PROJECT MNGR. T. R. Mace
COMPANY/ADDRESS 4029 Industrial Way
Longview, WA 98632
PHONE 636-8288
SAMPLERS SIGNATURE T. R. Mace

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐ Oregon 418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH - HCID	TCLP Metals ☐ VOA ☐ Semi VOA ☐ Pest ☐ Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br, NO_2, NO_3 (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 8020			REMARKS
G1-9	9-21-94	11:25am	K5760-1	Soil	1						X											
~~G2-9~~																						
G2-9	"	11:32am	2	"	"						X											
G3-9	"	11:38am	3	"	"						X											
G4-9	"	11:44am	4	"	"						X											
G5-9	"	11:50am	5	"	"						X											

RELINQUISHED BY:
Signature: T. R. Mace
Printed Name: T. R. Mace
Firm: RMC
Date/Time: 9-21-94

RECEIVED BY:
Signature: [illegible]
Printed Name: [illegible] K. Hawn
Firm: CAS
Date/Time: 9-21-94 17:22

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr X 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ______

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. # 5819 WA
Bill to: Reynolds Metals C

SAMPLE RECEIPT:
Shipping VIA: ______
Shipping #: ______
Condition: ______
Lab No.: K94-5760

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:
Pls FAX results to 636-8197

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

400-05

000015

Columbia Analytical Services inc.

October 3, 1994

Service Request No.: K945844

Tim Mace
Reynolds Metals Company
Reduction Plant
4029 Industrial Way
P. O. Box 999
Longview, WA 98632

Re: **Reynolds Metals Co. Cable Plant Project**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on September 23, 1994. Preliminary results were telephoned on October 3, 1994. For your reference, these analyses have been assigned our service request number K945844.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,
Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Project Chemist

LAH/rr

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

Acronyms

ASTM	American Society for Testing and Materials
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
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K945844
Project:	Reynolds Metals Co. Cable Plant	**Date Collected:**	9/23/94
Sample Matrix:	Soil	**Date Received:**	9/23/94
		Date Extracted:	9/26/94
		Date Analyzed:	9/27/94

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G
Units: mg/Kg (ppm)
Dry Weight Basis

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.05	0.1	0.1	0.1	5
Sample Name	**Lab Code**					
G6-923	K945844-001	ND	ND	ND	ND	ND
G7-923	K945844-002	ND	ND	ND	ND	ND
Method Blank	K940926-SB	ND	ND	ND	ND	ND

Approved By: ______________________ Date: 10/3/94

5A/061694
5844GBTX.XLS - 5A 10/3/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Reynolds Metals Company	**Service Request:**	K945844
Project:	Reynolds Metals Co. Cable Plant	**Date Collected:**	9/23/94
Sample Matrix:	Soil	**Date Received:**	9/23/94
		Date Extracted:	9/26/94
		Date Analyzed:	9/27/94

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 1,4-DFB (PID - BTEX)	**Percent Recovery** 1,4-DFB (FID - GAS)
G6-923	K945844-001	93	90
G7-923	K945844-002	91	92
Method Blank	K940926-SB	98	105
CAS Acceptance Limits:		51-133	51-133

Approved By: ______________________ Date: 10/3/94

SUR2/060194
5844GBTX.XLS - SUR2 10/3/94

Columbia Analytical Services inc.
1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 9-23-94 PAGE 1 OF 1

PROJECT NAME Reynolds Metals Co Cable Plant
PROJECT MNGR. T. R. Mace
COMPANY/ADDRESS 4029 Industrial Way
Longview, WA 98632
PHONE 636-8288
SAMPLERS SIGNATURE T. R. Mace

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐ Oregon 418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH - HCID	TCLP Metals ☐ VOA ☐ Semi VOA ☐ Pest/Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3 (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020			REMARKS
G6-923	9-22-94	12:10pm		Soil	1						X											
G7-923	"	12:16pm		"	"						X											

RELINQUISHED BY:
T. R. Mace
Signature
T. R. Mace
Printed Name
RMC
Firm
9-23-94 / 12:53
Date/Time

RECEIVED BY:
[illegible]
Signature
[illegible]
Printed Name
CAS
Firm
9-23-94 1253
Date/Time

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr X 5 day
___ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ______

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. # 5819 WA
Bill to: Reynolds Metals Co

SAMPLE RECEIPT:
Shipping VIA:
Shipping #:
Condition:
Lab No.:

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:
Pls FAX results to 636-8197
Dray ticket # 09369

Attachment E

EMCON
603 Royal Street West • P.O. Drawer B • Kelso, Washington 98626-0079 • (360) 423-3580 • Fax (360) 423-7518

January 25, 1996
Project 40133-001.007

Mr. Timothy R. Mace
Reynolds Metal Company
P. O. Box 999
Longview, Washington 98632

Re: 1995 Annual Groundwater Monitoring Report, Reynolds Cable Plant, Longview, Washington

Dear Mr. Mace:

EMCON is pleased to submit this letter report describing the results of the 1995 groundwater monitoring activities conducted at the Reynolds Metals Company (Reynolds) Cable Plant. The site is located at 4393 Industrial Way in Longview, Washington (Figure 1). The objectives of the monitoring and sampling activities were to determine groundwater quality and groundwater flow directions beneath the site.

SCOPE OF WORK

The field activities completed by EMCON on March 27, June 29, September 15, and December 15, 1995, are listed below.

- Measured depth to groundwater in all on-site monitoring wells
- Collected groundwater samples from on-site monitoring wells
- Collected and drummed monitoring well purge water for disposal by Reynolds personnel

Groundwater

Depth to groundwater measurements were collected using a Slope Indicator brand electronic well probe, and were measured from known reference elevations marked on the top of each PVC well riser. The measuring probe was decontaminated between each well using methanol and distilled water rinses, respectively.

Depth to water measurements were converted to groundwater elevations based on well elevation surveys conducted by Pacific Northern Geoscience (PNG) during previous site investigation work. The elevations of the wells were based on an arbitrary site datum of 4.79 feet (MW-1) referenced to the top of the PVC casing.

Sample Collection

Monitoring wells were purged using polyethylene disposable bailers attached to nylon string. A minimum of three well casing volumes of water was removed from each well with field measurements (pH, temperature, and specific conductance) recorded after removing each well volume.

Samples were collected with polyethylene disposable bailers equipped with low-flow emptying devices to minimize aeration of the sample. Samples were stored in cooled shipping containers and delivered to Columbia Analytical Services, Inc., in Kelso, Washington, under chain of custody documentation. Field Sampling Data Sheets for each sampling event are included in Appendix A.

Quantitative Chemical Analyses

Samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using USEPA Method 8020 and total petroleum hydrocarbons as gasoline (TPH-G) using Washington Department of Ecology Method WTPH-G. Select samples (MW-4 and MW-7) were analyzed for BTEX using USEPA Method 8260 during the June 29, 1995, monitoring event.

RESULTS

Groundwater

During 1995, depths to groundwater in the wells ranged from 3.04 (MW-6) to 8.28 (MW-9) feet below the top of the PVC riser (approximate ground surface). Water table elevations fluctuated 2.11 to 2.75 feet due to seasonal effects between the September 1995 and December 1995 sampling events. The lowest elevation occurred during September and the highest elevation occurred during December. The general groundwater flow direction beneath the site was consistently to the south-southwest at an average horizontal hydraulic gradient of approximately 0.06 feet/foot. Groundwater measurements are presented in Table 1 and groundwater elevation contour maps for each monitoring event are presented in Figures 2, 3, 4, and 5.

Quantitative Chemical Results

For each sampling event, toluene, ethylbenzene, total xylenes, and TPH as gasoline were not detected in any of the samples from any of the wells at concentrations above the method reporting limits (MRLs). Benzene was detected in samples from MW-4, MW-6, and MW-7. Benzene concentrations in the samples from MW-4, MW-6, and MW-7 ranged from 9.7 to 66.6 micrograms per liter (µg/L), less than 0.5 to 3.0 µg/L, and 60.5 to 150 µg/L, respectively.

Conclusions

EMCON believes that surface water cleanup levels should apply to the groundwater beneath the site because 1) the groundwater discharges into the surface water drainage ditch and 2) the groundwater will probably not be used as a drinking water source. The MTCA Method B cleanup level for benzene concentrations in surface water is 71 μg/L.

If you have any questions, please call Mike Staton at (206) 485-5000 or Tim Haderly at (360) 423-3580.

Sincerely,

EMCON

Timothy J. Haderly
Project Manager

for Michael D. Staton
Project Director

Attachments: Limitations
Table 1 - Groundwater Measurements
Table 2 - Groundwater Sample Analytical Results
Figure 1 - Site Location Map
Figure 2 - Water Table and Elevation Contour Map (3/27/95)
Figure 3 - Water Table and Elevation Contour Map (6/29/95)
Figure 4 - Water Table and Elevation Contour Map (9/15/95)
Figure 5 - Water Table and Elevation Contour Map (12/15/95)
Appendix A - Field Sampling Data Sheets
Appendix B - Analytical Reports and Chain of Custody Forms

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

Table 1

Groundwater Measurements
Reynolds Metals Company Cable Plant
Longview, Washington

Well	Date	Reference Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[3]
MW-1	10/15/92	4.79	7.30	-2.51
	10/19/92		7.25	-2.46
	11/6/92		6.91	-2.12
	11/11/92		6.73	-1.94
	12/9/92		5.80	-1.01
	12/18/92		5.52	-0.73
	3/11/93		6.78	-1.99
	3/23/93		6.60	-1.81
	6/7/93		6.22	-1.43
	Well abandoned on July 28, 1994.			
MW-2	10/15/92	3.56	5.84	-2.28
	10/19/92		5.75	-2.19
	11/6/92		5.40	-1.84
	11/11/92		5.32	-1.76
	12/9/92		4.71	-1.15
	12/18/92		4.59	-1.03
	3/11/93		4.76	-1.20
	3/23/93		5.51	-1.95
	6/7/93		5.53	-1.97
	Well abandoned on July 28, 1994.			
MW-3	10/15/92	3.71	6.24	-2.53
	10/19/92		6.17	-2.46
	11/6/92		5.84	-2.13
	11/11/92		5.75	-2.04
	12/9/92		5.15	-1.44
	12/18/92		5.07	-1.36
	3/11/93		5.90	-2.19
	3/23/93		5.71	-2.00
	6/7/93		5.65	-1.94
	Well abandoned on July 28, 1994.			

Table 1

Groundwater Measurements
Reynolds Metals Company Cable Plant
Longview, Washington

Well	Date	Reference Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[3]
MW-4	10/15/92	2.69	5.40	-2.71
	10/19/92		5.33	-2.64
	11/6/92		4.99	-2.30
	11/11/92		5.00	-2.31
	12/9/92		4.54	-1.85
	12/18/92		4.42	-1.73
	3/11/93		5.17	-2.48
	3/23/93		4.83	-2.14
	6/7/93		4.99	-2.30
	3/27/95		4.30	-1.61
	6/29/95		5.16	-2.47
	9/15/95		5.79	-3.10
	12/15/95		3.38	-0.69
MW-5	10/15/92	5.34	4.89	0.45
	10/19/92		8.16	-2.82
	11/6/92		7.74	-2.40
	11/11/92		7.62	-2.28
	12/9/92		6.72	-1.38
	12/18/92		6.51	-1.17
	3/11/93		6.71	-1.37
	3/23/93		8.10	-2.76
	6/7/93		6.54	-1.20
	3/27/95		5.92	-0.58
	6/29/95		6.62	-1.28
	9/15/95		7.53	-2.19
	12/15/95		5.37	-0.03

Table 1

Groundwater Measurements
Reynolds Metals Company Cable Plant
Longview, Washington

Well	Date	Reference Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[3]
MW-6	10/15/92	2.31	4.85	-2.54
	10/19/92		4.81	-2.50
	11/6/92		4.48	-2.17
	11/11/92		4.39	-2.08
	12/9/92		3.86	-1.55
	12/18/92		3.79	-1.48
	3/11/93		4.69	-2.38
	3/23/93		4.33	-2.02
	6/7/93		4.54	-2.23
	3/27/95		3.83	-1.52
	6/29/95		4.79	-2.48
	9/15/95		5.44	-3.13
	12/15/95		3.04	-0.73
MW-7	3/11/93	2.12	4.71	-2.59
	3/23/93		4.34	-2.22
	6/7/93		4.72	-2.60
	3/27/95		3.98	-1.86
	6/29/95		4.76	-2.64
	9/15/95		5.32	-3.20
	12/15/95		3.21	-1.09
MW-8	3/11/93	4.02	6.15	-2.13
	3/23/93		5.97	-1.95
	6/7/93		6.11	-2.09
	3/27/95		5.16	-1.14
	6/29/95		6.50	-2.48
	9/15/95		6.80	-2.78
	12/15/95		4.05	-0.03
MW-9	3/11/95	5.35	7.28	-1.93
	3/23/93		7.15	-1.80
	6/7/93		6.82	-1.47
	3/27/95		6.40	-1.05
	6/29/95		7.32	-1.97
	9/15/95		8.28	-2.93
	12/15/95		4.65	0.70

NOTE:
1 Reference elevation relative to a arbitrary site datum (MW-1) established on October 14, 1992.
2 Distance from established reference elevation marked on top of PVC well riser to water table.
3 Water table elevation relative to arbitrary site datum (MW-1) of 4.79 feet.

Table 2

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Sample Collector	Benzene[1] (µg/L)	Toluene[1] (µg/L)	Ethylbenzene[1] (µg/L)	Total Xylenes[1] (µg/L)	TPH as Gasoline[2] (µg/L)	Dissolved Lead[3] (µg/L)	Total Lead[3] (µg/L)
MTCA Method B Cleanup Levels[5]			71	200,000	29,000	NL[6]	10,000[7]	NL[6]	3.2
MW-1	10/19/92	PNG	71.4	2	29	9	550	NA	5
	3/11/93	PNG	1	ND	10	ND	190	ND	ND
	Well abandoned on July 28, 1994.								
MW-2	10/19/92	PNG	1840	46	136	222	1910	NA	38
	3/11/93	PNG	1500	41	200	271	2100	ND	14.3
	Well abandoned on July 28, 1994.								
MW-3	10/19/92	PNG	718	7	28	75	738	NA	42
	3/11/92	PNG	1400	15.0	49.0	114.0	1400	ND	10.4
	Well abandoned on July 28, 1994.								
MW-4	10/19/92	PNG	55.1	ND	ND	1	ND	NA	39
	3/11/93	PNG	110	ND	ND	ND	ND	ND	9.9
	3/27/95	EMCON	65.5	ND	ND	ND	ND	NA	NA
(Duplicate)	3/27/95	EMCON	63.5	ND	ND	ND	ND	NA	NA
	6/29/95	EMCON	41[4]	ND[4]	ND[4]	ND[4]	ND	NA	NA
	9/15/95	EMCON	64.4	ND	ND	ND	ND	NA	NA
(Duplicate)	9/15/95	EMCON	66.6	ND	ND	ND	ND	NA	NA
	12/15/95	EMCON	9.7	ND	ND	ND	ND	NA	NA
MW-5	10/19/92	PNG	ND	2	1	7	ND	NA	166
	3/11/93	PNG	ND	ND	ND	ND	ND	ND	ND
	3/27/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	6/29/95	EMCON	NS	NS	NS	NS	NS	NS	NS
	9/15/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	12/15/95	EMCON	ND	ND	ND	ND	ND	NA	NA

Table 2

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Sample Collector	Benzene[1] (µg/L)	Toluene[1] (µg/L)	Ethylbenzene[1] (µg/L)	Total Xylenes[1] (µg/L)	TPH as Gasoline[2] (µg/L)	Dissolved Lead[3] (µg/L)	Total Lead[3] (µg/L)
MTCA Method B Cleanup Levels[5]			71	200,000	29,000	NL[6]	10,000[7]	NL[6]	3.2
MW-6	10/19/92	PNG	ND	ND	ND	ND	ND	ND	17
	3/11/93	PNG	ND	ND	ND	ND	ND	ND	5.2
	3/27/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	6/29/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	9/15/95	EMCON	1.0	ND	ND	ND	ND	NA	NA
	12/15/95	EMCON	3.0	ND	ND	ND	ND	NA	NA
MW-7	3/11/93	PNG	2	ND	ND	ND	ND	ND	ND
	3/27/95	EMCON	121	ND	ND	ND	ND	NA	NA
	6/29/95	EMCON	78[4]	ND[4]	ND[4]	ND[4]	ND	NA	NA
(Duplicate)	6/29/95	EMCON	72[4]	ND[4]	ND[4]	ND[4]	ND	NA	NA
	9/15/95	EMCON	60.5	ND	ND	ND	ND	NA	NA
	12/15/95	EMCON	150	ND	ND	ND	ND	NA	NA
(Duplicate)	12/15/95	EMCON	148	ND	ND	ND	ND	NA	NA
MW-8	3/11/93	PNG	ND	ND	ND	ND	ND	ND	ND
	3/27/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	6/29/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	9/15/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	12/15/95	EMCON	ND	ND	ND	ND	ND	NA	NA

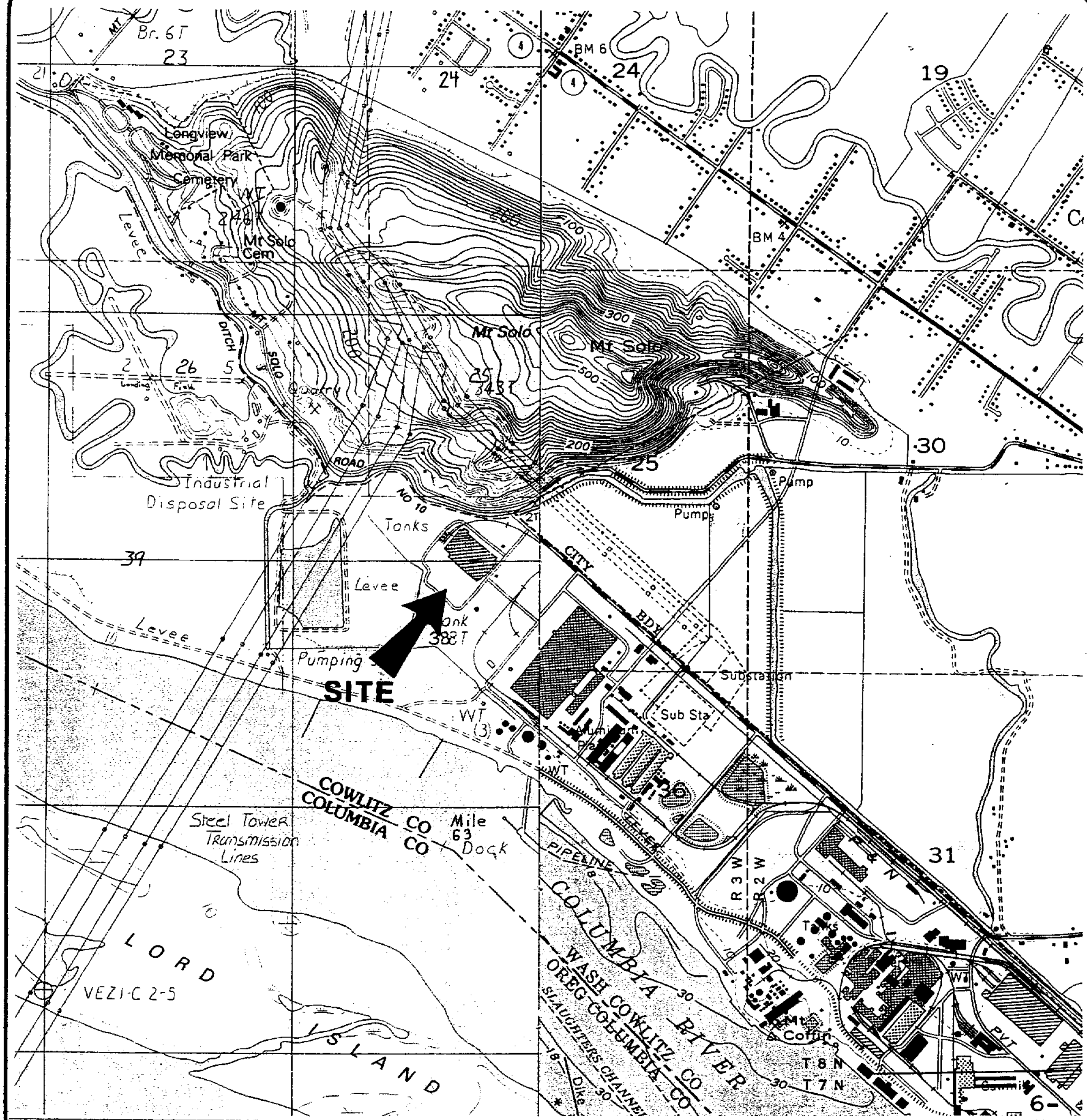
Table 2

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Sample Collector	Benzene[1] (µg/L)	Toluene[1] (µg/L)	Ethylbenzene[1] (µg/L)	Total Xylenes[1] (µg/L)	TPH as Gasoline[2] (µg/L)	Dissolved Lead[3] (µg/L)	Total Lead[3] (µg/L)
MTCA Method B Cleanup Levels[5]			71	200,000	29,000	NL[6]	10,000[7]	NL[6]	3.2
MW-9	3/11/95	PNG	ND	ND	ND	ND	ND	ND	ND
	3/27/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	6/29/95	EMCON	NS	NS	NS	NS	NS	NA	NS
	9/15/95	EMCON	ND	ND	ND	ND	ND	NA	NA
	12/15/95	EMCON	NS	NS	NS	NS	NS	NS	NS

NOTE: ND = Not detected at or above laboratory method reporting limit.
NS = Not sampled
NA = Not analyzed for particular analyte.
Shaded values exceed MTCA Method A Cleanup levels.
PNG = Pacific Northern Geoscience.
µg/L = Approximates parts per billion (ppb) concentrations.

1 BTEX (USEPA Method 8020).
2 Total petroleum hydrocarbons as gasoline (Ecology Method WTPH-G).
3 Total and dissolved lead (USEPA Method 7421).
4 BTEX (USEPA Method 8260).
5 Chapter 173-340 WAC, "The Model Toxics Control Act Cleanup Regulations, Method B Cleanup Levels for Surface Water". Amended December 1993. Includes federal water quality criteria to protect humans eating aquatic organisms (WQA, 40 CFR 131.36).
6 There is no Method B Surface Water cleanup level for total xylenes and dissolved lead.
7. Ecology, 1987. Discharges containing oil and grease of mineral origin. Water Quality 9, September.



Base Map From: U.S.G.S. 7.5 minute topographic quadrangles Kelso, Washington, 1970 and Coal Creek, Washington, 1985.

0 2000 4000

SCALE IN FEET

N

EMCON

DATE 12/95
DWN. MMM
APPR. TJH
REVIS.
PROJECT NO.
40133-001.007

Figure 1
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON

SITE LOCATION MAP

PLOT 1=1 G:\DWG\0133\001\007\KE007G08.dwg 1-3-95

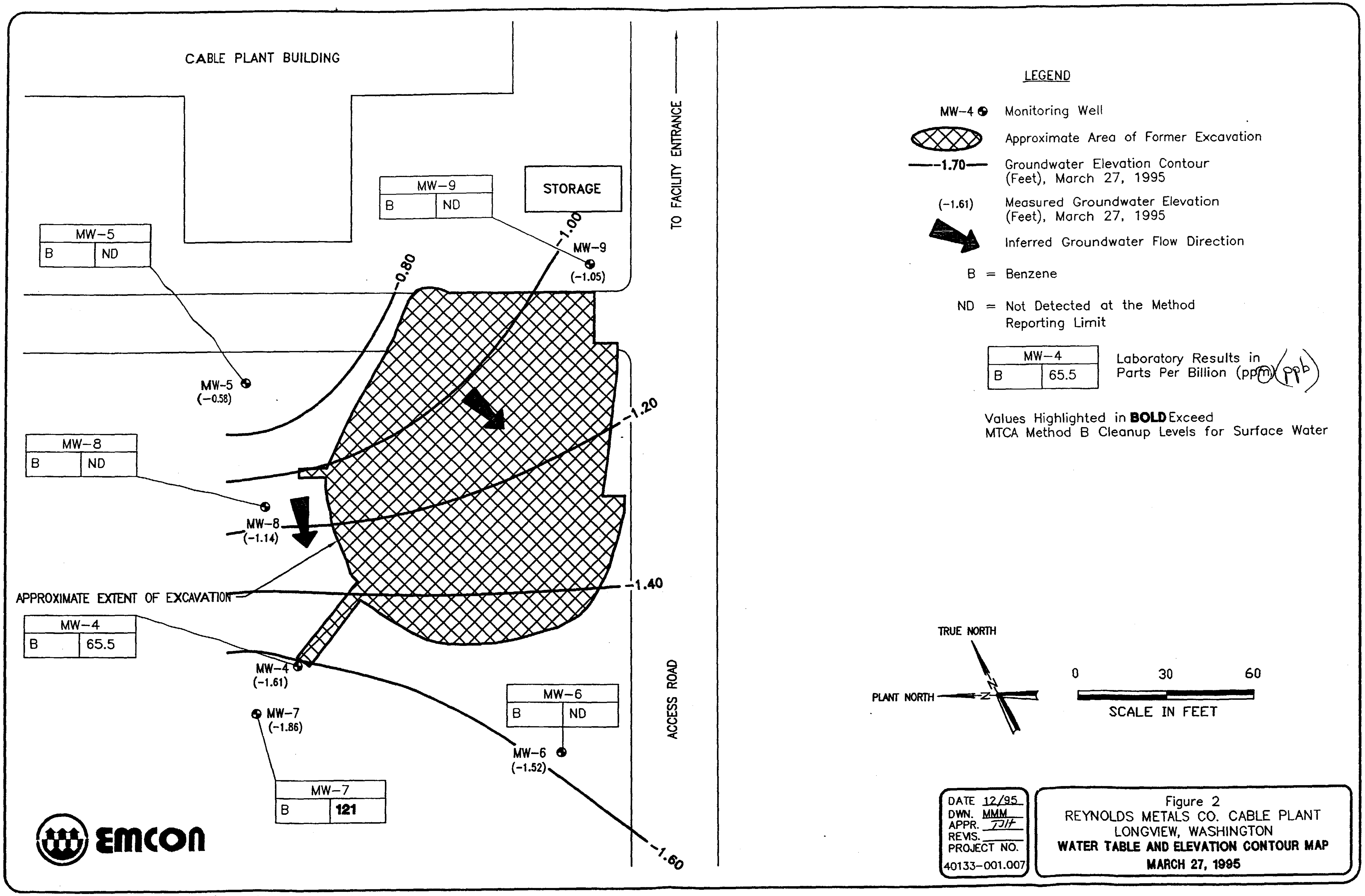


Figure 2
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE AND ELEVATION CONTOUR MAP
MARCH 27, 1995

PLOT 1=30 G:\DWG\0133\001\007\KE007G02.dwg 1-23-96

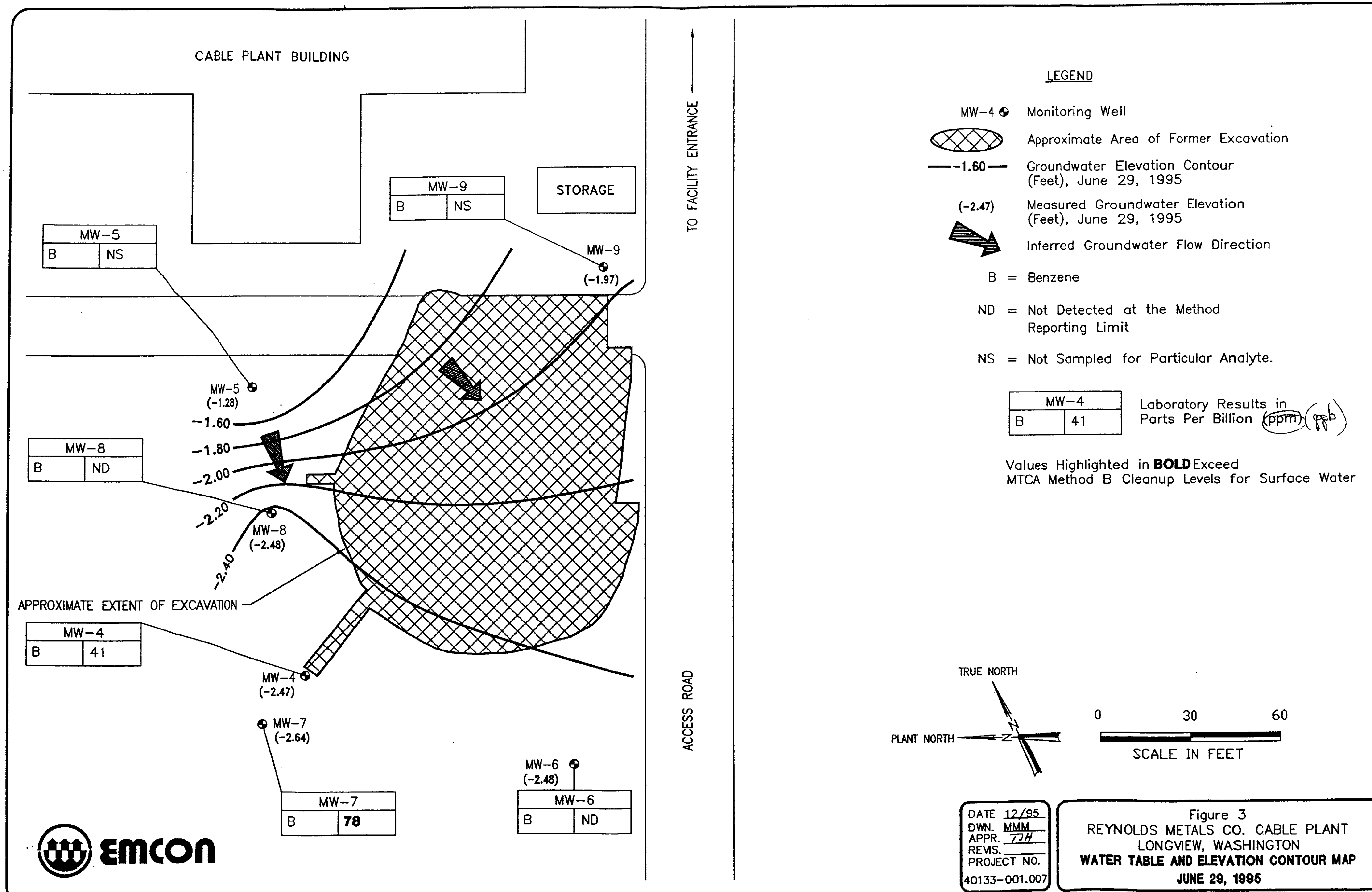
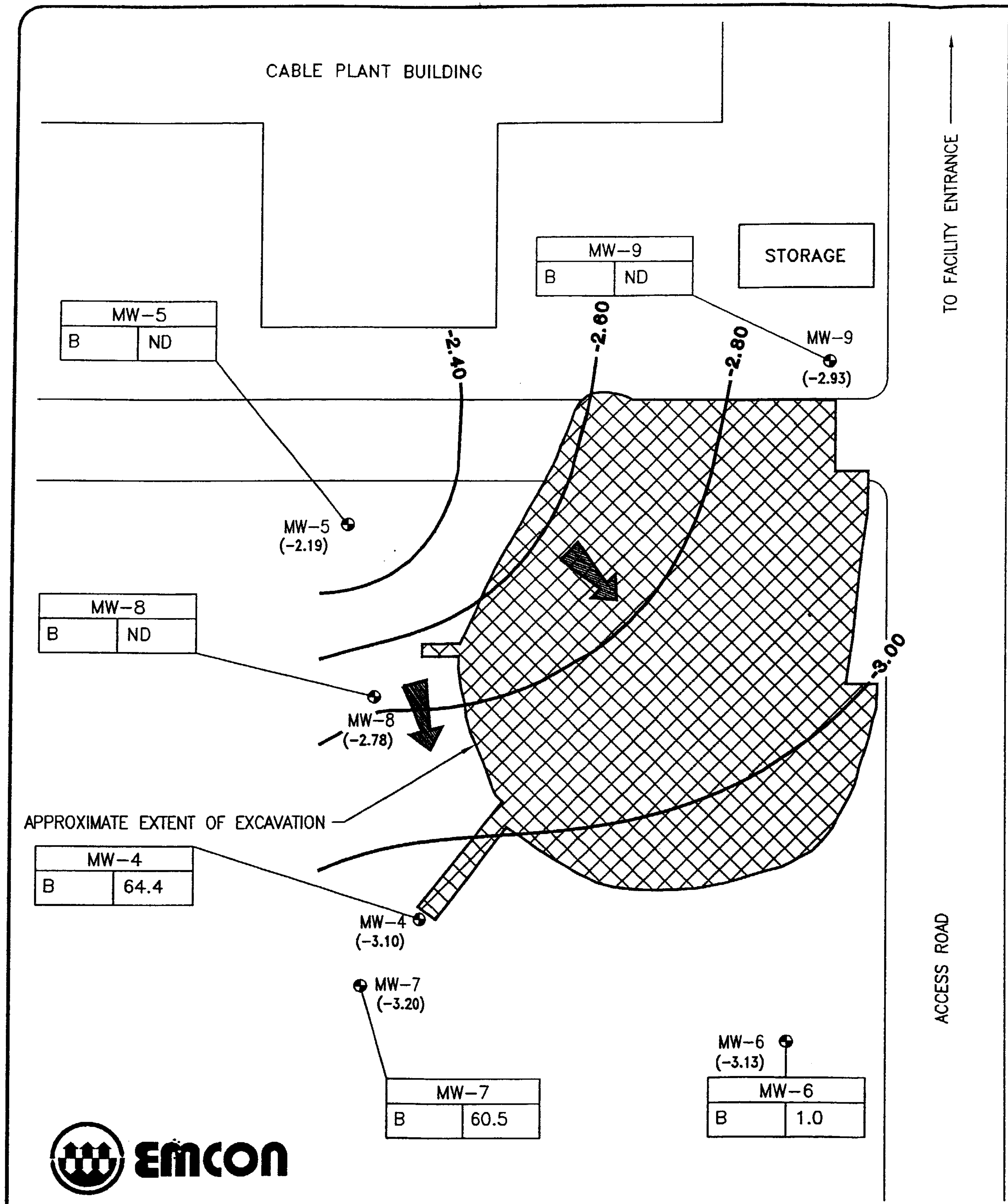


Figure 3
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE AND ELEVATION CONTOUR MAP
JUNE 29, 1995

PLOT 1=30 G:\DWG\0133\001\007\KE007G03.dwg 1-9-96



EMCON

LEGEND

MW-4 ⊕ Monitoring Well

Approximate Area of Former Excavation

—-2.40— Groundwater Elevation Contour (Feet), September 15, 1995

(-3.10) Measured Groundwater Elevation (Feet), September 15, 1995

Inferred Groundwater Flow Direction

B = Benzene

ND = Not Detected at the Method Reporting Limit

MW-4	
B	64.4

Laboratory Results in Parts Per Billion (ppm) ppb

Values Highlighted in **BOLD** Exceed MTCA Method B Cleanup Levels for Surface Water

TRUE NORTH

PLANT NORTH

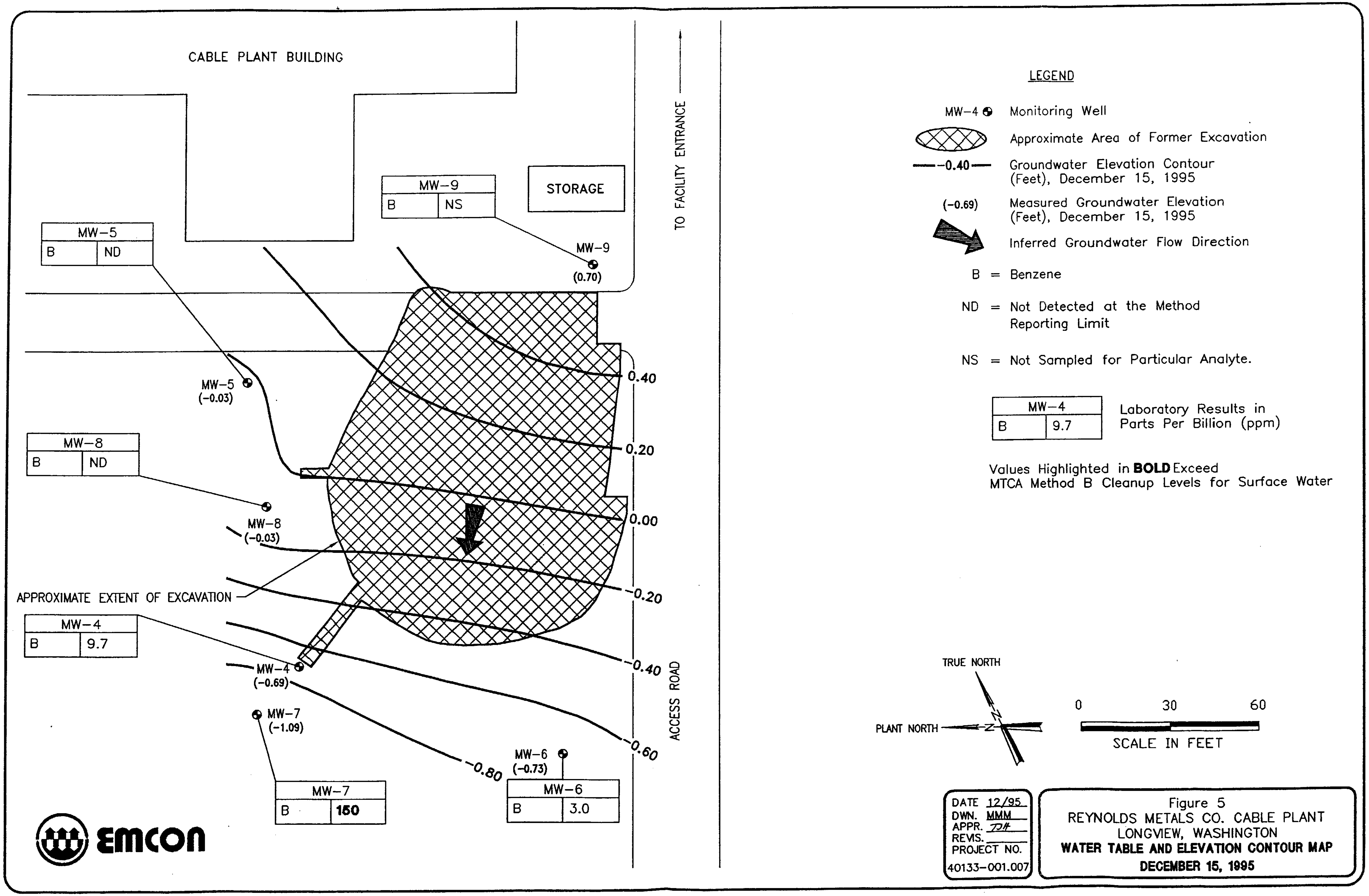
0 30 60

SCALE IN FEET

DATE 12/95
DWN. MMM
APPR. TJH
REVIS.
PROJECT NO.
40133-001.007

Figure 4
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE AND ELEVATION CONTOUR MAP
SEPTEMBER 15, 1995

PLOT 1=30 G:\DWG\0133\001\007\KE007G04.dwg 1-9-96



PLOT 1=30 G:\DWG\0133\001\007\KE007G05.dwg 1-9-95

APPENDIX A

FIELD SAMPLING DATA SHEETS

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Metals
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-4
Sample Designation RC4/3-27-95
Date, Time
Weather Sun ~70°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
4.30		3-27-95 1014	Slope Indicator

WELL EVACUATION: 1.5 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4.5	~~4.5~~ 3	Disposable Bailer		3-27-95 1542-1547

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

	Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preserva-tive	Iced (yes,no)
3	VOC	3-27-95 1550	Disp Bailer	40ml	Clear Glass	5-6	NO	HCL	yes

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse*
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	meter	13.6		687
3	malfunction	13.7		687

NOTES:

Well Cap Has bolts NOT locked

medium brown, silty

LAB: CAS SAMPLERS: Lynn Simpson / Ross Hobert

Total # of Bottles 3 Signature: Lynn Simpson

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Metals
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-5
Sample Designation RC2/3-27-95
Date, Time 3-27-95
Weather Sun ~70°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
5.92		3-27-95 1021	Slope Indicator

WELL EVACUATION: 1.3 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
~~26~~				3-27-95 1512-1518
4	3	Disposable Bailer		

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
TOC	3-27-95 1515	Disp Bailer	40ml	Clear Glass	6-9	NO	HCL	Yes

~~Sampler Cleaning Method~~
~~Non-Phosphatic detergent wash~~
~~H20 rinse~~
~~MeOH rinse*~~
~~Distilled H20 rinse~~
~~*Hexane rinse if oily~~

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	meter	14.5		473
3	malfunction	14.5		486

NOTES:

Well ~~Flush with~~ Cap bolted on but unlocked

LAB: CAS **SAMPLERS:** Lynn Simpson / Ross Hebert

Total # of Bottles: 3 Signature: Lynn Simpson

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Metals
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-#6
Sample Designation RC6/3-27-95
Date, Time
Weather Sun ~70°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
~~[illegible]~~ 3.83		3-27-95 ~~1029~~ 1035	Slope Indicator

WELL EVACUATION: 1.6 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4.8	3	Disp Bailer	—	3-27-95 1620

Surface Water Flow Speed________, Measurement Method________, Date, Time________

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	3-27-95 1630	Disp Bailer	40ml	Clear Glass	4-6	NO	HCL	Yes

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	meter	14.0		1138
3	malfunction	14.1		1167

NOTES:

well cap is bolted NOT locked - possible dirt and surface water run off - mud on well rim - and inside casing. slightly silty, pale grey in color improper bolt size for cap - needs 9/16" -

LAB: CAS SAMPLERS: Lynn Simpson / Russ Hebert

Total # of Bottles: 3 Signature: Lynn Simpson

EMCON

Field Sampling Data

Well or Surface Site Number: MW-7
Sample Designation: RCS/3-27-95
Date, Time:
Weather: Sun ~70°F

LOCATION/ADDRESS: Reynolds Metals
PROJECT NAME:
CLIENT/CONTACT:

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
3.98		3-27-95 1008	Slope Indicator

WELL EVACUATION: 1.6 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4.8	3	Disposable Bailer		3-27-95 1602-1609

Surface Water Flow Speed: , Measurement Method: , Date, Time:

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	3-27-95 1610	Disp Bailer	40ml	Clear Glass	4-6	No	HCl	Yes

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	meter	13.9		1145
3	malfunction	13.6		1135

NOTES:

dtb= well cap is bolted in place (NOT Locked)
Foamy when bailed - Lt brown, clear

LAB: CAS   SAMPLERS: Lynn Simpson / Russ Hobett

Total # of Bottles: 3   Signature: Lynn Simpson

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds metals
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-8
Sample Designation RC3/3-27-95
Date, Time
Weather Sun 70°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
5.16		3-27-95 1019	Slope Indicator

WELL EVACUATION: 1.4 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4.5	3	Disposable bailer		3-27-95 1525-1530

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	3-27-95 1535	Disp Bailer	40ml	Clear Glass	6-9	NO	HCl	yes

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	meter	14.7		1008
3	malfunction	14.6		974

NOTES:

Well Cap is bolted but not locked

LAB: CAS
SAMPLERS: Lynn Simpson / Ross Hebert
Total # of Bottles: 3
Signature: Lynn Simpson

EMCON

Field Sampling Data

Well or Surface Site Number MW-~~8~~ 9
Sample Designation RC1/3-27-95
Date, Time 3-27-95
Weather Sun

LOCATION/ADDRESS Reynolds Metals
PROJECT NAME
CLIENT/CONTACT

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
~~3.83~~		3-27-95 ~~1035~~	Slope Indicator
6.40		1029	

WELL EVACUATION: ~~X61.2~~ Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
~~3.2~~	~~2~~	Disposable Bailer	—	3-27-95 1435 TO
5	4			

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time 1450	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	3-27-95	Disp.		Clear Glass	6.5-9.5	NO	HCL	YES
	1450	Bailer	40ml					

Sampler Cleaning Method: ~~Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily~~

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	~~6~~	15.5		x190
34	meter	15.4		181
	malfunction			

NOTES:

Well Flush mount - Bolted down - NO Locks

LAB: CAS
SAMPLERS: Lynn Simpson / Ross Hebert
Total # of Bottles 3
Signature: Lynn Simpson

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable plant
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-4
Sample Designation MW-62995-4
Date, Time 6/29/95 10:17
Weather Clear, Sunny 80°

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
5.16		6/29/95 9:30	Slope Indicator w/p

WELL EVACUATION: 1.3 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4	3	Disposable Bailer		6/29/95 10:33

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preserva-tive	Iced (yes,no)
3 VOC	6/29/95 1035	Disposable Bailer	40	Clear Glass	~12	No	HCL	Yes

Sampler Cleaning Method: Non-Phosphate detergent w H2O rinse, MeOH rinse, Distilled H2O rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	6.68	15.8		550
2	6.65	15.2		563
3	6.60	15.4		552

NOTES:

Heavy Silt, Brown/Black in color, ~~Red~~ dtb = 13.36 + 0.24 = 13.60
NO odor

Bottles 3

SAMPLERS: Russ Hebert

EMCON

Field Sampling Data

Well or Surface Site Number MW-6
Sample Designation MW062995-6
Date, Time 6/29/95
Weather

LOCATION/ADDRESS Reynolds Cable plant
PROJECT NAME
CLIENT/CONTACT

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
4.79		6/29/95	slope Indicator w/p
		9:35	

WELL EVACUATION: 1.5 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4.5	3	Disposable		6/29/95
		Bailer		11:25

Surface Water Flow Speed ____ Measurement Method ____ Date, Time ____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	6/29/95	Disposable	40	Clear Glass	~10	NO	HCL	yes
	1130	Bailer						

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse *
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c⁰)	Conductivity (uS/cm)	Conductivity @ 25⁰ (uS/cm)				
1	6.62	15.8		1331				
2	6.61	15.5		1304				
3	6.55	15.2		1304				

NOTES:

Clear, slightly silty no odor   dtb = 13.80 + 0.24 = 14.04

Bottles 3

SAMPLERS: Russ Hobart

EMCON

Field Sampling Data

Well or Surface Site Number MW-7 ✯
Sample Designation MW0000895-7
Date, Time 6/29/95
Weather Clear Sunny 80°

LOCATION/ADDRESS Reynolds Cable plant
PROJECT NAME
CLIENT/CONTACT

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
4.76		6/29/95 9:33	Slope Indicator w/l

WELL EVACUATION: 1.3 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	~~Rinse Method~~	Date, Time
4	3	Disposable Bailer		6/29/95

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preserva-tive	Iced (yes,no)
3 VOC	6/29/95 1100	Disposable Bailer	40	Clear Glass	~11	No	HCL	yes

~~Sampler Cleaning Method: Non-Phosphate detergent w H20 rinse, MeOH rinse, Distilled H2O rinse, *Hexane rinse if oily~~

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	~~Conductivity (uS/cm)~~	Conductivity @ 25° (uS/cm)
1	6.69	16.2		1479
2	6.65	15.5		1368
3	6.56	15.4		1330

NOTES:

Clear, Slightly Silty, Slight Odor   dtb: 12.92 + 0.24 = 13.16

✯ Duplicate MW-10
@ 1110

SAMPLERS: Russ Hobet

emcon

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable plant
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-8
Sample Designation MW 06/29/95-8
Date, Time 6/29/95
Weather Clear, sunny 75°

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
6.50		6/29/95 9:28	Slope Indicator w/p

WELL EVACUATION: 1.2 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
3.8	3	Disposable Bailer		6/29/95 10:00

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	6/29/95 10:05	Disposable Bailer	40	Clear Glass	~13	NO	Hcl	yes

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse*
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	6.72	16.9		883
2	6.71	16.1		870
3	6.60	15.7		861

NOTES:

dtw = 14.13 + 0.24 = 14.37

Slightly silty, pale grey, No odor

Bottles 3

LAB: CAS SAMPLERS: Russ Hebert [signature]

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable Plant
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-4
Sample Designation MW-4/9/15/95
Date, Time 9/15/95 1431
Weather Sunny

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
5.79		9/15/95	
		1432	

WELL EVACUATION: 1.2 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
3.6	3	Disposable		9/15/95
		Bailer		1640

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
3 VOAS	9/15/95	Disp.	40	G. Glass	8	N	HCl	Y
	1645	Bailer						

Sampler Cleaning Method: Non-Phosphate detergent; H20 rinse; MeOH rinse; Distilled H20 rinse; *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	6.70	17.6		585
3	6.73	17.5		570

NOTES:

Grey, Silty, No odor

dtb = 13.30 + 0.24 = 13.54

Duplicate # mw-3/9/15/95

@ 1700

LAB: CAS SAMPLERS: Russ Hebert

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable Plant
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number mw-5
Sample Designation mw-5 9/15/95
Date, Time 9/15/95 1420
Weather Sunny

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
7.53		9/15/95	
		1421	

WELL EVACUATION: 1.0 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
3	3	Disposable		9/15/95
		Bailer		1525

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preserva-tive	Iced (yes,no)
(-) VOA	9/15/95	Disp.	40	C. Glass	9	N	HCl	Y
	1530	Bailer						

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse*
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	6.44	17.9		494
3	6.64	17.9		495

NOTES:

Heavy Silt, Grey, No odor

dtb = 14.03 + 0.24 = 14.27

LAB: CAS SAMPLERS: Russ Hebert

EMCON

Field Sampling Data

Well or Surface Site Number: mw-6
Sample Designation: mw-6/9/15/95
Date, Time: 9/15/95 1425
Weather: Sunny

LOCATION/ADDRESS: Reynolds Cable Plant
PROJECT NAME:
CLIENT/CONTACT:

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
5.44		9/15/95	

WELL EVACUATION: 1.3 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4	3	Disposable Bailer		9/15/95 1625

Surface Water Flow Speed: Measurement Method: Date, Time:

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
3 VOA	9/15/95 1630	Disp. Bailer	40	C. Glass	8	N	HCl	Y

Sampler Cleaning Method: Non-Phosphate detergent wash, H20 rinse, MeOH rinse, Distilled H20 rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	6.17	17.6		684
3	6.20	17.4		672

NOTES:

Grey, slightly silty, No odor

dtb = 13.63 - 0.24 = 13.87

LAB: CAS

SAMPLERS: Russ Hobart

emcon

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable Plant
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW - 7
Sample Designation MW - 7/9/15/95
Date, Time 9/15/95 1428
Weather Sunny

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
5.32		9/15/95	
		1429	

WELL EVACUATION: 1.2 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
3.6	3	Disposable		9/15/95
		Bailer		1605

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOA	9/15/95	Disp.	40	C. Glass	8	N	HCl	Y
	1608	Bailer						

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse*
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)				
2	6.03	18.3		735				
3	6.24	17.5		702				
4	6.10	17.8		672				

NOTES:

Some Silt
Some odor dtb > 12.86 + 0.24 = 13.10

LAB: CAS SAMPLERS: Rue Hebert.

emcon

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable Plant
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-8
Sample Designation MW-8/9/15/95
Date, Time 9/15/95 1425
Weather Sunny

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
6.80		1425	
		1426	

WELL EVACUATION: 1.2 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
3.6	3	Disposable		9/15/95
		Bailer		1545

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preserva-tive	Iced (yes,no)
VOA	9/15/95	Bailer	40	C. Glass	8	N	HCl	Y
	1550							

Sampler Cleaning Method: Non-Phosphate detergent, H20 rinse, MeOH rinse, Distilled H rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	6.15	18.8		783
3	6.27	18.2		758

NOTES:

Grey, Silty, No Odor

dth = 14.08 + 0.24 = 14.32

LAB: CAS SAMPLERS: Russ Hebert

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable
PROJECT NAME
CLIENT/CONTACT

Well or Surface Site Number MW-9
Sample Designation MW-9/9/15/95
Date, Time 9/15/95 1415
Weather Sunny

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
9.24		9/15/95	
		1417	

WELL EVACUATION: 1.0 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
3	3	Disposable		9/15/95
		Bailer		1453

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOA	9/15/95 1455	D Bailer	40	Clearglass		No	HCL	Yes

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily.

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
2	6.45	17.1		385
3	6.38	16.6		352

NOTES:

Clear, No color, No silt, No odor

dtb = 14.32 + 0.24 =
14.56

LAB: CAS SAMPLERS: Russ Hebert

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable
PROJECT NAME
CLIENT/CONTACT Tim mace

Well or Surface Site Number MW-4
Sample Designation MW4-121595
Date, Time 12/15/95
Weather

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
3.39	/	12/15/95	
	/	1332	

WELL EVACUATION: 1.6 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
5	3	Disposable	/	12/15/95
		Bailer	/	

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
3 VOC	12/15/95 1445	Disposable Bailer	40	Clear/Glass	~5	NO	HCL	YES

Sampler Cleaning Method
Non-Phosphatic detergent was
H20 rinse
MeOH rinse*
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)				
1	6.02	15.7	/	548				
2	6.05	16.2	/	560				
3	6.08	16.4	/	563				

NOTES:
LT grey, Slightly silty, No odor
dtb = 13.06 + 0.24 = 13.30

LAB: CAS
SAMPLERS: Russ Hebert
D. HTA

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable
PROJECT NAME
CLIENT/CONTACT Tim Marc

Well or Surface Site Number MW-5
Sample Designation MW-5-121595
Date, Time 12/15/95
Weather

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
5.37		12/15/95	
		1322	

WELL EVACUATION: 1.4 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4.5	3	Disposable		12/15/95
		Bailer		

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
3 VOC	12/15/95	Disposable	40	Clear glass	~	No	HCL	yes
	1540	Bailer						

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	5.85	16.0		429
2	6.16	16.7		459
3	6.28	16.7		462

NOTES:

LT Grey, LT silt, No odor.

dtb = 13.89 + 0.24 = 14.13

LAB: CAS

SAMPLERS: Russ Hibert

EMCON

Field Sampling Data

LOCATION/ADDRESS Reynolds Cable
PROJECT NAME
CLIENT/CONTACT Tim mare

Well or Surface Site Number MW-6
Sample Designation MW6-121595
Date, Time 12/15/95
Weather

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
3.64		12/15/95 1343	

WELL EVACUATION: 1.7 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
5.5	3	Disposable Bailer		12/15/95 1400

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
3 VOC	12/15/95 1405	Disposable Bailer	40	Clear glass	~4	No	HCL	Yes

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse*
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	6.01	15.0		863
2	6.10	16.1		886
3	6.10	16.7		855

NOTES:
LT Grey, No odor, No silt.
dtb = 13.54 + 0.24 = 13.74

LAB: CAS
2

SAMPLERS: Russ Hebert
RR, HA

EMCON

Field Sampling Data

Well or Surface Site Number: MW-7 ☆
Sample Designation: MW 7 - 121595
Date, Time: 12/15/95
Weather:

LOCATION/ADDRESS: Reynolds Cable
PROJECT NAME:
CLIENT/CONTACT: Tim Marc

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
X3.21		12/15/95 1336	

WELL EVACUATION: 1.6 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
5	3	Disposable Bailer		12/15/95

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
3 VOC	12/15/95 1420	Disposable Bailer	40	Clear Glass	~5	No	HCL	Yes

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	5.93	16.1		750
2	6.00	16.6		792
3	6.18	16.6		707

NOTES:

Clear, Colorless, No silt, No odor

dtb = 12.89 + 0.24 = 13.13

☆ Duplicate MW 10 - 121595 @ 1430

LAB: CAS

SAMPLERS: Russ Hebert

R. Hebert

EMCON

Field Sampling Data

Well or Surface Site Number mw - 8
Sample Designation mw 8 - 121595
Date, Time 12/15/95
Weather

LOCATION/ADDRESS Reynolds metals
PROJECT NAME
CLIENT/CONTACT Tim mull

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
4.05	/	12/15/95 1328	

WELL EVACUATION: 3 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
9	3	Disposable Bailer	/	12/15/95 1510

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
3 VOC	12/15/95 1515	Disposable Bailer	40	Clearless	~14	No	HCL	Yes

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse*, Distilled H20 rinse, *Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25°(uS/cm)
1	5.54	16.2	/	661
2	6.02	17.0	/	683
2.75	6.25	15.8	/	639

NOTES:

purged dry at 2.75 p/v and approx 7.5 Gal

dth = 14.09 + 0.24 = 14.33

Grey with moderate silt, No odor.

LAB: CAS

SAMPLERS: Russ Hebert, [illegible]

APPENDIX B

ANALYTICAL REPORTS AND CHAIN OF CUSTODY FORMS

Columbia Analytical Services inc.

April 10, 1995

Service Request No.: K9501795

Tim Haderly
EMCON
603 Royal Street W.
P. O. Drawer B
Kelso, WA 98626

Re: **Reynolds Cable Plant/Project #40133-001.007**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on March 28, 1995. For your reference, these analyses have been assigned our service request number K9501795.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Project Chemist

LAH/td

COLUMBIA ANALYTICAL SERVICES, Inc.

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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9501795
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	3/27/95
Sample Matrix:	Water	**Date Received:**	3/28/95
		Date Extracted:	NA
		Date Analyzed:	3/30/95

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
RC1/3-27-95 (MW-9)	K9501795-001	ND	ND	ND	ND	ND
RC2/3-27-95 (MW-5)	K9501795-002	ND	ND	ND	ND	ND
RC3/3-27-95 (MW-8)	K9501795-003	ND	ND	ND	ND	ND
RC4/3-27-95 (MW-4)	K9501795-004	65.5	ND	ND	ND	ND
RC5/3-27-95 (MW-7)	K9501795-005	121	ND	ND	ND	ND
RC6/3-27-95 (MW-6)	K9501795-006	ND	ND	ND	ND	ND
RC7/3-27-95 (MW-4 Dup)	K9501795-007	63.5	ND	ND	ND	ND
Method Blank	K950330-WB	ND	ND	ND	ND	ND

Approved By: Handanx Date: 4/8/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: Reynolds Cable Plant/#40133-001.007
Sample Matrix: Water

Service Request: K9501795
Date Collected: 3/27/95
Date Received: 3/28/95
Date Extracted: NA
Date Analyzed: 3/30,31/95

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	Lab Code	Percent Recovery 4-BFB (PID - BTEX)	Percent Recovery 4-BFB (FID - GAS)
RC1/3-27-95	K9501795-001	101	98
RC2/3-27-95	K9501795-002	103	100
RC3/3-27-95	K9501795-003	99	94
RC4/3-27-95	K9501795-004	102	93
RC5/3-27-95	K9501795-005	103	100
RC6/3-27-95	K9501795-006	101	100
RC7/3-27-95	K9501795-007	100	97
RC5/3-27-95	K9501795-005D	105	102
RC1/3-27-95	K9501795-001MS	112	-
RC2/3-27-95	K9501795-002MS	-	102
Laboratory Control Sample	K950330-WL	122	107
Method Blank	K950330-WB	105	103
	CAS Acceptance Limits:	70-122	51-143

Approved By: Uandanv Date: 4/8/95

SUR2/111594
01795PHC.LP1 - BTXwSUR 4/4/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9501795
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	3/27/95
Sample Matrix:	Water	**Date Received:**	3/28/95
		Date Extracted:	NA
		Date Analyzed:	3/30,31/95

Duplicate Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: μg/L (ppb)

Sample Name: RC5/3-27-95
Lab Code: K9501795-005

Analyte	**MRL**	**Sample Result**	**Duplicate Sample Result**	**Average**	**Relative Percent Difference**	**CAS RPD Acceptance Limit**
Benzene	0.5	121	109	115	10	30
Toluene	1	ND	ND	ND	ND	30
Ethylbenzene	1	ND	ND	ND	ND	30
Total Xylenes	1	ND	ND	ND	ND	30
Gasoline	50	ND	ND	ND	ND	30

Approved By: Wondane Date: 4/8/95

DUP1SRPD/102194
01795PHC.LP1 - BTXwDUP 4/4/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON
Project:	Reynolds Cable Plant/#40133-001.007
Sample Matrix:	Water

Service Request:	K9501795
Date Collected:	3/27/95
Date Received:	3/28/95
Date Extracted:	NA
Date Analyzed:	3/30,31/95

Matrix Spike Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

Sample Name: RC1/3-27-95
Lab Code: K9501795-001

Analyte	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**
Benzene	0.5	100	ND	90.0	90	56-129
Toluene	1	100	ND	78	78	61-126
Ethylbenzene	1	100	ND	75	75	54-132

Approved By: Uandane Date: 4/8/95

MS1S/102194
01795PHC.LP1 - BTXwMS 4/4/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9501795
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	3/27/95
Sample Matrix:	Water	**Date Received:**	3/28/95
		Date Extracted:	NA
		Date Analyzed:	3/30,31/95

Matrix Spike Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

Sample Name: RC2/3-27-95
Lab Code: K9501795-002

Analyte	**MRL**	**Spike Level**	**Sample Result**	**Spiked Sample Result**	**Percent Recovery**	**CAS Percent Recovery Acceptance Limits**
Gasoline	50	2500	ND	2040	82	52-133

Approved By: Uandamr Date: 4/8/95

MS1S/102194
01795PHC.LP1 - BTXwMS (2) 4/4/95

Analytical Services inc.

1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 3-27-95 PAGE 1 OF 1

PROJECT NAME Reynolds Cable Plant # 40133-001.007

PROJECT MNGR Tim Haderly

COMPANY/ADDRESS EMCON - Kelso

PHONE

SAMPLERS SIGNATURE Lynn Simpson

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐ Oregon 418.1 ☐	(TPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH - HCID	TCLP Metals ☐ VOA ☐ Semi ☐ Pest ☐ Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3 (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020			REMARKS
RC1/3-27-95	3-27-95	1450	K1795-1	water	3						X											
RC2/3-27-95	3-27-95	1515	-2	↓	3						X											
RC3/3-27-95	↓	1535	-3		3						X											
RC4/3-27-95		1550	-4		2						X											
RC5/3-27-95		1610	-5		3						X											
RC6/3-27-95		1630	-6		3						X											
RC7/3-27-95	↓	1600	-7	↓	1						X											

RELINQUISHED BY:
Lynn Simpson
Signature
Lynn Simpson
Printed Name
EMCON
Firm
3-28-95 1011
Date/Time

RECEIVED BY:
D Sloms
Signature
D Slorms
Printed Name
ASI
Firm
3/28/95 1010
Date/Time

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr ___ 5 day
X Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV.CLP Deliverable Report

INVOICE INFORMATION:
P.O. # ___
Bill to: ___

SAMPLE RECEIPT:
Shipping VIA: Hand Delivered
Shipping #: ___
Condition: ___
Lab No. K9501795

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

400-05

00008

Columbia Analytical Services inc.

JUL 18

c:\weekly\k9504029
July 15, 1995

Service Request No.: K9504029

Tim Haderly
EMCON
603 Royal Street W.
P. O. Drawer B
Kelso, WA 98626

Re: **Reynolds Cable Plant/Project #40133-001.007**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on June 29, 1995. For your reference, these analyses have been assigned our service request number K9504029.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Project Chemist

LAH/sm

Page 1 of ~~X~~ 10

COLUMBIA ANALYTICAL SERVICES, Inc.

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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9504029
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	6/29/95
Sample Matrix:	Water	**Date Received:**	6/29/95
		Date Extracted:	NA
		Date Analyzed:	7/7,8/95

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
MW062995-8 mw-8	K9504029-001	ND	ND	ND	ND	ND ✓
MW062995-4 mw-4	K9504029-002	-	-	-	-	ND ✓
MW062995-7 mw-7	K9504029-003	-	-	-	-	ND ✓
MW062995-10 mw-7 (dup)	K9504029-004	-	-	-	-	ND ✓
MW062995-6 mw-6	K9504029-005	ND	ND	ND	ND	ND ✓
K950706-MB	K950707-MB	ND	ND	ND	ND	ND

Approved By: [signature] Date: 7/12/95

5A/102194
04029PHC.LL1 - BTXw 7/10/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: Reynolds Cable Plant/ #40133-001.007
Sample Matrix: Water

Service Request: K9504029
Date Collected: 6/29/95
Date Received: 6/29/95
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8260
Units: µg/L (ppb)

		MW-4	MW-7	MW-7 (Dup).
	Sample Name:	**MW062995-4**	**MW062995-7**	**MW062995-10**
	Lab Code:	K9504029-002	K9504029-003	K9504029-004
	Date Analyzed:	7/12/95	7/12/95	7/12/95
Analyte	**MRL**			
Benzene	0.5	41	78(a)	72(a)
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND

a Result is from the analysis of a diluted sample, performed on 7/13/95. Dilution factor: 5.

Approved By: ________ Date: 7/19/95

K9504029.XLS - 8260rev7-18-95 7/18/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON
Project: Reynolds Cable Plant/ #40133-001.007
Sample Matrix: Water

Service Request: K9504029
Date Collected: NA
Date Received: NA
Date Extracted: NA

Volatile Organic Compounds
EPA Method 8260
Units: µg/L (ppb)

		Sample Name:	**Method Blank**
		Lab Code:	K9504029-MB
		Date Analyzed:	7/12/95
Analyte	**MRL**		
Benzene	0.5		ND
Toluene	0.5		ND
Ethylbenzene	0.5		ND
Total Xylenes	0.5		ND

a Result is from the analysis of a diluted sample, performed on 7/13/95. Dilution factor: 5.

Approved By: UAH Date: 7/19/95

K9504029.XLS - 8260rev7-18-95 (2) 7/19/95

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: Reynolds Cable Plant/#40133-001.007
Sample Matrix: Water

Service Request: K9504029
Date Collected: 6/29/95
Date Received: 6/29/95
Date Extracted: NA
Date Analyzed: 7/7,8/95

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	Lab Code	Percent Recovery 4-BFB (PID - BTEX)	Percent Recovery 4-BFB (FID - GAS)
MW062995-8	K9504029-001	88	80
MW062995-4	K9504029-002	-	83
MW062995-7	K9504029-003	-	80
MW062995-10	K9504029-004	-	80
MW062995-6	K9504029-005	92	84
K950706-MB	K950707-MB	90	85
	CAS Acceptance Limits:	69-114	65-117

Approved By: [signature] Date: 7/12/95

SUR2/111594
04029PHC.LL1 - BTXwSUR 7/12/95

Co...bia Analytical Services inc.

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CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 6/29/95 PAGE 1 OF 1 K4029

PROJECT NAME Reynolds .... #133-001.007

PROJECT MANAGER Tim ....

COMPANY/ADDRESS .... Kelso

PHONE 423 3580

SAMPLERS SIGNATURE

ANALYSIS REQUESTED: Volatile Organics 8240 8260; Volatile Organics 8020; Base/Neutral/Acid Org. 8270; Total Metals See Comments; Dissolved Metals See Comments; pH Cond TDS TSS BOD Turb Color Tanin/Lignin; COD TOC TPhos TKN NH_3; Alk, HCO_3 CO_3 Hardness; Anion Scan (Cl, SO_4, NO_3, NO_2, F); Cation Scan Diss (Ca, Mg, K, Na, Fe, Mn, Si); Anion: Cation Ratio; Bacteria T - Coliform F - Coliform; Enterococcus; Ortho Phos

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Volatile Organics 8240 8260	Volatile Organics 8020	REMARKS
MW062995-8	6/29/95	1005	K4029-1	H_2O	3		X	
MW062995-11	↓	1035	-2	↓	3	X		
MW062995-7	↓	1100	-3	↓	3	X		
MW062995-10	↓	1110	-4	↓	3	X		
MW062995-6	↓	1130	-5	↓	3		X	

RELINQUISHED BY:	RECEIVED BY:
Signature: [illegible]	Signature: [illegible]
Printed Name: [illegible]	Printed Name: [illegible]
Firm: [illegible]	Firm: CAS
Date/Time: 6/29/95 1236	Date/Time: 6/29/95 1236

TURNAROUND REQUIREMENTS
- ___ 24 hr ___ 48 hr. ___ 5 day
- X Standard (10-15 working days)
- ___ Provide Verbal Preliminary Results
- ✓ Provide FAX preliminary Results
- Requested Report Date ______

REPORT REQUIREMENTS
- ✓ I. Routine Report
- ___ II. Report (includes DUP.MS. MSD, as required, may be charged as samples)
- ___ III. Data Validation Report (includes All Raw Data)
- ___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. #:
Bill To:

SAMPLE RECEIPT:
Shipping VIA:
Shipping #:
Condition:
Lab No:

RELINQUISHED BY:	RECEIVED BY:
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

SPECIAL INSTRUCTIONS/COMMENTS: Landfill

Circle which metals are to be analyzed:

Total Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

Dissolved Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9504029
Project:	Reynolds Cable Plant/ #40133-001.007	**Date Collected:**	6/29/95
Sample Matrix:	Water	**Date Received:**	6/29/95
		Date Extracted:	NA
		Date Analyzed:	7/12/95

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8260

		Percent Recovery		
Sample Name	**Lab Code**	Dibromofluoromethane	Toluene-d_8	4-Bromofluorobenzene
MW062995-4	K9504029-002	102	99	91
MW062995-7	K9504029-003	103	99	92
MW062995-10	K9504029-004	101	99	91
Method Blank	K9504029-MB	99	100	94
	CAS Acceptance Limits:	91-117	90-110	82-119

Approved By: Lisa Gleiskopf Date: 7/14/95

SUR3/111594
04029VOA.JJ1 - 8260wSUR 7/14/95

06/30/95 14:30 ☎206 423 7518 EMCON - KELSO → CAS ☑001/001

Columbia Analytical Services inc.

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

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DATE 6/29/95 PAGE 1 OF 1

PROJECT NAME Reynolds cableplat #40133-001.007
PROJECT MANAGER Tim Hadeelz
COMPANY/ADDRESS Emcon Kelso
PHONE 423-3580
SAMPLERS SIGNATURE

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Volatile Organics 8010/8020	Volatile Organics 8260 / 8240 / 8020	Base/Neutral/Acid Org. 8270	Total Metals See Comments	Dissolved Metals See Comments	pH Cond TDS TSS BOD Turb Color Tanin/Lignin	COD TOC TPhos TKN NH_3	Alk, HCO_3 CO_3 Hardness	Anion Scan (Cl, SO_4, NO_3, NO_2, F)	Cation Scan Diss (Ca, Mg, K, Na, Fe, Mn, Si)	Anion: Cation Ratio	Bacteria T - Coliform F - Coliform	Enterococcus	Ortho Phos	WTPH - G		REMARKS
MW062995-8	6/29/95	1005		H_2O	3		X													X		Please add this analysis Thanks
MW062995-4		1035			3	X														X		
MW062995-7		1100			3	X														X		
MW062995-10		11:10			3	X														X		
MW062995-6		11:30			3		X													X		

Post-it® Fax Note 7671 | Date 6/30 | # of pages ▸ 1
To Lynda H. | From Tim H.
Co./Dept. | Co.
Phone # | Phone #
Fax # | Fax #
Please Add Analyses

RELINQUISHED BY:
Signature
Russ Hebert
Printed Name
Emcon Kelso
Firm
6/29/95 1236
Date/Time

RECEIVED BY:
Signature
Lori K. Hawn
Printed Name
CAS
Firm
6/29/95 12:35
Date/Time

TURNAROUND REQU...
___ 24 hr ___ 48 hr.
X Standard (10-15 wor...
___ Provide Verbal Prelim... Results
X Provide FAX preliminary Results
Requested Report Date ___

___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

SAMPLE RECEIPT:
...ng VIA:
Shipping #:
Condition:
Lab No: K9504029

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS: Landfill

Circle which metals are to be analyzed:

Total Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

Dissolved Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

...DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

Columbia Analytical Services Inc.

October 4, 1995

Service Request No.: K9505781

Tim Haderly
EMCON
603 Royal Street W.
P. O. Drawer B
Kelso, WA 98626

Re: **Reynolds Cable Plant Project**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on September 15, 1995. For your reference, these analyses have been assigned our service request number K9505781.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda A. Huckestein
Project Chemist

LAH/sm

cc: Tim Mace/Reynolds, Longview
Mike Staton/EMCON, Bothell

COLUMBIA ANALYTICAL SERVICES, Inc.

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
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9505781
Project:	Reynolds Cable Plant	**Date Collected:**	9/15/95
Sample Matrix:	Water	**Date Received:**	9/15/95
		Date Extracted:	NA
		Date Analyzed:	9/27-28/95

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
MW-9/9/15/95	K9505781-001	ND	ND	ND	ND	ND
MW-5/9/15/95	K9505781-002	ND	ND	ND	ND	ND
MW-8/9/15/95	K9505781-003	ND	ND	ND	ND	ND
MW-7/9/15/95	K9505781-004	60.5	ND	ND	ND	ND
MW-6/9/15/95	K9505781-005	1.0	ND	ND	ND	ND
MW-4/9/15/95	K9505781-006	64.4	ND	ND	ND	ND
MW-3/9/15/95	K9505781-007	66.6	ND	ND	ND	ND
Method Blank	K950927-MB	ND	ND	ND	ND	ND

Approved By: _______ Date: 10-3-95

5A/102194
05781PHC.LP1 - BTXw 10/3/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9505781
Project:	Reynolds Cable Plant	**Date Collected:**	9/15/95
Sample Matrix:	Water	**Date Received:**	9/15/95
		Date Extracted:	NA
		Date Analyzed:	9/27-28/95

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
MW-9/9/15/95	K9505781-001	99	68
MW-5/9/15/95	K9505781-002	98	68
MW-8/9/15/95	K9505781-003	98	67
MW-7/9/15/95	K9505781-004	99	68
MW-6/9/15/95	K9505781-005	99	68
MW-4/9/15/95	K9505781-006	99	68
MW-3/9/15/95	K9505781-007	100	67
Method Blank	K950927-MB	94	65
CAS Acceptance Limits:		69-114	65-117

Approved By: ______ Date: 10·3·95

SUR2/111594
05781PHC.LP1 - BTXwSUR 10/3/95

Columbia Analytical Services inc. 1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 9/15/95 PAGE 1 OF 1 K5781

PROJECT NAME Reynolds/cableplant #
PROJECT MANAGER Tim Haleck
COMPANY/ADDRESS Emcon Kelso
PHONE 423-3580
SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA/418.1 ☐ OR/418.1 ☐ WA/418.1 ☐	WTPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☐ *	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH/HCID ☐ OR/HCID ☐ WA/HCID ☐	TCLP Metals ☐ VOA ☐ Semi ☐ Pest ☐ Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO4, PO4, F, Br NO2, NO3 (circle)	NH3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020 ☐ (AOX) 1650A ☐			REMARKS
mw-9/9/15/95	9/15/95	1455	K5781-1	water	3						X											
mw-5/9/15/95		1530	-2		3						X											
mw-8/9/15/95		1550	-3		3						X											
mw-7/9/15/95		1608	-4		3						X											
mw-6/9/15/95		1630	-5		3						X											
mw-4/9/15/95		1645	-6		3						X											
mw-3/9/15/95	↓	1700	-7	↓	3						X											

RELINQUISHED BY: [signature] Signature; Russ Hebert Printed Name; Emcon Kelso Firm; 9/15/95 1720 Date/Time

RECEIVED BY: Ruth Higley Signature; Ruth Higley Printed Name; CAS Firm; 9/16/95 0730 Date/Time

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr. ___ 5 day
X Standard (10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX preliminary Results
Requested Report Date ______

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O.# ______
Bill To ______

SAMPLE RECEIPT:
Shipping VIA: ______
Shipping #: ______
Condition: ______
Lab No: ______

RELINQUISHED BY: Signature ______ Printed Name ______ Firm ______ Date/Time ______

RECEIVED BY: Signature ______ Printed Name ______ Firm ______ Date/Time ______

SPECIAL INSTRUCTIONS/COMMENTS:
* WTPH-G/BTEX using EPA Method 8020.

(Emcon Bothell) (Reynolds)
Please Send Copy of Report To Mike Staton & Tim Macc

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

Columbia Analytical Services inc.

RECEIVED
JAN 2 1996
KELSO OFFICE

December 29, 1995

Service Request No.: K9507815

Tim Haderly
EMCON
603 Royal Street W.
P. O. Drawer B
Kelso, WA 98626

Re: **Reynolds Cable Plant/Project #40133-001.007**

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on December 15, 1995. For your reference, these analyses have been assigned our service request number K9507815.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Project Chemist

LAH/sam

cc: Mike Staton, EMCON - Bothell
Tim Mace, Reynolds - Longview

COLUMBIA ANALYTICAL SERVICES, Inc.

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
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9507815
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	12/15/95
Sample Matrix:	Water	**Date Received:**	12/15/95.
		Date Extracted:	NA
		Date Analyzed:	12/28/95

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
MW4-121595	K9507815-001	9.7	ND	ND	ND	ND
MW5-121595	K9507815-002	ND	ND	ND	ND	ND
MW6-121595	K9507815-003	3.0	ND	ND	ND	ND
MW7-121595	K9507815-004	150	ND	ND	ND	ND
MW8-121595	K9507815-005	ND	ND	ND	ND	ND
MW10-121595	K9507815-006	148	ND	ND	ND	ND
Method Blank	K951227-WB	ND	ND	ND	ND	ND

Approved By: Kendan Date: 12/28/95

5A/102194
07815PHC.LP1 - BTXw 12/28/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9507815
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	12/15/95
Sample Matrix:	Water	**Date Received:**	12/15/95
		Date Extracted:	NA
		Date Analyzed:	12/28/95

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
MW4-121595	K9507815-001	87	83
MW5-121595	K9507815-002	86	82
MW6-121595	K9507815-003	87	84
MW7-121595	K9507815-004	89	84
MW8-121595	K9507815-005	86	81
MW10-121595	K9507815-006	90	82
Method Blank	K951227-WB	87	83
CAS Acceptance Limits:		69-114	65-117

Approved By: Ulanlew   Date: 12/28/95

SUR2/111594
07815PHC.LP1 - BTXwSUR 12/28/95

Columbia Analytical Services inc. 1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 12/15/95 PAGE 1 OF 1 K7815

PROJECT NAME Reynolds Cable #40133-001.007
PROJECT MANAGER Tim Hadeely
COMPANY/ADDRESS Emcon Kelso
PHONE 423-3580
SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA/418.1 ☐ OR/418.1 ☐ WA/418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 GAS BTEX	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH/HCID ☐ OR/HCID ☐ WA/HCID ☐	TCLP Metals ☐ VOA ☐ Semi VOA ☐ Pest/Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3 (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020 ☐ (AOX) 1650A ☐			REMARKS
MW4-121595	12/15/95	1445	K7815-1	water	3						X											
MW5-121595		1540	-2		3						X											
MW6-121595		1405	-3		3						X											
MW7-121595		1120	-4		3						X											
MW9-121595		1515	-5		3						X											
MW10-121595		1430	-6		3						X											
																						Rec'd a Trip Blank

RELINQUISHED BY:	RECEIVED BY:
[signature] Signature	[signature] Signature
Russ Hebert Printed Name	[illegible] Printed Name
Emcon Kelso Firm	CAS Firm
12/15/95 1617 Date/Time	12/15/95 1620 Date/Time

TURNAROUND REQUIREMENTS
- ___ 24 hr ___ 48 hr. ___ 5 day
- X Standard (10-15 working days)
- ___ Provide Verbal Preliminary Results
- ___ Provide FAX preliminary Results

Requested Report Date ______

REPORT REQUIREMENTS
- X I. Routine Report
- ___ II. Report (includes DUP.MS. MSD, as required, may be charged as samples)
- ___ III. Data Validation Report (includes All Raw Data)
- ___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O.# ______
Bill To ______

SAMPLE RECEIPT:
Shipping VIA: ______
Shipping #: ______
Condition: ______
Lab No: ______

RELINQUISHED BY:	RECEIVED BY:
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:
Reports to Tim Hadeely Emcon Kelso,
Mike Staton Emcon Bothell
Tim Mace Reynolds, Longview

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

400-05

Attachment F

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K9801603
Project:	Reynolds Metals Co, Cable Plant	**Date Collected:**	3/16/98
Sample Matrix:	Water	**Date Received:**	3/16/98
		Date Extracted:	NA

Total Toxic Organics (TTO)
Volatile Organic Compounds
EPA Method 624
Units: µg/L (ppb)

	Sample Name:	**Outfall 009**	**Method Blank**
	Lab Code:	K9801603-001	K980318-MB
	Date Analyzed:	3/18/98	3/18/98
Analyte	**MRL**		
Chloromethane	10	ND	ND
Vinyl Chloride	10	ND	ND
Bromomethane	10	ND	ND
Chloroethane	10	ND	ND
1,1-Dichloroethene (1,1-DCE)	5	ND	ND
Methylene Chloride	5	ND	ND
trans-1,2-Dichloroethene	5	ND	ND
1,1-Dichloroethane	5	ND	ND
Chloroform	5	ND	ND
1,1,1-Trichloroethane (TCA)	5	ND	ND
Carbon Tetrachloride	5	ND	ND
Benzene	5	ND	ND
1,2-Dichloroethane	5	ND	ND
Trichloroethene (TCE)	5	ND	ND
1,2-Dichloropropane	5	ND	ND
Bromodichloromethane	5	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
Total-1,3-Dichloropropylene	5	ND	ND
Toluene	5	ND	ND
1,1,2-Trichloroethane	5	ND	ND
Tetrachloroethene (PCE)	5	ND	ND
Dibromochloromethane	5	ND	ND
Chlorobenzene	5	ND	ND
Ethylbenzene	5	ND	ND
Bromoform	5	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND
1,3-Dichlorobenzene	5	ND	ND
1,4-Dichlorobenzene	5	ND	ND
1,2-Dichlorobenzene	5	ND	ND
Acrolein	100	ND	ND
Acrylonitrile	10	ND	ND

Approved By: [signature] Date: 3/31/98

3S30/102094 01603VOA.JG1 - 624TTO 3/31/98

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K9801603
Project:	Reynolds Metals Co., Cable Plant	**Date Collected:**	3/16/98
Sample Matrix:	Water	**Date Received:**	3/16/98
		Date Extracted:	3/19/98

Total Metals
Units: µg/L (ppb)

		Sample Name:	**Outfall 009**	**Method Blank**
		Lab Code:	K9801603-001	K9801603-MB
		Date Analyzed:	3/20/98	3/20/98
Analyte	**EPA Method**	**MRL**		
Antimony	6010A	50	ND	ND
Arsenic	7060A	5	ND	ND
Beryllium	6010A	5	ND	ND
Cadmium	6010A	4	ND	ND
Chromium	6010A	5	ND	ND
Copper	6010A	10	ND	ND
Lead	7421	2	ND	ND
Mercury	7470A	0.5	ND	ND
Nickel	6010A	20	ND	ND
Selenium	7740	5	ND	ND
Silver	6010A	10	ND	ND
Thallium	7841	5	ND	ND
Zinc	6010A	10	16	ND

Approved By: ____________ Date: 3/30/98

3S30EPA/102094
01603ICP.EA1 - Sample 3/27/98

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K9701755
Project:	Reynolds Metals Co, Cable Plant	**Date Collected:**	3/19/97
Sample Matrix:	Water	**Date Received:**	3/19/97
		Date Extracted:	NA

Total Toxic Organics (TTO)
Volatile Organic Compounds
EPA Method 624
Units: µg/L (ppb)

	Sample Name:	**Outfall 009**	**Method Blank**
	Lab Code:	K9701755-001	K970402-MB
	Date Analyzed:	4/2/97	4/2/97
Analyte	**MRL**		
Chloromethane	10	ND	ND
Vinyl Chloride	10	ND	ND
Bromomethane	10	ND	ND
Chloroethane	10	ND	ND
1,1-Dichloroethene (1,1-DCE)	5	ND	ND
Methylene Chloride	5	ND	ND
trans-1,2-Dichloroethene	5	ND	ND
1,1-Dichloroethane	5	ND	ND
Chloroform	5	ND	ND
1,1,1-Trichloroethane (TCA)	5	ND	ND
Carbon Tetrachloride	5	ND	ND
Benzene	5	ND	ND
1,2-Dichloroethane	5	ND	ND
Trichloroethene (TCE)	5	ND	ND
1,2-Dichloropropane	5	ND	ND
Bromodichloromethane	5	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
Total-1,3-Dichloropropylene	5	ND	ND
Toluene	5	ND	ND
1,1,2-Trichloroethane	5	ND	ND
Tetrachloroethene (PCE)	5	ND	ND
Dibromochloromethane	5	ND	ND
Chlorobenzene	5	ND	ND
Ethylbenzene	5	ND	ND
Bromoform	5	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND
1,3-Dichlorobenzene	5	ND	ND
1,4-Dichlorobenzene	5	ND	ND
1,2-Dichlorobenzene	5	ND	ND
Acrolein	100	ND	ND
Acrylonitrile	10	ND	ND

Approved By: Carla Lyon Date: 4/4/97

3S30/102094

01755VOA.NH1 - 624TTO 4/4/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K9701755
Project:	Reynolds Metals Co, Cable Plant	**Date Collected:**	3/19/97
Sample Matrix:	Water	**Date Received:**	3/19/97
		Date Extracted:	3/21/97

Total Metals
Units: µg/L (ppb)

		Sample Name:	**Outfall 009**	**Method Blank**
		Lab Code:	K9701755-001	K9701755-MB
		Date Analyzed:	3/24/97	3/24/97
Analyte	**EPA Method**	**MRL**		
Antimony	6010A	50	ND	ND
Arsenic	7060A	5	ND	ND
Beryllium	6010A	5	ND	ND
Cadmium	6010A	4	ND	ND
Chromium	6010A	5	ND	ND
Copper	6010A	10	ND	ND
Lead	7421	2	ND	ND
Mercury	7470A	0.5	ND	ND
Nickel	6010A	20	ND	ND
Selenium	7740	5	ND	ND
Silver	6010A	10	ND	ND
Thallium	7841	5	ND	ND
Zinc	6010A	10	20	ND

Approved By: JC Date: 4/2/97

3S30EPA/102094
01755ICP.JC1 - Sample 4/2/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Reynolds Metals Company
Project: Reynolds Metals Co., Cable Plant/ #REY1095LVMISC
Sample Matrix: Water

Service Request: K9601615
Date Collected: 3/21/96
Date Received: 3/21/96
Date Extracted: NA

Total Toxic Organics (TTO)
Volatile Organic Compounds
EPA Method 624
Units: µg/L (ppb)

	Sample Name:	**Outfall 009**	**Method Blank**
	Lab Code:	K9601615-001	K960404-MB
	Date Analyzed:	4/4/96	4/4/96
Analyte	**MRL**		
Chloromethane	10	ND	ND
Vinyl Chloride	10	ND	ND
Bromomethane	10	ND	ND
Chloroethane	10	ND	ND
1,1-Dichloroethylene	5	ND	ND
Methylene Chloride	5	ND	ND
trans-1,2-Dichloroethylene	5	ND	ND
1,1-Dichloroethane	5	ND	ND
Chloroform	5	ND	ND
1,1,1-Trichloroethane (TCA)	5	ND	ND
Carbon Tetrachloride	5	ND	ND
Benzene	5	ND	ND
1,2-Dichloroethane	5	ND	ND
Trichloroethylene (TCE)	5	ND	ND
1,2-Dichloropropane	5	ND	ND
Bromodichloromethane	5	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
Total-1,3-Dichloropropylene	5	ND	ND
Toluene	5	ND	ND
1,1,2-Trichloroethane	5	ND	ND
Tetrachloroethylene (PCE)	5	ND	ND
Dibromochloromethane	5	ND	ND
Chlorobenzene	5	ND	ND
Ethylbenzene	5	ND	ND
Bromoform	5	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND
1,3-Dichlorobenzene	5	ND	ND
1,4-Dichlorobenzene	5	ND	ND
1,2-Dichlorobenzene	5	ND	ND
Acrolein	100	ND	ND
Acrylonitrile	10	ND	ND

Approved By: Diane E. Wegel Date: 4/8/96 00007

3S30/102094

01615VOA.JG1 - 624TTO 4/8/96

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Reynolds Metals Company
Project: Reynolds Metals Co., Cable Plant/#REY1095LVMISC
Sample Matrix: Water

Service Request: K9601615
Date Collected: 3/21/96
Date Received: 3/21/96
Date Extracted: 4/1/96

Total Metals
Units: µg/L (ppb)

		Sample Name:	**Outfall 009**	**Method Blank**
		Lab Code:	K9601615-001	K9601615-MB
		Date Analyzed:	4/1/96	4/1/96
Analyte	**EPA Method**	**MRL**		
Antimony	6010A	50	ND	ND
Arsenic	7060	5	ND	ND
Beryllium	6010A	5	ND	ND
Cadmium	6010A	3	ND	ND
Chromium	6010A	5	ND	ND
Copper	6010A	10	ND	ND
Lead	7421	2	ND	ND
Mercury	7470	0.5	ND	ND
Nickel	6010A	20	ND	ND
Selenium	7740	5	ND	ND
Silver	6010A	10	ND	ND
Thallium	7841	5	ND	ND
Zinc	6010A	10	ND	ND

Approved By: JC Date: 4/4/96

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K9501717
Project:	Reynolds Metals Co; Cable Plant	**Date Collected:**	3/23/95
Sample Matrix:	Water	**Date Received:**	3/23/95
		Date Extracted:	NA

Total Toxic Organics (TTO)
Volatile Organic Compounds
EPA Method 624
Units: µg/L (ppb)

	Sample Name:	**Outfall 009**	**Method Blank**
	Lab Code:	K9501717-001	K9501717-MB
	Date Analyzed:	4/5/95	4/5/95
Analyte	**MRL**		
Chloromethane	10	ND	ND
Vinyl Chloride	10	ND	ND
Bromomethane	10	ND	ND
Chloroethane	10	ND	ND
1,1-Dichloroethylene	5	ND	ND
Methylene Chloride	5	ND	ND
trans-1,2-Dichloroethylene	5	ND	ND
1,1-Dichloroethane	5	ND	ND
Chloroform	5	ND	ND
1,1,1-Trichloroethane (TCA)	5	ND	ND
Carbon Tetrachloride	5	ND	ND
Benzene	5	ND	ND
1,2-Dichloroethane	5	ND	ND
Trichloroethylene (TCE)	5	ND	ND
1,2-Dichloropropane	5	ND	ND
Bromodichloromethane	5	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND
Total-1,3-Dichloropropylene	5	ND	ND
Toluene	5	ND	ND
1,1,2-Trichloroethane	5	ND	ND
Tetrachloroethylene (PCE)	5	ND	ND
Dibromochloromethane	5	ND	ND
Chlorobenzene	5	ND	ND
Ethylbenzene	5	ND	ND
Bromoform	5	ND	ND
1,1,2,2-Tetrachloroethane	5	ND	ND
1,3-Dichlorobenzene	5	ND	ND
1,4-Dichlorobenzene	5	ND	ND
1,2-Dichlorobenzene	5	ND	ND
Acrolein	100	ND	ND
Acrylonitrile	10	ND	ND

Approved By: [signature] Date: 4/6/95

3S30/102094

01717VOA.TD1 - 624TTO 4/6/95

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Service Request:**	K9501717
Project:	Reynolds Metals Co; Cable Plant	**Date Collected:**	3/23/95
Sample Matrix:	Water	**Date Received:**	3/23/95
		Date Extracted:	3/27/95

Total Metals
Units: µg/L (ppb)

		Sample Name:	**Outfall 009**	**Method Blank**
		Lab Code:	K9501717-001	K9501717-MB
		Date Analyzed:	3/30/95	3/30/95
Analyte	**EPA Method**	**MRL**		
Antimony	6010A	50	ND	ND
Arsenic	7060	5	ND	ND
Beryllium	6010A	5	ND	ND
Cadmium	6010A	3	ND	ND
Chromium	6010A	5	ND	ND
Copper	6010A	10	ND	ND
Lead	7421	2	ND	ND
Mercury	7470	0.5	ND	ND
Nickel	6010A	20	ND	ND
Selenium	7740	5	ND	ND
Silver	6010A	10	ND	ND
Thallium	7841	5	ND	ND
Zinc	6010A	10	12	ND

Approved By: [signature] Date: 4/6/95

3S30EPA/102094
01717ICP.WM1 - Sample (2) 4/6/95

Attachment G

emcon

18912 North Creek Parkway • Suite 100 • Bothell, Washington 98011-8016 • **(206) 485-5000** • Fax (206) 486-9766

January 14, 1998
Project 40133-001.007

Mr. Tim Mace
Reynolds Metals Company
P.O. Box 999
Longview, Washington 98632

Re: Groundwater Monitoring Report, Reynolds Cable Plant, Longview, Washington

Dear Mr. Mace:

EMCON is pleased to submit this letter report describing the results of quarterly groundwater monitoring activities conducted from March 1996 through April 1997 at the Reynolds Metals Company (Reynolds) Cable Plant. The site is located at 4393 Industrial Way in Longview, Washington (Figure 1). The objective of the work was to monitor groundwater quality and groundwater flow directions beneath the site over time.

SCOPE OF WORK

The field activities completed by EMCON on March 28, June 21, September 24, and December 13, 1996, and April 9, 1997, included the following:

- Measured depths to groundwater in all monitoring wells.
- Collected groundwater samples from selected monitoring wells.
- Placed all purge water in 55-gallon drums for disposal by Reynolds.

During each sampling event, EMCON measured depths to groundwater in each well by using an electronic water level probe. The probe was decontaminated between each well by using methanol and distilled water rinses, respectively. Depth to groundwater measurements were converted to groundwater elevations based on well elevation surveys conducted by Pacific Northern Geoscience (PNG) during previous site investigation work. The elevations of the wells were surveyed relative to a local site datum.

Before sample collection, at least three pore volumes of water were removed from the monitoring wells. Each well was purged using a disposable polyethylene bailer. Field parameters of pH, specific conductance, and temperature were measured following the removal of each pore volume. After stabilization of the field parameters (less than 10 percent difference between pore volumes), the sample was collected. Field Sampling Data Sheets for each sampling event are included in Appendix A.

Each sample was properly labeled and placed into an iced cooler. The samples were delivered under standard chain-of-custody protocol to Columbia Analytical Services, Inc., in Kelso, Washington. All of the samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by USEPA Method 5030A/8020 and total petroleum hydrocarbons as gasoline (TPH-G) by Washington Department of Ecology Method WTPH-G.

RESULTS

From March 1996 through April 1997, depths to groundwater in the wells ranged from 3.15 (MW-6) to 7.80 (MW-9) feet below the tops of the flush-grade well casings. Groundwater elevations in the wells fluctuated 1.53 to 2.03 feet due to seasonal effects. The general groundwater flow direction beneath the site was consistently to the south-southwest at an average horizontal hydraulic gradient of approximately 0.008 feet/foot. The depth to groundwater measurements and groundwater elevations are presented in Table 1, and groundwater elevation contour maps for each monitoring event are presented on Figures 2, 3, 4, 5, and 6.

For each 1996 and 1997 sampling event, toluene, ethylbenzene, total xylenes, and TPH as gasoline were not detected in any of the samples at concentrations above the method reporting limits (MRLs). Benzene was detected in one of the two samples from MW-6 and three of the five samples from MW-7; however, the concentrations were below the Model Toxics Control Act (MTCA) Method B Cleanup Level based on protection of surface water (71 micrograms per liter).

MTCA Method B cleanup levels based on protection of surface water should apply to the shallow groundwater beneath the site because the groundwater is probably not potable. The groundwater beneath the site is not a current source of drinking water, and it will not likely be a future source of drinking water. The site is located within an industrial zoned facility and the shallow groundwater discharges into a surface water drainage ditch located approximately 100 feet southwest (hydraulically downgradient) of MW-7. The deeper groundwater beneath the site discharges into the Columbia River, which is located approximately 2,000 feet southwest of the site.

If you have any questions, please call Mike Staton at (425) 485-5000.

Sincerely,

EMCON

Michael D. Staton, R.G.
Project Manager

Attachments: Limitations
- Table 1 - Groundwater Monitoring Results
- Table 2 - Groundwater Sample Analytical Results
- Figure 1 - Site Location Map
- Figure 2 - Water Table Elevation Contour Map (3/28/96)
- Figure 3 - Water Table Elevation Contour Map (6/21/96)
- Figure 4 - Water Table Elevation Contour Map (9/24/96)
- Figure 5 - Water Table Elevation Contour Map (12/13/96)
- Figure 6 - Water Table Elevation Contour Map (4/9/97)
- Appendix A - Field Sampling Data Sheets
- Appendix B - Analytical Reports and Chain of Custody Forms

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

Table 1

Groundwater Monitoring Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well	Date	Well Elevation[1] (feet)	Depth to Groundwater[2] (feet)	Groundwater Elevation[3] (feet)
MW-1	10/15/92	4.79	7.30	-2.51
	10/19/92		7.25	-2.46
	11/6/92		6.91	-2.12
	11/11/92		6.73	-1.94
	12/9/92		5.80	-1.01
	12/18/92		5.52	-0.73
	3/11/93		6.78	-1.99
	3/23/93		6.60	-1.81
	6/7/93		6.22	-1.43
	Well abandoned on July 28, 1994.			
MW-2	10/15/92	3.56	5.84	-2.28
	10/19/92		5.75	-2.19
	11/6/92		5.40	-1.84
	11/11/92		5.32	-1.76
	12/9/92		4.71	-1.15
	12/18/92		4.59	-1.03
	3/11/93		4.76	-1.20
	3/23/93		5.51	-1.95
	6/7/93		5.53	-1.97
	Well abandoned on July 28, 1994.			
MW-3	10/15/92	3.71	6.24	-2.53
	10/19/92		6.17	-2.46
	11/6/92		5.84	-2.13
	11/11/92		5.75	-2.04
	12/9/92		5.15	-1.44
	12/18/92		5.07	-1.36
	3/11/93		5.90	-2.19
	3/23/93		5.71	-2.00
	6/7/93		5.65	-1.94
	Well abandoned on July 28, 1994.			
MW-4	10/15/92	2.69	5.40	-2.71
	10/19/92		5.33	-2.64
	11/6/92		4.99	-2.30
	11/11/92		5.00	-2.31
	12/9/92		4.54	-1.85

Table 1

Groundwater Monitoring Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well	Date	Well Elevation[1] (feet)	Depth to Groundwater[2] (feet)	Groundwater Elevation[3] (feet)
MW-4 cont.	12/18/92	2.69	4.42	-1.73
	3/11/93		5.17	-2.48
	3/23/93		4.83	-2.14
	6/7/93		4.99	-2.30
	3/27/95		4.30	-1.61
	6/29/95		5.16	-2.47
	9/15/95		5.79	-3.10
	12/15/95		3.38	-0.69
	3/28/96		4.39	-1.70
	6/21/96		4.95	-2.26
	09/24/96		5.33	-2.64
	12/13/96		3.41	-0.72
	4/9/97		4.27	-1.58
MW-5	10/15/92	5.34	4.89	0.45
	10/19/92		8.16	-2.82
	11/6/92		7.74	-2.40
	11/11/92		7.62	-2.28
	12/9/92		6.72	-1.38
	12/18/92		6.51	-1.17
	3/11/93		6.71	-1.37
	3/23/93		8.10	-2.76
	6/7/93		6.54	-1.20
	3/27/95		5.92	-0.58
	6/29/95		6.62	-1.28
	9/15/95		7.53	-2.19
	12/15/95		5.37	-0.03
	3/28/96		6.01	-0.67
	6/21/96		6.59	-1.25
	09/24/96		7.20	-1.86
	12/13/96		5.67	-0.33
	4/4/97		5.82	-0.48
MW-6	10/15/92	2.31	4.85	-2.54
	10/19/92		4.81	-2.50
	11/6/92		4.48	-2.17
	11/11/92		4.39	-2.08

Table 1

Groundwater Monitoring Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well	Date	Well Elevation[1] (feet)	Depth to Groundwater[2] (feet)	Groundwater Elevation[3] (feet)
MW-6 cont.	12/9/92	2.31	3.86	-1.55
	12/18/92		3.79	-1.48
	3/11/93		4.69	-2.38
	3/23/93		4.33	-2.02
	6/7/93		4.54	-2.23
	3/27/95		3.83	-1.52
	6/29/95		4.79	-2.48
	9/15/95		5.44	-3.13
	12/15/95		3.04	-0.73
	3/28/96		4.12	-1.81
	6/21/96		4.61	-2.30
	09/24/96		4.82	-2.51
	12/13/96		3.15	-0.84
	4/9/97		3.85	-1.54
MW-7	3/11/93	2.12	4.71	-2.59
	3/23/93		4.34	-2.22
	6/7/93		4.72	-2.60
	3/27/95		3.98	-1.86
	6/29/95		4.76	-2.64
	9/15/95		5.32	-3.20
	12/15/95		3.21	-1.09
	3/28/96		4.03	-1.91
	6/21/96		4.60	-2.48
	09/24/96		4.89	-2.77
	12/13/96		3.31	-1.19
	4/9/97		3.88	-1.76
MW-8	3/11/93	4.02	6.15	-2.13
	3/23/93		5.97	-1.95
	6/7/93		6.11	-2.09
	3/27/95		5.16	-1.14
	6/29/95		6.50	-2.48
	9/15/95		6.80	-2.78
	12/15/95		4.05	-0.03
	3/28/96		5.34	-1.32
	6/21/96		5.89	-1.87

Table 1

Groundwater Monitoring Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well	Date	Well Elevation[1] (feet)	Depth to Groundwater[2] (feet)	Groundwater Elevation[3] (feet)
MW-8 cont.	09/24/96	4.02	6.35	-2.33
	12/13/96		4.32	-0.30
	4/9/97		5.28	-1.26
MW-9	3/11/95	5.35	7.28	-1.93
	3/23/93		7.15	-1.80
	6/7/93		6.82	-1.47
	3/27/95		6.40	-1.05
	6/29/95		7.32	-1.97
	9/15/95		8.28	-2.93
	12/15/95		4.65	0.70
	3/28/96		6.21	-0.86
	6/21/96		6.91	-1.56
	09/24/96		7.80	-2.45
	12/13/96		4.83	0.52
	4/9/97		5.91	-0.56

1 Reference elevation relative to a arbitrary site datum (MW-1) established on October 14, 1992.
2 Distance from established reference elevation marked on top of PVC well riser to water table.
3 Water table elevation relative to arbitrary site datum (MW-1) of 4.79 feet.

Table 2

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-1	10/19/92	71.4	2	29	9	550
	3/11/93	1	ND	10	ND	190
	Well abandoned on July 28, 1994.					
MW-2	10/19/92	1840	46	136	222	1910
	3/11/93	1500	41	200	271	2100
	Well abandoned on July 28, 1994.					
MW-3	10/19/92	718	7	28	75	738
	3/11/92	1400	15.0	49.0	114.0	1400
	Well abandoned on July 28, 1994.					
MW-4	10/19/92	55.1	ND	ND	1	ND
	3/11/93	110	ND	ND	ND	ND
	3/27/95	65.5	ND	ND	ND	ND
(Duplicate)	3/27/95	63.5	ND	ND	ND	ND
	6/29/95	41[d]	ND[d]	ND[d]	ND[d]	ND
	9/15/95	64.4	ND	ND	ND	ND
(Duplicate)	9/15/95	66.6	ND	ND	ND	ND
	12/15/95	9.7	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	ND	ND	ND	ND	ND
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS

Table 2

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-5	10/19/92	ND	2	1	7	ND
	3/11/93	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	NS	NS	NS	NS	NS
	9/15/95	ND	ND	ND	ND	ND
	12/15/95	ND	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	NS	NS	NS	NS	NS
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS
MW-6	10/19/92	ND	ND	ND	ND	ND
	3/11/93	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	ND	ND	ND	ND	ND
	9/15/95	1.0	ND	ND	ND	ND
	12/15/95	3.0	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	1.3	ND	ND	ND	ND
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS

Table 2

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-7	3/11/93	2	ND	ND	ND	ND
	3/27/95	121	ND	ND	ND	ND
	6/29/95	78[d]	ND[d]	ND[d]	ND[d]	ND
(Duplicate)	6/29/95	72[d]	ND[d]	ND[d]	ND[d]	ND
	9/15/95	60.5	ND	ND	ND	ND
	12/15/95	150	ND	ND	ND	ND
(Duplicate)	12/15/95	148	ND	ND	ND	ND
	3/28/96	38.3	ND	ND	ND	ND
	6/21/96	4.3	ND	ND	ND	ND
	9/24/96	0.7	ND	ND	ND	ND
	12/13/96	ND	ND	ND	ND	ND
	4/09/97	ND	ND	ND	ND	ND
MW-8	3/11/93	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	ND	ND	ND	ND	ND
	9/15/95	ND	ND	ND	ND	ND
	12/15/95	ND	ND	ND	ND	ND
	3/28/96	NS	NS	NS	NS	NS
	6/21/96	NS	NS	NS	NS	NS
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS

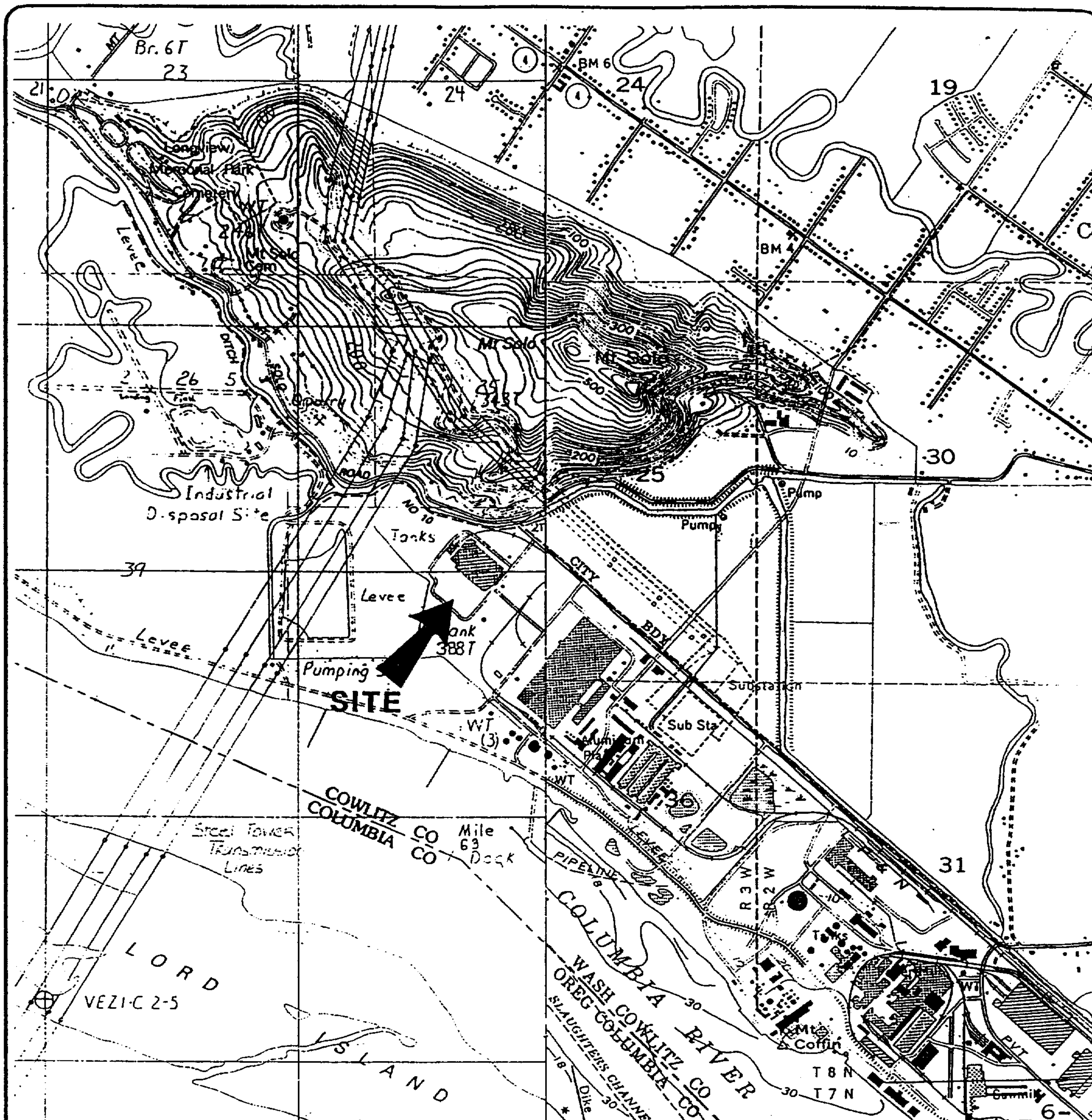
Table 2

Groundwater Sample Analytical Results
Reynolds Metals Company Cable Plant
Longview, Washington

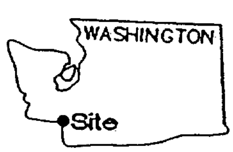
Well Number	Date Sampled	Benzene[a] (µg/L)	Toluene[a] (µg/L)	Ethylbenzene[a] (µg/L)	Total Xylenes[a] (µg/L)	TPH as Gasoline[b] (µg/L)
MTCA Method B Cleanup Levels[c]		71	200,000	29,000	NL[d]	10,000[e]
MW-9	3/11/95	ND	ND	ND	ND	ND
	3/27/95	ND	ND	ND	ND	ND
	6/29/95	NS	NS	NS	NS	NS
	9/15/95	ND	ND	ND	ND	ND
	12/15/95	NS	NS	NS	NS	NS
	3/28/96	NA	NA	NA	NA	NA
	6/21/96	NS	NS	NS	NS	NS
	9/24/96	NS	NS	NS	NS	NS
	12/13/96	ND	ND	ND	ND	ND
	4/9/97	NS	NS	NS	NS	NS

NOTE: ND = Not detected at or above laboratory method reporting limit.
NS = Not sampled
NA = Not analyzed for particular analyte.
µg/L = Micrograms per liter (parts per billion).
Shaded values exceed MTCA Method B Cleanup levels.

[a] BTEX by USEPA Method 5030A/8020.
[b] Total petroleum hydrocarbons as gasoline by Ecology Method WTPH-G.
[c] Chapter 173-340 WAC, "The Model Toxics Control Act Cleanup Regulations, Method B Cleanup Levels." Amended January 1996. Cleanup levels based on protection of surface water. Includes federal water quality criteria to protect humans eating aquatic organisms (WQA, 40 CFR 131.36).
[d] There are no Method B cleanup levels based on protection of surface water for total xylenes and dissolved lead.
[e] Ecology, 1987. Discharges containing oil and grease of mineral origin. Water Quality 9, September.
[f] BTEX by USEPA Method 8260.



Base Map From: U.S.G.S. 7.5 minute topographic quadrangles Kelso, Washington, 1970 and Coal Creek, Washington, 1985.



0 2000 4000

SCALE IN FEET

N

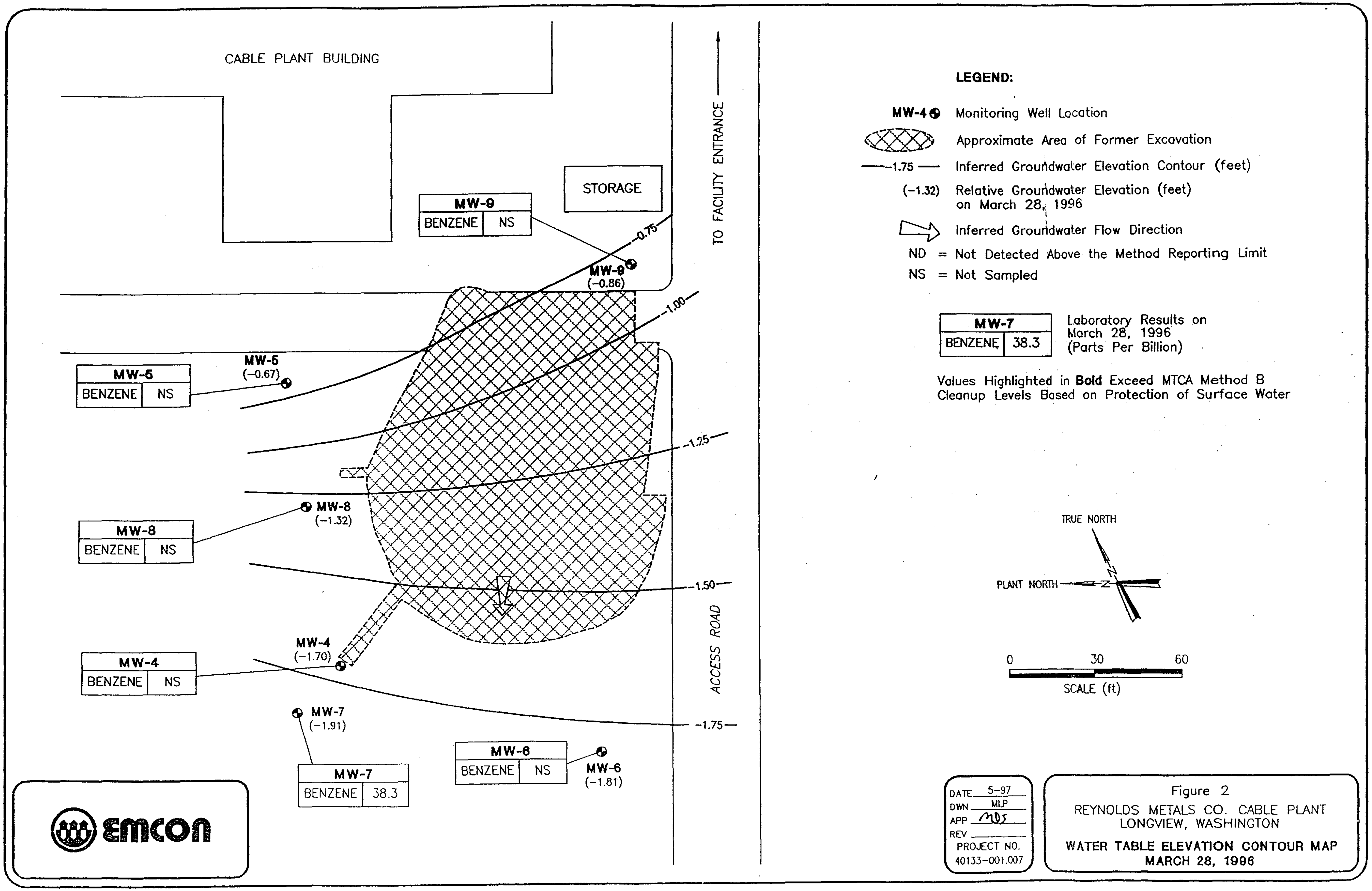
EMCON

DATE 12/95
DWN. MMM
APPR. MDS
REVIS.
PROJECT NO.
40133-001.007

Figure 1
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON

SITE LOCATION MAP

PLOT 1=1 G:\DWG\0133\001\007\EE007006.dwg 1-3-95



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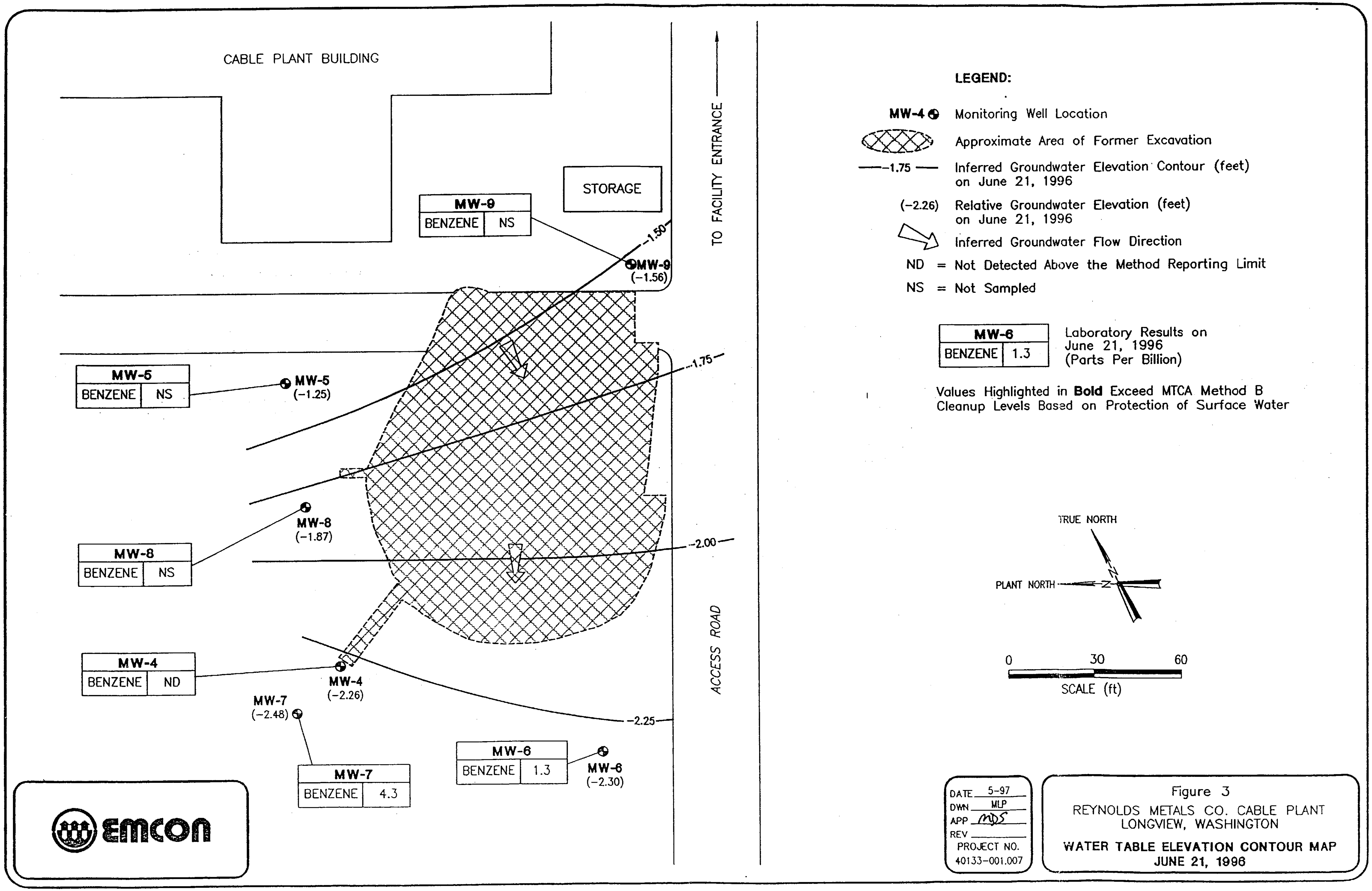

Figure 3
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE ELEVATION CONTOUR MAP
JUNE 21, 1996

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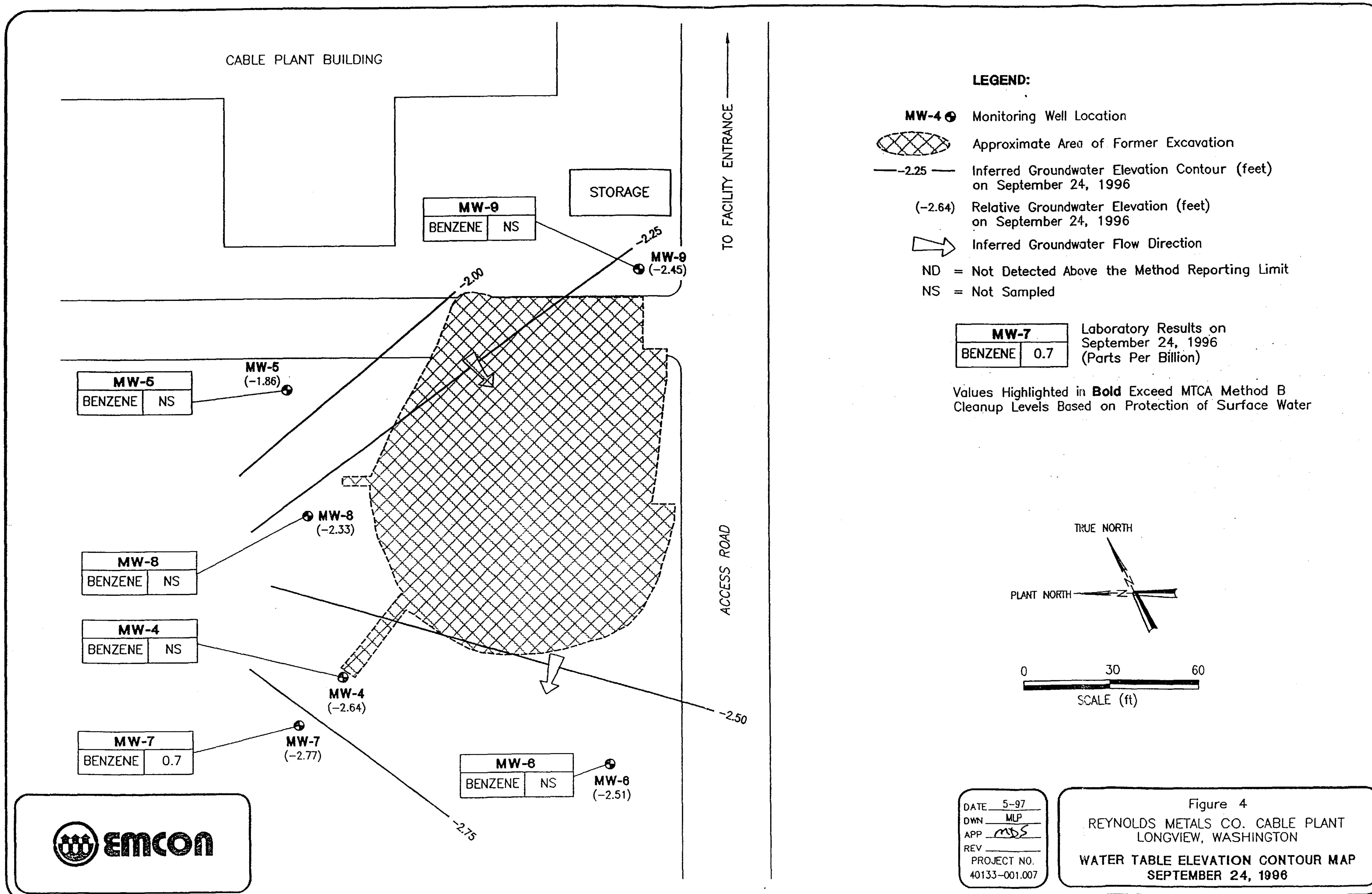

Figure 4
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE ELEVATION CONTOUR MAP
SEPTEMBER 24, 1996

ENW-BOTHELL2/DATA: G:\DWG\40133001\B0007R3.dwg Xrefs: <NONE>
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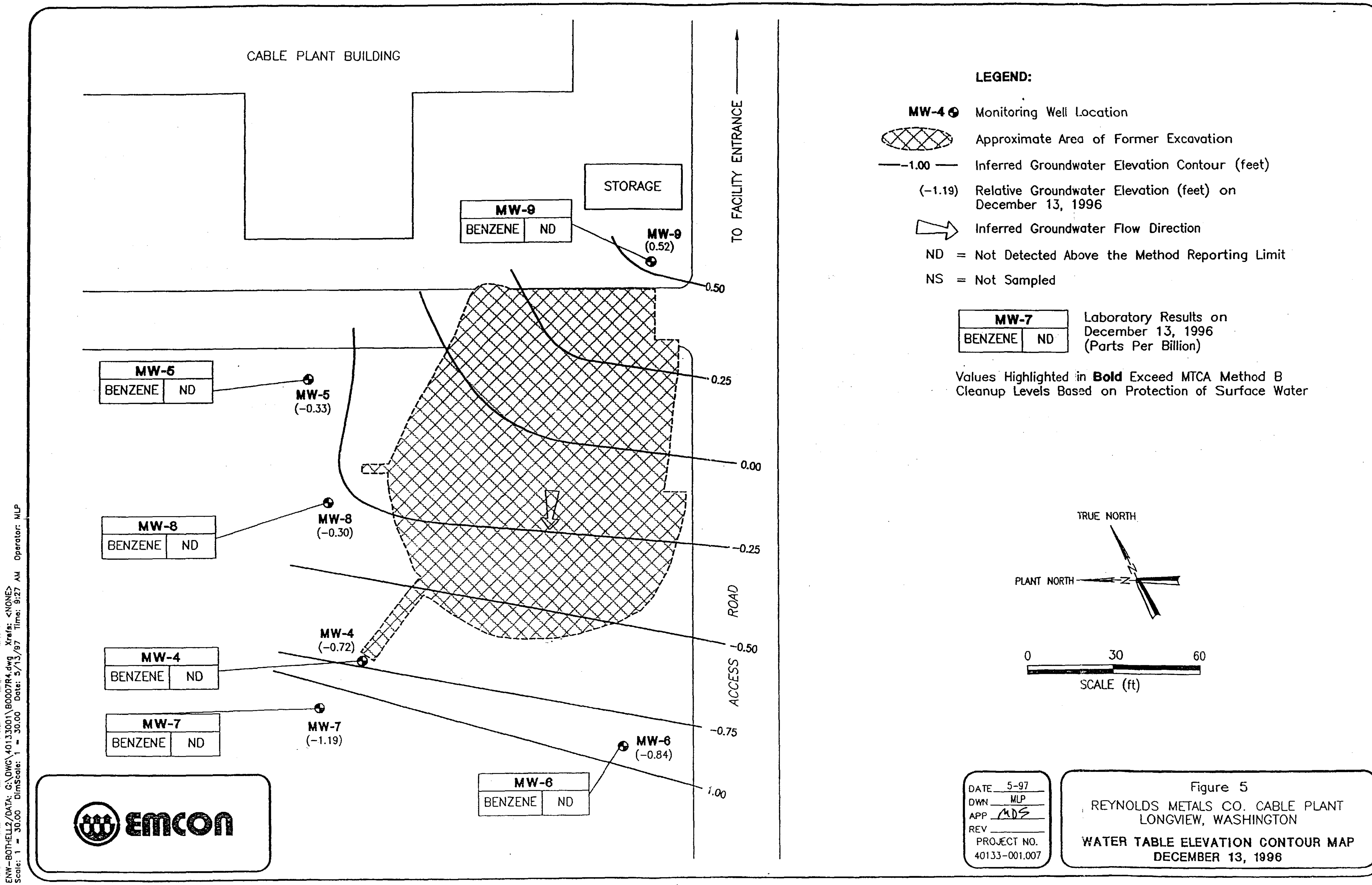
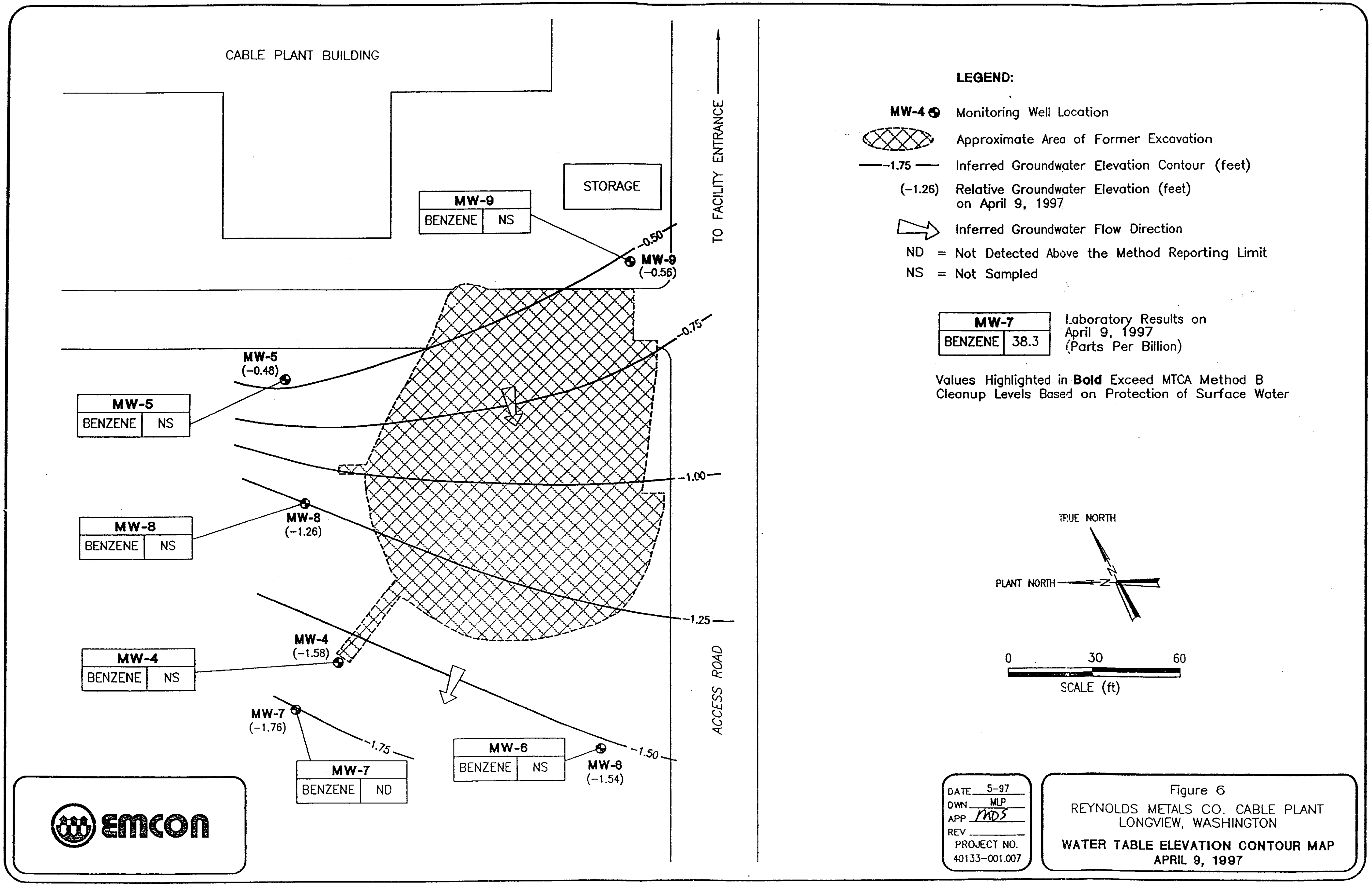


Figure 5
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE ELEVATION CONTOUR MAP
DECEMBER 13, 1996



DATE 5-97
DWN MLP
APP MDS
REV
PROJECT NO. 40133-001.007

Figure 6
REYNOLDS METALS CO. CABLE PLANT
LONGVIEW, WASHINGTON
WATER TABLE ELEVATION CONTOUR MAP
APRIL 9, 1997

ENW-BOTHELL2/DATA: G:\DWG\40133001\B000\R5.dwg Xrefs: <NONE>
Scale: 1 = 30.00 DimScale: 1 = 30.00 Date: 5/13/97 Time: 9:32 AM Operator: MLP

APPENDIX A

FIELD SAMPLING DATA SHEETS

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Field Sampling Data

LOCATION/ADDRESS Reynolds Cable plant
ROJECT NAME
LIENT/CONTACT

Well or Surface Site Number MW-7
Sample Designation W-7-032896
Date, Time 3/28/96, 9:40
Weather Foggy, mild

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
4.03		3/28/96	
		9:44	Sinco # 23274

WELL EVACUATION: 1.5 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4.4	3	Disposable		3/28/96
		Bailer		

Surface Water Flow Speed ______, Measurement Method ______, Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preserva-tive	Iced (yes,no)
VOC	3/28/96 1005	Disposable Bailer	40	Clear Glass	~8	No	HCl	Yes

Sampler Cleaning Method:
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse*
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	7.14	14.1		1120
2	7.09	13.9		1030
3	7.04	13.4		924
4	6.96	13.7		849

NOTES:

Tan, Silty, musty odor

1db + 15

d/tb = 12.82 + 0.24 = 13.06

LAB: CAS SAMPLERS: Ross Hebert

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Field Sampling Data

LOCATION/ADDRESS Reynolds Cable
ROJECT NAME 2nd Qtr 1996
LIENT/CONTACT Tim Marc

Well or Surface Site Number MW-4
Sample Designation W4-062196
Date, Time 6/21/96 1452
Weather Clear, warm

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
4.95		6/21/96	
		1449	SinCo # 23274

WELL EVACUATION: 1.3 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4	3	Disposable		6/21/96
		Bailer		1508

Surface Water Flow Speed ______ Measurement Method ______ Date, Time ______

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	6/21/96 1515	Disposable Bailer	40	Clear glass	~12	NO	HCL	Yes

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse *
Distilled H20 rinse
*Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	7.27	14.9		293
2	7.27	14.2		294
3	6.84	13.8		287
4	6.70	13.8		278

NOTES:

Grey, Silty, No odor

dTW=13.05+0.24=13.29

LAB: CAS
SAMPLERS: Russ Hebert
M NHA

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Field Sampling Data

LOCATION/ADDRESS Reynolds Cable
PROJECT NAME 2nd QTR 1996
CLIENT/CONTACT Tim Mace

Well or Surface Site Number MW-6
Sample Designation W6-062196
Date, Time 6/21/96
Weather Clear warm

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter # or Code)/Comments
4.61		6/21/96	
		1457	Staco #23274

WELL EVACUATION: 1.6 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
5	3	Disposable		6/21/96
		Bailer		1548

Surface Water Flow Speed ________, Measurement Method ________, Date, Time ________

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
VOC	6/21/96 1550	Disposable Bailer	40	Clear Glass	~12	NO	HCL	yes

Sampler Cleaning Method
Non-Phosphatic detergent wash
H20 rinse
MeOH rinse
Distilled H20 rinse
Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	6.30	15.0		558
2	6.43	14.8		543
3	6.44	14.7		523

NOTES:
Clear, Black & Red "flakes", no odor, no silt.
14.33 + 0.24 = 14.57

LAB: CAS
SAMPLERS: Ross Hebert
N/A

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Field Sampling Data

LOCATION/ADDRESS Reynolds Cable
PROJECT NAME 2nd Qtr 1996
CLIENT/CONTACT Tim Mace

Well or Surface Site Number MW-7
Sample Designation W7-062196
Date, Time 6/21/96
Weather Clear, warm

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method (Level Meter / or Code)/Comments
4.60		6/21/96	
		1451	Sinco # 23274

WELL EVACUATION: 1.3 Gallons/Pore Volume

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
4	3	Disposable		6/21/96
		Bailer		1530

Surface Water Flow Speed ____, Measurement Method ____, Date, Time ____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
OC	6/21/96	Disposable	40	Clear glass	H2O	No	HCL	Yes
	1535	Bailer						

Sampler Cleaning Method: Non-Phosphatic detergent wash, H20 rinse, MeOH rinse, Distilled H20 rinse, Hexane rinse if oily

FIELD WATER QUALITY TESTS:

Por Vol. Number	pH	Temp (c°)	Conductivity (uS/cm)	Conductivity @ 25° (uS/cm)
1	6.19	14.7		680
2	6.38	14.8		668
3	6.41	14.9		642

NOTES:

~~DTI~~ Pale Grey, No Silt, No odor

12.86 + 0.24 = 13.10

LAB: CAS

SAMPLERS: Russ Hebert

MJ N/A

FIELD SAMPLING DATA SHEET

EMCON
15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME: Reynolds Cable Plant **WELL ID:** MW-7
SITE ADDRESS: Longview, Washington **BLIND ID:** ~~NA~~ MW-7
DUP ID: NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY		CLOUDY		RAIN			?	TEMPERATURE: °F 65		°C

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
9/24/96	14:00	12.85	.	4.82	.	8.03	X 1	1.3
/ /	:	.	.	.	.		X 3	3.9

Gal/ft = (dia./2)^2 x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount & Volume mL		Preservative [circle]	Ice	Filter	pH	√ [√ if used]
VOA Glass	9/24/96	14:20	C	3	40 ml	HCl	YES	NO		
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
VOA Glass	9/24/96	14:20	C	3	40 250, 500, 1L	HCl	YES	NO	NA	

Total Bottles (include duplicate count): 6

Analysis Allowed per Bottle Type — BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA [✓]
AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA [ ]
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: : Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	1.5	6.44	1042	18.7		.	↑
2	C	1.5	6.47	1058	18.2		.	
1	C	1.5	6.45	1127	18.6		.	Med. brown, silty
0		0.00	.		.		.	

SAMPLER: JON BANKE (PRINTED NAME) _______ (SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON

15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME: Reynolds Cable Plant — WELL ID: MW-4

SITE ADDRESS: Longview, Washington — BLIND ID: RCP 121396-4

DUP ID: NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY		CLOUDY		RAIN			?	TEMPERATURE: °F 45 . °C		

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
12/13/96	11:00	12.85	.	3.41	.	9.44	X 1	1.5
/ /	:	.	.	.	.		X 3	4.5

Gal/ft = (dia./2)² x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount	Volume mL	Preservative [circle]	Ice	Filter	pH	√ [√ if used]
VOA Glass	12/13/96	11:25	C	6	40 ml	HCl	YES	NO		√
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
	/ /	:			250, 500, 1L		YES			

Total Bottles (include duplicate count): 6

Analysis Allowed per Bottle Type	BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA [ ]
	AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA [ ]
	WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
	YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Kjeldahl Nitrogen) (NH_3) (NO_3/NO_2)
	GREEN - Poly	(Cyanide)
	RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: :

Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	4.5	6.88	453	14.4		.	Silty, grey
2	C	3.0	6.92	433	14.4		.	Silty, grey
1	C	1.5	6.88	434	14.4		.	Silty, grey
0		0.00	.		.		.	

SAMPLER: John J Renel (PRINTED NAME) ____ (SIGNATURE)

FIELD SAMPLING DATA SHEET

emcon
15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME: Reynolds Cable Plant WELL ID: MW-5
SITE ADDRESS: Longview, Washington BLIND ID: RCP121396-2
DUP ID: NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY	CLOUDY	RAIN		?	TEMPERATURE: °F 45 . °C					

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
12/13/96	10:30	13.48	.	5.67	.	7.81	X 1	1.3
/ /	:	.	.	.	.		X 3	3.9

Gal/ft = $(dia./2)^2 \times 0.163$ | 1" = 0.041 | 2" = 0.163 | 3" = 0.367 | 4" = 0.653 | 6" = 1.469 | 10" = 4.080 | 12" = 5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount & Volume mL		Preservative [circle]	Ice	Filter	pH	[√ if used]
VOA Glass	12/13/96	10:55	C	6	40 ml	HCl	YES	NO		✓
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
	/ /	:			250, 500, 1L		YES			

Total Bottles (include duplicate count): 6

Analysis Allowed per Bottle Type	BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA [ ]
	AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA [ ]
	WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
	YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
	GREEN - Poly	(Cyanide)
	RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: 10:35 Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	3.9	6.69	390	15.7		.	Silty, grey
2	C	2.6	6.64	363	15.7		.	Silty, grey
1	C	1.3	6.70	354	15.7		.	Silty, grey
0		0.00	.		.		.	

SAMPLER: John J Renda (PRINTED NAME) [signature] (SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON

15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME: Reynolds Cable Plant WELL ID: MW-6
SITE ADDRESS: Longview, Washington BLIND ID: RCP121396-6
DUP ID: NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY		CLOUDY		RAIN		?		TEMPERATURE:	°F 45.	°C

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
12/13/96	11:35	13.43	.	3.15	.	10.28	X 1	1.7
/ /	:	.	.	.	.		X 3	5.1

Gal/ft = (dia./2)² x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount & Volume mL		Preservative [circle]	Ice	Filter	pH	[√ if used] √
VOA Glass	12/13/96	12:20	C	6	40 ml	HCl	YES	NO		√
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
	/ /	:			250, 500, 1L		YES			

Total Bottles (include duplicate count): 6

Analysis Allowed per Bottle Type	BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA [ ]
	AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA [ ]
	WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
	YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
	GREEN - Poly	(Cyanide)
	RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: :
Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	5.1	6.81	731	15.3		.	Cloudy, grey
2	C	3.4	6.82	707	15.2		.	Cloudy, [illegible]
1	C	1.7	6.82	670	15.2		.	Cloudy, grey
0		0.00	.		.		.	

SAMPLER: John J Reuda (PRINTED NAME)   [signature] (SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON

15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME: Reynolds Cable Plant WELL ID: MW-7
SITE ADDRESS: Longview, Washington BLIND ID: RCP-121398-5
DUP ID: NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY	CLOUDY	RAIN	Hail	?	TEMPERATURE:	°F 45	°C			

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
12/13/98	11:20	12.85	.	3.31	.	9.54	X 1	1.55
/ /	:	.	.	.	.		X 3	4.66

Gal/ft = (dia./2)^2 x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount & Volume mL		Preservative (circle)	Ice	Filter	pH	√ [√ if used]
VOA Glass	12/13/98	11:55	C	3	40 ml	HCl	YES	NO		
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
	/ /	:			250, 500, 1L		YES			

Total Bottles (include duplicate count): 6

Analysis Allowed per Bottle Type	BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA [ ]
	AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA [ ]
	WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
	YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
	GREEN - Poly	(Cyanide)
	RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: : Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	4.8	6.84	643	15.8		.	
2		3.2	6.87	638	15.8		.	
1		1.6	6.81	633	15.9		.	
0		0.00	.		.		.	

SAMPLER: S Harquail (PRINTED NAME) [signature] (SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON
15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME: Reynolds Cable Plant **WELL ID:** mw-8
SITE ADDRESS: Longview, Washington **BLIND ID:** RCP-121396-1
DUP ID: NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY		CLOUDY		RAIN		?		TEMPERATURE:	°F 45 .	°C

(Circle appropriate units)

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
12/13/96	10:15	14.10	.	4.32	.	9.78	X 1	1.59
/ /	:	.	.	.	.		X 3	4.78

Gal/ft = (dia./2)^2 x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount & Volume mL		Preservative [circle]	Ice	Filter	pH	√ [√ if used]
VOA Glass	12/13/96	10:45	C	36	40 ml	HCl	YES	NO		
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
	/ /	:			250, 500, 1L		YES			

Total Bottles (include duplicate count): 6

Analysis Allowed per Bottle Type

BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA [ ]
AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA [ ]
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: :
Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	4.8	6.89	861	15.0		.	slt cloudy clear
2		3.2	6.93	864	15.0		.	"
1		1.6	7.06	965	14.3		.	"
0		0.00	.		.		.	

SAMPLER: S Hargrail (PRINTED NAME)

(SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON
15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME: Reynolds Cable Plant WELL ID: MW-9

SITE ADDRESS: Longview, Washington BLIND ID: RCP-121396-3

DUP ID: NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY	CLOUDY	RAIN		?	TEMPERATURE:	°F 45 . °C				

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
12/13/96	10:48	14.40	.	4.83	.	9.57	X 1	1.55
/ /	:	.	.	.	.		X 3	4.67

Gal/ft = (dia./2)² x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount & Volume mL		Preservative [circle]	Ice	Filter	pH	√ [√ if used]
VOA Glass	12/13/96	11:10	C	3	40 ml	HCl	YES	NO		
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
	/ /	:			250, 500, 1L		YES			

Total Bottles (include duplicate count): 6

Analysis Allowed per Bottle Type	BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA [ ]
	AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA [ ]
	WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
	YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Kjeldahl Nitrogen) (NH_3) (NO_3/NO_2)
	GREEN - Poly	(Cyanide)
	RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
	RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: :

Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	4.8	6.82	280	14.9		.	sl Cloudy, Tan
2		3.2	6.81	279	14.9		.	"
1		1.6	6.93	269	14.9		.	"
0		0.00	.		.		.	

SAMPLER: S Hargrail
(PRINTED NAME)

(SIGNATURE)

FIELD SAMPLING DATA SHEET

EMCON
15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224-7712
Office: (503) 624-7200 Fax: (503) 620-7658

PROJECT NAME:	Reynolds Cable Plant	WELL ID:	MW-7
SITE ADDRESS:	Longview,Washington	BLIND ID:	~~RCW~~- RCP-040997-1
		DUP ID:	NA

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY	CLOUDY	RAIN	?	TEMPERATURE:	°F 45.	°C				

[Circle appropriate units]

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Bottom	DT-Product	DT-Water	DTP-DTW [Product Thickness]	DTB-DTW [Water Column]		Volume (gal) [Water Column x Gal/ft]
4/9/97	15:45	12.75	.	3.88	.	8.87	X 1	1.44
/ /	:	.	.	.	.		X 3	4.33

Gal/ft = (dia./2)^2 x 0.163	1" =	0.041	2" =	0.163	3" =	0.367	4" =	0.653	6" =	1.469	10" =	4.080	12" =	5.875

§ METHODS: (A) Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) PVC/Teflon Bailer (E) Dedicated Bailer (F) Dedicated Pump (G) Other =

GROUNDWATER SAMPLING DATA (if product is detected, do NOT sample)

Sample Depth:

Bottle Type	Date	Time	Method §	Amount & Volume mL		Preservative [circle]	Ice	Filter	pH	√ [√ if used]
VOA Glass	4/9/97	16:00	C	3	40 ml	HCl	YES	NO		√
Amber Glass	/ /	:			250, 500, 1L	(None) (HCl) (H_2SO_4)	YES	NO		
White Poly	/ /	:			250, 500, 1L	None	YES	NO	NA	
Yellow Poly	/ /	:			250, 500, 1L	H_2SO_4	YES	NO		
Green Poly	/ /	:			250, 500, 1L	NaOH	YES	NO		
Red Total Poly	/ /	:			250, 500, 1L	HNO_3	YES	NO		
Red Diss. Poly	/ /	:			250, 500, 1L	HNO_3	YES	YES		
	/ /	:			250, 500, 1L		YES			

Total Bottles (include duplicate count): 3

Analysis Allowed per Bottle Type — BOTTLE TYPE	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
VOA - Glass	(8010) (8010/8020) (8020) (8240) (8260) (BTEX) (TPH-G) (BTEX/TPH-G) OR [ ] WA[ ]
AMBER - Glass	(PAH) (TPH-HCID) (TPH-D) (TPH-418.1) (Oil &Grease) OR [ ] WA[ ]
WHITE - Poly	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO_3/CO_3) (Cl) (SO_4) (NO_3) (NO_2) (F)
YELLOW - Poly	(COD) (TOC) (Total PO_4) (Total Keldahl Nitrogen) (NH_3) (NO_3/NO_2)
GREEN - Poly	(Cyanide)
RED TOTAL - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
RED DISSOLVED - Poly	(As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)

WATER QUALITY DATA

Purge Start Time: :

Pump/Bailer Inlet Depth:

Meas. [Casing]	Method § [Select A-G]	Purged (gal) [Cumulative Totals]	pH	E Cond (µS)	°F Temp °C [Circle units]	Other	Diss O_2 (mg/l)	Water Quality [Clarity, Color]
4		.	.		.		.	
3	C	4.5	6.92	651	15.7		.	sl. Clouds, Color
2		3.0	6.84	643	15.7		.	"
1		1.5	6.87	621	15.6		.	"
0		0.00	.		.		.	

SAMPLER: S Hargrave
(PRINTED NAME)

(SIGNATURE)

APPENDIX B

ANALYTICAL REPORTS AND CHAIN OF CUSTODY FORMS

ORIGINAL IS IN PROJECT FILING

Columbia Analytical Services inc.

RECEIVED APR 17 1996

April 15, 1996

Service Request No.: K9601763

Mike Staton
EMCON
18912 North Creek Parkway, Suite 100
Bothell, WA 98011

Re: **Reynolds Cable Plant/Project #40133-001.007**

Dear Mike:

Enclosed are the results of the sample(s) submitted to our laboratory on March 28, 1996. For your reference, these analyses have been assigned our service request number K9601763.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 243.

Respectfully submitted,

Columbia Analytical Services, Inc

Richard A Craven

Richard Craven
Project Chemist

RAC/td

17 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, Inc.

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
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9601763
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	3/28/96
Sample Matrix:	Water	**Date Received:**	3/28/96
		Date Extracted:	NA
		Date Analyzed:	4/10/96

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
W1/032896 MW-7	K9601763-001	38.3	ND	ND	ND	ND
Method Blank	K960410-WB	ND	ND	ND	ND	ND

Approved By: ______ Date: 4/11/96

5A/102194
01763PHC.SP1 - BTXw 4/11/96

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9601763
Project:	Reynolds Cable Plant/#40133-001.007	**Date Collected:**	3/28/96
Sample Matrix:	Water	**Date Received:**	3/28/96
		Date Extracted:	NA
		Date Analyzed:	4/10/96

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
W1/032896	K9601763-001	90	94
Method Blank	K960410-WB	91	94
CAS Acceptance Limits:		69-114	65-117

Approved By: [signature] Date: 4/11/96

SUR2/111594
01763PHC.SP1 - BTXwSUR 4/11/96

An[illegible]ical Services inc. 1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222 • (800) 695-7222 • FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 3/28/96 PAGE 1 OF 7

PROJECT NAME Reynolds Cableplant #40133001.007
PROJECT MANAGER Mike Staton
COMPANY/ADDRESS Emcon Bothell
PHONE 486-5200
SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Volatile Organics A8010 B8240 C8260	Volatile Organics 524.2	Base/Neutral/Acid Org. 8270	Total Metals See Comments	Dissolved Metals See Comments	pH Cond TDS TSS BOD Turb Color Tanin/Lignin	COD TOC TPhos TKN NH_3	Alk, HCO_3 CO_3 Hardness	Anion Scan (Cl, SO_4, NO_3, NO_2, F)	Cation Scan Diss (Ca, Mg, K, Na, Fe, Mn, Si)	Anion: Cation Ratio	Bacteria T - Coliform F - Coliform	Enterococcus	Ortho Phos	BTEX/TPH-G		REMARKS
W1032896	3/28/96	1005		WATER	3															X		

RELINQUISHED BY:	RECEIVED BY:
Signature [signature]	Signature [signature]
Printed Name Russ Hebert	Printed Name [illegible]
Firm Emcon Kelso	Firm CAS
Date/Time 3/28/96 1700	Date/Time 3/28/96 1701

TURNAROUND REQUIREMENTS
- ___ 24 hr ___ 48 hr. ___ 5 day
- X Standard (10-15 working days)
- ___ Provide Verbal Preliminary Results
- ___ Provide FAX preliminary Results

Requested Report Date ______

REPORT REQUIREMENTS
- X I. Routine Report
- ___ II. Report (includes DUP.MS. MSD, as required, may be charged as samples)
- ___ III. Data Validation Report (includes All Raw Data)
- ___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. #: ______
Bill To: ______

SAMPLE RECEIPT:
Shipping VIA: ______
Shipping #: ______
Condition: ______
Lab No: ______

RELINQUISHED BY:	RECEIVED BY:
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

SPECIAL INSTRUCTIONS/COMMENTS: Landfill

Circle which metals are to be analyzed:

Total Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

Dissolved Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

400-05

ORIGINAL IS
IN PROJECT
FILING

Columbia Analytical Services inc.

RECEIVED
JUL 11 1996

July 8, 1996

Service Request No.: K9603701

Mike Staton
EMCON
18912 North Creek Parkway, Suite 100
Bothell, WA 98011

Re: **Reynolds Cable Plant/Project #40133-001.007**

Dear Mike:

Enclosed are the results of the sample(s) submitted to our laboratory on June 21, 1996. For your reference, these analyses have been assigned our service request number K9603701.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 243.

Respectfully submitted,

Columbia Analytical Services, Inc

Richard A Craven

Richard Craven
Project Chemist

RAC/ll

' South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, Inc.

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
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9603701
Project:	Reynolds Cable Plant/40133-001.007	**Date Collected:**	6/21/96
Sample Matrix:	Water	**Date Received:**	6/21/96
		Date Extracted:	NA
		Date Analyzed:	7/1,2/96

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
W4-062196 MW-4	K96013701-001	ND	ND	ND	ND	ND
W7-062196 MW-7	K96013701-002	4.3	ND	ND	ND	ND
W6-062196 MW-6	K96013701-003	1.3	ND	ND	ND	ND
Method Blank	K960701-WB	ND	ND	ND	ND	ND

Approved By: Uandaur Date: 7/5/96

SA102194
03701PHC.SP1 - BTXw 7/3/96

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9603701
Project:	Reynolds Cable Plant/40133-001.007	**Date Collected:**	6/21/96
Sample Matrix:	Water	**Date Received:**	6/21/96
		Date Extracted:	NA
		Date Analyzed:	7/1,2/96

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
W4-062196	K96013701-001	100	93
W7-062196	K96013701-002	98	94
W6-062196	K96013701-003	100	93
Method Blank	K960701-WB	100	91
	CAS Acceptance Limits:	69-114	65-117

Approved By: Wandauw Date: 7/5/96

SUR2/111594
03701PHC.SP1 - BTXwSUR 7/3/96

Services inc. 1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222 • (800) 695-7222 • FAX (206) 636-1068 DATE 6/21/96 PAGE 1 OF 1

PROJECT NAME Reynolds Cablept #40133-001.007

PROJECT MANAGER Mike Staton

COMPANY/ADDRESS Emcon Bothell

PHONE

SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Volatile Organics A8010 B8240 C8260	Volatile Organics 524.2	Base/Neutral/Acid Org. 8270	Total Metals See Comments	Dissolved Metals See Comments	pH Cond TDS TSS BOD Turb Color Tanin/Lignin	COD TOC TPhos TKN NH3	Alk. HCO3 CO3 Hardness	Anion Scan (Cl, SO4, NO3, NO2, F)	Cation Scan Diss (Ca, Mg, K, Na, Fe, Mn, Si)	Anion: Cation Ratio	Bacteria T-Coliform F-Coliform	Enterococcus	Ortho Phos	BTEX-TPH G		REMARKS
W4-062196	6/21/96	1515	13701-1	water	3															X		
W7-062196	↓	1535	-2	↓	3															X		
W6-062196	↓	1550	-3	↓	3															X		

RELINQUISHED BY:
[signature]
Signature
Russ Hebert
Printed Name
Emcon/Kelso
Firm
6/21/96 1620
Date/Time

RECEIVED BY:
[signature]
Signature
Lisa k. Hann
Printed Name
CAS
Firm
062196 1620
Date/Time

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr. ___ 5 day
X Standard (10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O. #: ___
Bill To: ___

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping #: ___
Condition: ___
Lab No: ___

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS: Landfill

Circle which metals are to be analyzed:

Total Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

Dissolved Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator

400-05

000005

RECEIVED
OCT - 7 1996

Columbia Analytical Services inc.

October 3, 1996

Service Request No: K9605999

Mike Staton
EMCON
18912 North Creek Parkway, Suite 100
Bothell, WA 98011

Re: Reynolds cable Plant/40133-001.007

Dear Mike:

Enclosed are the results of the sample(s) submitted to our laboratory on September 25, 1996. For your reference, these analyses have been assigned our service request number K9605999.

All analyses were performed consistent with our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 243.

Respectfully submitted,

Columbia Analytical Services, Inc.

Richard Craven
Project Chemist

RAC/td

ORIGINAL IS PROJECT FILING

Page 1 of 6

COLUMBIA ANALYTICAL SERVICES, Inc.

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
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9605999
Project:	Reynolds Cable Plant/40133-001.007	**Date Collected:**	9/24/96
Sample Matrix:	Water	**Date Received:**	9/25/96
		Date Extracted:	NA
		Date Analyzed:	9/27/96

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
MW-7	K9605999-001	0.7	ND	ND	ND	ND
Method Blank	K960927-WB	ND	ND	ND	ND	ND

Approved By: Meena Shah Date: 10/2/96

SA/102194
05999PHC.SP1 - BTXw 10/2/96

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9605999
Project:	Reynolds Cable Plant/40133-001.007	**Date Collected:**	9/24/96
Sample Matrix:	Water	**Date Received:**	9/25/96
		Date Extracted:	NA
		Date Analyzed:	9/27/96

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
MW-7	K9605999-001	96	86
Method Blank	K960927-WB	94	85
	CAS Acceptance Limits:	69-114	65-117

Approved By: Meena Shah Date: 10/2/96

SUR2/111594
05999PHC.SP1 - BTXwSUR 10/2/96

Columbia Analytical Services inc. 1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222 • (800) 695-7222 • FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 9.24.96 PAGE 1 OF 1

00005

PROJECT NAME Reynolds Cold Plant 40133-001.007

PROJECT MANAGER Mike Staton

COMPANY/ADDRESS EMCON - Bothell

PHONE 485.5000

SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Volatile Organics A8010 B8240 C8260	Volatile Organics 524.2	Base/Neutral/Acid Org. 8270	Total Metals See Comments	Dissolved Metals See Comments	pH Cond TDS TSS BOD Turb Color Tanin/Lignin	COD TOC TPhos TKN NH3	Alk, HCO3 CO3 Hardness	Anion Scan (Cl, SO4, NO3, NO2, F)	Cation Scan Diss (Ca, Mg, K, Na, Fe, Mn, Si)	Anion: Cation Ratio	Bacteria T-Coliform	F-Coliform Enterococcus	Ortho Phos	8020 (BTEX)	WTPH-G	REMARKS
MW-7	9/24/96	1420		Water	6															X	X	
										Rec'd Trip Blank not on COC.											lkH/CAS	

RELINQUISHED BY:	RECEIVED BY:	TURNAROUND REQUIREMENTS	REPORT REQUIREMENTS	INVOICE INFORMATION:	SAMPLE RECEIPT:
Signature [signature]	Signature [signature]	___ 24 hr ___ 48 hr. ___ 5 day	✓ I. Routine Report	P.O. #:	Shipping VIA:
Printed Name JON BANKE	Printed Name Lori K. Hann	✓ Standard (10-15 working days)	___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)	Bill To:	Shipping #:
Firm EMCON	Firm CAS	___ Provide Verbal Preliminary Results	___ III. Data Validation Report (includes All Raw Data)		Condition:
Date/Time 9/24/96 1657	Date/Time 092496 1657	___ Provide FAX preliminary Results	___ IV. CLP Deliverable Report		
		Requested Report Date ___			Lab No: K96-5999

RELINQUISHED BY:	RECEIVED BY:
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

SPECIAL INSTRUCTIONS/COMMENTS: Landfill

Circle which metals are to be analyzed:

Total Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

Dissolved Metals: As Sb Ba Be Ca Cd Co Cr Cu Fe Pb Mg Mn Ni Ag Se Tl V Zn Hg

Report to Mike Staton

Columbia Analytical Services inc.

January 3, 1997

Service Request No: K9608050

Mike Staton
EMCON
18912 North Creek Parkway, Suite 100
Bothell, WA 98011-8016

Re: Reynolds Cable Plant/40133-001.007

Dear Mike:

Enclosed are the results of the sample(s) submitted to our laboratory on December 13, 1996. For your reference, these analyses have been assigned our service request number K9608050.

All analyses were performed according to our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 243.

Respectfully submitted,

Columbia Analytical Services, Inc.

Richard Craven
Project Chemist

RAC/sm

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9608050
Project:	Reynolds Cable Plant/40133-001.007	**Date Collected:**	12/13/96
Sample Matrix:	Water	**Date Received:**	12/13/96
		Date Extracted:	NA
		Date Analyzed:	12/20,26/96

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

	Analyte:	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH as Gasoline**
	Method Reporting Limit:	0.5	1	1	1	50
Sample Name	**Lab Code**					
RCP-121396-1 mw-8	K9608050-001	ND	ND	ND	ND	ND
RCP-121396-2 mw-5	K9608050-002	ND	ND	ND	ND	ND
RCP-121396-3 mw-9	K9608050-003	ND	ND	ND	ND	ND
RCP-121396-4 mw-4	K9608050-004	ND	ND	ND	ND	ND
RCP-121396-5 mw-7	K9608050-005	ND	ND	ND	ND	ND
RCP-121396-6 mw-6	K9608050-006	ND	ND	ND	ND	ND
Trip Blank	K9608050-007	ND	ND	ND	ND	ND
Method Blank	K961220-MB	ND	ND	ND	ND	ND

Approved By: [signature] Date: 1/2/97

00002

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON
Project: Reynolds Cable Plant/40133-001.007
Sample Matrix: Water

Service Request: K9608050
Date Collected: 12/13/96
Date Received: 12/13/96
Date Extracted: NA
Date Analyzed: 12/20,26/96

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	**Lab Code**	**Percent Recovery** 4-BFB (PID - BTEX)	**Percent Recovery** 4-BFB (FID - GAS)
RCP-121396-1	K9608050-001	95	95
RCP-121396-2	K9608050-002	97	95
RCP-121396-3	K9608050-003	96	95
RCP-121396-4	K9608050-004	96	95
RCP-121396-5	K9608050-005	96	95
RCP-121396-6	K9608050-006	96	95
Trip Blank	K9608050-007	99	97
Method Blank	K961220-MB	93	87
Method Blank	K961226-MB	99	96
CAS Acceptance Limits:		69-114	65-117

00003

Approved By: _______ Date: 1/2/97

SUR2/111594
08050VOA.MS1 - BTX-SUR 1/2/97

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CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE [illegible] PAGE ____ OF ____

PROJECT NAME Reynolds Cable Plant # 40133001.007

PROJECT MANAGER Mike Staton

COMPANY/ADDRESS Emcon Bothell (Kelk II)

PHONE 485-5000

SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 602/8020	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA/418.1 OR/418.1 WA/418.1	TPH/Gas/BTEX 5030/8015/8020 Gas BTEX	TPH/8015 Modified Diesel	TPH/HCID Hydrocarbon Scan WA/HCID OR/HCID	TCLP Metals VOA Semi Pest/ VOA Herb	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3 (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020 (AOX) 1650A			REMARKS
RCP-121396-1	12/13/96	10:45	1	H2O	6			X			X											
2		10:55	2		6			X			X											
3		11:10	3		6			X			X											
4		11:25	4		6			X			X											
5		11:55	5		6			X			X											
6		12:20	6		6			X			X											
Trip Blank			7		4			X			X											

RELINQUISHED BY: [signature]
Signature
JOHN J RENDA
Printed Name
EMCON
Firm
12/13/96 12:40
Date/Time

RECEIVED BY: [signature]
Signature
[illegible]
Printed Name
[illegible]
Firm
12/13/96 [illegible]
Date/Time

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr. ___ 5 day
X Standard (10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX preliminary Results
Requested Report Date ____

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP.MS. MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV. CLP Deliverable Report

INVOICE INFORMATION:
P.O.# ____
Bill To ____

SAMPLE RECEIPT:
Shipping VIA: ____
Shipping #: ____
Condition: ____
Lab No: K96-8050

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:
TPH-G (Ecology method WTPH-G)

00004

DISTRIBUTION: [illegible]

Columbia Analytical Services inc.

RECEIVED APR 28 1997

April 25, 1997

Service Request No: K9702309

ORIGINAL IS IN PROJECT FILING

Mike Staton
EMCON
18912 North Creek Parkway, Suite 100
Bothell, WA 98011-8016

Re: Reynolds Cable Plant/40133-001.007

Dear Mike:

Enclosed are the results of the sample(s) submitted to our laboratory on April 9, 1997. For your reference, these analyses have been assigned our service request number K9702309.

All analyses were performed according to our laboratory's quality assurance program. 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 samples analyzed.

Please call if you have any questions. My extension is 281.

Respectfully submitted,

Columbia Analytical Services, Inc.

Elizabeth Schneider
Project Chemist

ES/mc

South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

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
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
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
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
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.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9702309
Project:	Reynolds Cable Plant/40133-001.007	**Date Collected:**	4/9/97
Sample Matrix:	Water	**Date Received:**	4/9/97
		Date Extracted:	NA
		Date Analyzed:	4/22/97

BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G
Units: µg/L (ppb)

		Analyte:	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH as Gasoline
		Method Reporting Limit:	0.5	1	1	1	50
Sample Name		**Lab Code**					
RCP-040997-1	MW-7	K9702309-001	ND	ND	ND	ND	ND
Trip Blank		K9702309-002	ND	ND	ND	ND	ND
Method Blank		K970421-MB	ND	ND	ND	ND	ND

Approved By: [signature] Date: 4/24/97

A/102194
02309VOA.MS1 - BTXw 4/24/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON	**Service Request:**	K9702309
Project:	Reynolds Cable Plant/40133-001.007	**Date Collected:**	4/9/97
Sample Matrix:	Water	**Date Received:**	4/9/97
		Date Extracted:	NA
		Date Analyzed:	4/22/97

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030A/8020 and Washington DOE Method WTPH-G

Sample Name	Lab Code	Percent Recovery 4-BFB (PID - BTEX)	Percent Recovery 4-BFB (FID - GAS)
RCP-040997-1	K9702309-001	100	104
Trip Blank	K9702309-002	101	104
Method Blank	K970421-MB	101	105
	CAS Acceptance Limits:	69-114	65-117

Approved By: AH Notzloff Date: 4/24/97

SUR2/111594
02309VOA.MS1 - BTXwSUR 4/24/97

Services inc. 1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068 DATE 4/9/97 PAGE 1 OF 1

PROJECT NAME Reynolds Cable #40133001007

PROJECT MANAGER mike staton

COMPANY/ADDRESS Emcon Bothell

PHONE 485-5000

SAMPLERS SIGNATURE [signature]

ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GCMS 625/8270	Volatile Organics GCMS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA/418.1 ☐ OR/418.1 ☐ WA/418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☐ BTEX ☐	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH/HCID ☐ OR/HCID ☐ WA/HCID ☐	TCLP Metals ☐ VOA ☐ Semi ☐ Pest/Herb ☐	Metals (total or dissolved) List Below	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br NO_2, NO_3, (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020 ☐ (AOX) 1650A ☐			REMARKS
RCR040997-1	4/9/97	1600	2309-1	H2O	3						X											
Trip Blank			-2		1						X											

RELINQUISHED BY:	RECEIVED BY:
Signature [signature]	Signature [signature]
Printed Name Steph Hargraves	Printed Name [illegible]
Firm Emcon PDX	Firm CAS
Date/Time 4/9/97 1830	Date/Time 4/9/97 1833

TURNAROUND REQUIREMENTS

___ 24 hr ___ 48 hr. ___ 5 day

X Standard (10-15 working days)

___ Provide Verbal Preliminary Results

___ Provide FAX preliminary Results

Requested Report Date ___

REPORT REQUIREMENTS

X I. Routine Report

___ II. Report (includes DUP, MS, MSD, as required, may be charged as samples)

___ III. Data Validation Report (includes All Raw Data)

___ IV. CLP Deliverable Report

INVOICE INFORMATION:

P.O.# ___

Bill To ___

SAMPLE RECEIPT:

Shipping VIA: ___

Shipping #: ___

Condition: ___

Lab No: K9702309

RELINQUISHED BY:	RECEIVED BY:
Signature	Signature
Printed Name	Printed Name
Firm	Firm
Date/Time	Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

Call mike Staton in bothell to confirm analysis

000005

DISTRIBUTION: WHITE - return to originator, YELLOW - lab, PINK - retained by originator.

400-05

U-Ditch Reroute and Soil Removal – Main Channel, Side Channel, and Main Channel Supplementary tables and U-Ditch Sample Locations figure

Anchor QEA, LLC. Prepared for Millennium Bulk Terminals – Longview, LLC. 2012.

	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
Task				U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
Location ID				B01	B02	B03	B04	B05	B06	B07	B08	B08	B09
Sample ID				MBTL-SO-UD-B01	MBTL-SO-UD-B02	MBTL-SO-UD-B03	MBTL-SO-UD-B04	MBTL-SO-UD-B05	MBTL-SO-UD-B06	MBTL-SO-UD-B07	MBTL-SO-UD-B08	MBTL-SO-UD-B08D	MBTL-SO-UD-B09
Sample Date				11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
Depth				0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Matrix				SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
Sample Type				N	N	N	N	N	N	N	N	FD	N
X				1005660.72	1005652.68	1005635.71	1005616.83	1005584.15	1005563.67	1005536.69	1005510.48	1005510.48	1005477.9
Y				304573.83	304607.96	304637.76	304660.31	304688.18	304713.12	304734.21	304757.36	304757.36	304786.43
Conventional Parameters (mg/kg)													
Cyanide, total	SM4500CNE	70000	--	**7.18**	**2.96**	**2.39**	**5.92**	**2.24**	**4.28**	**16.6**	**1.89**	**22.5**	**3.54**
Fluoride	SM4500FC	210000	--	**1070**	**2180**	**518**	**720**	**380**	**473**	**1100**	**429**	**548**	**1110**
Conventional Parameters (pct)													
Total solids	APEXsolids	--	--	**63.8**	**78**	**79**	**74.6**	**76.2**	**79**	**65.5**	**79.1**	**75.6**	**80.3**
Total solids	SM2540G	--	--	--	--	--	--	--	--	--	**75.7**	--	--
Metals (mg/kg)													
Antimony	SW6020A	1400	--	1.61 U	1.28 U	1.33 U	1.31 U	1.27 U	1.34 U	1.59 U	1.24 U	1.37 U	1.36 U
Arsenic	SW6020A	20	20	**3.29**	**1.05 J**	**0.864 J**	**1.19 J**	**1.06 J**	**0.751 J**	**2.72 J**	2.48 U	**1.14 J**	**1.06 J**
Beryllium	SW6020A	7000	--	1.61 U	1.28 U	1.33 U	1.31 U	1.27 U	1.34 U	1.59 U	1.24 U	1.37 U	1.36 U
Cadmium	SW6020A	2	2	1.61 U	1.28 U	1.33 U	1.31 U	1.27 U	1.34 U	1.59 U	1.24 U	1.37 U	1.36 U
Chromium	SW6020A	--	2000	**16**	**39.7**	**10.5**	**9.31**	**11**	**4.84**	**15.7**	**3.32**	**11.5**	**5.66**
Copper	SW6020A	140000	--	**30.5**	**16.7**	**13**	**22.5**	**32.9**	**22**	**41.2**	**16**	**32.6**	**49.5**
Lead	SW6020A	1000	1000	**8.7**	**2.33**	**2.34**	**4.47**	**2.9**	**1.6**	**7.52**	**0.733 J**	**4.24**	**2.8**
Mercury	SW6020A	2	2	0.128 U	0.102 U	0.106 U	0.105 U	0.101 U	0.107 U	0.127 U	0.0993 U	0.11 U	0.109 U
Nickel	SW6020A	38	--	**27.2**	**17.6**	**11.3**	**12.9**	**9.55**	**6.58**	**23.2**	**4.01**	**10.2**	**9.53**
Selenium	SW6020A	1800	--	3.21 U	2.56 U	2.66 U	2.62 U	2.53 U	2.68 U	3.18 U	2.48 U	2.74 U	2.72 U
Silver	SW6020A	1800	--	1.61 U	1.28 U	1.33 U	1.31 U	1.27 U	1.34 U	1.59 U	1.24 U	1.37 U	1.36 U
Thallium	SW6020A	--	--	1.61 U	1.28 U	1.33 U	1.31 U	1.27 U	1.34 U	1.59 U	1.24 U	1.37 U	1.36 U
Zinc	SW6020A	1100000	--	**158**	**103**	**68.3**	**89.8**	**74.4**	**31.1**	**171**	**15.7**	**60.4**	**32.1**
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	SW8270DSIM	--	--	428 U	360 U	692 U	734 U	71.3 U	140 U	409 U	33.9 U	71.7 U	**20.4 J**
2-Methylnaphthalene	SW8270DSIM	--	--	428 U	360 U	692 U	734 U	71.3 U	140 U	409 U	33.9 U	71.7 U	**40.1**
Acenaphthene	SW8270DSIM	--	--	**180 J**	180 U	346 U	367 U	**41.4**	70.2 U	205 U	**9.45 J**	**60.2**	**96.6**
Acenaphthylene	SW8270DSIM	--	--	214 U	180 U	346 U	367 U	35.7 U	70.2 U	205 U	17 U	35.8 U	16.7 U
Anthracene	SW8270DSIM	--	--	**194 J**	180 U	346 U	367 U	**66**	**49.3 J**	**133 J**	**15.1 J**	**262**	**125**
Benzo(a)anthracene	SW8270DSIM	--	--	**4410**	**877**	**1090**	**2470**	**673**	**678**	**1880**	**194**	**4950**	**2740**
Benzo(a)pyrene	SW8270DSIM	2000 / 18000 [2]	2000 [2]	**2950**	**558**	**678**	**1820**	**610**	**591**	**1610**	**174**	**4060**	**1500**
Benzo(b,k)fluoranthene	SW8270DSIM	--	--	**15700**	**3070**	**3210**	**8040**	**2360**	**2420**	**6580**	**695**	**12700**	**7070**
Benzo(g,h,i)perylene	SW8270DSIM	--	--	**2970**	**601**	**741**	**1960**	**692**	**763**	**1730**	**186**	**2840**	**1350**
Chrysene	SW8270DSIM	--	--	**15800**	**2840**	**3060**	**10600**	**2120**	**1920**	**5410**	**505**	**11000**	**8420**
Dibenzo(a,e)pyrene	SW8270DSIM	--	--	2140 U	1800 U	3460 U	3670 U	357 U	702 U	3030 U	235 U	**246 J**	**91.2 J**
Dibenzo(a,h)anthracene	SW8270DSIM	--	--	**753**	**101 J**	346 U	**368**	**131**	**102**	**330**	**27.8**	**693**	**370**
Dibenzo(a,h)pyrene	SW8270DSIM	--	--	2140 U	1800 U	3460 U	3670 U	357 U	702 U	3030 U	235 U	253 U	167 U
Dibenzo(a,i)pyrene	SW8270DSIM	--	--	2140 U	1800 U	3460 U	3670 U	357 U	702 U	3030 U	235 U	253 U	167 U
Dibenzo(a,j)acridine	SW8270DSIM	--	--	2140 U	1800 U	3460 U	3670 U	357 U	702 U	3030 U	235 U	253 U	167 U
Dibenzo(a,l)pyrene	SW8270DSIM	--	--	2140 U	1800 U	3460 U	3670 U	**179 J**	702 U	3030 U	235 U	**596**	**254**
Dibenzofuran	SW8270DSIM	--	--	214 U	180 U	346 U	367 U	35.7 U	70.2 U	205 U	17 U	**20.2 J**	**58.6**
Fluoranthene	SW8270DSIM	--	--	**6930**	**1710**	**2230**	**5830**	**1570**	**1490**	**3520**	**351**	**9210**	**4750**

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	B01	B02	B03	B04	B05	B06	B07	B08	B08	B09
			Sample ID	MBTL-SO-UD-B01	MBTL-SO-UD-B02	MBTL-SO-UD-B03	MBTL-SO-UD-B04	MBTL-SO-UD-B05	MBTL-SO-UD-B06	MBTL-SO-UD-B07	MBTL-SO-UD-B08	MBTL-SO-UD-B08D	MBTL-SO-UD-B09
			Sample Date	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N	N	N	N	FD	N
			X	1005660.72	1005652.68	1005635.71	1005616.83	1005584.15	1005563.67	1005536.69	1005510.48	1005510.48	1005477.9
			Y	304573.83	304607.96	304637.76	304660.31	304688.18	304713.12	304734.21	304757.36	304757.36	304786.43
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial										
Fluorene	SW8270DSIM	--	--	214 U	180 U	346 U	367 U	**23.6 J**	70.2 U	205 U	17 U	**45.3**	**49**
Indeno(1,2,3-c,d)pyrene	SW8270DSIM	--	--	**2990**	**621**	**739**	**1950**	**635**	**671**	**1670**	**177**	**2710**	**1340**
Naphthalene	SW8270DSIM	5000	--	428 U	360 U	692 U	734 U	71.3 U	140 U	409 U	33.9 U	71.7 U	33.5 U
Phenanthrene	SW8270DSIM	--	--	**340**	**158 J**	346 U	**563**	**241**	**185**	**516**	**45.6**	**354**	**413**
Pyrene	SW8270DSIM	--	--	**7010**	**1760**	**2690**	**7180**	**1540**	**1580**	**3540**	**361**	**9090**	**4980**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)[1]		2000 / 18000 [2]	2000 [2]	**5493.3**	**1053.3 J**	**1229.8**	**3208.8**	**1011.1**	**997.3**	**2710.1**	**288.4**	**6275.3**	**2736.2**
Total Petroleum Hydrocarbons (mg/kg)													
Diesel Range Hydrocarbons	NWTPHDx	2000	2000	**47**	**22.4**	**16.2**	**41.8**	**17.5**	**14.6**	**47**	**5.25 J**	**39**	**24.5**
Oil	NWTPHDx	--	--	**199**	**82.8**	**113**	**147**	**74.1**	**51.5**	**287**	**22.8**	**177**	**111**

Notes:

Detected concentration is greater than MBTL_Soil screening level

Detected concentration is greater than MTCA Method A Indust screening level

Bold = Detected result

FD = Field Duplicate

J = Estimated value

cPAH = carcinogenic PAH

mg/kg = milligrams per kilogram

N = Normal Field Sample

pct = percent

µg/kg = micrograms per kilogram

U = Compound analyzed, but not detected above detection limit

MTCA = Model Toxics Control Act

TEQ = Toxic Equivalent Quantity

-- Results not reported or not applicable

Totals are calculated as the sum of all detected results and 1/2 the undetected result. If all results are undetected, the highest reporting limit value is reported as the sum.

Significant figures are applied to all calculations.

1 cPAH minimum 7 analytes calculation includes Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 "Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708(e).

2 Soils were screened both against the MTCA Method A cleanup level and the MTCA Method C cleanup level for benzo(a)pyrene and cPAH TEQ is 18000 ug/kg (18 mg/kg).

U-Ditch Reroute and Soil Removal - Main Channel

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19
			Sample ID	MBTL-SO-UD-B10	MBTL-SO-UD-B11	MBTL-SO-UD-B12	MBTL-SO-UD-B13	MBTL-SO-UD-B14	MBTL-SO-UD-B15	MBTL-SO-UD-B16	MBTL-SO-UD-B17	MBTL-SO-UD-B18	MBTL-SO-UD-B19
			Sample Date	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N	N	N	N	N	N
			X	1005446.58	1005423.36	1005393.66	1005363.24	1005337.74	1005313.91	1005284.04	1005253.68	1005195.91	1005170.42
			Y	304819.67	304840.43	304867.36	304887.6	304917.87	304945.25	304972.47	305000.2	305050.37	305076.69
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial										
Conventional Parameters (mg/kg)													
Cyanide, total	SM4500CNE	70000	--	**4.33**	**26.3**	**42.6**	**2.34**	**1.15**	**1.96**	0.305 U	**0.332**	**0.426**	**0.962**
Fluoride	SM4500FC	210000	--	**434**	**1470**	**1810**	**191**	**174**	**1240**	**209**	**260**	**282**	**350**
Conventional Parameters (pct)													
Total solids	APEXsolids	--	--	**77.6**	**63.4**	**66**	**71.8**	**77.4**	**76.8**	**74.7**	**72.4**	**74**	**73.7**
Total solids	SM2540G	--	--	--	--	--	--	--	--	--	--	--	--
Metals (mg/kg)													
Antimony	SW6020A	1400	--	1.37 U	1.56 U	1.48 U	1.44 U	1.38 U	1.31 U	1.34 U	1.43 U	1.49 U	1.43 U
Arsenic	SW6020A	20	20	**2.07 J**	**2.68 J**	**2.67 J**	2.88 U	**1.23 J**	**1.25 J**	2.69 U	2.86 U	**1.28 J**	**1.41 J**
Beryllium	SW6020A	7000	--	1.37 U	1.56 U	1.48 U	1.44 U	1.38 U	1.31 U	1.34 U	1.43 U	1.49 U	1.43 U
Cadmium	SW6020A	2	2	1.37 U	1.56 U	1.48 U	1.44 U	1.38 U	1.31 U	1.34 U	1.43 U	1.49 U	1.43 U
Chromium	SW6020A	--	2000	**7.09**	**12**	**13.9**	**3.75**	**8.71**	**8.4**	**10.1**	**10.9**	**7.55**	**8.37**
Copper	SW6020A	140000	--	**23.4**	**47.6**	**120**	**10.7**	**17.9**	**41.1**	**12.2**	**35.9**	**19.5**	**22.3**
Lead	SW6020A	1000	1000	**2.22**	**6.05**	**6.94**	**0.865 J**	**2.47**	**3.06**	**2.51**	**1.79**	**2.49**	**2.8**
Mercury	SW6020A	2	2	0.109 U	0.124 U	0.118 U	0.115 U	0.11 U	0.105 U	0.108 U	0.114 U	0.119 U	0.114 U
Nickel	SW6020A	38	--	**10.6**	**22.3**	**24.8**	**4.66**	**9.43**	**19.8**	**6.68**	**7.72**	**10.6**	**12.4**
Selenium	SW6020A	1800	--	2.74 U	3.11 U	2.95 U	2.88 U	2.76 U	2.63 U	2.69 U	2.86 U	2.98 U	2.86 U
Silver	SW6020A	1800	--	1.37 U	1.56 U	1.48 U	1.44 U	1.38 U	1.31 U	1.34 U	1.43 U	1.49 U	1.43 U
Thallium	SW6020A	--	--	1.37 U	1.56 U	1.48 U	1.44 U	1.38 U	1.31 U	1.34 U	1.43 U	1.49 U	1.43 U
Zinc	SW6020A	1100000	--	**42.2**	**108**	**142**	**16.9**	**26.8**	**71.2**	**20.4**	**40.5**	**26**	**29.4**
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	SW8270DSIM	--	--	69.1 U	170 U	84.1 U	9.9 U	8.78 U	**30.1 J**	9.04 U	**6.68 J**	8.24 U	7.71 U
2-Methylnaphthalene	SW8270DSIM	--	--	69.1 U	170 U	84.1 U	9.9 U	8.78 U	**52.9**	9.04 U	**14.7**	8.24 U	7.71 U
Acenaphthene	SW8270DSIM	--	--	**28.8 J**	**155**	**55.9**	4.95 U	4.39 U	**155**	4.52 U	**22.1**	**5.31**	**4.15**
Acenaphthylene	SW8270DSIM	--	--	34.5 U	85 U	42.1 U	4.95 U	4.39 U	20 U	4.52 U	4 U	4.12 U	3.86 U
Anthracene	SW8270DSIM	--	--	**64**	**204**	**178**	**2.72 J**	4.39 U	**72.3**	4.52 U	**15.9**	**54.3**	**14.6**
Benzo(a)anthracene	SW8270DSIM	--	--	**1130**	**3300**	**2930**	**45.8**	**33.2**	**542**	**3.17 J**	**167**	**633**	**185**
Benzo(a)pyrene	SW8270DSIM	2000 / 18000 [2]	2000 [2]	**910**	**2590**	**2630**	**55.3**	**28.2**	**483**	4.52 U	**162**	**354**	**145**
Benzo(b,k)fluoranthene	SW8270DSIM	--	--	**3800**	**9800**	**9290**	**197**	**119**	**2540**	**6.75 J**	**611**	**1190**	**499**
Benzo(g,h,i)perylene	SW8270DSIM	--	--	**901**	**2410**	**2170**	**49**	**32.6**	**789**	**2.77 J**	**379**	**290**	**152**
Chrysene	SW8270DSIM	--	--	**4080**	**10100**	**9500**	**186**	**108**	**1990**	**4.93**	**445**	**1440**	**549**
Dibenzo(a,e)pyrene	SW8270DSIM	--	--	345 U	850 U	**440 J**	49.5 U	43.9 U	200 U	45.2 U	53.9 U	269 U	**41 J**
Dibenzo(a,h)anthracene	SW8270DSIM	--	--	**193**	**493**	**465**	**13**	**7.82**	**176**	4.52 U	**59**	**91.9**	**39.6**
Dibenzo(a,h)pyrene	SW8270DSIM	--	--	345 U	850 U	600 U	49.5 U	43.9 U	200 U	45.2 U	53.9 U	269 U	53.3 U
Dibenzo(a,i)pyrene	SW8270DSIM	--	--	345 U	850 U	600 U	49.5 U	43.9 U	200 U	45.2 U	53.9 U	269 U	53.3 U
Dibenzo(a,j)acridine	SW8270DSIM	--	--	345 U	850 U	600 U	49.5 U	43.9 U	200 U	45.2 U	53.9 U	269 U	53.3 U
Dibenzo(a,l)pyrene	SW8270DSIM	--	--	**209 J**	**487 J**	**1170**	49.5 U	43.9 U	**195 J**	45.2 U	**59.9**	269 U	**102**
Dibenzofuran	SW8270DSIM	--	--	34.5 U	**71.3 J**	**37.2 J**	4.95 U	4.39 U	**121**	4.52 U	**21.2**	**2.4 J**	**2.14 J**
Fluoranthene	SW8270DSIM	--	--	**1950**	**5520**	**4550**	**25.2**	**33.3**	**816**	**2.71 J**	**253**	**1720**	**314**

			Task	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**
			Location ID	**B10**	**B11**	**B12**	**B13**	**B14**	**B15**	**B16**	**B17**	**B18**	**B19**
			Sample ID	**MBTL-SO-UD-B10**	**MBTL-SO-UD-B11**	**MBTL-SO-UD-B12**	**MBTL-SO-UD-B13**	**MBTL-SO-UD-B14**	**MBTL-SO-UD-B15**	**MBTL-SO-UD-B16**	**MBTL-SO-UD-B17**	**MBTL-SO-UD-B18**	**MBTL-SO-UD-B19**
			Sample Date	**11/1/2012**	**11/1/2012**	**11/1/2012**	**11/1/2012**	**11/1/2012**	**11/1/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**
			Depth	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**
			Matrix	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
			Sample Type	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
			X	**1005446.58**	**1005423.36**	**1005393.66**	**1005363.24**	**1005337.74**	**1005313.91**	**1005284.04**	**1005253.68**	**1005195.91**	**1005170.42**
			Y	**304819.67**	**304840.43**	**304867.36**	**304887.6**	**304917.87**	**304945.25**	**304972.47**	**305000.2**	**305050.37**	**305076.69**
	Method	**MTCA Method C Industrial or Alternate Screening Level**	**MTCA Method A Industrial**										
Fluorene	SW8270DSIM	--	--	34.5 U	**77.4 J**	**37.5 J**	4.95 U	4.39 U	**111**	4.52 U	**15.7**	**4.71**	**3.11 J**
Indeno(1,2,3-c,d)pyrene	SW8270DSIM	--	--	**846**	**2330**	**2080**	**45.4**	**29.4**	**621**	4.52 U	**300**	**263**	**132**
Naphthalene	SW8270DSIM	5000	--	69.1 U	170 U	84.1 U	9.9 U	8.78 U	40 U	9.04 U	**4.16 J**	8.24 U	7.71 U
Phenanthrene	SW8270DSIM	--	--	**157**	**648**	**373**	**3.17 J**	**4.98**	**281**	4.52 U	**66.4**	**71.9**	**31.8**
Pyrene	SW8270DSIM	--	--	**2260**	**5980**	**5120**	**27.6**	**36.5**	**701**	**2.28 J**	**239**	**1620**	**413**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)[1]		2000 / 18000 [2]	2000 [2]	**1547.7**	**4283.3**	**4201.5**	**87.3**	**48.22**	**890.8**	**3.75 J**	**280.1**	**586.2**	**236.1**
Total Petroleum Hydrocarbons (mg/kg)													
Diesel Range Hydrocarbons	NWTPHDx	2000	2000	**17.3**	**33.8**	**21.7**	9.9 U	8.78 U	**7.12 J**	**4.76 J**	**4.14 J**	**10.1**	**4.95 J**
Oil	NWTPHDx	--	--	**76.9**	**200**	**148**	19.8 U	17.6 U	**38.4**	18.1 U	**13.1 J**	**30.3**	**24.6**

Notes:

Detected concentration is greater than MBTL_Soil screening level

Detected concentration is greater than MTCA Method A Indust screening level

Bold = Detected result

FD = Field Duplicate

J = Estimated value

cPAH = carcinogenic PAH

mg/kg = milligrams per kilogram

N = Normal Field Sample

pct = percent

µg/kg = micrograms per kilogram

U = Compound analyzed, but not detected above detection limit

MTCA = Model Toxics Control Act

TEQ = Toxic Equivalent Quantity

-- Results not reported or not applicable

Totals are calculated as the sum of all detected results and 1/2 the undetected result. If all results are undetected, the highest reporting limit value is reported as the sum.

Significant figures are applied to all calculations.

1 cPAH minimum 7 analytes calculation includes Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 "Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708(e).

2 Soils were screened both against the MTCA Method A cleanup level and the MTCA Method C cleanup level for benzo(a)pyrene and cPAH TEQ is 18000 ug/kg (18 mg/kg).

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	**B20**	**B21**	**B22**	**B23**	**B24**	**B25**	**B26**	**B26**	**B26**	**B26**
			Sample ID	**MBTL-SO-UD-B20**	**MBTL-SO-UD-B21**	**MBTL-SO-UD-B22**	**MBTL-SO-UD-B23**	**MBTL-SO-UD-B24**	**MBTL-SO-UD-B25**	**MBTL-SO-UD-B26**	**MBTL-SO-UD-B26**	**MBTL-SO-UD-B26D**	**MBTL-SO-UD-B26D**
			Sample Date	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/15/2012**	**11/2/2012**	**11/15/2012**
			Depth	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0.5 - 1.5 ft**	**0 - 0.5 ft**	**0.5 - 1.5 ft**
			Matrix	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
			Sample Type	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**FD**	**FD**
			X	**1005148.85**	**1005118.96**	**1005088.98**	**1005061.28**	**1005030.5**	**1004992.68**	**1004950.98**	**1004950.98**	**1004950.98**	**1004950.98**
			Y	**305093.61**	**305124.51**	**305149.49**	**305160.5**	**305168.23**	**305174.17**	**305174.04**	**305174.04**	**305174.04**	**305174.04**
	Method	**MTCA Method C Industrial or Alternate Screening Level**	**MTCA Method A Industrial**										
Conventional Parameters (mg/kg)													
Cyanide, total	SM4500CNE	70000	--	**50.1**	0.289 U	0.304 U	**15.9**	**1.1**	**1.18**	**64.2**	--	**59.7**	--
Fluoride	SM4500FC	210000	--	**186**	**203**	**155**	**176**	**143**	**554**	**2070**	--	**1590**	--
Conventional Parameters (pct)													
Total solids	APEXsolids	--	--	**76.2**	**76.5**	**79.1**	**76.5**	**77.4**	**77.5**	**71**	--	**61.6**	--
Total solids	SM2540G	--	--	--	--	--	--	--	--	--	--	--	--
Metals (mg/kg)													
Antimony	SW6020A	1400	--	1.36 U	1.35 U	1.24 U	1.38 U	1.42 U	1.35 U	1.42 U	--	1.7 U	--
Arsenic	SW6020A	20	20	2.72 U	2.7 U	2.47 U	2.77 U	**1.42 J**	**1.88 J**	**2.07 J**	--	**2.92 J**	--
Beryllium	SW6020A	7000	--	1.36 U	1.35 U	1.24 U	1.38 U	1.42 U	1.35 U	1.42 U	--	1.7 U	--
Cadmium	SW6020A	2	2	1.36 U	1.35 U	1.24 U	1.38 U	1.42 U	1.35 U	1.42 U	--	1.7 U	--
Chromium	SW6020A	--	2000	**3.95**	**2.61 J**	**3.38**	**5.4**	**9.04**	**8.58**	**6.82**	--	**8.93**	--
Copper	SW6020A	140000	--	**12.9**	**11.4**	**13.4**	**14.5**	**20.6**	**45.9**	**19.2**	--	**25.6**	--
Lead	SW6020A	1000	1000	**1.37**	**1.71**	**1.03 J**	**2.13**	**2.83**	**4.91**	**5.19**	--	**7.59**	--
Mercury	SW6020A	2	2	0.109 U	0.108 U	0.099 U	0.111 U	0.114 U	0.108 U	0.113 U	--	0.136 U	--
Nickel	SW6020A	38	--	**4.97**	**4.74**	**4.68**	**7.15**	**9.19**	**10.9**	**18.5**	--	**29.4**	--
Selenium	SW6020A	1800	--	2.72 U	2.7 U	2.47 U	2.77 U	2.84 U	2.7 U	2.83 U	--	3.4 U	--
Silver	SW6020A	1800	--	1.36 U	1.35 U	1.24 U	1.38 U	1.42 U	1.35 U	1.42 U	--	1.7 U	--
Thallium	SW6020A	--	--	1.36 U	1.35 U	1.24 U	1.38 U	1.42 U	1.35 U	1.42 U	--	1.7 U	--
Zinc	SW6020A	1100000	--	**17.6**	**14.5**	**13.5**	**20.6**	**34.3**	**33.6**	**39.7**	--	**53.7**	--
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	SW8270DSIM	--	--	9.54 U	8.11 U	8.04 U	9.45 U	8.68 U	8.59 U	--	9.98 U	--	9.8 U
2-Methylnaphthalene	SW8270DSIM	--	--	9.54 U	8.11 U	8.04 U	9.45 U	8.68 U	8.59 U	--	9.98 U	--	9.8 U
Acenaphthene	SW8270DSIM	--	--	4.77 U	4.05 U	4.02 U	4.72 U	**2.59 J**	**17.2**	--	**28.2**	--	**33.3**
Acenaphthylene	SW8270DSIM	--	--	4.77 U	4.05 U	4.02 U	4.72 U	4.34 U	4.3 U	--	4.99 U	--	4.9 U
Anthracene	SW8270DSIM	--	--	**12.2**	**7.29**	4.02 U	**16**	**16.9**	**81.2**	--	**83**	--	**182**
Benzo(a)anthracene	SW8270DSIM	--	--	**95.4**	**89.9**	**4.05**	**248**	**246**	**740**	--	**1020**	--	**1850**
Benzo(a)pyrene	SW8270DSIM	2000 / 18000 [2]	2000 [2]	**53.9**	**51.1**	**4.36**	**294**	**150**	**485**	--	**595**	--	**1020**
Benzo(b,k)fluoranthene	SW8270DSIM	--	--	**194**	**201**	**12.4**	**1080**	**543**	**1590**	--	**1830**	--	**3180**
Benzo(g,h,i)perylene	SW8270DSIM	--	--	**66**	**42.9**	**5.07**	**501**	**131**	**448**	--	**362**	--	**695**
Chrysene	SW8270DSIM	--	--	**237**	**219**	**8.15**	**739**	**1280**	**1600**	--	**2360**	--	**4780**
Dibenzo(a,e)pyrene	SW8270DSIM	--	--	47.7 U	40.5 U	40.2 U	**32.5 J**	43.4 U	**34.2 J**	--	**38 J**	--	**89.6**
Dibenzo(a,h)anthracene	SW8270DSIM	--	--	**17.4**	**11.4**	4.02 U	**82.3**	**30.9**	**108**	--	**143**	--	**275**
Dibenzo(a,h)pyrene	SW8270DSIM	--	--	47.7 U	40.5 U	40.2 U	51.6 U	43.4 U	51.6 U	--	49.9 U	--	49 U
Dibenzo(a,i)pyrene	SW8270DSIM	--	--	47.7 U	40.5 U	40.2 U	51.6 U	43.4 U	51.6 U	--	49.9 U	--	49 U
Dibenzo(a,j)acridine	SW8270DSIM	--	--	47.7 U	40.5 U	40.2 U	51.6 U	43.4 U	51.6 U	--	49.9 U	--	49 U
Dibenzo(a,l)pyrene	SW8270DSIM	--	--	47.7 U	40.5 U	40.2 U	**89.4**	**34.9 J**	**93.8**	--	**104**	--	**236**
Dibenzofuran	SW8270DSIM	--	--	4.77 U	4.05 U	4.02 U	4.72 U	4.34 U	**5.35**	--	**11.1**	--	**14**
Fluoranthene	SW8270DSIM	--	--	**235**	**200**	**5.33**	**144**	**343**	**1590**	--	**2670**	--	**4560**

U-Ditch Reroute and Soil Removal - Main Channel

			Task	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**	**U-Ditch Sampling**
			Location ID	**B20**	**B21**	**B22**	**B23**	**B24**	**B25**	**B26**	**B26**	**B26**	**B26**
			Sample ID	**MBTL-SO-UD-B20**	**MBTL-SO-UD-B21**	**MBTL-SO-UD-B22**	**MBTL-SO-UD-B23**	**MBTL-SO-UD-B24**	**MBTL-SO-UD-B25**	**MBTL-SO-UD-B26**	**MBTL-SO-UD-B26**	**MBTL-SO-UD-B26D**	**MBTL-SO-UD-B26D**
			Sample Date	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/2/2012**	**11/15/2012**	**11/2/2012**	**11/15/2012**
			Depth	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0 - 0.5 ft**	**0.5 - 1.5 ft**	**0 - 0.5 ft**	**0.5 - 1.5 ft**
			Matrix	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**	**SO**
			Sample Type	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**FD**	**FD**
			X	**1005148.85**	**1005118.96**	**1005088.98**	**1005061.28**	**1005030.5**	**1004992.68**	**1004950.98**	**1004950.98**	**1004950.98**	**1004950.98**
			Y	**305093.61**	**305124.51**	**305149.49**	**305160.5**	**305168.23**	**305174.17**	**305174.04**	**305174.04**	**305174.04**	**305174.04**
	Method	**MTCA Method C Industrial or Alternate Screening Level**	**MTCA Method A Industrial**										
Fluorene	SW8270DSIM	--	--	4.77 U	4.05 U	4.02 U	4.72 U	4.34 U	**10.1**	--	**33**	--	**39.9**
Indeno(1,2,3-c,d)pyrene	SW8270DSIM	--	--	**53.1**	**41**	**3.77 J**	**453**	**117**	**410**	--	**375**	--	**701**
Naphthalene	SW8270DSIM	5000	--	9.54 U	8.11 U	8.04 U	9.45 U	8.68 U	**4.82 J**	--	9.98 U	--	**5.55 J**
Phenanthrene	SW8270DSIM	--	--	**34.2**	**10.7**	4.02 U	**26.6**	**27.3**	**202**	--	**162**	--	**315**
Pyrene	SW8270DSIM	--	--	**229**	**236**	**5.68**	**170**	**414**	**1500**	--	**2370**	--	**4110**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)[1]		2000 / 18000 [2]	2000 [2]	**92.3**	**87.6**	**6.66 J**	**487.7**	**256.5**	**785.8**	--	**955.4**	--	**1668.4**
Total Petroleum Hydrocarbons (mg/kg)													
Diesel Range Hydrocarbons	NWTPHDx	2000	2000	9.54 U	8.11 U	8.04 U	9.45 U	**4.86 J**	**10.5**	**216**	--	**312**	--
Oil	NWTPHDx	--	--	**9.67 J**	**11.9 J**	16.1 U	**20.5**	**12.2 J**	**45.9**	**1020**	--	**918**	--

Notes:

Detected concentration is greater than MBTL_Soil screening level

Detected concentration is greater than MTCA Method A Indust screening level

Bold = Detected result

FD = Field Duplicate

J = Estimated value

cPAH = carcinogenic PAH

mg/kg = milligrams per kilogram

N = Normal Field Sample

pct = percent

µg/kg = micrograms per kilogram

U = Compound analyzed, but not detected above detection limit

MTCA = Model Toxics Control Act

TEQ = Toxic Equivalent Quantity

-- Results not reported or not applicable

Totals are calculated as the sum of all detected results and 1/2 the undetected result. If all results are undetected, the highest reporting limit value is reported as the sum.

Significant figures are applied to all calculations.

1 cPAH minimum 7 analytes calculation includes Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 "Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708(e).

2 Soils were screened both against the MTCA Method A cleanup level and the MTCA Method C cleanup level for benzo(a)pyrene and cPAH TEQ is 18000 ug/kg (18 mg/kg).

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	S01E	S01W	S02E	S02W	S03E	S03W	S04E	S04E	S04W
			Sample ID	MBTL-SO-UD-S01E	MBTL-SO-UD-S01W	MBTL-SO-UD-S02E	MBTL-SO-UD-S02W	MBTL-SO-UD-S03E	MBTL-SO-UD-S03W	MBTL-SO-UD-S04E	MBTL-SO-UD-S04ED	MBTL-SO-UD-S04W
			Sample Date	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N	N	N	FD	N
			X	1005594.6	1005613.05	1005523.5	1005503.84	1005429.06	1005414.41	1005342.14	1005342.14	1005328.31
			Y	304654.39	304678.07	304760.09	304739.92	304841.49	304827.42	304926.15	304926.15	304906.63
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial									
Conventional Parameters (mg/kg)												
Cyanide, total	SM4500CNE	70000	--	0.386 U	**0.985**	**2.13**	**15.7**	0.316 U	**36.4**	0.305 U	0.272 U	0.286 U
Fluoride	SM4500FC	210000	--	**713**	**353**	**834**	**1090**	**648**	**2450**	**186**	**152**	**125**
Conventional Parameters (pct)												
Total solids	APEXsolids	--	--	**63.9**	**82.5**	**69**	**70.5**	**69.8**	**57.8**	**75.7**	**80.1**	**87.2**
Total solids	SM2540G	--	--	--	--	--	--	--	--	**79.1**	--	--
Metals (mg/kg)												
Antimony	SW6020A	1400	--	1.62 U	1.2 U	1.58 U	1.5 U	1.41 U	**1.05 J**	1.44 U	1.28 U	1.19 U
Arsenic	SW6020A	20	20	**5.31**	**0.842 J**	**3.22**	**4.46**	**3.47**	**4.87**	**1.31 J**	**0.756 J**	**0.914 J**
Beryllium	SW6020A	7000	--	**0.942 J**	1.2 U	1.58 U	1.5 U	**0.888 J**	**1.08 J**	1.44 U	1.28 U	1.19 U
Cadmium	SW6020A	2	2	1.62 U	1.2 U	1.58 U	1.5 U	1.41 U	1.72 U	1.44 U	1.28 U	1.19 U
Chromium	SW6020A	--	2000	**20.6**	**8.89**	**17.5**	**17.3**	**20.7**	**20.4**	**6.26**	**4.06**	**3.44**
Copper	SW6020A	140000	--	**42.8**	**16.8**	**35.1**	**43.6**	**31.4**	**103**	**15.1**	**10.9**	**8.06**
Lead	SW6020A	1000	1000	**7.47**	**1.88**	**8.59**	**10.7**	**7.56**	**11.4**	**2.07**	**1.54**	**1.96**
Mercury	SW6020A	2	2	0.13 U	0.0962 U	0.126 U	**0.0704 J**	0.113 U	0.137 U	0.115 U	0.103 U	0.095 U
Nickel	SW6020A	38	--	**21.1**	**10.3**	**22.4**	**24.2**	**16.1**	**55**	**8.36**	**6.06**	**6.17**
Selenium	SW6020A	1800	--	3.25 U	2.41 U	3.16 U	2.99 U	2.82 U	3.43 U	2.87 U	2.56 U	2.37 U
Silver	SW6020A	1800	--	1.62 U	1.2 U	1.58 U	1.5 U	1.41 U	1.72 U	1.44 U	1.28 U	1.19 U
Thallium	SW6020A	--	--	1.62 U	1.2 U	1.58 U	1.5 U	1.41 U	1.72 U	1.44 U	1.28 U	1.19 U
Zinc	SW6020A	1100000	--	**64.1**	**26.8**	**51.3**	**70.9**	**33.8**	**140**	**23**	**16.8**	**27.4**
Polycyclic Aromatic Hydrocarbons (µg/kg)												
1-Methylnaphthalene	SW8270DSIM	--	--	8.49 U	6.91 U	38.8 U	40.1 U	7.79 U	192 U	7.66 U	9.42 U	8.03 U
2-Methylnaphthalene	SW8270DSIM	--	--	8.49 U	6.91 U	38.8 U	40.1 U	7.79 U	192 U	7.66 U	9.42 U	8.03 U
Acenaphthene	SW8270DSIM	--	--	4.24 U	3.46 U	**17.1 J**	**33.2**	3.89 U	**66.9 J**	3.83 U	4.71 U	4.02 U
Acenaphthylene	SW8270DSIM	--	--	4.24 U	3.46 U	**14.6 J**	20 U	3.89 U	95.8 U	3.83 U	4.71 U	4.02 U
Anthracene	SW8270DSIM	--	--	4.24 U	**2.25 J**	**50.3**	**106**	3.89 U	**349**	3.83 U	4.71 U	4.02 U
Benzo(a)anthracene	SW8270DSIM	--	--	**6.84**	**25.1**	**230**	**1700**	**2.16 J**	**6020**	**15.6**	**5.9**	**13.2**
Benzo(a)pyrene	SW8270DSIM	2000 / 18000 [2]	2000 [2]	**7.85**	**38.7**	**301**	**1440**	**2.31 J**	**4680**	**16.9**	**6.47**	**15.1**
Benzo(b,k)fluoranthene	SW8270DSIM	--	--	**24.6**	**152**	**861**	**5170**	**5.51 J**	**16900**	**63.9**	**22.7**	**42.1**
Benzo(g,h,i)perylene	SW8270DSIM	--	--	**16.2**	**127**	**573**	**1440**	**2.2 J**	**3760**	**85.9**	**52.5**	**17.3**
Chrysene	SW8270DSIM	--	--	**14.5**	**64.4**	**544**	**4900**	**3.06 J**	**18100**	**39.5**	**13.6**	**23.5**
Dibenzo(a,e)pyrene	SW8270DSIM	--	--	42.4 U	34.6 U	194 U	**233 J**	38.9 U	958 U	38.3 U	47.1 U	40.2 U
Dibenzo(a,h)anthracene	SW8270DSIM	--	--	4.24 U	**15.3**	**70.3**	**294**	3.89 U	**837**	**7.71**	**3.35 J**	**4.05**
Dibenzo(a,h)pyrene	SW8270DSIM	--	--	42.4 U	34.6 U	194 U	279 U	38.9 U	958 U	38.3 U	47.1 U	40.2 U
Dibenzo(a,i)pyrene	SW8270DSIM	--	--	42.4 U	34.6 U	194 U	279 U	38.9 U	958 U	38.3 U	47.1 U	40.2 U
Dibenzo(a,j)acridine	SW8270DSIM	--	--	42.4 U	34.6 U	194 U	279 U	38.9 U	958 U	38.3 U	47.1 U	40.2 U
Dibenzo(a,l)pyrene	SW8270DSIM	--	--	42.4 U	**30.2 J**	**130 J**	**592**	38.9 U	**766 J**	**21.2 J**	47.1 U	40.2 U
Dibenzofuran	SW8270DSIM	--	--	4.24 U	3.46 U	**11.4 J**	**18.4 J**	3.89 U	95.8 U	3.83 U	4.71 U	4.02 U
Fluoranthene	SW8270DSIM	--	--	**10.4**	**37.8**	**475**	**3370**	3.89 U	**12900**	**20.9**	**8.73**	**24.8**

U-Ditch Reroute and Soil Removal - Main Channel

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	S01E	S01W	S02E	S02W	S03E	S03W	S04E	S04E	S04W
			Sample ID	MBTL-SO-UD-S01E	MBTL-SO-UD-S01W	MBTL-SO-UD-S02E	MBTL-SO-UD-S02W	MBTL-SO-UD-S03E	MBTL-SO-UD-S03W	MBTL-SO-UD-S04E	MBTL-SO-UD-S04ED	MBTL-SO-UD-S04W
			Sample Date	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012	11/1/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N	N	N	FD	N
			X	1005594.6	1005613.05	1005523.5	1005503.84	1005429.06	1005414.41	1005342.14	1005342.14	1005328.31
			Y	304654.39	304678.07	304760.09	304739.92	304841.49	304827.42	304926.15	304926.15	304906.63
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial									
Fluorene	SW8270DSIM	--	--	4.24 U	3.46 U	**15.8 J**	**21.5**	3.89 U	**49.9 J**	3.83 U	4.71 U	4.02 U
Indeno(1,2,3-c,d)pyrene	SW8270DSIM	--	--	**11.7**	**105**	**459**	**1350**	3.89 U	**3680**	**37.1**	**20.4**	**16.4**
Naphthalene	SW8270DSIM	5000	--	8.49 U	6.91 U	**28.5 J**	40.1 U	7.79 U	192 U	7.66 U	9.42 U	8.03 U
Phenanthrene	SW8270DSIM	--	--	**4.08 J**	**8.74**	**222**	**240**	3.89 U	**697**	**5.57**	**2.8 J**	**9.78**
Pyrene	SW8270DSIM	--	--	**12.2**	**36.8**	**597**	**3370**	**2.53 J**	**12500**	**20.8**	**8.61**	**22**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)[1]		2000 / 18000 [2]	2000 [2]	**12.52**	**69.1**	**468.5**	**2340.4**	**3.5 J**	**7604.7**	**29.73**	**11.84 J**	**22.91**
Total Petroleum Hydrocarbons (mg/kg)												
Diesel Range Hydrocarbons	NWTPHDx	2000	2000	8.49 U	6.91 U	**10.9**	**21.5**	7.79 U	**51.4**	7.66 U	9.42 U	8.03 U
Oil	NWTPHDx	--	--	17 U	13.8 U	**36.5**	**121**	15.6 U	**300**	15.3 U	18.8 U	16.1 U

Notes:

Detected concentration is greater than MBTL_Soil screening level

Detected concentration is greater than MTCA Method A Indust screening level

Bold = Detected result

FD = Field Duplicate

J = Estimated value

cPAH = carcinogenic PAH

mg/kg = milligrams per kilogram

N = Normal Field Sample

pct = percent

µg/kg = micrograms per kilogram

U = Compound analyzed, but not detected above detection limit

MTCA = Model Toxics Control Act

TEQ = Toxic Equivalent Quantity

-- Results not reported or not applicable

Totals are calculated as the sum of all detected results and 1/2 the undetected result. If all results are undetected, the highest reporting limit value is reported as the sum.

Significant figures are applied to all calculations.

1 cPAH minimum 7 analytes calculation includes Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 "Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708(e).

2 Soils were screened both against the MTCA Method A cleanup level and the MTCA Method C cleanup level for benzo(a)pyrene and cPAH TEQ is 18000 ug/kg (18 mg/kg).

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	S05E	S05W	S06E	S06E	S07E	S07W	S08E	S08E	S08W
			Sample ID	MBTL-SO-UD-S05E	MBTL-SO-UD-S05W	MBTL-SO-UD-S06E	MBTL-SO-UD-S06ED	MBTL-SO-UD-S07E	MBTL-SO-UD-S07W	MBTL-SO-UD-S08E	MBTL-SO-UD-S08ED	MBTL-SO-UD-S08W
			Sample Date	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	FD	N	N	N	FD	N
			X	1005249.8	1005244.64	1005165.2	1005165.2	1005072.25	1005060.08	1004950.61	1004950.61	1004952.26
			Y	305009.45	304987.79	305087.39	305087.39	305165.64	305138.36	305178.21	305178.21	305157.23
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial									
Conventional Parameters (mg/kg)												
Cyanide, total	SM4500CNE	70000	--	0.317 U	0.274 U	**0.519**	**0.364**	0.283 U	0.315 U	**1.9**	**0.31**	**5.3**
Fluoride	SM4500FC	210000	--	**186**	**138**	**494**	**440**	**179**	**348**	**380**	**223**	**1230**
Conventional Parameters (pct)												
Total solids	APEXsolids	--	--	**71**	**86.5**	**71.9**	**72.7**	**78.5**	**75.5**	**70.1**	**78.1**	**81.9**
Total solids	SM2540G	--	--	--	--	**72.7**	--	**78.9**	--	**73.1**	--	--
Metals (mg/kg)												
Antimony	SW6020A	1400	--	1.45 U	1.12 U	1.44 U	1.49 U	1.26 U	1.35 U	1.47 U	1.33 U	1.22 U
Arsenic	SW6020A	20	20	2.9 U	**1.52 J**	**3.95**	**2.08 J**	**0.908 J**	2.71 U	**1.81 J**	**1.4 J**	**1.63 J**
Beryllium	SW6020A	7000	--	1.45 U	1.12 U	1.44 U	1.49 U	1.26 U	1.35 U	1.47 U	1.33 U	1.22 U
Cadmium	SW6020A	2	2	1.45 U	1.12 U	1.44 U	1.49 U	1.26 U	1.35 U	1.47 U	1.33 U	1.22 U
Chromium	SW6020A	--	2000	**7.27**	**4**	**8.76**	**10.1**	**6.52**	**8.72**	**12.3**	**5.31**	**6.2**
Copper	SW6020A	140000	--	**17.3**	**10.3**	**14.5**	**14.8**	**18.7**	**18.3**	**30**	**19.4**	**17.1**
Lead	SW6020A	1000	1000	**1.74**	**2.7**	**5.96**	**6.64**	**1.5**	**2.19**	**6.16**	**1.43**	**4.16**
Mercury	SW6020A	2	2	0.116 U	0.09 U	0.115 U	0.119 U	0.101 U	0.108 U	0.118 U	0.107 U	0.0975 U
Nickel	SW6020A	38	--	**7.59**	**8.18**	**15.8**	**17.1**	**7.18**	**6.11**	**15.6**	**7.12**	**10.1**
Selenium	SW6020A	1800	--	2.9 U	2.25 U	2.87 U	2.97 U	2.52 U	2.71 U	2.95 U	2.67 U	2.44 U
Silver	SW6020A	1800	--	1.45 U	1.12 U	1.44 U	1.49 U	1.26 U	1.35 U	1.47 U	1.33 U	1.22 U
Thallium	SW6020A	--	--	1.45 U	1.12 U	1.44 U	1.49 U	1.26 U	1.35 U	1.47 U	1.33 U	1.22 U
Zinc	SW6020A	1100000	--	**23.8**	**29.6**	**53.3**	**56.5**	**20.9**	**20.7**	**38.6**	**17.8**	**37.4**
Polycyclic Aromatic Hydrocarbons (µg/kg)												
1-Methylnaphthalene	SW8270DSIM	--	--	10.2 U	8.76 U	10.6 U	9.81 U	9.06 U	8.3 U	11.3 U	9.37 U	**6.87 J**
2-Methylnaphthalene	SW8270DSIM	--	--	10.2 U	8.76 U	10.6 U	9.81 U	9.06 U	8.3 U	11.3 U	9.37 U	**7.01 J**
Acenaphthene	SW8270DSIM	--	--	**9.48**	4.38 U	**14.6**	4.9 U	4.53 U	4.15 U	**3.86 J**	4.69 U	**32.6**
Acenaphthylene	SW8270DSIM	--	--	5.08 U	4.38 U	5.3 U	4.9 U	4.53 U	4.15 U	5.64 U	4.69 U	**3.5 J**
Anthracene	SW8270DSIM	--	--	**12.2**	**2.83 J**	**27.9**	**7.81**	4.53 U	4.15 U	**11.5**	4.69 U	**36.9**
Benzo(a)anthracene	SW8270DSIM	--	--	**155**	**20.4**	**93.1**	**55**	**3.79 J**	4.15 U	**174**	**6.6**	**162**
Benzo(a)pyrene	SW8270DSIM	2000 / 18000 [2]	2000 [2]	**139**	**23.2**	**113**	**71**	**4.52 J**	**2.16 J**	**161**	**4.41 J**	**105**
Benzo(b,k)fluoranthene	SW8270DSIM	--	--	**454**	**53**	**310**	**234**	**12.9**	**4.17 J**	**676**	**21.3**	**337**
Benzo(g,h,i)perylene	SW8270DSIM	--	--	**199**	**23.2**	**1210**	**884**	**12.3**	4.15 U	**338**	**8.06**	**72.7**
Chrysene	SW8270DSIM	--	--	**392**	**29.7**	**406**	**273**	**7.61**	**2.19 J**	**705**	**13.4**	**379**
Dibenzo(a,e)pyrene	SW8270DSIM	--	--	56.2 U	43.8 U	**35.8 J**	**45.2 J**	45.3 U	41.5 U	55.4 U	46.9 U	45.5 U
Dibenzo(a,h)anthracene	SW8270DSIM	--	--	**43.3**	**5.36**	**112**	**79.3**	4.53 U	4.15 U	**60**	4.69 U	**18.6**
Dibenzo(a,h)pyrene	SW8270DSIM	--	--	56.2 U	43.8 U	55.1 U	52 U	45.3 U	41.5 U	55.4 U	46.9 U	45.5 U
Dibenzo(a,i)pyrene	SW8270DSIM	--	--	56.2 U	43.8 U	55.1 U	52 U	45.3 U	41.5 U	55.4 U	46.9 U	45.5 U
Dibenzo(a,j)acridine	SW8270DSIM	--	--	56.2 U	43.8 U	55.1 U	52 U	45.3 U	41.5 U	55.4 U	46.9 U	45.5 U
Dibenzo(a,l)pyrene	SW8270DSIM	--	--	56.2 U	43.8 U	**94.8**	**122**	45.3 U	41.5 U	55.4 U	46.9 U	**23.8 J**
Dibenzofuran	SW8270DSIM	--	--	**5.77**	4.38 U	**5.76**	4.9 U	4.53 U	4.15 U	5.64 U	4.69 U	**13.2**
Fluoranthene	SW8270DSIM	--	--	**179**	**32.4**	**131**	**55.3**	**4.52 J**	4.15 U	**261**	**10.5**	**642**

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	S05E	S05W	S06E	S06E	S07E	S07W	S08E	S08E	S08W
			Sample ID	MBTL-SO-UD-S05E	MBTL-SO-UD-S05W	MBTL-SO-UD-S06E	MBTL-SO-UD-S06ED	MBTL-SO-UD-S07E	MBTL-SO-UD-S07W	MBTL-SO-UD-S08E	MBTL-SO-UD-S08ED	MBTL-SO-UD-S08W
			Sample Date	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	FD	N	N	N	FD	N
			X	1005249.8	1005244.64	1005165.2	1005165.2	1005072.25	1005060.08	1004950.61	1004950.61	1004952.26
			Y	305009.45	304987.79	305087.39	305087.39	305165.64	305138.36	305178.21	305178.21	305157.23
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial									
Fluorene	SW8270DSIM	--	--	**6.12**	4.38 U	**10.9**	4.9 U	4.53 U	4.15 U	5.64 U	4.69 U	**9.3**
Indeno(1,2,3-c,d)pyrene	SW8270DSIM	--	--	**163**	**21.8**	**510**	**362**	**6.17**	4.15 U	**275**	**4.62 J**	**73.3**
Naphthalene	SW8270DSIM	5000	--	10.2 U	8.76 U	10.6 U	9.81 U	9.06 U	8.3 U	11.3 U	9.37 U	**5.18 J**
Phenanthrene	SW8270DSIM	--	--	**38.3**	**10.9**	**128**	**15**	4.53 U	4.15 U	**39.3**	**2.8 J**	**197**
Pyrene	SW8270DSIM	--	--	**198**	**33.8**	**154**	**57.6**	**4.76**	4.15 U	**251**	**8.59**	**533**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)[1]		2000 / 18000 [2]	2000 [2]	**224.5**	**33.55**	**219.6**	**146.8**	**7.11 J**	**3.22 J**	**286.6**	**8.03 J**	**167.9**
Total Petroleum Hydrocarbons (mg/kg)												
Diesel Range Hydrocarbons	NWTPHDx	2000	2000	10.2 U	8.76 U	**5.9 J**	**5.29 J**	9.06 U	8.3 U	**7.55 J**	9.37 U	9.1 U
Oil	NWTPHDx	--	--	**21.8**	**9.58 J**	**30.5**	**29.2**	18.1 U	**13.1 J**	**36.1**	18.7 U	**16.8 J**

Notes:

Detected concentration is greater than MBTL_Soil screening level

Detected concentration is greater than MTCA Method A Indust screening level

Bold = Detected result

FD = Field Duplicate

J = Estimated value

cPAH = carcinogenic PAH

mg/kg = milligrams per kilogram

N = Normal Field Sample

pct = percent

µg/kg = micrograms per kilogram

U = Compound analyzed, but not detected above detection limit

MTCA = Model Toxics Control Act

TEQ = Toxic Equivalent Quantity

-- Results not reported or not applicable

Totals are calculated as the sum of all detected results and 1/2 the undetected result. If all results are undetected, the highest reporting limit value is reported as the sum.

Significant figures are applied to all calculations.

1 cPAH minimum 7 analytes calculation includes Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 "Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708(e).

2 Soils were screened both against the MTCA Method A cleanup level and the MTCA Method C cleanup level for benzo(a)pyrene and cPAH TEQ is 18000 ug/kg (18 mg/kg).

U-Ditch Reroute and Soil Removal - Side Channel

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	CB01	CB02	CB03	CB04	CB05	CB06	CB07	CB08	CBS09W	CBS09W
			Sample ID	MBTL-SO-UD-CB01	MBTL-SO-UD-CB02	MBTL-SO-UD-CB03	MBTL-SO-UD-CB04	MBTL-SO-UD-CB05	MBTL-SO-UD-CB06	MBTL-SO-UD-CB07	MBTL-SO-UD-CB08	MBTL-SO-UD-CBS09W	MBTL-SO-UD-CBS09WD
			Sample Date	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N	N	N	N	N	FD
			X	1005136.34	1005116.5	1005098.6	1005080.6	1005063.51	1005047.27	1005028.66	1005007.6	1005028.61	1005028.61
			Y	305068.74	305075.95	305081.23	305085.89	305090.1	305093.94	305094.73	305095.85	305075.32	305075.32
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial										
Conventional Parameters (mg/kg)													
Cyanide, total	SM4500CNE	70000	--	**5.37**	**0.352**	0.369 U	**1.64**	**0.644**	**1.26**	**0.36**	**42.8**	**5.2**	**6.38**
Fluoride	SM4500FC	210000	--	**591**	**546**	**458**	**635**	**595**	**1180**	**659**	**1490**	**1170**	**1160**
Conventional Parameters (pct)													
Total solids	APEXsolids	--	--	**67.2**	**71**	**67**	**71.9**	**68.9**	**53.4**	**64.4**	**58.1**	**69.9**	**72.1**
Metals (mg/kg)													
Antimony	SW6020A	1400	--	1.54 U	1.51 U	1.47 U	1.44 U	1.45 U	1.95 U	1.7 U	1.73 U	1.41 U	1.49 U
Arsenic	SW6020A	20	20	**1.89 J**	**3.63**	**2.08 J**	**3.15**	**3.96**	**4.34**	**4.34**	**5.02**	**3.15**	**3.59**
Beryllium	SW6020A	7000	--	1.54 U	1.51 U	1.47 U	1.44 U	1.45 U	1.95 U	1.7 U	**1.06 J**	1.41 U	1.49 U
Cadmium	SW6020A	2	2	1.54 U	1.51 U	1.47 U	1.44 U	1.45 U	1.95 U	1.7 U	1.73 U	1.41 U	1.49 U
Chromium	SW6020A	--	2000	**14.2**	**8.25**	**13.7**	**12.5**	**13.8**	**16.1**	**11.6**	**15.9**	**11.5**	**11**
Copper	SW6020A	140000	--	**14**	**9.79**	**25.6**	**21.3**	**17.2**	**37**	**24.5**	**35.6**	**28.2**	**31.4**
Lead	SW6020A	1000	1000	**6.89**	**7.01**	**12.9**	**8.73**	**16**	**18.9**	**10.1**	**16.6**	**7.76**	**8.34**
Mercury	SW6020A	2	2	0.123 U	0.121 U	**0.0596 J**	0.115 U	0.116 U	**0.0937 J**	0.136 U	**0.0941 J**	0.113 U	0.119 U
Nickel	SW6020A	38	--	**13.8**	**13.6**	**15.9**	**18.2**	**17.1**	**28.1**	**17.7**	**43.6**	**23.5**	**24.9**
Selenium	SW6020A	1800	--	3.08 U	3.02 U	2.95 U	2.88 U	2.9 U	3.91 U	3.41 U	3.46 U	2.83 U	2.98 U
Silver	SW6020A	1800	--	1.54 U	1.51 U	1.47 U	1.44 U	1.45 U	1.95 U	1.7 U	1.73 U	1.41 U	1.49 U
Thallium	SW6020A	--	--	1.54 U	1.51 U	1.47 U	1.44 U	1.45 U	1.95 U	1.7 U	1.73 U	1.41 U	1.49 U
Zinc	SW6020A	1100000	--	**58**	**44.7**	**79.2**	**54.4**	**82.9**	**103**	**60.5**	**79.5**	**50.3**	**51.8**
Polycyclic Aromatic Hydrocarbons (µg/kg)													
1-Methylnaphthalene	SW8270DSIM	--	--	9.2 U	9.2 U	11.5 U	10.4 U	10 U	13 U	**9.43 J**	11 U	10.3 U	9.98 U
2-Methylnaphthalene	SW8270DSIM	--	--	9.2 U	9.2 U	11.5 U	10.4 U	10 U	13 U	**17.3**	11 U	10.3 U	9.98 U
Acenaphthene	SW8270DSIM	--	--	4.6 U	4.6 U	5.75 U	**31.8**	5.02 U	6.52 U	**63.9**	**10.5**	**9.14**	**7.31**
Acenaphthylene	SW8270DSIM	--	--	4.6 U	4.6 U	5.75 U	5.18 U	**20.1**	**4.25 J**	**3.11 J**	5.51 U	**3.33 J**	**2.78 J**
Anthracene	SW8270DSIM	--	--	4.6 U	**2.88 J**	**3.84 J**	**252**	**75.6**	**9.51**	**86.9**	**274**	**234**	**114**
Benzo(a)anthracene	SW8270DSIM	--	--	**18.3**	**11.6**	**13.2**	**1760**	**270**	**40.8**	**625**	**2280**	**1840**	**1170**
Benzo(a)pyrene	SW8270DSIM	2000 / 18000 [2]	2000 [2]	**14.5**	**11.2**	**12.6**	**911**	**266**	**51.3**	**685**	**1580**	**1620**	**1120**
Benzo(b,k)fluoranthene	SW8270DSIM	--	--	**50.8**	**53.7**	**34.6**	**3320**	**378**	**193**	**1740**	**5660**	**5400**	**3510**
Benzo(g,h,i)perylene	SW8270DSIM	--	--	**15.7**	**20.3**	**14.7**	**721**	**147**	**74.5**	**690**	**1140**	**2050**	**1660**
Chrysene	SW8270DSIM	--	--	**50.7**	**27**	**22.3**	**5260**	**269**	**79.6**	**1130**	**7450**	**7450**	**4660**
Dibenzo(a,e)pyrene	SW8270DSIM	--	--	46 U	46 U	57.5 U	1040 U	56.8 U	65.2 U	**98**	342 U	**215 J**	275 U
Dibenzo(a,h)anthracene	SW8270DSIM	--	--	**4.07 J**	**6.68**	**3.75 J**	**259**	**37.4**	**13.8**	**158**	**440**	**668**	**489**
Dibenzo(a,h)pyrene	SW8270DSIM	--	--	46 U	46 U	57.5 U	1040 U	56.8 U	65.2 U	61.8 U	342 U	284 U	275 U
Dibenzo(a,i)pyrene	SW8270DSIM	--	--	46 U	46 U	57.5 U	1040 U	56.8 U	65.2 U	61.8 U	342 U	284 U	275 U
Dibenzo(a,j)acridine	SW8270DSIM	--	--	46 U	46 U	57.5 U	1040 U	56.8 U	65.2 U	61.8 U	342 U	284 U	275 U
Dibenzo(a,l)pyrene	SW8270DSIM	--	--	46 U	46 U	57.5 U	1040 U	**33.6 J**	65.2 U	**250**	**457**	**597**	**375**
Dibenzofuran	SW8270DSIM	--	--	4.6 U	4.6 U	5.75 U	**13.1**	5.02 U	6.52 U	**17.8**	**7.46**	**10.6**	**6.7**
Fluoranthene	SW8270DSIM	--	--	**19.1**	**22.5**	**16.9**	**6350**	**505**	**81.3**	**1280**	**3280**	**1110**	**705**
Fluorene	SW8270DSIM	--	--	4.6 U	4.6 U	5.75 U	**31.9**	**4.84 J**	6.52 U	**20**	**13.2**	**11.9**	**6.89**

U-Ditch Reroute and Soil Removal - Side Channel

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	CB01	CB02	CB03	CB04	CB05	CB06	CB07	CB08	CBS09W	CBS09W
			Sample ID	MBTL-SO-UD-CB01	MBTL-SO-UD-CB02	MBTL-SO-UD-CB03	MBTL-SO-UD-CB04	MBTL-SO-UD-CB05	MBTL-SO-UD-CB06	MBTL-SO-UD-CB07	MBTL-SO-UD-CB08	MBTL-SO-UD-CBS09W	MBTL-SO-UD-CBS09WD
			Sample Date	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N	N	N	N	N	FD
			X	1005136.34	1005116.5	1005098.6	1005080.6	1005063.51	1005047.27	1005028.66	1005007.6	1005028.61	1005028.61
			Y	305068.74	305075.95	305081.23	305085.89	305090.1	305093.94	305094.73	305095.85	305075.32	305075.32
	Method	**MTCA Method C Industrial or Alternate Screening Level**	**MTCA Method A Industrial**										
Indeno(1,2,3-c,d)pyrene	SW8270DSIM	--	--	**14.2**	**19.5**	**14.2**	**672**	**147**	**67.1**	**700**	**1200**	**2180**	**1690**
Naphthalene	SW8270DSIM	5000	--	9.2 U	9.2 U	11.5 U	10.4 U	**15.3**	**6.58 J**	**29.3**	**5.64 J**	**6.44 J**	9.98 U
Phenanthrene	SW8270DSIM	--	--	**5.44**	**12**	**10.2**	**829**	**144**	**38.8**	**317**	**314**	**292**	**147**
Pyrene	SW8270DSIM	--	--	**18.9**	**23.6**	**20.4**	**5710**	**549**	**84.9**	**1320**	**3200**	**929**	**622**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)[1]		2000 / 18000 [2]	2000 [2]	**23.74 J**	**20.62**	**19.4 J**	**1564.7**	**351.9**	**83.6**	**1018.6**	**2612.5**	**2703.3**	**1852.5**
Total Petroleum Hydrocarbons (mg/kg)													
Diesel Range Hydrocarbons	NWTPHDx	2000	2000	9.2 U	9.2 U	11.5 U	**29.9**	**9.9 J**	**7.37 J**	**13.5**	**21**	**13.1**	**10.4**
Oil	NWTPHDx	--	--	**20**	18.4 U	**21.7 J**	**113**	**39.7**	**54.5**	**94.5**	**108**	**136**	**112**

Notes:
Detected concentration is greater than MBTL_Soil screening level
Detected concentration is greater than MTCA Method A Indust screening level
Bold = Detected result
FD = Field Duplicate
J = Estimated value
mg/kg = milligrams per kilogram
N = Normal Field Sample
pct = percent
µg/kg = micrograms per kilogram
U = Compound analyzed, but not detected above detection limit
-- Results not reported or not applicable
Totals are calculated as the sum of all detected results and 1/2 the undetected result. If all results are undetected, the highest reporting limit value is reported as the sum.
Significant figures are applied to all calculations.
1 cPAH minimum 7 analytes calculation includes Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene and Indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 "Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) under WAC 173-340-708(e).
2 Soils were screened both against the MTCA Method A cleanup level and the MTCA Method C cleanup level for benzo(a)pyrene, and cPAH TEQ is 18,000 µg/kg (18 mg/kg).

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	B08	S04E	S06E	S07E	S08E
			Sample ID	MBTL-SO-UD-B08	MBTL-SO-UD-S04E	MBTL-SO-UD-S06E	MBTL-SO-UD-S07E	MBTL-SO-UD-S08E
			Sample Date	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N
			X	1005510.48	1005342.14	1005165.2	1005072.25	1004950.61
			Y	304757.36	304926.15	305087.39	305165.64	305178.21
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial					
Conventional Parameters (pct)								
Total solids	SM2540G	--	--	**75.7**	**79.1**	**72.7**	**78.9**	**73.1**
Volatile Organics (µg/kg)								
1,1,1,2-Tetrachloroethane	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,1,1-Trichloroethane	SW8260B	--	2000	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,1,2,2-Tetrachloroethane	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,1,2-Trichloroethane	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,1-Dichloroethane	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,1-Dichloroethene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,1-Dichloropropene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,2,3-Trichlorobenzene	SW8260B	--	--	446 U	403 U	412 U	441 U	409 U
1,2,3-Trichloropropane	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,2,4-Trichlorobenzene	SW8260B	--	--	446 U	403 U	412 U	441 U	409 U
1,2,4-Trimethylbenzene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,2-Dibromo-3-chloropropane	SW8260B	--	--	446 U	403 U	412 U	441 U	409 U
1,2-Dichlorobenzene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,2-Dichloroethane	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,2-Dichloroethene, cis-	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,2-Dichloroethene, trans-	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,2-Dichloropropane	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,3,5-Trimethylbenzene (Mesitylene)	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,3-Dichlorobenzene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,3-Dichloropropane	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
1,3-Dichloropropene, cis-	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,3-Dichloropropene, trans-	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
1,4-Dichlorobenzene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
2,2-Dichloropropane	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
2-Butanone (MEK)	SW8260B	--	--	891 U	806 U	823 U	883 U	817 U
2-Chlorotoluene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
2-Hexanone (Methyl butyl ketone)	SW8260B	--	--	891 U	806 U	823 U	883 U	817 U
4-Chlorotoluene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
4-Isopropyltoluene (4-Cymene)	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	B08	S04E	S06E	S07E	S08E
			Sample ID	MBTL-SO-UD-B08	MBTL-SO-UD-S04E	MBTL-SO-UD-S06E	MBTL-SO-UD-S07E	MBTL-SO-UD-S08E
			Sample Date	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N
			X	1005510.48	1005342.14	1005165.2	1005072.25	1004950.61
			Y	304757.36	304926.15	305087.39	305165.64	305178.21
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial					
Acetone	SW8260B	--	--	1780 U	1610 U	1650 U	1770 U	1630 U
Benzene	SW8260B	--	30	22.3 U	20.2 U	20.6 U	22.1 U	20.4 U
Bromobenzene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Bromochloromethane	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Bromodichloromethane	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Bromoform (Tribromomethane)	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
Bromomethane (Methyl Bromide)	SW8260B	--	--	891 U	806 U	823 U	883 U	817 U
Carbon tetrachloride (Tetrachloromethane)	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Chlorobenzene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Chloroethane	SW8260B	--	--	891 U	806 U	823 U	883 U	817 U
Chloroform	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
Chloromethane	SW8260B	--	--	446 U	403 U	412 U	441 U	409 U
Dibromochloromethane	SW8260B	--	--	178 U	161 U	165 U	177 U	163 U
Dibromomethane	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
Dichlorodifluoromethane	SW8260B	--	--	178 U	161 U	165 U	177 U	163 U
Dichloromethane (Methylene chloride)	SW8260B	--	20	446 U	403 U	412 U	441 U	409 U
Ethylbenzene	SW8260B	--	6000	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Ethylene dibromide (1,2-Dibromoethane)	SW8260B	--	5	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	SW8260B	--	--	178 U	161 U	165 U	177 U	163 U
Isopropylbenzene (Cumene)	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
m,p-Xylene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
Methyl isobutyl ketone (4-Methyl-2-pentanone or (MIBK))	SW8260B	--	--	891 U	806 U	823 U	883 U	817 U
Methyl tert-butyl ether (MTBE)	SW8260B	--	100	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
Naphthalene	SW8260B	5000	--	178 U	161 U	165 U	177 U	163 U
n-Butylbenzene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
n-Propylbenzene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
o-Xylene	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
sec-Butylbenzene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
Styrene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
tert-Butylbenzene	SW8260B	--	--	89.1 U	80.6 U	82.3 U	88.3 U	81.7 U
Tetrachloroethene (PCE)	SW8260B	--	50	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Toluene	SW8260B	--	7000	**315**	80.6 U	82.3 U	88.3 U	81.7 U

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	B08	S04E	S06E	S07E	S08E
			Sample ID	MBTL-SO-UD-B08	MBTL-SO-UD-S04E	MBTL-SO-UD-S06E	MBTL-SO-UD-S07E	MBTL-SO-UD-S08E
			Sample Date	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N
			X	1005510.48	1005342.14	1005165.2	1005072.25	1004950.61
			Y	304757.36	304926.15	305087.39	305165.64	305178.21
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial					
Trichloroethene (TCE)	SW8260B	--	30	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Trichlorofluoromethane (Fluorotrichloromethane)	SW8260B	--	--	178 U	161 U	165 U	177 U	163 U
Vinyl chloride	SW8260B	--	--	44.6 U	40.3 U	41.2 U	44.1 U	40.9 U
Semivolatile Organics (µg/kg)								
1,2,4-Trichlorobenzene	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
1,2-Dichlorobenzene	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
1,3-Dichlorobenzene	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
1,4-Dichlorobenzene	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
2,3,4,6-Tetrachlorophenol	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
2,4,5-Trichlorophenol	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
2,4,6-Trichlorophenol	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
2,4-Dichlorophenol	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
2,4-Dimethylphenol	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
2,4-Dinitrophenol	SW8270D	--	--	5170 U	122 U	1320 U	120 U	546 U
2,4-Dinitrotoluene	SW8270D	--	--	2070 U	48.7 U	526 U	47.9 U	218 U
2,6-Dinitrotoluene	SW8270D	--	--	2070 U	48.7 U	526 U	47.9 U	218 U
2-Chloronaphthalene	SW8270D	--	--	207 U	4.87 U	52.6 U	4.79 U	21.8 U
2-Chlorophenol	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
2-Methylphenol (o-Cresol)	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
2-Nitroaniline	SW8270D	--	--	4140 U	97.3 U	1050 U	95.8 U	436 U
2-Nitrophenol	SW8270D	--	--	2070 U	48.7 U	526 U	47.9 U	218 U
3-Methylphenol & 4-Methylphenol (m&p-Cresol)	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
3-Nitroaniline	SW8270D	--	--	4140 U	97.3 U	1050 U	95.8 U	436 U
4-Bromophenyl-phenyl ether	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
4-Chloro-3-methylphenol	SW8270D	--	--	2070 U	48.7 U	526 U	47.9 U	218 U
4-Chloroaniline	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
4-Chlorophenyl phenyl ether	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
4-Nitroaniline	SW8270D	--	--	4140 U	97.3 U	1050 U	95.8 U	436 U
4-Nitrophenol	SW8270D	--	--	2070 U	48.7 U	526 U	47.9 U	218 U
Aniline	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
Benzoic acid	SW8270D	--	--	25900 U	608 U	6580 U	599 U	2730 U
Benzyl alcohol	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	B08	S04E	S06E	S07E	S08E
			Sample ID	MBTL-SO-UD-B08	MBTL-SO-UD-S04E	MBTL-SO-UD-S06E	MBTL-SO-UD-S07E	MBTL-SO-UD-S08E
			Sample Date	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N
			X	1005510.48	1005342.14	1005165.2	1005072.25	1004950.61
			Y	304757.36	304926.15	305087.39	305165.64	305178.21
	Method	MTCA Method C Industrial or Alternate Screening Level	MTCA Method A Industrial					
bis(2-Chloroethoxy)methane	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
bis(2-Chloroethyl)ether	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
bis(2-Chloroisopropyl)ether	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
Bis(2-ethylhexyl)phthalate	SW8270D	--	--	4140 U	97.3 U	1050 U	95.8 U	436 U
Butylbenzyl phthalate	SW8270D	--	--	4140 U	97.3 U	1050 U	95.8 U	436 U
Carbazole	SW8270D	--	--	310 U	7.3 U	78.9 U	7.19 U	32.7 U
Dibenzofuran	SW8270D	--	--	207 U	4.87 U	52.6 U	4.79 U	21.8 U
Diethyl phthalate	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
Dimethyl phthalate	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
Di-n-butyl phthalate	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	SW8270D	--	--	5170 U	122 U	1320 U	120 U	546 U
Di-n-octyl phthalate	SW8270D	--	--	4140 U	97.3 U	1050 U	95.8 U	436 U
Hexachlorobenzene	SW8270D	--	--	207 U	4.87 U	52.6 U	4.79 U	21.8 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
Hexachlorocyclopentadiene	SW8270D	--	--	1030 U	24.3 U	263 U	24 U	109 U
Hexachloroethane	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
Isophorone	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
Nitrobenzene	SW8270D	--	--	2070 U	48.7 U	526 U	47.9 U	218 U
N-Nitrosodimethylamine	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
N-Nitrosodi-N-propylamine	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
N-Nitrosodiphenylamine	SW8270D	--	--	517 U	12.2 U	132 U	12 U	54.6 U
Pentachlorophenol	SW8270D	--	--	4140 U	97.3 U	1050 U	95.8 U	436 U
Phenol	SW8270D	--	--	414 U	9.73 U	105 U	9.58 U	43.6 U
PCB Aroclors (µg/kg)								
Aroclor 1016	SW8082A	--	--	5.19 U	4.64 U	5.45 U	4.73 U	5.14 U
Aroclor 1221	SW8082A	--	--	5.19 U	4.64 U	5.45 U	4.73 U	5.14 U
Aroclor 1232	SW8082A	--	--	5.19 U	4.64 U	5.45 U	4.73 U	5.14 U
Aroclor 1242	SW8082A	--	--	**7.69**	4.64 U	5.45 U	4.73 U	5.14 U
Aroclor 1248	SW8082A	--	--	5.19 U	4.64 U	5.45 U	4.73 U	5.14 U
Aroclor 1254	SW8082A	--	--	**27.5**	4.64 U	**12.6**	4.73 U	**5.77**
Aroclor 1260	SW8082A	--	--	**44.5**	4.64 U	**24.3**	4.73 U	**7.46**
Aroclor 1262	SW8082A	--	--	5.19 U	4.64 U	5.45 U	4.73 U	5.14 U

			Task	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling	U-Ditch Sampling
			Location ID	B08	S04E	S06E	S07E	S08E
			Sample ID	MBTL-SO-UD-B08	MBTL-SO-UD-S04E	MBTL-SO-UD-S06E	MBTL-SO-UD-S07E	MBTL-SO-UD-S08E
			Sample Date	11/1/2012	11/1/2012	11/2/2012	11/2/2012	11/2/2012
			Depth	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
			Matrix	SO	SO	SO	SO	SO
			Sample Type	N	N	N	N	N
			X	1005510.48	1005342.14	1005165.2	1005072.25	1004950.61
			Y	304757.36	304926.15	305087.39	305165.64	305178.21
	Method	**MTCA Method C Industrial or Alternate Screening Level**	**MTCA Method A Industrial**					
Aroclor 1268	SW8082A	--	--	5.19 U	4.64 U	5.45 U	4.73 U	5.14 U
Total PCB Aroclors (U = 1/2)		10000	10000	**95.26**	4.64 U	**55.98**	4.73 U	**31.22**

Notes:

Detected concentration is greater than MBTL_Soil screening level

Detected concentration is greater than MTCA Method A Indust screening level

Bold = Detected result

FD = Field Duplicate

N = Normal Field Sample

pct = percent

µg/kg = micrograms per kilogram

U = Compound analyzed, but not detected above detection limit

-- Results not reported or not applicable

Totals are calculated as the sum of all detected results and 1/2 the undetected result. If all results are undetected, the highest reporting limit value is reported as the sum.

Significant figures are applied to all calculations.

LEGEND

⊙ U-Ditch Sample Locations

B = Base
S = Sidewall
E = East
W = West
CB = Side Channel Base
CBS = Side Channel Sidewall

NOTE:
Aerial Imagery: Microsoft Bing Maps, copyright 2010

Feet
0 75 150

Q:\Jobs\110730-01.05_Millennium_Bulk_Term_Holdback_Agrmt\MobileGIS\2012_11\MBTL UDITCH Check Print.mxd ckiblinger 11/9/2012 3:19:53 PM

BULK TERMINALS
millennium
LONGVIEW, LLC

Figure 1
U-Ditch Sample Locations
Millennium Bulk Terminals – Longview, LLC

Memorandum: Reynolds Drum Soil Cleanup, February 14, 1986, and Attachment: Letter to Tom Dickey (Reynolds), February 20, 1986

Washington State Department of Ecology.

MEMORANDUM

CHECK
INFORMATON ✓
FOR ACTION
PERMIT
OTHER

State of Washington Department of Ecology

TO: Dick Burkhalter

FROM: George Houck George Houck

SUBJECT: Reynolds PCB Cleanup

DATE: February 14, 1986

Attached is the Reynolds Metals Company summary report (dated January 31) of their cleanup activities at the PCB spill site described in their September 11, 1984, letter to us. I believe the site has now been cleaned adequately, and the matter should be closed. I have attached a draft letter for your signature to the company stating words to this effect. A copy should go to Mike Hoyles of EPA.

The spill occurred some time after 1969 near the North Plant when it was being constructed. It consisted of leakage of about one-third of a 55 gallon drum, and was not discovered by the company until July 10, 1984. The company has utilized their own people, Reidel Emergency Environmental Services, Chem Security Systems, Inc., Dames and Moore, and Laucks Laboratories at different times and stages of the cleanup work. The entire activity is described in the Reynolds report.

The company has dug out a hole about 12 feet deep and 20 feet in diameter and carried the contaminated soil to the Arlington, Oregon hazardous waste site. In total this was 105 cubic yards plus 77 drums. Only one drum remains at the plant, in a PCB temporary storage area, to be hauled to Arlington soon.

Plate 3 of the report shows the final testing results. There are 12 sample locations and all exhibit less than 1 ppm PCB. Also, Table 2 shows 10 sample locations where trichlorobenzene (TCB) was analysed. All tests show no more than 0.1 ppm, except for one where 0.4 ppm was found. Trichlorobenzene, in high concentration, was a carrier to the PCB in the original product.

Because of various stops and starts, the cleanup project took a year and a half. This seems an inordinately long time. However, the work is now complete in my opinion.

GCH:bkw
Attachment

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

February 20, 1986

Mr. Tom Dickey
Reynolds Metals Company
P. O. Box 999
Longview, Washington 98632

Dear Mr. Dickey:

We have reviewed your January 31 summary report of the cleanup at the PCB spill site described in your September 11, 1984, letter. According to results from Laucks Laboratories, the PCB cleanup meets Ecology policy of less than 1 ppm. Trichlorobenzene has also been cleaned up to concentrations of less than 1 ppm.

We have concluded the site has been adequately cleaned up, and your company may proceed to fill the hole with soil.

Sincerely,

Richard A. Burkhalter, P.E.
Supervisor
Industrial Section

RAB:bkw

cc: Mike Hoyles, EPA/WOO

Independent Cleanup Documents, 200,000 Gallon Diesel AST

Reynolds Metals Company. 1991-1993.

REYNOLDS ALUMINUM

Reynolds Metals Company • P.O. Box 999 • Longview, Washington 98632 • (206)425-2800

October 30, 1991

Mr. Paul Skyllingstad
Industrial Section
Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7706

Dear Mr. Skyllingstad:

This letter is a follow-up to Reynolds report regarding the independent clean-up of diesel contamination in the area surrounding the plants' 200,000 gallon aboveground storage tank.

The excavation site has been backfilled with clean fill. The concrete work is underway and should be completed by the middle of November. Remediation of the contaminated soil is continuing.

Per our telephone conversation, the notation in Reynolds deed will be made at the same time as the notation regarding the closure of the black mud surface impoundment.

Should you have any questions or comments, please contact me at (206) 636-8203.

Sincerely,

REYNOLDS METALS COMPANY
LONGVIEW REDUCTION PLANT

Tom Dickey

Thomas D. Dickey
Technical Supt.

mb

c: Ray Walker
John Amos; G-4-9
Larry Tropea; E-L-3
Donna Dabney; E-2-2

NOV 08 1991

FILE COPY

AIR ☐
WATER/SOLID ☐
HAZ WASTE ☐
HWCU ☒

see engineering file

Reynolds - Ind oil tank Cl.

OCT 07 1991

FILE COPY

REYNOLDS ALUMINUM

Reynolds Metals Company • P.O. Box 999 • Longview, Washington 98632 • (206)425-2800

AIR
WATER/SOLID
HAZ. WASTE
HWCU ☒

October 2, 1991

Oil tank cleanup - spill

Mr. Paul Skyllingstad
Dept. of Ecology Industrial Section
2404 Chandler Court S.W., Suite 260
Olympia, WA 98502-6038

Dear Mr. Skylingstad:

Attached is a report detailing the Reynolds Metals Company independent cleanup of the area adjacent to the on-site 200,000 gallon aboveground diesel tank. It is Reynolds intent to persue the action items in the report and to keep you informed of our progress.

Should you have additional questions or comments, please contact me at (206) 636-8203.

REYNOLDS METALS COMPANY
LONGVIEW REDUCTION PLANT

Thomas D. Dickey
Technical Supt.

mb

Attachment

c: Jerry Newman - Longview
Hal Hays - Longview

John Amos - G-4-9
Larry Tropea - E-L-3

Sent to TCP Site Reg. 10-8-91 PW

See engineering files

REYNOLDS METAL COMPANY LONGVIEW REDUCTION PLANT INDEPENDENT CLEANUP OF HISTORIC DIESEL RELEASE

On April 19, 1991, Reynolds became aware of potential diesel contamination in the soil surrounding the discharge pumps, valves, and piping of the on-site 200,000 gallon aboveground storage tank. Subsequent soil sampling confirmed that the diesel contamination exceeded the 200 ppm cleanup standard in chapter 173-340 WAC, the Model Toxics Control Act (MTCA) cleanup regulation. There is no evidence that the tank has ever leaked. It is therefore assumed that the contamination is the result of maintenance activity on or failure of the discharge equipment. Figure 1 shows the initial sampling locations and diesel levels (in ppm).

Several excavation attempts were required to remove all accessible contaminated soil above 200 ppm. Reynolds initially manually removed twenty-four 55-gallon drums of soil before realizing that the plume of contamination was greater than expected. Four additional excavations were required as shown in the table below.

Date	Contaminated Soil Removed
07/25/91 - 07/29/91	101 Cubic Yards
08-07-91	90 Cubic Yards
08-12-91	60 Cubic Yards
09/24/91 - 09/26/91	230 Cubic Yards

All of the contaminated soil has been placed on plastic and surrounded with grass bales to capture potential leachate. It is Reynolds' intent to bio-treat this material on-site to below 200 ppm, and then to use the material in a suitable location.

Unfortunately some of the contamination extends under the tank and can not be removed without removing the tank. Reynolds proposes to leave this material in place (until the tank is taken out of service) and to cover the site with concrete.

With the exception of the soil under the tank, Reynolds considers the site remediated. Figure L-68-Y-100 shows the location of samples taken from the excavation site as well as borings (TB-10, TB-16, and TB-17) taken prior to excavation. A groundwater sample was also taken from the bottom of the excavation and found to be below 1 ppm. In addition, a water sample taken at location TB-17 did not detect diesel. Documentation of these analyses is attached. (Note: Some samples shown in the documentation indicate concentrations above the action levels. These areas were removed by subsequent excavation. Therefore the location of these samples is not shown in figure L-68-Y-100)

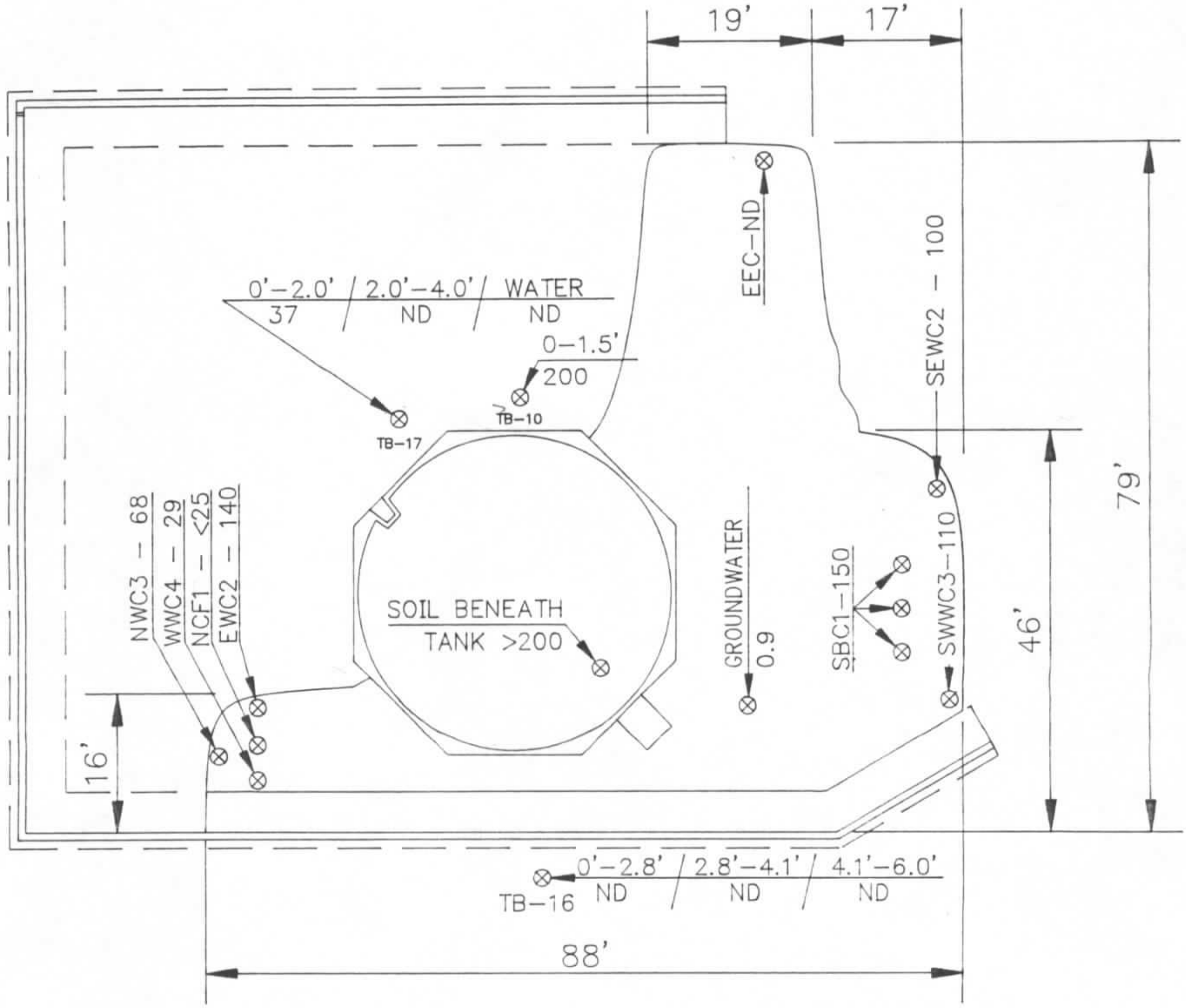
Reynolds therefore proposes the following actions:

1) The excavation site will be backfilled with clean fill and compacted.

2) The entire area around the diesel tank will be covered with concrete and surrounded by concrete containment walls.

3) A notation will be made in Reynolds property deed stating that diesel contamination exists directly under the tank. This material will be remediated upon the removal of the tank.

4) Contaminated soil will be bio-remediated on site to < 200 ppm diesel.



ND=NOT DETECTED
OTHER LEVELS SHOWN ARE MG/KG, DRY WT. BASIS

REMOVED APPROX. 481 CUBIC YARDS OF CONTAMINATED SOIL

REYNOLDS METALS CO. LONGVIEW REDUCTION PLANT	200,000 GALLON FUEL OIL STORAGE CONTAMINATED SOIL REMOVAL AREA
DRAWN JOHN CAPLE CH'K	CAD NO.– Y–0100
SCALE 1"=20' APPR.	DATE 8–27–91 L–68–Y–100 REV. 0

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Sweet-Edwards/EMCON, Inc.
Project: Reynolds Metals/#S3301.04
Sample Matrix: Soil

Date Received: 05/21/91
Date Extracted: 05/23/91
Date Analyzed: 05/24,30/91
Work Order #: K912757

Hydrocarbon Scan
EPA Methods 3550/Modified 8015
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Diesel	Jet Fuel	Gasoline	Kerosene	Mineral Spirits	Oil*
TB-2 0'-1.5'	K2757-1	10	1,800	ND	ND	ND	ND	ND
TB-4 1.5'-3.0'	K2757-2	10	1,500	ND	ND	ND	ND	ND
TB-8 1,5'-3.0'	K2757-3	10	6,400	ND	ND	ND	ND	ND
TB-10 0'-1.5'	K2757-4	10	ND	ND	ND	ND	ND	**200
TB-5 3.0'-4.5'	K2757-5	10	860	ND	ND	ND	ND	ND
Method Blank	K2757-MB	10	ND	ND	ND	ND	ND	ND

MRL Method Reporting Limit
* Quantitated using hydraulic oil as a standard. The MRL for oil is four times the MRL shown above.
ND None Detected at or above the method reporting limit
** Unidentified product that matches the volatility range of oil.

Approved by Cheryl Fisher Date 6/6/91

206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edward/EMCON, Inc.	**Date Received:**	06/11/91
Project:	Reynolds/#S3301.01	**Date Extracted:**	06/12/91
Sample Matrix:	Soil	**Date Analyzed:**	06/13/91
		Work Order #:	K913155

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	**Lab Code**	**MRL**	**Result**
TB16-0-2.8	K3155-1	25	ND
TB16-2.8-4.1	K3155-2	25	ND
TB16-4.1-6.0	K3155-3	25	ND
TB17-0-2	K3155-4	25	37
TB17-2-4	K3155-5	25	ND
TB9 1.5-3.0	K3155-6	25	39
Method Blank	K3155-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Cheryl Fisher Date 6/24/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	06/07/91
Project:	Reynolds Metals/#S3301.04	**Date Extracted:**	06/10/91
Sample Matrix:	Water	**Date Analyzed:**	06/10/91
		Work Order #:	K913127

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1
mg/L (ppm)

Sample Name	**Lab Code**	**MRL**	**Result**
TB-11	K3127-1	0.5	2.3
TB-15	K3127-2	0.5	ND
TB-17	K3127-3	0.5	ND
Method Blank	K3127-MB	0.5	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Cheryl R Foster Date 6/14/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Reynolds Metals Company
Sample Matrix: Soil

Date Received: 08/08/91
Date Extracted: 08/08/91
Date Analyzed: 08/09/91
Work Order #: K914437

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
SSEWC5	K4437-1	25	350
SSWC6	K4437-2	25	1,800
NCF1	K4437-3	25	ND
EWC2	K4437-4	25	140
NWC3	K4437-5	25	68
WWC4	K4437-6	25	29
Method Blank	K4437-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by [signature] Date 8/12/91

00001

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Reynolds Metals Company
Sample Matrix: Soil

Date Received: 08/13/91
Date Extracted: 08/14/91
Date Analyzed: 08/14/91
Work Order #: K914541

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	Lab Code	MRL	Result
SBC1	K4541-1	25	150
SEWC2	K4541-2	25	100
SWWC3	K4541-3	25	110
Method Blank	K4541-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by [signature] Date 8/15/91

17 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Reynolds Metals Company
Sample Matrix: Water

Date Received: 08/22/91
Date Extracted: 08/23/91
Date Analyzed: 08/23/91
Work Order #: K914791

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1
mg/L (ppm)

Sample Name	**Lab Code**	**MRL**	**Result**
Ground Water	K4791-1	0.5	0.9
Method Blank	K4791-MB	0.5	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by ____________ Date 8/27/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Date Received:**	09/26/91
Sample Matrix:	Soil	**Date Extracted:**	09/26/91
		Date Analyzed:	09/27/91
		Work Order #:	K915542

Total Recoverable Petroleum Hydrocarbons
SM Method 5520E/EPA Method 418.1
mg/Kg (ppm)
Dry Weight Basis

Sample Name	**Lab Code**	**MRL**	**Result**
EEC 9-26-91 Soil	K5542-1	25	ND
Method Blank	K5542-MB	25	ND

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by ______________ Date 10/1/91

REYNOLDS ALUMINUM

PRIMARY METALS DIVISION

June 11, 1991

FILE COPY

JUN 13 1991

AIR

WATER/SOLID

HAZ. WASTE

HWCU

Reynolds -

~~KI6TR~~

Mr. Paul Skyllingstad
Dept. of Ecology Industrial Section
2404 Chandler Court S.W., Suite 260
Olympia, WA 98502-6038

Dear Mr. Skyllingstad:

On April 19, 1991, Reynolds became aware of potential diesel contamination around the discharge pumps, valves, and piping of our on-site 200,000 gallon aboveground storage tank. Subsequent soil sampling has shown diesel contamination exceeding the 200 ppm clean-up standard in chapter 173-340 WAC, the Model Toxics Control Act cleanup regulation. A sketch of the diesel tank and soil sample sites is attached.

It is Reynolds intent to proceed with a voluntary cleanup. Additional sampling will be conducted to determine the extent of the contamination. Reynolds will keep Ecology informed of its progress on this matter.

Sincerely,

REYNOLDS METALS COMPANY
LONGVIEW REDUCTION PLANT

Thomas D. Dick

Thomas D. Dickey
Technical Supt.

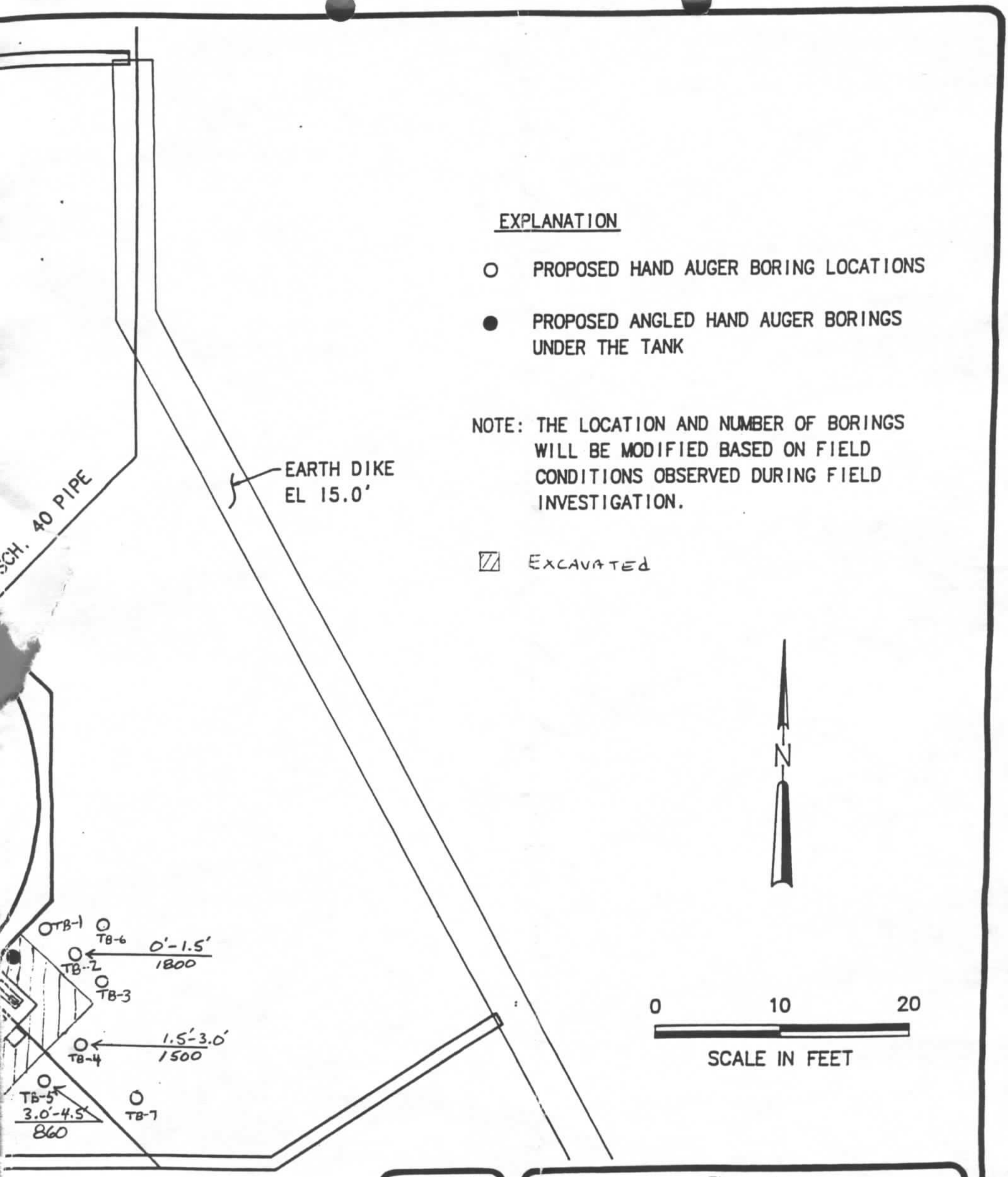
mb

Attachment

cc: John Claunch
John Amos, G-4-9
Larry Tropea, E-L-3

Notification of Independent Ch. Oil spill @ diesel tank

see engineering files



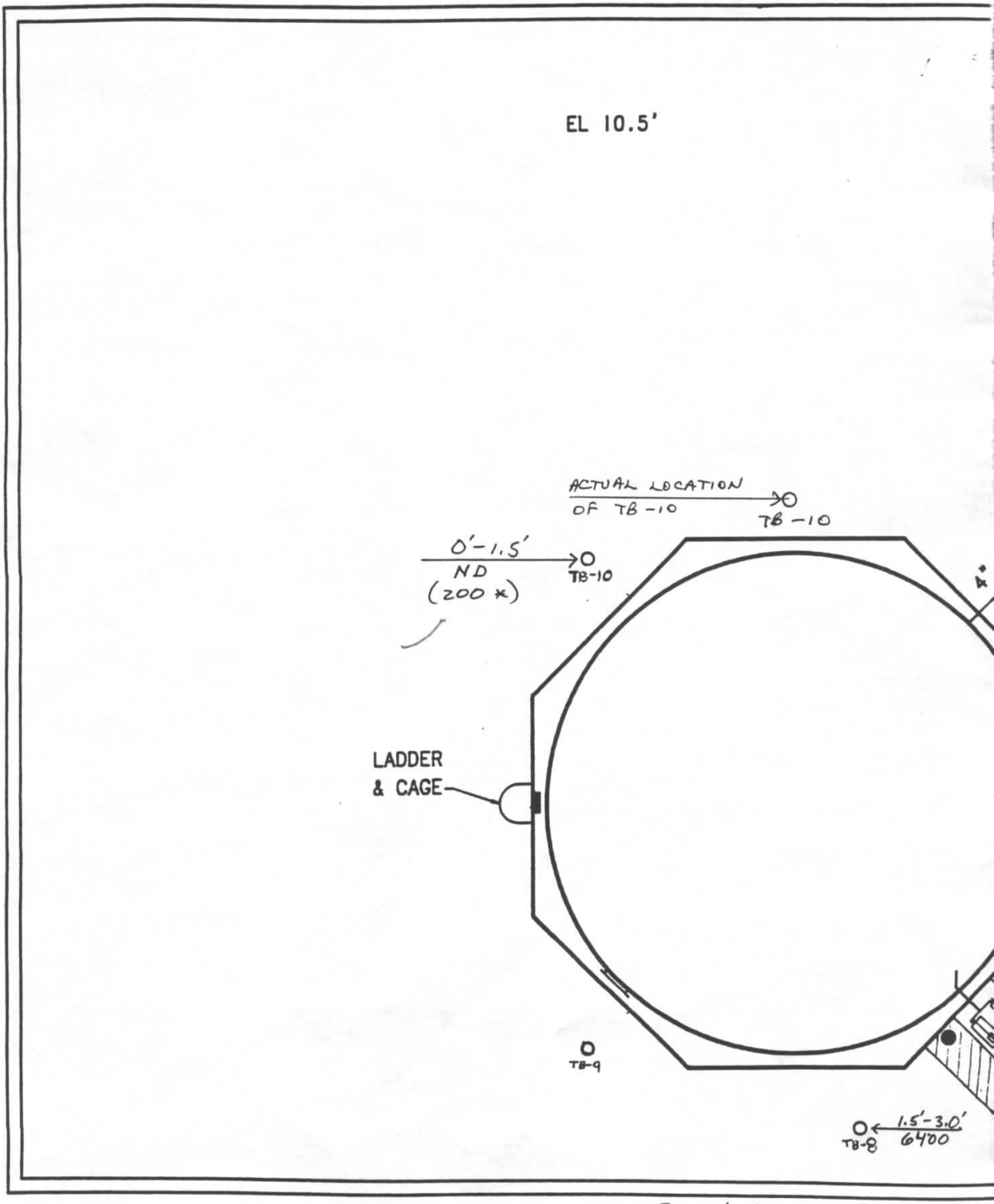
DATE 5/91
DWN. MMM
APPR. ______
REVIS. ______
PROJECT NO. 8.08

Figure 1

REYNOLDS METALS CO.
DIESEL TANK SPILL INVESTIGATION

PROPOSED BORING LOCATIONS

131245



* 200 mg/Kg of petroleum product with The volatility range of oil.

Sweet-Edwards
EMCON

Soil Removal from Former Cryolite Ditches – Summary of Confirmational Testing Results table, Waste Profile Composite Sampling Results table, and Remediation Areas and Confirmation Sample Locations figure

Anchor QEA, LLC. Prepared for Northwest Alloys, Inc. 2011.

Summary of Confirmational Testing Results, 2008

Chemical	Units	MTCA Method A Industrial Soil Criteria	Angle Ditch No. 1 10/16/2008	Angled Ditch No. 2 10/16/2008	Angled Ditch No. 3 10/16/2008	Angled Ditch No. 4 10/16/2008	Cryolite Ditch No. 1 10/21/2008	Cryolite Ditch No. 2 10/21/2008	Cryolite Ditch No. 3 10/21/2008	Cryolite Ditch No. 4 10/21/2008	Railroad Ditch #1 10/27/2008	Railroad Ditch #2 10/27/2008	Railroad Ditch #3 10/27/2008	Railroad Ditch #4 10/27/2008
Conventional Parameters (pct)														
Total solids	pct		**63.5**	**71**	**71.7**	**55.1**	**64.3**	**78.4**	**76.3**	**75.6**	**66.8**	**69.4**	**75.4**	**74.2**
Polycyclic Aromatic Hydrocarbons (µg/kg)														
Total PAH (U = 1/2)	µg/kg	--	**377**	**568**	**223**	**219**	20.5 U	**249**	**302**	**4,814**	20 U	19.2 U	**543**	**187**
Total PAH (U = 0)	µg/kg	--	**272**	**493**	**93.3**	**37.9**	20.5 U	**147**	**207**	**4,779**	20 U	19.2 U	**473**	**71.0**
Total cPAH (U=1/2)	µg/kg	2,000[1]	**16.0**	**18.5**	**14.0**	**18.3**	**15.5**	**14.5**	**14.2**	**337**	**15.1**	**14.5**	**33.2**	**13.5**
Total cPAH (U=0)	µg/kg	2,000[1]	**0.23**	**6.3**	**0.0**	**0.0**	**0.0**	**2.6**	**2.1**	**337**	**0.0**	**0.0**	**31.4**	**0.0**
2-Methylnaphthalene	µg/kg	--	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/kg	--	**30.4**	**27.2**	**66.9**	24.2 U	20.5 U	17 U	17.3 U	17.5 U	20 U	19.2 U	17.6 U	17.9 U
Acenaphthylene	µg/kg	--	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	17.5 U	20 U	19.2 U	17.6 U	17.9 U
Anthracene	µg/kg	--	**99.5**	**37.8**	**26.4**	**37.9**	20.5 U	17 U	17.3 U	**53.4**	20 U	19.2 U	17.6 U	17.9 U
Benzo(a)anthracene	µg/kg	B(a)P	21 U	**25**	18.5 U	24.2 U	20.5 U	17 U	17.3 U	**374**	20 U	19.2 U	**34.9**	17.9 U
Benzo(a)pyrene	µg/kg	2,000	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	**204**	20 U	19.2 U	**20.3**	17.9 U
Benzo(b)fluoranthene	µg/kg	B(a)P	21 U	**32.7**	18.5 U	24.2 U	20.5 U	**22.1**	**18.5**	**537**	20 U	19.2 U	**47.5**	17.9 U
Benzo(g,h,i)perylene	µg/kg	--	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	**126**	20 U	19.2 U	17.6 U	17.9 U
Benzo(k)fluoranthene	µg/kg	B(a)P	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	**206**	20 U	19.2 U	**21.7**	17.9 U
Chrysene	µg/kg	B(a)P	**23.2**	**55.9**	18.5 U	24.2 U	20.5 U	**34.7**	**27.4**	**757**	20 U	19.2 U	**70.8**	17.9 U
Dibenzo(a,h)anthracene	µg/kg	B(a)P	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	**45.3**	20 U	19.2 U	17.6 U	17.9 U
Fluoranthene	µg/kg	--	**41.4**	**107**	18.5 U	24.2 U	20.5 U	**48.4**	**61.1**	**1,160**	20 U	19.2 U	**130**	**27.6**
Fluorene	µg/kg	--	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	17.5 U	20 U	19.2 U	17.6 U	17.9 U
Indeno(1,2,3-c,d)pyrene	µg/kg	B(a)P	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	**96.7**	20 U	19.2 U	17.6 U	17.9 U
Naphthalene	µg/kg	5,000	21 U	18.7 U	18.5 U	24.2 U	20.5 U	17 U	17.3 U	17.5 U	20 U	19.2 U	17.6 U	17.9 U
Phenanthrene	µg/kg	--	**36**	**91.4**	18.5 U	24.2 U	20.5 U	17 U	**48.7**	**170**	20 U	19.2 U	**31.3**	**21.7**
Pyrene	µg/kg	--	**41.6**	**116**	18.5 U	24.2 U	20.5 U	**41.8**	**51.4**	**1,050**	20 U	19.2 U	**116**	**21.7**

Notes:

Detected concentration is greater than MTCA Method C Soil screening level

Bold = Detected result

-- = Not analyzed

µg/kg = microgram per kilogram

U = Compound analyzed, but not detected above detection limit

cPAH = carcinogenic PAHs

MTCA = Model Toxics Control Act

1 cPAHs were calculated using toxicity equivalency factor methodology and include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluorantene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-c,d)pyrene.

Waste Profile Composite Sampling Results, 2009

Chemical	Unit	CD1 #1 10/21/2009	CD1 #3 10/21/2009	CD1 #4 10/21/2009	CD2 #1 10/21/2009	CD2 #3 10/21/2009	CD2 #4 10/21/2009	CD3 #1 10/21/2009	CD3 #2 10/21/2009	CD3 #4 10/21/2009	CD4 #1 10/22/2009	CD4 #2 10/22/2009	CD5 #1 10/22/2009	CD5 #2 10/22/2009	CD6 #1 10/22/2009	CD6 #2 10/22/2009	#1 8/27/2009	#2 8/27/2009	#3 8/27/2009	#4 8/27/2009
Conventional Parameters (mg/kg)																				
Cyanide, total	mg/kg	**18**	--	--	**9.5**	--	--	**20.9**	--	--	**8.8**	--	--	--	**28.6**	--	--	--	--	--
Fluoride	mg/kg	**55,600**	--	--	**8,680**	--	--	**32,300**	--	--	**14,300**	--	--	--	**49,100**	--	--	--	--	--
Total solids	pct	**78.6**	**84**	**85.1**	**87.5**	**83.4**	**89.6**	**84**	**83.4**	**80.3**	**73.8**	**74.4**	**72.6**	**74.3**	**75.6**	**76.1**	**87**	**87.9**	**88.5**	**92.1**
Metals (µg/L) - TCLP			--	--		--	--		--	--		--	--	--		--				
Arsenic	ug/l	100 U	--	--	100 U	--	--	100 U	--	--	100 U	--	--	--	100 U	--	--	--	--	--
Barium	ug/l	1,000 U	--	--	1,000 U	--	--	1,000 U	--	--	1,000 U	--	--	--	1,000 U	--	--	--	--	--
Cadmium	ug/l	**10**	--	--	10 U	--	--	**10**	--	--	10 U	--	--	--	**20**	--	--	--	--	--
Chromium	ug/l	10 U	--	--	10 U	--	--	**10**	--	--	10 U	--	--	--	10 U	--	--	--	--	--
Lead	ug/l	50 U	--	--	50 U	--	--	50 U	--	--	50 U	--	--	--	50 U	--	--	--	--	--
Mercury	ug/l	1 U	--	--	1 U	--	--	1 U	--	--	1 U	--	--	--	1 U	--	--	--	--	--
Nickel	ug/l	**360**	--	--	**210**	--	--	**770**	--	--	**230**	--	--	--	**790**	--	--	--	--	--
Selenium	ug/l	100 U	--	--	100 U	--	--	100 U	--	--	100 U	--	--	--	100 U	--	--	--	--	--
Silver	ug/l	20 U	--	--	20 U	--	--	20 U	--	--	20 U	--	--	--	20 U	--	--	--	--	--
Zinc	ug/l	500 U	--	--	500 U	--	--	500 U	--	--	500 U	--	--	--	500 U	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)																				
Total 18 PAH (U = 1/2)	µg/kg	--	**4,576,625**	**3,693,154**	--	**1,501,676**	**1,610,913**	--	**5,637,678**	**4,467,598**	--	**1,161,224**	**1,348,417**	**1,055,640**	**5,752,240**	**5,742,305**	**11,809,000**	**3,117,900**	**9,780,000**	**19,029,000**
Total 18 PAH (U = 0)	µg/kg	--	**4,576,625**	**3,693,154**	--	**1,501,676**	**1,610,913**	--	**5,637,678**	**4,467,598**	--	**1,161,190**	**1,348,417**	**1,055,640**	**5,752,240**	**5,742,220**	**11,809,000**	**3,117,900**	**9,780,000**	**19,029,000**
2-Methylnaphthalene	µg/kg	--	**52**	**54**	--	**35**	**45**	--	**68**	**58**	--	34 U	**66**	**3,500**	**320**	**270**	--	--	--	--
Acenaphthene	µg/kg	--	**4,000**	**2,000**	--	**720**	**730**	--	**4,200**	**1,600**	--	**1,100**	**11,000**	**20,000**	**11,000**	**10,000**	**15,000**	**3,900**	**23,000**	**150,000**
Acenaphthylene	µg/kg	--	**200**	**120**	--	**44**	**51**	--	**200**	**100**	--	**60**	**470**	**540**	**430**	**450**	--	--	--	--
Anthracene	µg/kg	--	**15,000**	**12,000**	--	**7,300**	**9,200**	--	**18,000**	**14,000**	--	**6,400**	**24,000**	**38,000**	**35,000**	**34,000**	**74,000**	**19,000**	**61,000**	**690,000**
Benzo(a)anthracene	µg/kg	--	**340,000**	**280,000**	--	**130,000**	**150,000**	--	**430,000**	**360,000**	--	**86,000**	**67,000**	**79,000**	**420,000**	**430,000**	**870,000**	**240,000**	**740,000**	**750,000**
Benzo(a)pyrene	µg/kg	--	**230,000**	**190,000**	--	**89,000**	**95,000**	--	**230,000**	**170,000**	--	**55,000**	**43,000**	**55,000**	**220,000**	**230,000**	**440,000**	**130,000**	**400,000**	**440,000**
Benzo(b)fluoranthene	µg/kg	--	**750,000**	**620,000**	--	**250,000**	**270,000**	--	**790,000**	**620,000**	--	**190,000**	**120,000**	**120,000**	**760,000**	**790,000**	**1,400,000**	**450,000**	**1,300,000**	**1,200,000**
Benzo(g,h,i)perylene	µg/kg	--	**190,000**	**140,000**	--	**48,000**	**49,000**	--	**160,000**	**130,000**	--	**37,000**	**31,000**	**37,000**	**150,000**	**160,000**	**270,000**	**84,000**	**260,000**	**330,000**
Benzo(k)fluoranthene	µg/kg	--	**170,000**	**140,000**	--	**51,000**	**53,000**	--	**160,000**	**130,000**	--	**33,000**	**26,000**	**30,000**	**140,000**	**140,000**	**330,000**	**81,000**	**290,000**	**290,000**
Chrysene	µg/kg	--	**560,000**	**360,000**	--	**260,000**	**270,000**	--	**450,000**	**390,000**	--	**190,000**	**190,000**	**130,000**	**410,000**	**450,000**	**1,400,000**	**480,000**	**1,300,000**	**1,500,000**
Dibenzo(a,h)anthracene	µg/kg	--	**28,000**	**25,000**	--	**13,000**	**13,000**	--	**28,000**	**24,000**	--	**8,700**	**6,300**	**7,300**	**29,000**	**32,000**	**60,000**	**20,000**	**56,000**	**49,000**
Fluoranthene	µg/kg	--	**1,000,000**	**840,000**	--	**320,000**	**350,000**	--	**1,700,000**	**1,400,000**	--	**240,000**	**330,000**	**190,000**	**1,800,000**	**1,700,000**	**3,400,000**	**800,000**	**2,500,000**	**4,400,000**
Fluorene	µg/kg	--			--			--			--				**6,300**		--	--	--	--
Indeno(1,2,3-c,d)pyrene	µg/kg	--	**160,000**	**120,000**	--	**46,000**	**49,000**	--	**130,000**	**100,000**	--	**35,000**	**26,000**	**33,000**	**120,000**	**130,000**	**220,000**	**77,000**	**210,000**	**230,000**
Naphthalene	µg/kg	--	**73**	**110**	--	**67**	**67**	--	**110**	**110**	--	34 U	**81**	**9,300**	**190**	170 U	--	--	--	--
Phenanthrene	µg/kg	--	**28,000**	**23,000**	--	**16,000**	**21,000**	--	**36,000**	**27,000**	--	**18,000**	**60,000**	**97,000**	**150,000**	**130,000**	**330,000**	**63,000**	**240,000**	**3,800,000**
Pyrene	µg/kg	--	**1,100,000**	**940,000**	--	**270,000**	**280,000**	--	**1,500,000**	**1,100,000**	--	**260,000**	**410,000**	**190,000**	**1,500,000**	**1,500,000**	**3,000,000**	**670,000**	**2,400,000**	**5,200,000**
Semivolatile Organics (µg/kg)																				
Dibenzofuran	µg/kg	--	**470**	**290**	--	**290**	**340**	--	**550**	**410**	--	**290**	**390**	**12,000**	**2,400**	**2,200**	--	--	--	--

Notes:

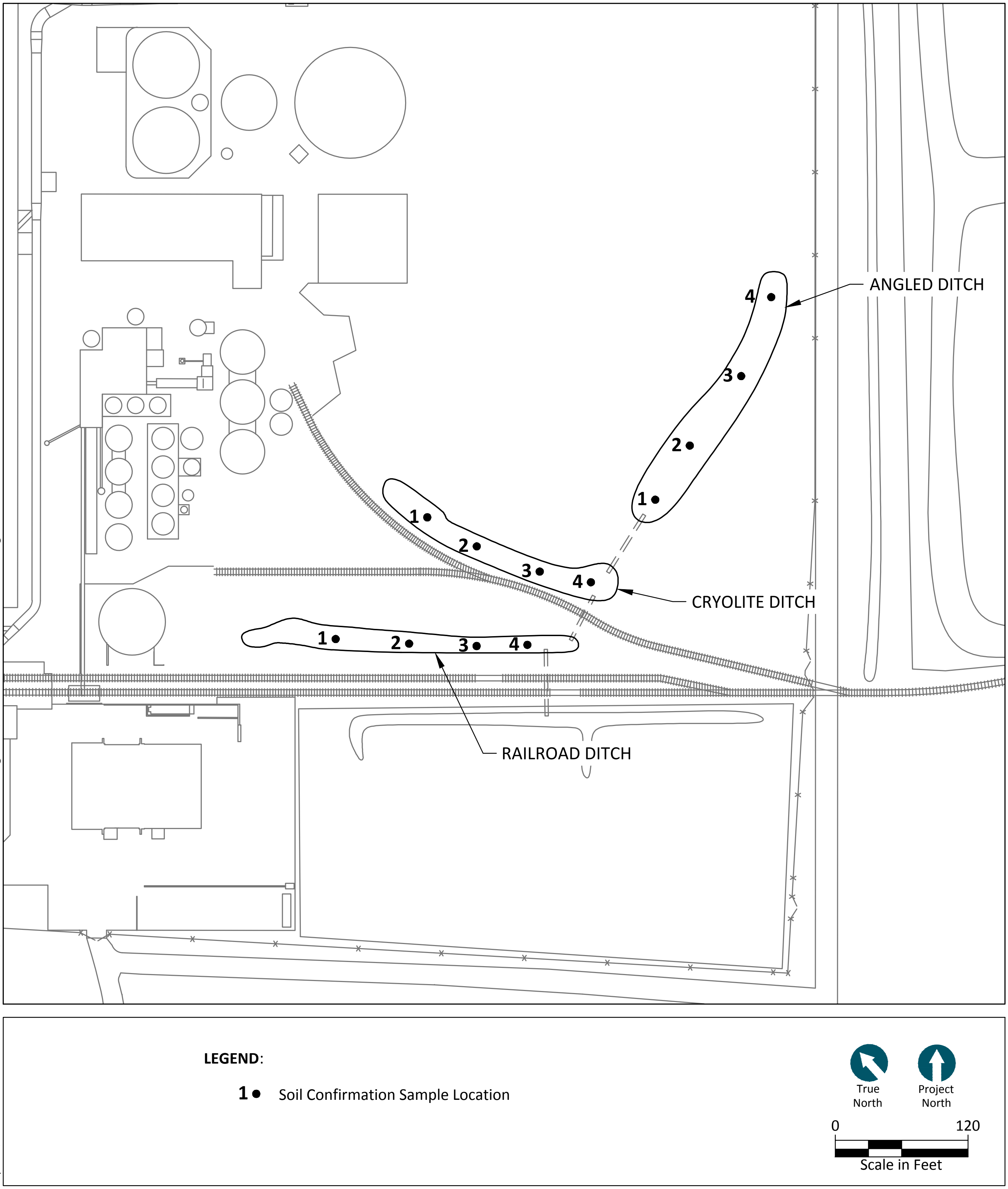
Bold = Detected result

U = compound analyzed, but not detected above detection limit

-- = not analyzed

µg/kg = microgram per kilogram

µg/L = microgram per liter



ANCHOR QEA

Figure 2
Remediation Areas and Confirmation Sample Locations
Millennium Bulk Terminals - Longview

Warehouse UST and Fuel Island Cleanup – Confirmation TPH Results for Former UST Fuel Island Soils table

Anchor QEA, LLC. Prepared for Northwest Alloys, Inc. 2011.

Confirmation TPH Results for Former UST Fuel Island Soils

Analyte	Sample ID	CV-001-102407	CV-002-102407	CV-003-102407	CV-004-102407	CV-005-102407	CV-006-102407
	Sample Date	10/24/2007	10/24/2007	10/24/2007	10/24/2007	10/24/2007	10/24/2007
	Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Total Petroleum Hydrocarbons (mg/kg)							
Diesel Range Hydrocarbons		6.6 U	6.6 U	**12**	6.7 U	5.7 U	5.6 U
Gasoline Range Hydrocarbons		9.6 U	9.8 U	9.8 U	9.9 U	6.8 U	6.7 U
Motor Oil Range		13 U	13 U	**14**	13 U	11 U	11 U

Notes:

Bold = Detected result

U = Compound analyzed, but not detected above detection limit

-- Results not reported or not applicable

mg/kg = milligrams per kilogram

Reynolds Metals Company – Class II Inspection – February 1990

Washington State Department of Ecology.
June 1991.

REYNOLDS METAL COMPANY
CLASS II INSPECTION
FEBRUARY 1990

by
Marc Heffner

Washington State Department of Ecology
Environmental Investigations and Laboratory Services Program
Compliance Monitoring Section
Olympia, Washington 98504-6814

Water Body No. WA-CR-1010
(Segment No. 26-00-04)

June 1991

ABSTRACT

A Class II Inspection was conducted in February 1990 at the Reynolds Metals Company primary aluminum smelter in Longview. Samples were collected from the five permitted discharges. Receiving water sediments near the principal discharge to the Columbia River (002A) and centrifuge samples of the 002A discharge were also collected. NPDES permit compliance was good during the inspection. Some toxicity was observed in 002A effluent using *Daphnia magna*, fathead minnow and Microtox bioassays. Sediment impacts near the 002A discharge were not detected.

INTRODUCTION

A Class II Inspection was conducted on February 26-28, 1990,at the Reynolds Metals Company (Reynolds) primary aluminum smelter in Longview. Receiving water sediment samples were collected on February 23, 1990. The inspection was conducted by Keith Seiders and Marc Heffner of the Ecology Compliance Monitoring Section and Wayne Wooster of the Ecology Industrial Section. Reynolds staff providing assistance were Hal Hays, Stan Casswell, and Tom Dickey.

The smelter has five point discharges regulated by NPDES Permit #WA-000008-6 and Order #89-3 (Figure 1). Outfall 002A into the Columbia River serves as the primary discharge for water used in the plant. Outfall 001 into the Columbia River discharges sanitary wastes generated and treated on-site. Discharge 003 into the Longview Ditch system includes non-contact cooling water and site runoff. Discharges 004 and 005 into the Longview Ditch system are site runoff. At the time of the inspection the cryolite recovery plant, which was scheduled for closure, was in operation.

Objectives of the inspection included:

1. Verify effluent compliance with NPDES permit limits.

2. Characterize priority pollutants in the 002 discharge stream.

3. Characterize priority pollutants in the sediments near outfall 002.

4. Evaluate outfall 002 effluent and sediments for toxicity using a series of bioassays.

5. Review lab procedures at the mill to determine adherence to accepted protocols. Samples were split with the permittee to determine the comparability of Ecology and permittee laboratory results.

6. Advance the state-of-the art of compliance inspections by contributing to ongoing developmental efforts with centrifugation.

PROCEDURES

Ecology sample collection in the 001 and 002 outfall systems included composite and grab samples. Ecology Isco composite samplers were set up to collect 001 effluent, 002-A effluent, 002-B influent, and 002-B effluent samples. Sampler configurations and locations are summarized in Figure 1 and Table 1. Samplers collected equal volumes of sample every 30 minutes for 24 hours. Sampling quality assurance/quality control steps included priority pollutant cleaning samplers prior to the inspection and collecting a field transfer blank sample (Table 2).

Reynolds also collected composite samples of the 002-A effluent and 002-B effluent. Ecology and Reynolds samples were split for analysis by both the Ecology and Reynolds labs. Samples collected, sampling times, and parameters analyzed are summarized in Table 3.

Ecology 003, 004, and 005 discharge grab samples and the 001 Reynolds grab sample collection procedures attempted to assure similar sample was submitted for each analysis. Samples for PAH, oil and grease, and fecal coliform analysis were collected directly into the appropriate containers. For the remaining parameters, grab samples were placed in a large jug until adequate volume was available for all analysis. The sample was shaken then distributed into the appropriate containers. Locations are summarized in Figure 1 and Table 1. Samples collected, sampling times and parameters analyzed are summarized in Table 3.

Receiving water sediments were collected with a 0.1 m^2 van Veen grab sampler at three stations; one at a background site approximately 500 yards upstream of the outfall (upstrm), one within ten yards downstream of the outfall diffuser (diffuser), and one 300 feet downstream of the diffuser at the edge of the dilution zone (dwnstrm). At each station, the top two centimeters of sample from successive grab samples were collected. A VOA bottle was filled from the first grab while the remainder of the sample was put in a stainless steel bucket. After an adequate volume was collected, the contents of the bucket were homogenized and put in appropriate containers. Sampling quality assurance/quality control steps included collecting only sediment not in direct contact with the sampler and pre-inspection priority pollutant cleaning of equipment that would touch the samples (Table 2). Sampling times and parameters analyzed are included in Table 3.

Samples for Ecology analysis were placed on ice and delivered to the Ecology Manchester Laboratory. Analytical procedures and the laboratories doing the analysis are summarized in Table 4.

RESULTS AND DISCUSSION

Laboratory Evaluation/Split Sample Results

Reynolds laboratory procedures were reviewed by Stew Lombard and Lee Fearon of the Ecology Quality Assurance Section. Their comments and recommendations are included in Appendix A.

Split sample analytical results compared well (Table 5).

001-Sanitary Discharge

The trickling filter plant effluent was within most NPDES permit limits during the inspection (Table 6). The Ecology effluent composite sample TSS concentration (31 mg/L) slightly exceeded the daily average permit limit (30 mg/L) and the two Ecology fecal coliform grab sample results (590/100mL and 36000-estimated/100mL) exceeded permit limits. Chlorine residual concentrations varied from <0.04 to 0.4 mg/L, perhaps contributing to the high coliform counts.

Trickling filter plant operation was a concern. When collecting the February 27, 1720 effluent grab sample, TSS concentrations appeared high. Further plant inspection revealed approximately 2 inches of water ponded on the trickling filter. A clarifier core sample found a shallow sludge blanket (< 1 foot) but poor settling throughout the water column. Effluent TSS (127 mg/L) and COD (110 mg/L) were elevated while the chlorine residual concentration (<0.04 mg/L) was low (Table 7). Plant personnel reported a blocked line to the treatment plant had been cleared at approximately 1500 on February 27, possibly resulting in the plant disturbance.

When collecting the February 28, 0920 sample, soap suds were observed coming out of the trickling filter intake wetwell. Plant personnel reported that weekly shower cleanup had begun at 0500 resulting in the suds and reducing the amount of cleaner used would be investigated. Ponding was again observed on the trickling filter.

More attention to plant operation appears necessary. Collecting influent composite data to evaluate trickling filter loading and measuring effluent quality with composite samples would be useful. The cause of the ponding should be found and eliminated before further problems develop. Chlorine dosage rates should be set to provide the lowest chlorine residual concentration capable of adequate disinfection. Meeting the requirements in the new permit for the 001 discharge should help correct the plant loading and chlorine residual concerns.

002 - Industrial Discharge

General Chemistry

The discharge was within NPDES Permit general chemistry parameters with the exception of one of the three oil and grease grab samples (grab - 18 mg/L: daily maximum limit - 15 mg/L: Table 6). The other two oil and grease grabs were well below permit limits. The inspection data suggest cyanide sources other than the 002B stream, to which the permit limit applies, may exist. One-third to one-fourth of the cyanide being discharged appeared to come from the 002B stream. Reynolds reported that the cyanide concentrations observed in the 002A sample likely resulted from a pipe in the North plant air pollution control system that broke during the inspection spilling water with elevated cyanide and sulfate concentrations into the 002A system. Cyanide concentrations in the 002A and 002B streams should be resampled during the next inspection.

Laboratory analysis of both the weak & dissociable and total cyanide in the 002A stream found the weak & dissociable concentration to be approximately one-sixth of the total cyanide concentration (Table 7). Continued measurement of total cyanide in the discharge is reasonable because of the varying solubility and reactivity of cyanides and toxicity of hydrogen cyanide (HCN).

Nutrient concentrations were low in the discharge (Table 7). Other general chemistry parameter concentrations appeared acceptable.

Organics

Benzo(a)pyrene, the only organic compound with an NPDES permit limit, was within limits (Table 6). The load in the 002B stream, the permitted stream, represented 10-20 percent of the load measured in the 002A stream. The 002A load fell between the average and maximum loads allowed in the 002B stream.

Organics in the 002A discharge were primarily high molecular weight polynuclear aromatic hydrocarbons (HPAH; Tables 8 and 9). Fluoranthene (22mg/L) was the HPAH found in the highest concentration. The 002B discharge had higher concentrations of HPAHs and several low molecular weight polynuclear aromatic hydrocarbons (LPAH). Organics concentrations detected in the 002A stream were less than available toxicity criteria (EPA, 1986; Table 10). The 002A organic concentrations may also have been influenced by the spill in the North plant discussed in the general chemistry section. A recheck of both the 002A and 002B streams for PAHs is suggested for the next inspection.

Bis(2-Ethylhexyl)phthalate was found in the 002A and 002B samples as well as the transfer blank. Sample or laboratory contamination appear the likely source of the phthalate. Low concentrations of acetone and chloroform were found in the 002A discharge (2 ug/L or less) and higher concentrations of acetone were found in the 002B discharge (17 and 100 ug/L). Five ug/L of acetone, a common laboratory contaminant, was found in the transfer blank.

A complete list of parameters analyzed and analytical results is included in Appendix B.

Tentatively identified compounds are included in Appendix C. Only two compounds were tentatively identified in the 002A sample, both at concentrations of 13 ug/L-estimated or less. In the 002B sample the twenty tentatively identified compounds found in the highest concentration ranged in concentration from 130-910 ug/L-estimated. Most were long-chain carbon compounds.

Metals

Interpretation of permit compliance for metals is difficult due to the poor detection limits attained by the Ecology contract laboratory (Table 11). The Ecology contract laboratory performance evaluation sample results bordered on the unacceptable range for aluminum and nickel (Table 5). The problem was in part caused by improper sample preparation after the sample preparation directions were either not forwarded to the contract lab or lost. Reynolds lab PE sample results for Al and Ni were good. The PE sample provided by the QA section did not contain a known concentration of Sb. Ecology contract laboratory Sb concentrations were all greater than the Reynolds laboratory results. A PE sample for Sb analysis by Reynolds is suggested for the next inspection. The Reynolds metals results, which are thought to be the most accurate, indicate permit compliance (Table 6).

Detection limits also hampered efforts to compare 002A concentrations to toxicity criteria (Table 10). Several detection limits exceeded the criteria and several of the metals detected were detected at the detection limit, a range of limited analytical accuracy.

Bioassays

The rainbow trout bioassay results were in compliance with the NPDES limit (Table 6). One hundred percent survival occurred in both the 65% effluent concentration specified in the permit and in 100% effluent (Table 12).

Some toxicity was noted in the other organisms tested (Table 12). Acute results showed an LC_{50} of 26% effluent for *Daphnia magna* and 58.8% effluent for fathead minnow. Chronic results showed a NOEC of 25% effluent for *Daphnia magna* and 12.5% effluent for fathead minnow. The Microtox EC_{50} was 38% effluent.

The cause of the toxicity is not clear. Comparison of results to toxicity criteria found cyanide to be the only parameter measured in concentrations greater than acute toxicity criteria (EPA, 1986; Table 10). Organics in the effluent were in concentrations less than available toxicity criteria, and comparison of results to metals criteria is inconclusive. Chlorine residual concentrations in 002A effluent samples were <40 ug/L (Table 7). Although the detection limit was slightly greater than the acute (19 ug/L) and chronic (11 ug/L) criteria, chlorine toxicity is not considered likely (EPA, 1986).

Centrifuge

Analysis of centrifuge cake (solids captured in the bowl of the centrifuge) for organics found many of the HPAH and LPAH compounds found in the 002A and 002B samples (Table 8). A similar compound list was found in the 002B treatment plant sludge, although sludge concentrations were generally less than centrifuge cake concentrations. Phenol was only found in the centrifuge solids sample. A volatile organics analysis was not run on the two samples.

Metals results also indicated higher concentrations of metals in the centrifuge cake than in the sludge (Table 11). High effluent metals detection limits prevent informative comparison of centrifuge and effluent data.

A more complete discussion of centrifuge methods and results will be presented in a centrifuge study report (Andreasson, in prep).

003, 004, & 005 - Discharges to the Longview Ditches

The three surface water discharges into the Longview Ditch system were within NPDES Permit limits (Table 6).

The 003 stream general chemistry results closely approximated the Longview Ditch characteristics in the discharge area (Table 7). Chrysene was the only PAH detected at 0.25 ug/L, just above the detection limit of 0.20 ug/L (Table 9). Metals results are not useful.

The 004 stream water quality was somewhat different than ditch quality. Fluoride (29.4 mg/L) and cyanide (total - 370 ug/L: weak and dissociable - 29 ug/L) were both observed in the 004 flow from Reynolds property (Table 7). PAHs were all below detection limits in the discharge (Table 9).

The 005 stream permitted site included flows from both the smelter and cable plant. The upstream station, which included smelter flow only was notably different than downstream (Table 7). The cyanide concentration was higher (total - 53 ug/L: weak and dissociable - 13 ug/L) and eight PAHs, ranging in concentration from 0.3-8.8 ug/L were detected in the upstream station (Table 9).

Rerouting the 004 discharge and further monitoring the 003 and 005 discharges as required in the new permit appears appropriate.

Sediments

Sediments in the area of the 002 outfall showed little impact from the discharge for the parameters measured (Tables 7 and 8). Current velocities appeared adequate to minimize deposition near the outfall. Sediment samples collected varied from 96-98% sand while the centrifuge cake was 95% silt and clay (Table 8). TOC concentrations were very low; 0.15 percent-dry wt basis or lower.

Methylene chloride, acetone, and bis(2-Ethylhexyl)phthalate were found in the three sediment samples collected (Table 8). All three compounds were also found in the transfer blank. Four LPAHs were found in the downstream sample at concentrations up to 76 ug/Kg-dry wt-estimated. Metals concentrations were similar for all three samples (Table 11).

A complete list of parameters analyzed and detection limits is included in Appendix B. Also, five tentatively identified compounds were found in each sample at estimated concentrations up to 890 ug/Kg-dry wt basis (Appendix C).

Bioassays using *Hyallela azteca* and Microtox found no indication of toxicity in the sediments (Table 13).

RECOMMENDATIONS AND CONCLUSIONS

Laboratory Evaluation/Split Sample Results

Sample split results compared well. Laboratory recommendations made by the Ecology Quality Assurance Section are included in Appendix A.

001 - Sanitary Discharge

The sanitary discharge approached BOD_5 and TSS permit limits, and one fecal coliform measurement was quite high, likely due to variable chlorine residual concentrations. More attention to plant operation is recommended; including, measurement of influent loading, correcting the trickling filter ponding as necessary, and maintaining the minimum chlorine residual necessary for good disinfection. Meeting conditions of the new NPDES permit should help satisfy the recommendations.

002 - Industrial Discharge

General Chemistry

Discharge concentrations and loadings were within permit limits. The cyanide loadings observed were greater in the 002A flow than in the 002B flow. The spill in the North plant may account for the observation. A recheck of cyanide in both streams during the next inspection is recommended.

The weak and dissociable cyanide concentrations represented approximately one-sixth of the total cyanide measured. Monitoring both parameters is of value because of the variable stability of many cyanide compounds.

Organics

Organics detected were primarily HPAH compounds. Benzo(A)pyrene loading was within limits in the permitted 002B stream. The load in the 002A stream fell between the monthly average and daily maximum 002B limits. The North plant spill may have contributed to the observation. A recheck of PAHs in both streams during the next inspection is recommended.

Metals

Poor Ecology detection limits limited usefulness of the data. Reynolds results appeared accurate and indicated permit compliance.

Bioassays

The trout bioassay found no toxicity indicating permit compliance. Acute test LC_{50}s ranged from 26-58.8% 002A effluent and chronic test NOECs ranged from 12.5-25% 002A effluent in tests run with other organisms (*Daphnia magna*, fathead minnow, and Microtox). The cause was unclear although cyanide concentrations exceeded toxicity criteria.

Centrifuge

Many of the compounds found in the 002A&B samples and a list very similar to compounds found in the 002B sludge, were found in the centrifuge cake sample. Both metals and organics concentrations were higher in the centrifuge cake than in the sludge.

003, 004, & 005 - Discharges to the Longview Ditches

All three discharges were within permit limits at the time of the inspection. The 003 discharge was similar to the Longview Ditch water near the discharge. The 004 discharge had elevated fluoride (29.4 mg/L) and cyanide (total-370 ug/L) concentrations in comparison to the Longview Ditch. The 005 discharge upstream of the cable plant contributions had cyanide (total-53 ug/L) and eight PAHs (0.3-8.8 ug/L) detected.

Discontinuing the 004 discharge and studies of the 003 and 005 discharges required in the new permit appear appropriate.

Sediments

The sediments were fairly clean with no detected impacts from the Reynolds discharge. There was no indication of toxicity in the bioassays.

REFERENCES

Andreasson, Jeanne, in preparation. Summary of Ecology Centrifuge Testing.

EPA, Level 1 Biological Testing Assessment and Data Formatting, EPA 600/7-80-079. April, 1980.

EPA, Quality Criteria for Water, EPA 440/5-86-001, 1986.

FIGURE

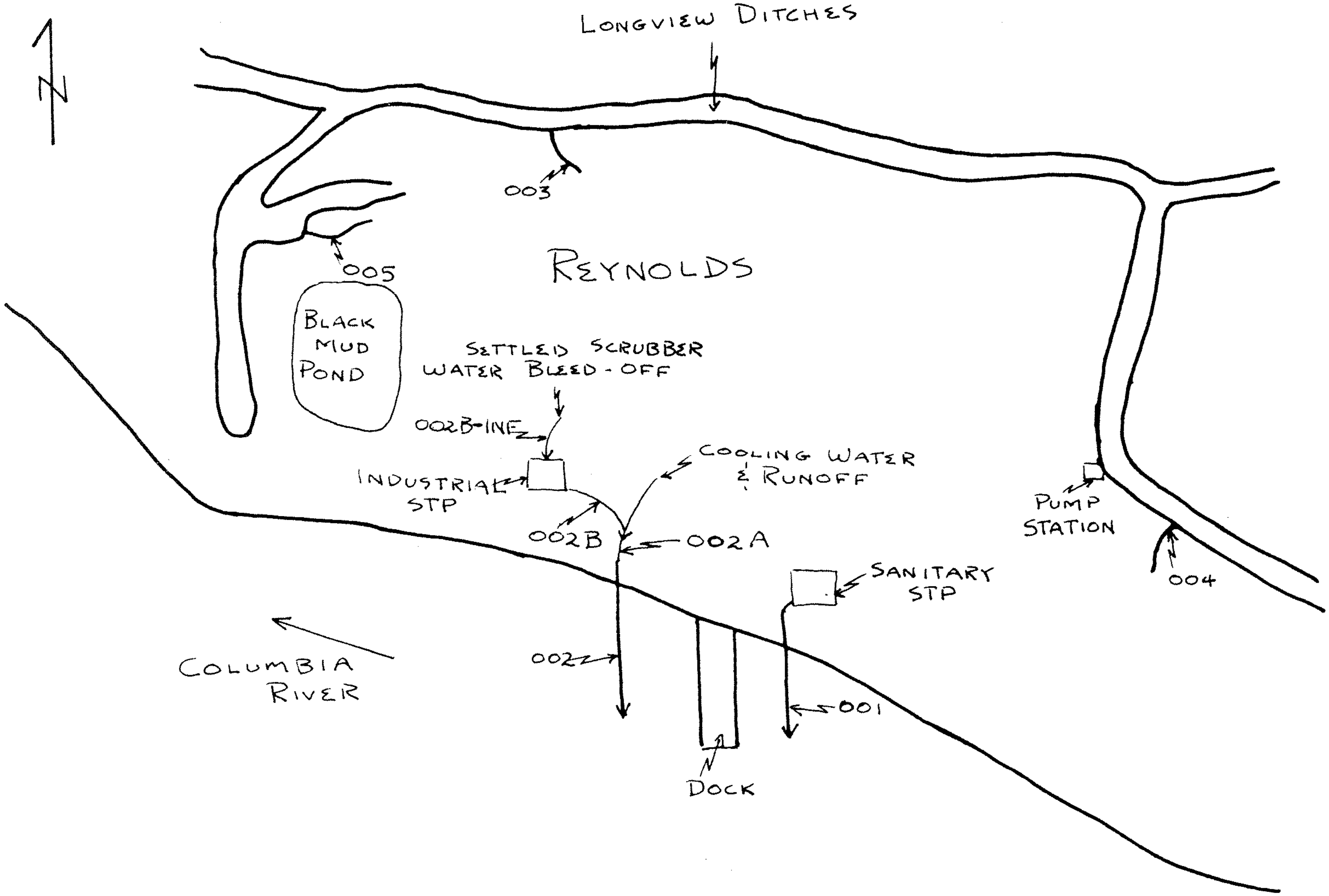


Figure 1 - Simplified Schematic - Reynolds Metals, February 1990.

TABLES

Table 1 - Sampling Station Descriptions - Reynolds, February 1990.

001

Treated Sanitary Wastewater - Samples collected from the effluent weir box just upstream of the weir.

002-A

Cooling Water, Site Runoff, and Treated Industrial Wastewater - Samples collected from a tap off the effluent pipe gallery above the discharge wet well. Composite and centrifuge samples were collected from a priority pollutant cleaned stainless steel bucket placed under the tap and allowed to overflow at a rate to prevent solids from settling.

002-B-Influent

Industrial Wastewater Treatment Plant Influent - Samples collected from a tap on the pipe into the industrial wastewater treatment plant. Composite sample was collected from a priority pollutant cleaned stainless steel bucket placed under the tap and allowed to overflow at a rate to prevent solids from settling.

002-B

Treated Industrial Wastewater - Samples collected from a tap on the discharge line. Composite samples were collected from a priority pollutant cleaned stainless steel bucket placed above the wet well tank. A teflon line was run from the tap to the bucket and the flow rate set to allow the bucket to overflow at a rate to prevent solids from settling.

003-Upstream

Sample collected approximately 5 feet upstream* of the discharge and 10 feet out into the Longview Drainage District Ditch.

003

Sample collected at corner of Reynolds Cable Plant parking lot just after the 003 ditch passed under the reduction plant/cable plant boundary fence.

003-Downstream

Sample collected in the effluent plume approximately 8 feet into the Longview Drainage District Ditch. The plume was relatively clear water compared to the turbid receiving water.

Table 1 - Cont'd - Reynolds, February 1990.

004-Upstream

Sample collected approximately 10 feet upstream* of the discharge and 8 feet out into the Longview Drainage District Ditch.

004

Sample collected as the 004 discharge fell from the culvert pipe into the Longview Drainage District Ditch.

004-Downstream

Sample collected in the effluent plume approximately 8 feet into the Longview Drainage District Ditch.

005-Upstream

Sample collected from the 005 ditch at the corner of the cable plant spool storage area. Location was upstream of inputs from the cable plant.

005-Permit

Sample collected at the Reynolds sampling bridge just prior to the 005 ditch entering a culvert running into a swampy area.

* Longview Drainage District Ditches were flowing east to west

Table 2 - Priority Pollutant Cleaning and Field Transfer Blank Procedures - Reynolds, February 1990.

PRIORITY POLLUTANT SAMPLING EQUIPMENT CLEANING PROCEDURES

1. Wash with laboratory detergent
2. Rinse several times with tap water
3. Rinse with 10% HNO3 solution
4. Rinse three (3) times with distilled/deionized water
5. Rinse with high purity methylene chloride
6. Rinse with high purity acetone
7. Allow to dry and seal with aluminum foil

FIELD TRANSFER BLANK PROCEDURE

1. Pour organic free water directly into appropriate bottles for parameters to be analyzed from grab samples (VOA).

2. Run approximately 1L of organic free water through a compositor and discard.

3. Run approximately 6L of organic free water through the same compositor and put the water into appropriate bottles for parameters to be analyzed from composite samples (BNA, Pesticide/PCB, metals, cyanide, and PAH).

Table 3 - Sampling Schedule - Reynolds, February 1990.

Sample+:	001	001	001-E	001-R	001	Intake	002A	002A	002A	002A-E	002A-R	002B-Inf	002B-Inf	002B-Inf	002B-Inf	002B	002B	002B
Date:	2/27	2/27	2/27-28	2/28	2/28	2/28	2/27	2/27	2/28	2/27-28	2/27-28	2/27	2/27	2/28	2/27-28	2/27	2/27	2/28
Time:	0920	1720	0700-0700	0920	1530	1200	0955	1755	1020	0700-0700	0700-0700	1035	1820	1045	0700-0700	1025	1810	1110
Type:	Grab	Grab	Composite	Grab	Grab	Grab	Grab	Grab	Grab	Composite	Composite	Grab	Grab	Grab	Composite	Grab	Grab	Grab
Lab Log #:		098261	098230	098231	098232	098233	098234	098235	098262	098236	098237				098238	098239	098240	
Field Analyses																		
pH	E	E	E R	E R			E	E	E	E R	E R	E	E	E	E	E	E	E
Conductivity	E	E	E	E			E	E	E	E	E	E	E	E	E	E	E	E
Temperature	E	E	E	E			E	E	E	E	E	E	E	E	E	E	E	E
Chlorine residual	E	E		E			E			E						E	E	
Sulfide										E								
Laboratory Analyses																		
Conductivity			E	E						E	E				E			
Alkalinity										E								
Hardness			E			E				E	E							
Fluoride (total)			E	E R		E				E R	E R				E			
Fluoride (Soluble)																		
Sulfate										E	E				E			
Cyanide (Total)										E R	E R				E			
Cyanide (Wk & Disoc)										E R	E R				E			
TS			E	E						E					E			
TNVS			E	E						E					E			
TSS		E	E R	E R						E R	E R				E			
TNVSS			E	E						E					E			
BOD5			E R	E R														
Inhib. BOD5			E	E														
COD		E	E	E														
TOC (liquid)										E								
TOC (solids)																		
NH3-N			E	E						E	E							
NO3+NO2-N			E	E						E	E							
Total-P			E	E						E	E							
Oil and Grease							E	E	E R							E	E	
Fecal Coliform				E R	E													
Aluminum (total)			E	E		E				E R	E R				E			
Antimony (total)										E R	E R							
Nickel (total)										E R	E R							
Copper (tot rec)																		
pp metals			E			E				E					E			
pp metals (dissolved)										E								
BNA (water)										E								
VOA (water)							E	E								E	E	
Pest/PCB (water)										E								
PAH (Mthd 610)										E	E				E			
BNA (solids)																		
VOA (solids)																		
Pest/PCB (solids)																		
% Solids																		
Grain Size																		
Trout (65% effluent)										E**								
Trout (100% effluent)										E**								
Microtox										E**								
Fathead Minnow										E**								
Daphnia Magna										E**								
Hyallela (sediment)																		

E Ecology analysis
R Reynolds analysis
* R analysis for Benzo(a)Pyrene only
** bioassay samples are comprised of equal volumes of the three 002A grab samples.
+ station - sampler. Ecology sample when not specified
*+ additional data will be presented in a centrifuge report (Andreasson, in prep)

Table 3 - Cont'd - Reynolds, February 1990.

Sample+:	002B-E	002B-R	003-upstm	003	003-dnstm	004-upstm	004	004-dnstm	005-upstm	005-permit	Trns Blk	PE sample	Upstrm	Diffuser	Dwnstrm	Cent Cake	Sludge
Date:	2/27-28	2/27-28	2/27	2/27	2/27	2/27	2/27	2/27	2/27	2/27	2/26		2/23	2/23	2/23	2/28	2/28
Time:	0700-0700	0700-0700	1220	1255	1150	1515	1530	1500	1620	1640	1430		1515-1545	1245-1340	1355-1415	*+	*+
Type:	Composite	Composite	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab		Grab	Grab	Grab	Composite	Grab
Lab Log #	098241	098242	098243	098244&52	098245	098246	098247&54	098248	098249&56	098250&58	098251	098260	088022	088020	088021	098280	098283
Field Analyses																	
pH	E	E	E	E R	E R	E	E R	E R	E R	E R							
Conductivity	E	E	E	E	E	E	E	E	E	E							
Temperature	E	E	E	E	E	E	E	E	E	E							
Chlorine residual			E	E	E	E	E	E	E	E							
Sulfide			E	E	E	E	E	E	E	E							
Laboratory Analyses																	
Conductivity	E	E	E	E	E	E	E	E	E	E							
Alkalinity	E																
Hardness	E		E	E	E	E	E	E	E	E							
Fluoride (total)	E	E	E	E R	E R	E	E R	E R	E R	E R		E R	E	E	E		
Fluoride (Soluble)													E	E	E		
Sulfate	E	E		E			E		E	E							
Cyanide (Total)	E R	E R	E	E	E	E	E	E	E	E	E	E R	E	E	E		
Cyanide (Wk & Dis	E R	E R	E	E R	E R	E	E R	E R	E R	E R	E		E	E	E		
TS	E																
TNVS	E																
TSS	E	E R										E R					
TNVSS	E																
BOD5																	
Inhib. BOD5																	
COD																	
TOC (liquid)																	
TOC (solids)													E	E	E	E	E
NH3-N				E			E		E	E							
NO3+NO2-N				E			E		E	E							
Total-P				E			E		E	E							
Oil and Grease				E			E		E	E							
Fecal Coliform																	
Aluminum (total)	E	E	E	E	E	E	E	E	E	E		E R	E	E	E	E	E
Antimony (total)	E	E										E R					
Nickel (total)	E	E										E R					
Copper (tot rec)				R	R			R		R							
pp metals	E		E	E	E	E	E	E	E	E	E		E	E	E	E	E
pp metals (dissolved)																	
BNA (water)	E										E						
VOA (water)											E						
Pest/PCB (water)	E										E						
PAH (Mthd 610)	E R*	E R*		E			E		E	E	E						
BNA (solids)													E	E	E	E	E
VOA (solids)													E	E	E		
Pest/PCB (solids)													E	E	E	E	E
% Solids													E	E	E	E	E
Grain Size													E	E	E	E	E
Trout (65% effluent)																	
Trout (100% effluent)																	
Microtox													E	E	E		
Fathead Minnow																	
Daphnia Magna																	
Hyallela (sediment)													E	E	E		

Table 4 – Ecology Analytical Methods – Reynolds, February 1990.

	Method Used for Ecology Analysis (Ecology, 1988&89)	Laboratory Performing Analysis
Laboratory Analyses		
Conductivity	EPA #120.1	Ecology
Alkalinity	EPA #310.1	Ecology
Hardness	EPA #130.2	Ecology
Fluoride (total)	EPA #340.3	Ecology
Fluoride (soluble)	EPA #340.3	Ecology
Sulfate	EPA #300.0	Ecology
NH3-N	EPA #350.1	Ecology
NO3+NO2-N	EPA #353.2	Ecology
Total-P	EPA #365.2	Ecology
TS	EPA #160.3	Ecology
TNVS	EPA #160.4	Ecology
TSS	EPA #160.2	Ecology
TNVSS	EPA #160.4	Ecology
COD	EPA #410.1	Ecology
BOD5	EPA #405.1	Ecology
Inhib. BOD5	EPA #405	Ecology
Fecal Coliform (MF)	APHA, 1985: #909C	Ecology
Oil and Grease	EPA #413.1	Amtest
TOC (water)	EPA #415.1	Ecology
TOC (sed/sludge)	Tetra Tech, 1986	Amtest
% Solids	EPA #160.3	Amtest
Grain Size	Tetra Tech, 1986	Laucks
Cyanide (total)	EPA #335.3	Ecology
Cyanide (wk & dis)	APHA, 1985: #412H	Ecology
VOA (water)	EPA #624	Laucks
VOA (sed/sludge)	EPA #8240	Laucks
BNA (water)	EPA #625	Laucks
BNA (sed/sludge)	EPA #8270	Laucks
Pest/PCB (water)	EPA #608	Laucks
Pest/PCB (sed/sludge)	EPA #8080	Laucks
PAH (water)	EPA #610	Ecology
Metals (water)	EPA #200	Sound Analytical Services
Metals (sediments)	EPA #200	Amtest
Metals (cent/sludge)	EPA #200	Ecology
Trout	Ecology, 1981	Weyerhaeuser
Fathead Minnow	EPA, 1989	Northwestern Aquatic Sciences
Daphnia Magna	EPA, 1987	Ecology
Microtox (water)	Beckman, 1982	ECOVA
Microtox (sed/sludge)	Tetra Tech, 1986	ECOVA
Hyallela	Nebeker, 1984	Northwestern Aquatic Sciences

Table 4 - Cont'd - Reynolds, February 1990.

	Method Used for Ecology Analysis (Ecology, 1988&89)	Laboratory Performing Analysis
Field Analyses		
pH	APHA, 1985: #423	Ecology
Conductivity	APHA, 1985: #205	Ecology
Temperature	APHA, 1985: #212	Ecology
Chlorine Residual	APHA, 1985: #408E	Ecology
Sulfide	EPA #376.2	Ecology

APHA-AWWA-WPCF, 1985. Standard Methods for the Examination of Water and Wastewater, 16th ed.

Beckman Instruments, Inc., 1982. Microtox System Operating Manual.

Ecology, 1981. Static Acute Fish Toxicity Test, DOE 80-12, revised July 1981.

Ecology, 1988. Department of Ecology Laboratory Users Manual.

Ecology, 1989. Manchester Laboratory Price List, 6/15/89.

EPA, 1983. Methods for Chemical Analysis of Water and Wastes, 600/4/79-020, revised March 1983.

EPA, 1984. 40 CFR Part 136, October 26, 1984.

EPA, 1986. Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846, 3rd ed., November 1986.

EPA, 1987. A Short-Term Chronic Toxicity Test Using Daphnia magna, EPA/600/D-87/080.

EPA, 1989. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, second edition, EPA/600/4-89/001.

Nebeker, A.V., et al, 1984. Biological Methods for Determining Toxicity of Contaminated Freshwater Sediments to Invertebrates, Env. Tox. and Chemistry, vol. 3.

Tetra Tech, 1986, Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound, Prepared for Puget Sound Estuary Program.

Table 5 - Split Sample Results Comparison - Reynolds, February 1990.

	Sample +:	001-E	001-R	002A	002A-E	002A-R	002B-E	002B-R	003	003-dnstm	004	004-dnstm	005-upstm	005-permit	PE sample	PE sample true value (acceptance limits)
	Date:	2/27-28	2/28	2/28	2/27-28	2/27-28	2/27-28	2/27-28	2/27	2/27	2/27	2/27	2/27	2/27		
	Time:	0700-0700	0920	1020	0700-0700	0700-0700	0700-0700	0700-0700	1255	1150	1530	1500	1620	1640		
	Type:	Composite	Grab	Grab	Composite	Composite	Composite	Composite	Grab	Grab	Grab	Grab	Grab	Grab		
	Lab Log #:	098230	098231	098262	098236	098237	098241	098242	098244&52	098245	098247&54	098248	098249&56	098250&58	098260	098260
	Laboratory															
pH (S.U.)	Ecology	7.1	7.4		7.4	7.4			7.2	7.6	7.3	6.6	7.0	7.3		
	Reynolds	7.8	7.6		7.5	7.5			7.6	7.6	7.4	6.8	7.1	7.6		
Fluoride (total-mg/L)	Ecology		4.7		8.4	8.0			1.4	1.4	29.4	0.75	9.7	0.50	1.7	1.60
	Reynolds		2.4		6.7	7.4			1.2	1.1	22.0	0.65	8.6	0.43	1.6	(1.39-1.78)
Cyanide (total-ug/L)	Ecology				191	649	2630	2950							903	890
	Reynolds				150	171	2250	2890							980	(562-1140)
Cyanide (wk&dis-ug/L)	Ecology				27	19	606	569	2	4	29	4	13	4		
	Reynolds				25	23	890	1040	<5	<5	33	<5	19	<5		
TSS (mg/L)	Ecology	31	19		11	10		285							27	29.7
	Reynolds	32.8	20.8		13.2	11.0		162							29.3	(24.2-33.3)
BOD5 (mg/L)	Ecology	20	19													
	Reynolds	22.4	15.9													
Oil and Grease (mg/L)	Ecology			5.7												
	Reynolds			3.0												
Fecal Coliform (#/100mL)	Ecology		590													
	Reynolds		107													
Benzo(a)pyrene (ug/L)	Ecology						33.0	30.8								
	Reynolds						31	12								
Cu (ug/L)	Ecology								<50	<50		<10		<50		
	Reynolds								<10	<10		<10		<10		
Al (ug/L)	Ecology				690	630									441*	350
	Reynolds				530	500									350	(269-439)
Ni (ug/L)	Ecology				70	50									417*	370
	Reynolds				<20	<20									390	(319-419)
Sb (ug/L)	Ecology				280	70									230*	**
	Reynolds				<50	<50									<50	

+ station - sampler. Ecology sample when not specified.
* proper dilution instructions were not provided to the contract laboratory analyzing the samples.
** true value of Sb not quantified in the PE sample tested.

Table 6 – NPDES Permit Limits/Inspection Results Comparison – Reynolds, February 1990.

Outfall 001

	Effluent Limits Daily Average	Effluent Limits Daily Maximum				
			Sample +:	001-E	001-R	001
			Date:	2/27-28	2/28	
			Time:	0700-0700	0920	
			Type:	Composite	Grab	Grabs
			Lab Log #:	098230	098231	
			Laboratory			
pH (S.U.)	6.5-8.5 at all times		Ecology		7.4	7.2; 7.4
			Reynolds		7.6	
TSS (mg/L)	30	45	Ecology	31	19	
			Reynolds	32.8	20.8	
(lbs/D)	38	90	Ecology	23.5	14.4	
			Reynolds	24.9	15.8	
BOD5 (mg/L)	25	45	Ecology	20	19	
			Reynolds	22.4	15.9	
(lbs/D)	31	90	Ecology	15.2	14.4	
			Reynolds	17.0	12.1	
Fecal Coliform (#/100mL)	200	400	Ecology		590	36000LJ
			Reynolds		107	
Chlorine Residual (mg/L)	range 0.1-3.0		Ecology		0.3	0.4; <0.04
Flow (MGD)	0.22	0.32		0.091	0.091	

+ station – sampler. Ecology sample when not specified.
LJ estimated – total plate count greater than 200

Outfalls 003, 004, & 005

		Effluent Limits Daily Average	Effluent Limits Daily Maximum							
				Sample:	003	003-dnstm	004	004-dnstm	005-upstm	005-permit
				Date:	2/27	2/27	2/27	2/27	2/27	2/27
				Time:	1255	1150	1530	1500	1620	1640
				Type:	Grab	Grab	Grab	Grab	Grab	Grab
				Lab Log #:	098244&52	098245	098247&54	098248	098249&56	098250&58
				Laboratory						
pH (S.U.)		6.5-9.0 at all times		Ecology	7.2+	7.6	7.3+	6.6	7.0	7.3+
				Reynolds	7.6+	7.6	7.4+	6.8	7.1	7.6+
Fluoride (total-mg/L)		**		Ecology	1.4	1.4+	29.4	0.75+	9.7	0.50+
				Reynolds	1.2	1.1+	22.0	0.65+	8.6	0.43+
Cyanide (wk&dis-ug/L)		5.2++		Ecology	2	4+	29	4+	13	4+
				Reynolds	<5	<5+	33	<5+	19	<5+
Oil and Grease (mg/L)		no visible sheen			no sheen+	no sheen	no sheen+	no sheen	no sheen	no sheen+
				Ecology	1.2		3.3		3.1	6.4
Benzo(a)pyrene (ug/L)		***		Ecology	0.20U		0.20U		0.6	0.1U+
				Reynolds						
Cu (ug/L)	003	12.7*		Ecology		<50+				
				Reynolds		<10+				
	004	13.0*		Ecology				<10+		
				Reynolds				<10+		
	005	22.0*		Ecology						<50+
				Reynolds						<10+

+ location where permit limits are applied
++ chronic toxicity criteria
* chronic toxicity criteria based on hardness
** concentration to be less than chronic toxicity criteria. No criteria available.
*** limit for outfall 005 only. Concentration to be less than chronic toxicity criteria. No criteria available.
U compound analyzed for but not detected at the given detection limit.

Table 6 – Cont'd – Reynolds, February 1990.

Outfall 002

	Effluent Limits Daily Average	Effluent Limits Daily Maximum	Laboratory	002A	002A-E	002A-R	002B-E	002B-R
Date:					2/27-28	2/27-28	2/27-28	2/27-28
Time:					0700-0700	0700-0700	0700-0700	0700-0700
Type:				Grab	Composite	Composite	Composite	Composite
Lab Log #:					098236	098237	098241	098242
pH (S.U.)	6.0-9.0		Ecology	7.1;7.5;7.1				
			Reynolds					
Total Fluoride (mg/L)			Ecology		8.4	8.0		
			Reynolds		6.7	7.4		
(lbs/D)	608	1315	Ecology		563	536		
			Reynolds		449	496		
Total Cyanide (ug/L)			Ecology		191	649	2630	2950
			Reynolds		150	171	2250	2890
(lbs/D)	12.0*	18.0*	Ecology		12.8**	43.5**	3.2	3.6
			Reynolds		10.1**	11.5**	2.8	3.5
TSS (mg/L)			Ecology		11	10		
			Reynolds		13.2	11.0		
(lbs/D)	1850	3700	Ecology		738	671		
			Reynolds		885	738		
Oil and Grease (mg/L)	10	15	Ecology	18;2.1;5.7				
			Reynolds	3.0				
Benzo(a)pyrene (ug/L)			Ecology		5.7	3.0	33.0	30.8
			Reynolds				31	12
(lbs/D)	0.070*	1.000*	Ecology		0.382**	0.201**	0.041	0.038
			Reynolds				0.038	0.015
Al (ug/L)			Ecology		690	630		
			Reynolds		530	500		
(lbs/D)	150*	300*	Ecology		46	42		
			Reynolds		36	34		
Ni (ug/L)			Ecology		70	50		
			Reynolds		<20	<20		
(lbs/D)	3.0	5.1	Ecology		4.7	3.4		
			Reynolds		<1.3	<1.3		
Sb (ug/L)			Ecology		280	70		
			Reynolds		<50	<50		
(lbs/D)	10.1	22.5	Ecology		18.8	4.7		
			Reynolds		<3.4	<3.4		
Salmonid Bioassay (% Survival)	>80		Ecology		100			
Flow (MGD)					8.04	8.04	0.147	0.147
Temperature (F)								

* per Order No. 89-3.
** limit applies to 002B flow
\+ station – sampler. Ecology sample when not specified.

Note: column header row label is "Sample +:".

Table 7 – Ecology Laboratory General Chemistry Results – Reynolds, February 1990.

Sample +:	001	001	001–E	001–R	001	Intake	002A	002A	002A	002A–E	002A–R	002B–Inf	002B–Inf	002B–Inf	002B–Inf	002B	002B	002B
Date:	2/27	2/27	2/27–28	2/28	2/28	2/28	2/27	2/27	2/28	2/27–28	2/27–28	2/27	2/27	2/28	2/27–28	2/27	2/27	2/28
Time:	0920	1720	0700–0700	0920	1530	1200	0955	1755	1020	0700–0700	0700–0700	1035	1820	1045	0700–0700	1025	1810	1110
Type:	Grab	Grab	Composite	Grab	Grab	Grab	Grab	Grab	Grab	Composite	Composite	Grab	Grab	Grab	Composite	Grab	Grab	Grab
Lab Log #:		098261	098230	098231	098232	098233	098234	098235	098262	098236	098237				098238	098239	098240	
Field Analyses																		
pH (S.U.)	7.2	7.4	7.1	7.4			7.1	7.5	7.1	7.4	7.4	9.3	8.9	8.6	9.0	3.0	3.9	3.5
Conductivity (umhos/cm	480	517	460	454			1055	1268	1120	1132	1210	38600	37300	34500	36700	36700	36000	44200
Temperature (C)	12.0	15.2	1.5	11.6			17.6	16.8	16.7	3.7	18.6	29.7	30.7	27.0	3.1	26.8	28.1	26.5
Chlorine residual (mg/L)																		
Free	0.2	<0.1		<0.1														
Total	0.4	<0.04		0.3			<0.04			<0.04						*	*	
Sulfide (mg/L)										<0.1								
Laboratory Analyses																		
Conductivity (umhos/cm)			517	481						1290	1310				33900			
Alkalinity (mg/L as CaCO3)										125								
Hardness (mg/L as CaCO3)			160			112				132	132							
Fluoride (total–mg/L)			3.3	4.7		0.87				8.4	8.0				1110			
Fluoride (total–mg/Kg dry wt)																		
Flouride (soluble–mg/L)																		
Sulfate (mg/L)										375	390				17500			
Cyanide (total–ug/L)										191	649				28600			
Cyanide (wk & dis–ug/L)										27	19				865			
Cyanide (total–mg/Kg dry wt)																		
Cyanide (wk & dis–mg/Kg dry wt)																		
TS (mg/L)			372	340						881					38000			
TNVS (mg/L)			257	254						792					32900			
TSS (mg/L)		127	31	19						11	10				309			
[illegible]SS (mg/L)			14	8						8					211			
[illegible]5 (mg/L)			20	19														
Inhib. BOD5 (mg/L)			17	16														
COD (mg/L)		110	69	85														
TOC (liquid–mg/L)										11								
TOC (solids–% dry wt)																		
NH3–N (mg/L)			5.6	3.2						0.36	0.28							
NO3+NO2–N (mg/L)			0.61	0.58						0.07	0.19							
Total–P (mg/L)			1.2	0.84						0.46	0.47							
Oil and Grease (mg/L)							18	2.1	5.7							58	25	
Fecal Coliform (#/100mL)				590	36000 LJ													
% Solids																		

* sample too turbid for accurate test results
\+ station – sampler (E – Ecology: R – Reynolds). Ecology sample when not specified.
J estimated
L total plate count greater than 200
U less than

Table 7 - Cont'd - Reynolds, February 1990.

Sample +:	002B-E	002B-R	003-upstm	003	003-dnstm	004-upstm	004	004-dnstm	005-upstm	005-permit	Trns Blk	PE sample	Upstrm	Diffuser	Dwnstrm
Date:	2/27-28	2/27-28	2/27	2/27	2/27	2/27	2/27	2/27	2/27	2/27	2/26		2/23	2/23	2/23
Time:	0700-0700	0700-0700	1220	1255	1150	1515	1530	1500	1620	1640	1430		1515-1545	1245-1340	1355-1415
Type:	Composite	Composite	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab		Grab	Grab	Grab
Lab Log #:	098241	098242	098243	098244&52	098245	098246	098247&54	098248	098249&56	098250&58	098251	098260	088022	088020	088021
Field Analyses															
pH (S.U.)	3.9	3.4	7.0	7.2	7.6	6.7	7.3	6.6	7.0	7.3					
Conductivity (umhos/cm)	35100	36500	285	330	280	297	735	302	849	497					
Temperature (C)	5.1	17.9	9.6	14.1	11.7	13.0	7.1	13.5	11.3	13.7					
Chlorine residual (mg/L)															
Free															
Total			<0.04	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	0.08					
Sulfide (mg/L)			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
Laboratory Analyses															
Conductivity (umhos/cm)	34400	34400	297	287	276	280	793	297	910	533					
Alkalinity (mg/L as CaCO3)	1U														
Hardness (mg/L as CaCO3)	303		108	110	109	106	96	112	196	207					
Fluoride (total-mg/L)	190	230	0.80	1.4	1.4	0.20	29.4	0.75	9.7	0.50		1.7			
Fluoride (total-mg/Kg dry wt)													114	34.2	23.5
Flouride (soluble-mg/L)													3.8U	3.8U	3.1U
Sulfate (mg/L)	18900	20500		3.9			40		64	3.4					
Cyanide (total-ug/L)	2630	2950	8	2U	2	2	370	32	53	4	2U	903			
Cyanide (wk & dis-ug/L)	606	569	6	2	4	6	29	4	13	4	2U				
Cyanide (total-mg/Kg dry wt)													0.091U	0.100U	0.099U
Cyanide (wk & dis-mg/Kg dry wt)													0.094U	0.099U	0.094U
TS (mg/L)	34200														
TNVS (mg/L)	33500														
TSS (mg/L)	308	285										27			
TNVSS (mg/L)	203														
BOD5 (mg/L)															
Inhib. BOD5 (mg/L)															
COD (mg/L)															
TOC (liquid-mg/L)															
TOC (solids-% dry wt)													0.07	0.05	0.15
NH3-N (mg/L)				0.14			0.04		0.65	0.44					
NO3+NO2-N (mg/L)				0.10			0.28		0.16	0.05					
Total-P (mg/L)				0.42			0.12		0.13	0.45					
Oil and Grease (mg/L)				1.2			3.3		3.1	6.4					
Fecal Coliform (#/100mL)															
% Solids													78.2	76.4	76.6

Table 8 – VOA, BNA, and Pest/PCB Compounds Detected – Reynolds, February 1990.

Sample ++:	002A	002A	002B	002B	Trns Blk	Upstrm	Diffuser	Dwnstrm	Cent Cake	Sludge
Date:	2/27	2/27	2/27	2/27	2/26	2/23	2/23	2/23	2/26–28	2/28
Time:	0955	1755	1025	1810	1430	1515–1545	1245–1340	1355–1415		
Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Comp	Grab
Lab Log #:	098234	098235	098239	098240	098251	088022	088020	088021	098280	098283
% Solids						78.2	76.4	76.6	16.1	55.2
% TOC (dry-wt basis)						0.07	0.05	0.15	10.5	3.1
Grain size (%)										
Gravel – +10 mesh						<2	<2	<2	<1	<1
Sand – +230 mesh						96	96	98	5	<1
Silt – 5 – 8 phi						4	3	1	44	69
Clay – 9 – 12 phi						<1	1	1	51	31
VOA Compounds	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)		
Methylene Chloride	– –	– –	– –	– –	1	12 B	14 B	12 B		
Acetone	2 J	– –	100	17 J	5	31	24	27		
Chloroform	1	2	– –	– –	– –	– –	– –	– –		

Sample ++:	002A–E	002B–E	Trns Blk	Upstrm	Diffuser	Dwnstrm	Cent Cake	Sludge
Date:	2/27–28	2/27–28	2/26	2/23	2/23	2/23	2/26–28	2/28
Time:	0700–0700	0700–0700	1430	1515–1545	1245–1340	1355–1415		
Type:	Composite	Composite	Grab	Grab	Grab	Grab	Comp	Grab
Lab Log #:	098236	098241	098251	088022	088020	088021	098280	098283
BNA Compounds	(ug/L)	(ug/L)	(ug/L)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)
Phenol	– –	– –	– –	– –	– –	– –	13000	– –
2,4–Dimethylphenol	– –	2 J	– –	– –	– –	– –	– –	– –
2–Methylnaphthalene	– –	2 J	– –	– –	– –	– –	– –	– –
Dibenzofuran	– –	1 J	– –	– –	– –	– –	– –	– –
Bis(2–Ethylhexyl)phthalate	53	55	33	520	210 B	750	– –	– –
Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAH)								
Naphthalene	– –	3 J	– –	– –	– –	– –	– –	– –
Acenaphthylene	– –	4 J	– –	– –	– –	– –	– –	– –
Acenaphthene	– –	20	– –	– –	– –	– –	6600 J	9300
Phenanthrene	1 J	16	– –	– –	– –	– –	130000	17000
Anthracene	– –	6	– –	– –	– –	– –	47000	8500
High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH)								
Fluoranthene	22	320	– –	– –	– –	39 J	1900000	520000
Pyrene	21	380	– –	– –	– –	37 J	2300000 D	570000
Benzo(a)Anthracene	6	75	– –	– –	– –	– –	1100000	240000
Chrysene	10	61	– –	– –	– –	– –	1700000	390000
Benzo(b+k)Fluoranthene	11	150	– –	– –	– –	76 J	1800000 D	510000
Benzo(a)Pyrene	3 J	36	– –	– –	– –	42 J	620000	130000
Indeno(1,2,3–cd)Pyrene	1 J	12	– –	– –	– –	– –	210000	40000
Dibenzo(a,h)Anthracene	– –	4 J	– –	– –	– –	– –	88000	17000
Benzo(g,h,i)Perylene	2 J	13	– –	– –	– –	– –	230000	44000
Pest/PCB Compounds								
Aldrin	– –	0.42	– –	– –	– –	– –	– –	– –

J estimated value – less than the specified detection limit
D result from analysis of a diluted sample
B detected in the method blank also
** dry–wt basis
++ station – sampler. Ecology sample when not specified.

Table 9 – PAH Scan Results – Reynolds, February 1990.

Sample ++:	002A-E	002A-E	002A-R	002A-R	002B-Inf	002B-E	002B-E
Date:	2/27-28	2/27-28	2/27-28	2/27-28	2/27-28	2/27-28	2/27-28
Time:	0700-0700	0700-0700	0700-0700	0700-0700	0700-0700	0700-0700	0700-0700
Type:	Composite	Composite	Composite	Composite	Composite	Composite	Composite
Lab Log #:	098236	098236	098237	098237	098238	098241	098241
	PAH Scan (ug/L)	BNA Scan (ug/L)	PAH Scan (ug/L)	BNA Scan (ug/L)	PAH Scan (ug/L)	PAH Scan (ug/L)	BNA Scan (ug/L)
Benzo(a)Pyrene	5.7	3 J	3.0	1 J	400	33.0	36
Dibenzo(a,h)Anthracene	1.0 J	4 U	1.1 J	2 U	60 UJ	1.3 UJ	4 J
Benzo(a)Anthracene	9.6	6	4.8	4	720	138	75
Acenaphthene	0.5 U	2 U	0.5 U	2 U	2.5 U	19.0	20
Phenanthrene	1.2	1 J	0.5 U	0.2 J	2.5 U	26.6	16
Fluorene	0.5 U	2 U	0.5 U	2 U	2.5 U	3.0	4 U
Naphthalene	0.5 U	4 U	0.5 U	2 U	2.5 U	1.5	3 J
Anthracene	0.5 UJ	2 U	0.5 U	2 U	2.5 U	10.4	6
Pyrene	20.7	21	6.1	4	2090 J	535	380
Benzo(g,h,i)Perylene	1.2	2 J	1.8	1 J	165	3.0	13
Indeno(1,2,3-cd)Pyrene	1.0 J	1 J	1.1 J	1 J	60 UJ	1.3 UJ	12
Benzo(b)Fluoranthene	14.4	11 X	8.7	5	1000	164 J	150 X
Fluoranthene	27.1	22	7.7	7	2290 J	535	320
Benzo(k)Fluoranthene	7.6	11 X	3.1	4	555	67.0 J	150 X
Acenaphthylene	0.5 U	2 U	0.5 U	2 U	2.5 U	3.5	4 J
Chrysene	17.4	10	9.2	9	1490 J	129	61

Sample ++:	002B-R	003	004	005-upstm	005-permit	Trans Blk	Trans Blk
Date:	2/27-28	2/27	2/27	2/27	2/27	2/26	2/26
Time:	0700-0700	1255	1530	1620	1640	1430	1430
Type:	Composite	Grab	Grab	Grab	Grab	Grab	Grab
Lab Log #:	098242	098244&52	098247&54	098249&56	098250&58	098251	098251
	PAH Scan (ug/L)	PAH Scan (ug/L)	PAH Scan (ug/L)	PAH Scan (ug/L)	PAH Scan (ug/L)	PAH Scan (ug/L)	BNA Scan (ug/L)
Benzo(a)Pyrene	30.8	0.20 U	0.20 U	0.6	0.1 U	0.2 U	4 U
Dibenzo(a,h)Anthracene	4.0 J	0.20 U	0.20 U	0.2 UJ	0.1 U	0.2 U	4 U
Benzo(a)Anthracene	70.7	0.20 U	0.20 U	1.7	0.1 U	0.2 U	2 U
Acenaphthene	4.8	0.20 U	0.20 U	0.2 U	0.1 U	0.2 U	2 U
Phenanthrene	11.0	0.20 U	0.20 U	0.2 U	0.1 U	0.2 U	2 U
Fluorene	2.5 U	0.20 U	0.20 U	0.2 U	0.2	0.2 U	2 U
Naphthalene	2.5 U	0.20 U	0.20 U	0.2 U	0.1 U	0.2 U	4 U
Anthracene	4.0	0.20 U	0.20 U	0.2 U	0.1 U	0.2 U	2 U
Pyrene	298	0.20 U	0.20 U	4.9	0.2	0.2 U	2 U
Benzo(g,h,i)Perylene	10.1	0.20 U	0.20 U	0.3	0.1 U	0.2 U	4 U
Indeno(1,2,3-cd)Pyrene	4.0 J	0.20 U	0.20 U	0.2 UJ	0.1 U	0.2 U	4 U
Benzo(b)Fluoranthene	75.4 J	0.20 U	0.20 U	2.2 J	0.1 U	0.2 U	4 U
Fluoranthene	300	NAR	0.20 U	8.4	0.3	0.2 U	2 U
Benzo(k)Fluoranthene	30.7 J	0.20 U	0.20 U	0.8 J	0.1 U	0.2 U	4 U
Acenaphthylene	2.5 U	0.20 U	0.20 U	0.2 U	0.1 U	0.2 U	2 U
Chrysene	77.3	0.25	0.20 U	3.3	0.2	0.2 U	2 U

NAR no analytical result
U compound analyzed for but not detected at the given detection limit
J estimated value less than the specified detection limit
X Benzo(b+k)Fluoranthene
++ station – sampler. Ecology sample when not specified.

Table 10 - Comparison of 002A Data to Toxicity Criteria - Reynolds, February 1990.

			Freshwater Toxicity Criteria (EPA, 1986)	
Sample ++:	002A	002A		
Date:	2/27	2/27		
Time:	0955	1755		
Type:	Grab	Grab		
Lab Log #:	098234	098235	Acute	Chronic
VOA Compounds	(ug/L)	(ug/L)		
Acetone	2 J	- -		
Chloroform	1	2	28900 *	1240 *

		Acute	Chronic
Sample ++:	002A-E		
Date:	2/27-28		
Time:	0700-0700		
Type:	Composite		
Lab Log #:	098236		
	(ug/L)		
Cyanide (total)	191		
Cyanide (wk & dis)	27	22	5.2
BNA Compounds			
Bis(2-Ethylhexyl)phthalate	53	940 **	3 **
LPAHs			
Phenanthrene	1 J		
HPAHs			
Fluoranthene	22	3980 *	
Pyrene	21		
Benzo(a)Anthracene	6		
Chrysene	10		
Benzo(b+k)Fluoranthene	11		
Benzo(a)Pyrene	3 J		
Indeno(1,2,3-cd)Pyrene	1 J		
Benzo(g,h,i)Perylene	2 J		
Metals			
Antimony (TR)	40	9000 *	1600 *
Arsenic (TR)	100 +*		
(Penta)		850 *	48 *
(Tri)		360	190
Beryllium (TR)	10 U+**	130 *	5.3 *
Cadmium (TR)	10 U+**	5.4 +	1.4 +
Chromium (TR)	50 U		
(Hexa)		16	11
(Tri)		2180 +	260 +
Copper (TR)	50 U+**	23 +	15 +
Lead (TR)	100 U+**	116 +	4.5 +
Mercury (TR)	0.2 U	2.4	0.012
Nickel (TR)	50 U	1790 +	199 +
Selenium (TR)	100 +*	260	35
Silver (TR)	100 U+**	6.5 +	0.12
Thallium (TR)	100 U	1400 *	40 *
Zinc (TR)	50 U	148 +	134 +

J estimated value - less than the specified detection limit
U indicates compound was analyzed for but not detected at the given detection limit
* insufficient data to develop criteria - Lowest Observed Effect Level (LOEL) presented
** LOEL for phthalate esters
+ calculation based on hardness (132 mg/L as CaCO3)
++ station - sampler. Ecology sample when not specified.
+* exceeds chronic toxicity criteria - concentration reported is at detection limit
+** detection limit exceeds acute and/or chronic toxicity criteria
LPAHs Low Molecular Weight Polynuclear Aromatic Hydrocarbons
HPAHs High Molecular Weight Polynuclear Aromatic Hydrocarbons
TR total recoverable metal

Table 11 - Metals Scan Results - Reynolds, February 1990.

Sample ++:	001-E	001-R	Intake	002A-E	002A-E	002A-R	002B-Inf	002B-E	002B-R	003-upstm	003	003-dnstm
Date:	2/27-28	2/28	2/28	2/27-28	2/27-28	2/27-28	2/27-28	2/27-28	2/27-28	2/27	2/27	2/27
Time:	0700-0700	0920	PM	0700-0700	0700-0700	0700-0700	0700-0700	0700-0700	0700-0700	1220	1255	1150
Type:	Composite	Grab	Grab	Composite	Composite	Composite	Composite	Composite	Composite	Grab	Grab	Grab
Lab Log #:	098230	098231	098233	098236	098236	098237	098238	098241	098242	098243	098244&52	098245
					dissolved							
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
Antimony (TR)	10 U		10 U	40	10 U		10 U	30		20	70	10 U
Arsenic (TR)	100 U		100 U	100	100 U		500	300		100 U	100 U	100 U
Beryllium (TR)	10 U		10 U	10 U	10 U		10 U	10 U		10 U	10 U	10 U
Cadmium (TR)	10 U		10 U	10 U	10 U		10 U	10 U		12	10 U	10 U
Chromium (TR	50 U		50 U	50 U	50 U		50 U	80		50 U	50 U	50 U
Copper (TR)	50 U		50 U	50 U	60		50 U	50 U		50	50 U	50 U
Lead (TR)	100 U		100 U	100 U	100 U		200	200		100 U	100 U	100 U
Mercury (TR)	0.2 U		0.2 U	0.2 U	0.2 U		0.2 U	0.2 U		0.3	0.2 U	0.2 U
Nickel (TR)	50 U		50 U	50 U	50 U		50 U	470		50 U	50 U	50 U
Selenium (TR)	100 U		100 U	100	100 U		500	100 U		100	100 U	100 U
Silver (TR)	100 U		100 U	100 U	600		100 U	100 U		100	100 U	100 U
Thallium (TR)	100 U		100 U	100 U	100 U		100 U	100 U		100 U	100 U	100 U
Zinc (TR)	50 U		50 U	50 U	60		50 U	50 U		50 U	50 U	50 U
Aluminum (T)	490	340	70	690		630	31800	660	850	370	310	290
Antimony (T)				280		70		90	90			
Nickel (T)				70		50		490	500			

Sample ++:	004-upstm	004	004-dnstm	005-upstm	005-permit	Trns Blk	PE sample	Upstrm	Diffuser	Dwnstrm	Cent Cake	Sludge
Date:	2/27	2/27	2/27	2/27	2/27	2/26		2/23	2/23	2/23	2/26-28	2/28
Time:	1515	1530	1500	1620	1640	1430		1515-1545	1245-1340	1355-1415		
Type:	Grab	Grab	Grab	Grab	Grab	Grab		Grab	Grab	Grab	Composite	Grab
Lab Log #:	098246	098247&54	098248	098249&56	098250&58	098251	098260	088022	088020	088021	098280	098283
	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(mg/Kg **)	(mg/Kg **)	(mg/Kg **)	(mg/Kg **)	(mg/Kg **)
Antimony (TR)	10 U	10 U	10 U	10 U	10 U	10 U		2.5 U	2.4 U	2.4 U	1.4 J	0.2 U
Arsenic (TR)	100 U	100 U	100 U	100 U	100 U	100 U		0.86	1.1	0.71	325	16
Beryllium (TR)	10 U	10 U	10 U	10 U	10 U	10 U		0.98	0.56 U	0.71	3.4	2.0
Cadmium (TR)	10 U	10 U	10 U	10 U	10 U	10 U		0.49	0.24 U	0.24 U	11 J	4.2
Chromium (TR	50 U	50 U	50 U	50 U	50 U	50 U		23	13	16	95	1.6 J
Copper (TR)	10	30	10 U	10 U	50 U	50 U		24	14	19	176	47
Lead (TR)	100 U	100 U	100 U	100	100	100		1.2	5.7	1.1	80 J	38
Mercury (TR)	0.2 U	0.7	0.6	0.9	0.2 U	0.4		0.031	0.011 U	0.012 U	1.8	0.67
Nickel (TR)	50 U	50 U	50 U	50 U	50 U	50 U		14	7.4	9.9	495	158
Selenium (TR)	100 U	100 U	100 U	100 U	100 U	100 U		0.61 U	0.59 U	0.59 U	36	9.8
Silver (TR)	100 U	100 U	100 U	100 U	100 U	100 U		2.5	2.4	2.4	0.3 U	0.09 U
Thallium (TR)	100 U	100 U	100 U	100 U	100 U	100 U		1.2	0.71	1.1	1.6 UN	0.45 UN
Zinc (TR)	50 U	50 U	50 U	50 U	50 U	50 U		57	28	39	553	15
Aluminum (T)	580	1530	690	400	240	230	441	5800	6500	6500	70000	15430
Antimony (T)						10 U	230					
Nickel (T)						50 U	417					

U indicates compound was analyzed for but not detected at the given detection limit
J estimated value less than the specified detection limit
N spiked sample recovery not within control limits
** total metal - dry weight basis
T total metal for liquid samples
TR total recoverable metal for liquid samples
++ station - sampler. Ecology sample when not specified.

Table 12 – Effluent Bioassay Results – Reynolds, February 1990.

NOTE: all tests were run on 002A effluent - lab log #098236

Daphnia magna - 7 day survival and reproduction test
(Daphnia magna)

Sample	# Tested	Percent Survival	Mean # Young per Original Female
Control	10	100	22.1
6.25 % Effluent	10	100	29.1
12.5 % Effluent	10	100	27.5
25 % Effluent	10	100	29.1
50 % Effluent	10	10	23.3
100 % Effluent	10	0	9.9

Acute
LC50 = 26 % effluent
NOEC = 25 % effluent
LOEC = 50 % effluent

Chronic
NOEC = 25 % effluent

Fathead Minnow - 7 day survival and growth test
(Pimephales promelas)

Sample	# Tested *	Percent Survival	Mean Weight per Fish (mg)
Control	60	95.0	0.475
6.25 % Effluent	60	91.7	0.471
12.5 % Effluent	60	86.7	0.428
25 % Effluent	60	85.0	0.304
50 % Effluent	60	61.7	--
100 % Effluent	60	21.7	--

Acute
NOEC = 25 % effluent
LOEC = 50 % effluent
LC50 = 58.8 % effluent

Chronic
NOEC = 12.5 % effluent
LOEC = 25 % effluent

* four replicates of 15 organisms

Rainbow Trout - 96 hour survival test
(Oncorhynchus mykiss)

Sample	# Tested	Percent Survival
Control	10	100
65% Effluent	30	100
100% Effluent	30	100

Microtox

	EC50 (% effluent)	Ranking *
15 minutes	38	moderate

* priority ranking for further toxicity evaluation based on the EC50 (EPA, 1980)

NOEC - no observable effects concentration
LOEC - lowest observable effects concentration
LC50 - lethal concentration for 50% of the organisms
EC50 - effect concentration for 50% of the organisms

Table 13 - Sediment Bioassay Results - Reynolds, February 1990.

		Hyalella azteca		Microtox
Sample	Lab Log #	# Tested	Percent Survival	EC50
Control		75	96	
Upstrm	088022	75	96	NSR
Diffuser	088020	75	100	NSR
Dwnstrm	088021	75	99	NSR

NSR data not suitable for reduction indicating low toxicity
EC50 effect concentration for 50% of the organisms

APPENDIX A

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS & LABORATORY SERVICES
Quality Assurance Section

April 3, 1990

TO: Marc Hefner

FROM: Stewart Lombard SML
Lee Fearon LEF

SUBJECT: Laboratory Evaluation, Reynolds Metals Co., 3/16/1990

Here are our comments and recommendations for the Reynolds lab:

The following Reynolds staff participated in the lab evaluation:

Hal Hayes	Lab Manager
Stan Caswell	Environmental Chemist
Mike Burnside	Chemist
Jack Malone	Chemist (Low Fluorine Lab)
Nick Peyton	Chemist (Cyanide Distillations)
Tom Dickey	Technical Supervisor

BOD

A grab sample for BOD from the sanitary STP (Outfall 01) is collected and analyzed weekly. Duplicate analyses are run at 3 dilutions (aliquots of 60 mL, 120 mL, and 180 mL are diluted to 300 mL in the BOD bottles) along with a blank. Results are in the 5-15 mg/L range. Seed is collected from the settling pond and allowed to age for 24 hours. Samples are incubated in an under-counter cabinet and no temperature check is made. The HVAC system maintains the lab temperature at 72 ± 2 ^{o}F (22.2 ± 1.1 ^{o}C). This deviation from the required 20 ± 1 ^{o}C would produce consistently high BOD results. Dissolved oxygen is determined using the membrane electrode technique. No standards are analyzed with the samples. Quality Control (QC) consists of running the weekly sample in duplicate. Each set consists of two sub sets of three sample aliquot dilutions plus the dilution water/seed blank (Mike Burnside)

<u>It is recommended</u> that the procedure in Standard Methods, 17th edition, Method 5210 B be followed by running a glucose/glutamic acid standard with each set of samples and incubating the samples at 20 ^{o}C. The standard sub-set should consist of three dilutions. It is also recommended that the phosphate buffer solution be stored under refrigeration.

TSS

A grab sample from the sanitary STP (Outfall 01) is collected and analyzed weekly. A 24-hour composite sample from Outfall 02A is collected and analyzed daily. QC consists of analyzing all samples in duplicate (Mike Burnside)

It is recommended that a standard control suspension, such as those available from EPA, ERA, or APG, be run on a weekly basis on the same day that both Outfall samples are run.

Total Chlorine Residual

A grab sample from the sanitary STP (Outfall 01) is collected and analyzed daily. QC consists of running this sample in duplicate on a daily basis (Mike Burnside). It is recommended that a freshly prepared chlorine check standard in the range of 1 to 3 mg/L be run along with the normal set in accordance with Method 4500-Cl(G) of Standard Methods, 17th edition.

Fecal Coliform

A grab sample from the sanitary STP (Outfall 01) is collected and analyzed monthly. The 100 mL sample is filtered and the filter is put into a plastic bag and incubated in a water bath inside an oven. A thermometer graduated in 0.1 ^{o}C increments is immersed in the water bath and checked each working day. Colonies are counted visually. Typical results are 0-12 $\pm$ 3 colonies per filter. No duplicate analyses are performed. (Mike Burnside)

The 0.45 μm membranes used for the fecal coliform test are currently acceptable. However, when new membranes are ordered, it is recommended that the laboratory obtain a type developed for testing chlorinated effluents. The Millipore Corporation type HC (or equivalent) helps prevent heat damage to chlorine-injured organisms during the critical first few hours of the fecal coliform test. Because these filters have a larger pore size, they are also less subject to clogging.

The large deviation in results at the low colony count level of the chlorinated effluent makes it impossible to implement any quality assurance measures.

pH

Grab samples from Outfalls 03, 04 and 05 are collected and analyzed monthly.

Cyanide

A 24-hour composite sample from the industrial WTP (Outfall 02B) is collected and analyzed for total cyanide daily. Grab samples from Outfalls 03, 04 and 05 are collected and analyzed monthly for "free cyanide". Distillation is performed under vacuum. The procedure for maintaining the flow rate of the cyanide is not very precise. (Nick Peyton)

Cyanide is determined by specific ion electrode. The meter is calibrated with two standards. Quantitation is based on the results of a check standard which is distilled along with the samples. Duplicate analyses are performed occasionally. The same material is used to prepare the calibration and check standards. (Mike Burnside)

<u>It is recommended</u> that the daily cyanide sample be run in duplicate along with a check standard (prepared from a source different from the calibration standards) or spiked sample. Both the check standard and the spike should be run together at least once a week.

<u>Fluoride</u>

A 24-hour composite sample from Outfall 02 is collected and analyzed daily. Grab samples from Outfalls 03, 04 and 05 are collected and analyzed monthly. Fluoride is determined by specific ion electrode directly on the sample (no distillation is used). (Jack Malone)

According to Method 4500-F^-(C), Standard Methods, 17th edition, the distillation step should be performed if there is a possibility of aluminum concentration levels greater than 3 mg/L. <u>It is recommended</u> that the distillation step be performed at the Reynolds lab.

<u>Oil and Grease</u>

A grab sample from Outfall 02 is collected and analyzed daily. The acidified contents (1 liter) of the sample bottle are extracted three times with 30 mL portions of freon in a 2-liter separatory funnel and extracted with freon. The first 30 mL freon portion is used to wash residual oil and grease from the sample bottle before extraction. The freon is passed through a filter paper into a tared beaker and evaporated with warm air. The beaker is weighed on a Mettler electronic balance with a sensitivity of 0.1 mg. No measures are taken to insure that no water is present in the freon.

According to Method 5520 B, Standard Methods, 17th edition, anhydrous sodium sulfate should be used if it is suspected that a stable emulsion may be formed, if there is not a clear separation of water and freon, or if there is an obvious presence of water bubbles in the freon layer. The anhydrous sodium sulfate is poured into the filter paper and the freon is slowly drained from the separatory funnel. <u>It is recommended</u> that anhydrous sodium sulfate be used at the Reynolds lab.

Metals and Benzo (a) pyrene

24-hour composite samples from Outfall 02A and from the industrial WTP (Outfall 02B) are collected and sent to Columbia Analytical Services, Longview, WA weekly for analysis for aluminum, antimony, nickel and benzo(a)pyrene.

We informed Hal and Stan that our proposed WAC 173-220, if adopted as planned later this year, would require the Reynolds laboratory to be accredited by July 1, 1992 but that they could request accreditation at any time. We referred Hal to Perry Brake of our office for further questions and assistance with accreditation.

We discussed the use of Method 4500-CN(I) from Standard Methods, 17th Edition, for the analysis of "weak and dissociable" cyanide in the effluent from the industrial WTP (Outfall 02B) with Hal and Stan. The treatment process includes the use of ferrous iron to complex the cyanide in the waste stream. The ferrocyanide complex would tie up most of the cyanide. However, the formation of the complex is an equilibrium process, so temperature, pH, concentrations of ferrous iron and cyanide, competing equilibria and retention time in the treatment plant will affect the final concentration of "weak and dissociable" cyanide.

Sample preservation with NaOH to pH 12 would not be suitable for samples of the WTP effluent if the goal of the test is to exclude cyanide complexed as ferrous-cyanide since the complex would be destroyed under these conditions. Unfortunately, Standard Methods, 17th Edition, does not address this situation. We recommend sample storage in a closed dark brown bottle away from sunlight and preservation with a sodium acetate pH 8.5 buffer solution

We have attached a copy of a generic QA Manual for a small WTP lab. We suggest that you forward a copy of the manual to Hal to help him understand the purpose and use of the additional QC data that we have recommended.

If you have any questions please call us.

Attachments

APPENDIX B

Appendix B - VOA, BNA, and Pest/PCB Scan Results - Reynolds, February 1990.

	Sample ++:	002A	002A	002B	002B	Trns Blk	Upstrm	Diffuser	Dwnstrm	Cent Cake	Sludge
	Date:	2/27	2/27	2/27	2/27	2/26	2/23	2/23	2/23	2/26-28	2/28
	Time:	0955	1755	1025	1810	1430	1515-1545	1245-1340	1355-1415		
	Type:	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Comp	Grab
	Lab Log #:	098234	098235	098239	098240	098251	088022	088020	088021	098280	098283
% Solids							78.2	76.4	76.6	16.1	55.2
% TOC (dry wt basis)							0.07	0.05	0.15	10.5	3.1
Grain size (%)	Gravel - +10 mesh						<2	<2	<2	<1	<1
	Sand - +230 mesh						96	96	98	5	<1
	Silt - 5 - 8 phi						4	3	1	44	69
	Clay - 9 - 12 phi						<1	1	1	51	31
VOA Compounds		(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)		
2-Chloroethylvinylether											
Chloromethane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Bromomethane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Vinyl Chloride		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Chloroethane		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
Methylene Chloride		1 U	1 U	2 U	5 U	1	12 B	14 B	12 B		
Acetone		2 J	5 U	100	17 J	5	31	24	27		
Carbon Disulfide		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
1,1-Dichloroethene		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
1,1-Dichloroethane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
1,2-Dichloroethene (total)		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Chloroform		1	2	2 U	5 U	1 U	2 U	2 U	2 U		
1,2-Dichloroethane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
2-Butanone		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
1,1,1-Trichloroethane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Carbon Tetrachloride		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Vinyl Acetate		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Bromodichloromethane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
1,2-Dichloropropane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
cis-1,3-Dichloropropene		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
Trichloroethene		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Dibromochloromethane		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
1,1,2-Trichloroethane		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Benzene		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
trans-1,3-Dichloropropene		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
Bromoform		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
4-Methyl-2-Pentanone		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
2-Hexanone		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
Tetrachloroethene		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
1,1,2,2-Tetrachloroethane		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
Toluene		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Chlorobenzene		3 U	3 U	6 U	15 U	3 U	6 U	6 U	5 U		
Ethylbenzene		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Styrene		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		
Total Xylenes		1 U	1 U	2 U	5 U	1 U	2 U	2 U	2 U		

U indicates a compound was analyzed for but not detected at the given detection limit
J estimated value less than the detection limit
B detected in the method blank also
X Benzo(b+k)Fluoranthene

D result from analysis of a diluted sample
UJ indicates a compound was analyzed for but not detected at the estimated detection limit
** dry-wt basis
++ station - sampler. Ecology sample when not specified.

Appendix B – Cont'd – Reynolds, February 1990.

Sample ++:	002A–E	002B–E	Trns Blk	Upstrm	Diffuser	Dwnstrm	Cent Cake	Sludge
Date:	2/27–28	2/27–28	2/26	2/23	2/23	2/23	2/26–28	2/28
Time:	0700–0700	0700–0700	1430	1515–1545	1245–1340	1355–1415		
Type:	Composite	Composite	Grab	Grab	Grab	Grab	Comp	Grab
Lab Log #:	098236	098241	098251	088022	088020	088021	098280	098283
BNA Compounds	(ug/L)	(ug/L)	(ug/L)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)
Aniline								
1,2–Diphenylhydrazine								
Phenol	2 U	4 U	2 U	43 U	46 U	43 U	13000	3700 U
Bis(2–Chloroethyl)Ether	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
2–Chlorophenol	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
1,3–Dichlorobenzene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
1,4–Dichlorobenzene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Benzyl Alcohol	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
1,2–Dichlorobenzene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
2–Methylphenol	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Bis(2–chloroisopropyl)ether	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
4–Methylphenol	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
N–Nitroso–Di–n–Propylamine	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Hexachloroethane	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
Nitrobenzene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Isophorone	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
2–Nitrophenol	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
2,4–Dimethylphenol	2 U	2 J	2 U	43 U	46 U	43 U	12000 U	3700 U
Benzoic Acid	50 U	100 U	50 U	1100 U	1200 U	1100 U	310000 U	93000 U
Bis(2–Chloroethoxy)Methane	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
2,4–Dichlorophenol	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
1,2,4–Trichlorobenzene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Naphthalene	4 U	3 J	4 U	86 U	92 U	85 U	25000 U	7400 U
4–Chloroaniline	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Hexachlorobutadiene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
4–Chloro–3–Methylphenol	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
2–Methylnaphthalene	2 U	2 J	2 U	43 U	46 U	43 U	12000 U	3700 U
Hexachlorocyclopentadiene	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
2,4,6–Trichlorophenol	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
2,4,5–Trichlorophenol	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
2–Chloronaphthalene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
2–Nitroaniline	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
Dimethyl Phthalate	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Acenaphthylene	2 U	4 J	2 U	43 U	46 U	43 U	12000 U	3700 U
2,6–Dinitrotoluene	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
3–Nitroaniline	10 U	20 U	10 U	210 U	230 U	210 U	61000 U	19000 U
Acenaphthene	2 U	20	2 U	43 U	46 U	43 U	6600 J	9300
2,4–Dinitrophenol	20 U	40 U	20 U	430 U	460 U	430 U	120000 U	37000 U
4–Nitrophenol	20 U	40 U	20 U	430 U	460 U	430 U	120000 U	37000 U
Dibenzofuran	2 U	1 J	2 U	43 U	46 U	43 U	12000 U	3700 U
2,4–Dinitrotoluene	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
Diethyl Phthalate	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
4–Chlorophenyl–Phenylether	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Fluorene	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
4–Nitroaniline	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
4,6–Dinitro–2–Methylphenol	20 U	40 U	20 U	430 U	460 U	430 U	120000 U	37000 U
N–Nitrosodiphenylamine	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
4–Bromophenyl–Phenylether	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U

Appendix B - Cont'd - Reynolds, February 1990.

Sample ++:	002A-E	002B-E	Trns Blk	Upstrm	Diffuser	Dwnstrm	Cent Cake	Sludge
Date:	2/27-28	2/27-28	2/26	2/23	2/23	2/23	2/26-28	2/28
Time:	0700-0700	0700-0700	1430	1515-1545	1245-1340	1355-1415		
Type:	Composite	Composite	Grab	Grab	Grab	Grab	Comp	Grab
Lab Log #:	098236	098241	098251	088022	088020	088021	098280	098283
BNA Compounds	(ug/L)	(ug/L)	(ug/L)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)	(ug/Kg **)
Benzidine								
Hexachlorobenzene	4 U	8 U	4 U	86 U	92 U	85 U	25000 U	7400 U
Pentachlorophenol	20 U	40 U	20 U	430 U	460 U	430 U	120000 UJ	37000 U
Phenanthrene	1 J	16	2 U	43 U	46 U	43 U	130000	17000
Anthracene	2 U	6	2 U	43 U	46 U	43 U	47000	8500
Di-n-Butyl Phthalate	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Fluoranthene	22	320	2 U	43 U	46 U	39 J	1900000	520000
Pyrene	21	380	2 U	43 U	46 U	37 J	2300000 D	570000
Butylbenxylphthalate	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
3,3'-Dichlorobenzidine	20 U	40 U	20 U	430 U	460 U	430 U	120000 U	37000 U
Benzo(a)Anthracene	6	75	2 U	43 U	46 U	43 U	1100000	240000
Chrysene	10	61	2 U	43 U	46 U	43 U	1700000	390000
Bis(2-Ethylhexyl)phthalate	53	55	33	520	210 B	750	12000 U	3700 U
Di-n-Octyl Phthalate	2 U	4 U	2 U	43 U	46 U	43 U	12000 U	3700 U
Benzo(b)Fluoranthene	11 X	150 X	4 U	86 U	92 U	76 JX	1800000 DX	510000 X
Benzo(k)Fluoranthene	11 X	150 X	4 U	86 U	92 U	76 JX	1800000 DX	510000 X
Benzo(a)Pyrene	3 J	36	4 U	86 U	92 U	42 J	620000	130000
Indeno(1,2,3-cd)Pyrene	1 J	12	4 U	86 U	92 U	85 U	210000	40000
Dibenzo(a,h)Anthracene	4 U	4 J	4 U	86 U	92 U	85 U	88000	17000
Benzo(g,h,i)Perylene	2 J	13	4 U	86 U	92 U	85 U	230000	44000
Pest/PCB Compounds								
alpha-BHC	0.050 U	0.050 U	0.050 U	10 U	11 U	10 U	49 U	15 U
beta-BHC	0.050 U	0.050 U	0.050 U	10 U	11 U	10 U	49 U	15 U
delta-BHC	0.050 U	0.050 U	0.050 U	10 U	11 U	10 U	49 U	15 U
gamma-BHC (Lindane)	0.050 U	0.050 U	0.050 U	10 U	11 U	10 U	49 U	15 U
Heptachlor	0.050 U	0.050 U	0.050 U	10 U	11 U	10 U	490 UD	15 U
Aldrin	0.050 U	0.42	0.050 U	10 U	11 U	10 U	49 U	15 U
Heptachlor Epoxide	0.050 U	0.050 U	0.050 U	10 U	11 U	10 U	49 U	15 U
Endosulfan I	0.050 U	0.050 U	0.050 U	10 U	11 U	10 U	49 U	15 U
Dieldrin	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
4,4'-DDE	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
Endrin	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
Endosulfan II	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
4,4'-DDD	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
Endosulfan Sulfate	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
4,4'-DDT	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
Methoxychlor	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
Endrin Ketone	0.10 U	0.10 U	0.10 U	21 U	22 U	20 U	98 U	30 U
alpha-Chlordane	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
gamma-Chlordane	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
Toxaphene	1.0 U	1.0 U	1.0 U	210 U	220 U	200 U	980 U	300 U
Aroclor-1016	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
Aroclor-1221	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
Aroclor-1232	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
Aroclor-1242	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
Aroclor-1248	0.50 U	0.50 U	0.50 U	100 U	110 U	100 U	490 U	150 U
Aroclor-1254	1.0 U	1.0 U	1.0 U	210 U	220 U	200 U	980 U	300 U
Aroclor-1260	1.0 U	1.0 U	1.0 U	210 U	220 U	200 U	980 U	300 U
Endrin Aldehyde								

APPENDIX C

1F Sample - 002A-E

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

Lab Log #: 098236

Lab Name: Laucks Testing Labs Contract: __________

Lab Code: LAUCKS Case No.:03051 SAS No.: ______ SDG No.:_____

Matrix: (soil/water) WATER Lab Sample ID: 03051-6

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >LC143::D1

Level: (low/med) LOW Date Received: 03/02/90

% Moisture: not dec.__ dec.__ Date Extracted:03/05/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/13/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

Number TICs found: 2

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	15.74	9	JN
2.56803373	PHOSPHORIC ACID, (1,1-DIMETH	36.64	13	JN
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

N - good indication identification is correct

FORM I SV-TIC 1/87 Rev.

131

1F Sample - 002 B-E

SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Log #: 098241

Lab Name: Laucks Testing Labs Contract: ___________

Lab Code: LAUCKS Case No.: 03051 SAS No.: ______ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 03051-7

Sample wt/vol: 1000. (g/ml) ML Lab File ID: >LC148::S3

Level: (low/med) LOW Date Received: 03/02/90

% Moisture: not dec. __ dec. __ Date Extracted: 03/05/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 03/14/90

GPC Cleanup: (Y/N) N pH: 0.0 Dilution Factor: 2.0

CONCENTRATION UNITS:
Number TICs found: 20 (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 112403	DODECANE	15.92	150	J N
2. 629505	TRIDECANE	17.84	280	J
3. 74645980	DODECANE, 2,7,10-TRIMETHYL-	19.21	160	J
4. 629594	TETRADECANE	19.62	490	J
5. 13151741	DECANE 3-CYCLOHEXYL-, 3-CYCL	20.44	140	J
6. 629925	NONADECANE	20.69	230	J
7. 629505	TRIDECANE	21.32	600	J
8. 629969	1-EICOSANOL	22.14	180	J
9. ____________	UNKNOWN	22.35	130	J
10. 629970	DOCOSANE	22.90	640	J
11. 75163972	OCTADECANE, 2,6-DIMETHYL-	23.62	330	J
12. 4443601	CYCLOHEXANE, (1-HEXYLTETRADE	23.74	200	J
13. 629787	HEPTADECANE	24.40	910	J
14. 61141728	DODECANE, 4,6-DIEMTHYL-	24.48	440	J
15. 630079	PENTATRIACONTANE	25.94	210	J
16. 74685306	5-EICOSANE, (E)-	26.90	270	J
17. 629925	NONADECANE	27.15	500	J
18. 630024	OCTACOSANE	28.44	250	J
19. 74685339	3-EICOSENE, (E)-	29.51	540	J
20. ____________	UNKNOWN	35.92	190	J
21.				
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N - good indication identification is correct

FORM I SV-TIC 1/87 Rev.

162

1F Sample - Solids Method Blank SAMPLE NO.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SBLKL1

Lab Name: Laucks Testing Labs Contract: ________

Lab Code: LAUCKS Case No.: 02340 SAS No.: ______ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: B0302MSVSLO

Sample wt/vol: 30.0 (g/ml) G Lab File ID: >LC136::D1

Level: (low/med) LOW Date Received: 02/26/90

% Moisture: not dec. 0 dec. __ Date Extracted: 03/02/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/13/90

GPC Cleanup: (Y/N) N pH: 7.0 Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 4

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN ALDOL CONDENSATION	7.42	580	JA N
2.	UNKNOWN ALDOL CONDENSATION	8.15	5400	JA
3.	UNKNOWN ALDOL CONDENSATION	9.62	550	JA
4. 646139	OCTADECANOIC ACID, 2-METHYLP	33.01	380	J
5.				
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N - good indication identification is correct

1F Sample - Upstrm

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

~~EPA~~ DOE SAMPLE NO.

Lab Log # ; 088022

Lab Name: Laucks Testing Labs Contract: ______

Lab Code: LAUCKS Case No.: 02340 SAS No.: ______ SDG No.: ______

Matrix: (soil/water) SOIL Lab Sample ID: 02340-36

Sample wt/vol: 30.0 (g/ml) G Lab File ID: >LC139::D1

Level: (low/med) LOW Date Received: 02/26/90

% Moisture: not dec. 22 dec. __ Date Extracted: 03/02/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/13/90

GPC Cleanup: (Y/N) N pH: 6.9 Dilution Factor: 1.0

Number TICs found: 9

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. ______	~~UNKNOWN ALDOL CONDENSATION~~	~~7.42~~	~~560~~	~~JA~~ N
2. ______	~~UNKNOWN ALDOL CONDENSATION~~	~~8.13~~	~~6100~~	~~JA~~
3. ______	~~UNKNOWN ALDOL CONDENSATION~~	~~9.65~~	~~680~~	~~JA~~
4. ______	UNKNOWN ALDOL CONDENSATION	10.04	400	JA
5. 4436753	3-HEXENE-2,5-DIONE	10.49	610	JA
6. ______	UNKNOWN ALDOL CONDENSATION	11.58	330	JA
7. ______	UNKNOWN ALDOL CONDENSATION	12.87	330	JA
8. ______	UNKNOWN	30.00	890	J
9. 646139	~~OCTADECANOIC ACID, 2-METHYLP~~	~~33.05~~	~~810~~	~~J~~
10. ______				
11. ______				
12. ______				
13. ______				
14. ______				
15. ______				
16. ______				
17. ______				
18. ______				
19. ______				
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N - Good indication identification is correct

FORM I SV-TIC 1/87 Rev.

Pa
~~EPA~~ SAMPLE NO.

1F Sample - Diffusen

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Log #: 088020

Lab Name: Laucks Testing Labs Contract: __________

Lab Code: LAUCKS Case No.: 02340 SAS No.: ______ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 02340-1B

Sample wt/vol: 30.0 (g/ml) G Lab File ID: >LC137::D1

Level: (low/med) LOW Date Received: 02/26/90

% Moisture: not dec. 28 dec. __ Date Extracted: 03/02/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/13/90

GPC Cleanup: (Y/N) N pH: 6.9 Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 9

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	~~UNKNOWN ALDOL CONDENSATION~~	~~7.39~~	~~710~~	~~JA~~ N
2.	~~UNKNOWN ALDOL CONDENSATION~~	~~8.14~~	~~7300~~	~~JA~~
3.	~~UNKNOWN ALDOL CONDENSATION~~	~~9.63~~	~~980~~	~~JA~~
4.	UNKNOWN ALDOL CONDENSATION	9.99	230	JA
5. 4436753	3-HEXENE-2,5-DIONE	10.44	520	JA
6.	UNKNOWN ALDOL CONDENSATION	11.56	400	JA
7. 116096	2-PROPANONE, 1-HYDROXY-	12.82	310	JA
8.	UNKNOWN	29.95	850	J
9. 646139	~~OCTADECANOIC ACID, 2-METHYLP~~	~~33.00~~	~~540~~	~~J~~
10.				
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N - good indication identification is correct

FORM I SV-TIC 1/87 97

1F Sample - Dwnstrm

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

~~EPA~~ SAMPLE NO.

Lab Log #: 088021

Lab Name: Laucks Testing Labs Contract: __________

Lab Code: LAUCKS Case No.: 02340 SAS No.: ______ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 02340-2B

Sample wt/vol: 30.0 (g/ml) G Lab File ID: >LC138::D1

Level: (low/med) LOW Date Received: 02/26/90

% Moisture: not dec. 22 dec. __ Date Extracted: 03/02/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/13/90

GPC Cleanup: (Y/N) N pH: 6.9 Dilution Factor: 1.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 9

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	~~UNKNOWN ALDOL CONDENSATION~~	~~7.39~~	~~570~~	~~JA~~ N
2.	~~UNKNOWN ALDOL CONDENSATION~~	~~8.12~~	~~6200~~	~~JA~~
3.	~~UNKNOWN ALDOL CONDENSATION~~	~~9.63~~	~~760~~	~~JA~~
4.	UNKNOWN ALDOL CONDENSATION	9.99	420	JA
5. 4436753	3-HEXENE-2,5-DIONE	10.44	440	JA
6. 108225	1-PROPEN-2-OL, ACETATE	11.54	310	JA
7.	UNKNOWN ALDOL CONDENSATION	12.82	270	JA
8.	UNKNOWN	29.96	800	J
9. 646139	~~OCTADECANOIC ACID, 2-METHYLP~~	~~33.01~~	~~580~~	~~J~~
10.				
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N - good indication identification is correct

<u>N O T I C E</u>

The property that is the subject of this notice has been the subject of an independent cleanup by Reynolds Metals Company to comply with WAC 173-340, the Model Toxics Control Act ("MTCA") cleanup regulation. Diesel contaminated soils exceeding the 200 ppm cleanup standard were removed from the plant's on-site Above Ground 200,000 Gallon Fuel Oil Storage Tank. Notice is made to inform interested parties that some of the contamination greater than 200 ppm extends under the fuel oil storage tank and cannot be removed without removing the tank.

The undersigned, Reynolds Metals Company, is the fee owner of real property in the County of Cowlitz, State of Washington, hereafter referred to as the "Above Ground 200,000 Gallon Fuel Oil Storage Tank Property", being a portion of the property described in Deed Volume 264, page 539 (Fee No. 209738), which portion is described as follows:

> Beginning at the intersection of the North line of the Weyerhaeuser Timber Company property, as described in Volume 122, Page 358, Cowlitz County Deed Records, with the Southwesterly right-of-way line of the Northern Pacific Railway Company*, et al, as described in Volume 167, Page 426, said point of beginning being marked by a concrete monument inscribed "W. T. 4" and is located 1883.45 feet South and 1242.18 feet East of a concrete monument inscribed "LB 395", set to mark the Northwest corner of Section 31, Township 8 North, Range 2 West, W. M., Cowlitz County, Washington; thence along the North line of said Weyerhaeuser Timber Company property West 926.34 feet to a Northwesterly corner of said property marked by a concrete monument inscribed "W. T. 3"; thence along the Westerly property line of said Weyerhaeuser Timber Company property South 40 degrees 55 minutes West 1324 feet; thence North 49 degrees 5 minutes West 2607 feet to the center of the Above Ground 200,000 Gallon Fuel Oil Storage Tank with said tank being circular with a diameter of 36 feet.

04-12-93 RC 0886 REC 02 9.00

* now owned by Burlington Northern Railway Company

9

Reynolds Metals Company will comply with the following limitations, restrictions, and uses listed in Sections 1-4 below:

Section 1: Diesel contaminated soil exceeding the 200 ppm cleanup standard that is present under the Above Ground 200,000 Gallon Fuel Oil Storage Tank Property will be remediated consistent with WAC 173-340 if the tank is removed.

Section 2: Any activity of the Above Ground 200,000 Gallon Fuel Oil Storage Tank Property that may interfere with future remediation is prohibited. The entire area around the Above Ground 200,000 Gallon Fuel Oil Storage Tank Property has been covered with concrete and surrounded by concrete containment walls to contain any future diesel spill.

Section 3: The owner of the Above Ground 200,000 Gallon Fuel Oil Storage Tank Property must give written notice to the Dept. of Ecology, or to a successor agency, of the owner's intent to convey any interest in the Above Ground 200,000 Gallon Fuel Oil Storage Tank Property. No conveyance of title, easement, lease, or other interest in the Above Ground 200,000 Gallon Fuel Oil Storage Tank Property shall be consummated by the owner without adequate and complete provision for future cleanup action.

Section 4: The owner must notify and obtain approval from the Dept. of Ecology, or from a successor agency, prior to any use of the Above Ground 200,000 Gallon Fuel Oil Storage Tank Property that is inconsistent with the terms of this Notice

REYNOLDS METALS COMPANY

By: [signature]

Title: VICE PRESIDENT, TREASURER

Date: MARCH 31, 1993

F:\JLD\LONGVIEW.RED\NOTICE

COMMONWEALTH OF VIRGINIA)
) ss
COUNTY OF HENRICO)

On this 31ST day of MARCH, 1993, before me personally appeared JULIAN H. TAYLOR, to me known to be the VICE PRESIDENT, TREASURER of the corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

In witness whereof, I have hereunto set my hand and affixed my official seal the day and year first above written.

Bonnie E. Wood
Notary Public in and for the
Commonwealth of Virginia,
residing at RICHMOND, VA

My Commission expires: April 23, 1993

DARLENE F. DEROSIER
COWLITZ CO. AUDITOR

APR 12 2 56 PM '93

FILED
REQUEST OF Reynolds Metal

F:\JLD\NOTARY.ACK

REYNOLDS ALUMINUM

Reynolds Metals Company • P.O. Box 999 • Longview, Washington 98632 • (206)425-2800

February 22, 1993

RECEIVED
FEB 24 1993
Department of Ecology
Industrial Section

Mr. Paul Skyllingstad
Department of Ecology
Industrial Section
P.O. Box 47706
Olympia, Wa. 98504-7706

Dear Mr. Skyllingstad:

Attached is a draft of the notice which Reynolds plans to record with our property deed related to the above ground diesel tank. This draft is also being submitted to our corporate staff for review and comment.

Should you have any questions or comments regarding this draft notice prior to its being recorded, please contact me at (206) 636-8203.

Sincerely,

REYNOLDS METALS COMPANY
LONGVIEW REDUCTION

Tom Dickey

Tom Dickey
Technical Superintendent

TD:tc
Enc.
cc: Kent Moore
Hal Hays
Ray Walker
Doug Macauley - Richmond E-L-3

FILE COPY

AIR ☐
WATER/SOLID ☐
HAZ WASTE ☐
HWCU ☒
ENFORCEMENT ☐

Independent Cl1 Oil Tank

OCT 01 1992

REYNOLDS ALUMINUM FILE COPY

Reynolds Metals Company • P.O. Box 999 • Longview, Washington 98632 • (206)425-2800

September 28, 1992

AIR
WATER/SOLID
HAZ. WASTE
HWCU

Mr. Paul Skyllingstad
Dept. of Ecology Industrial Sec.
P.O. Box 47706
Olympia, WA 98504-7706

Dear Mr. Skyllingstad:

Attached are the results of testing the diesel contaminated soil which was excavated from the site of Reynolds' aboveground diesel storage tank. (See Reynolds' report dated October 2, 1991.) The soil was divided into eight rectangular areas for testing purposes. As can be seen in the attached data, six of the areas are <200 ppm diesel.

The soil which is below 200 ppm and therefore no longer considered a hazard per MTCA will be moved to a location behind Reynolds' potliner digging area. Stormwater runoff from this location is contained and returned to the plant's fume control system. Bioremediation will continue for the soil in the two areas which contain diesel at levels greater than 200 ppm.

Should you have any questions or comments, please contact me at (206) 636-8203.

Sincerely,

REYNOLDS METALS COMPANY
LONGVIEW REDUCTION PLANT

Tom Dick

Thomas D. Dickey
Technical Supt.

mb

attachment

c: Kent Moore
John Amos (G-4-9)
Doug Macauley (E-L-3)

See Independent Oil tank
see engineering files PG

INTRACOMPANY CORRESPONDENCE
R-98 (Rev. 1-68)

FROM: Harold Hays

TO: Tom Dickey

COPY: Frank Eisle

DATE & SUBJECT: 9/17/92 **Soil Bioremediation of Diesel Contaminated Soil**

Attached are the analytical results obtained on samples collected from the bioremediation area for the soils excavated from the vicinity of the plant diesel storage tank.

The area was divided into a grid of eight sub-areas, labeled A through H. Each grid area was sampled at 4 locations within the grid. The samples from each grid area were composited to form a sample representative of that area. Each sample consisted of a core of soil extending from the upper surface to the bottom. A sketch depicting the sampling grid, sample designation, and analytical results is attached.

The eight composite samples were collected at approximately 9:00 a.m. on 8/21/92. The samples were kept under refrigeration and submitted to Columbia Analytical Services on 8/24/92 to be analyzed for residual diesel concentration using Washington Department of Ecology Method WTPH-D.

Of the eight grid areas sampled, only two areas, A and G, remain above the 200 mg/kg concentration specified as the clean-up level for diesel under WAC 173-340-740 (2), (Model Toxics Control Act, soil clean-up levels, Method A.)

Harold D Hays

Harold Hays

DIESEL STORAGE TANK SOIL REMEDIATION AREA
SAMPLING GRID

PLANT NORTH

E GRID (170 PPM)	D GRID (57 PPM)
F GRID (116 PPM)	C GRID (100 PPM)
G GRID (459 PPM)	B GRID (138 PPM)
H GRID (54 PPM)	A * GRID * (679 PPM) * *

FAC 71
(WWTP)

* SAMPLE LOCATIONS PER GRID AREA, TYPICAL
( ) TPH–DIESEL CONCENTRATION, MG/KG DRY WT. BASIS
SOIL SAMPLES COLLECTED 8/21/92, 9:00 A.M., BY R. G. WILSON

SKETCH NOT TO SCALE

Columbia Analytical Services inc.

September 11, 1992

Harold Hays
Reynolds Metals Company
Reduction Plant
P.O. Box 999
Longview, WA 98632

Dear Harold:

Enclosed are the results of the samples submitted to our lab on August 24, 1992. For your reference, these analyses have been assigned our work order number K925242.

All analyses were performed in accordance with our laboratory's quality assurance program. Reproduction of reports is allowed only in whole, not in part. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Kevin DeWhitt

Kevin DeWhitt
Project Chemist

KD/eaw

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Date Received:**	08/24/92
Sample Matrix:	Soil	**Date Extracted:**	08/26/92
		Date Analyzed:	08/27,28/92
		Work Order No.:	K925242

Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

		Diesel		Oil♦	
Sample Name	**Lab Code**	**MRL**	**Result**	**MRL**	**Result**
A Grid	K5242-1	25	679	100	ND
B Grid	K5242-2	25	138	100	ND
C Grid	K5242-3	25	100	100	ND
D Grid	K5242-4	25	57	100	ND
E Grid	K5242-5	25	170	100	ND
F Grid	K5242-6	25	116	100	ND
G Grid	K5242-7	25	459	100	ND
H Grid	K5242-8	25	54	100	ND
Method Blank	K5242-MB	25	ND	100	ND

♦ Quantified using 30-weight motor oil as a standard.
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Kevin Dennett Date 9-16

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

APPENDIX A

LABORATORY QC RESULTS

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Reynolds Metals Company	**Date Received:**	08/24/92
Sample Matrix:	Soil	**Date Analyzed:**	08/26/92
		Work Order No.:	K925242

Solids, Total
EPA Method Modified 160.3
Percent (%)

Sample Name	**Lab Code**	**Result**
A Grid	K5242-1	94.7
B Grid	K5242-2	93.8
C Grid	K5242-3	92.4
D Grid	K5242-4	93.0
E Grid	K5242-5	92.8
F Grid	K5242-6	93.2
G Grid	K5242-7	95.2
H Grid	K5242-8	93.4

Approved by Kevin Dewhitt Date 9-16

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Reynolds Metals Company
Sample Matrix: Soil

Date Received: 08/24/92
Date Extracted: 08/26/92
Date Analyzed: 08/27,28/92
Work Order No.: K925242

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D

Sample Name	**Lab Code**	**Percent Recovery** *p*-Terphenyl
A Grid	K5242-1	85
B Grid	K5242-2	86
C Grid	K5242-3	82
D Grid	K5242-4	86
E Grid	K5242-5	86
F Grid	K5242-6	86
G Grid	K5242-7	88
H Grid	K5242-8	86
Method Blank	K5242-MB	89
	CAS Acceptance Criteria	50-114

Approved by Kevin DeWhitt Date 9-16

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

Memorandum: Determination Regarding the Suitability of Proposed Dredged Material from the Weyerhaeuser Property, Longview, Washington, for Flow-Lane Disposal in the Columbia River, or for Beneficial Use

Dredged Material Management Program.
January 2, 2009.

CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD January 2, 2009

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE WEYERHAEUSER PROPERTY, LONGVIEW, WASHINGTON, FOR FLOW-LANE DISPOSAL IN THE COLUMBIA RIVER, OR FOR BENEFICIAL USE.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, and Washington Departments of Ecology and Natural Resources) regarding the suitability of up to 110,000 cubic yards (cy) of dredged material from the Weyerhaeuser property in Longview for beneficial use or for flow-lane disposal in the Columbia River.

2. Background. The Mount Coffin Ship Access Channel in the Columbia River and areas adjacent to the Weyerhaeuser property require routine maintenance dredging to ensure navigation depths for ocean-going vessels and river barges that are shipping mill products and raw materials to existing Weyerhaeuser facilities. The Mount Coffin Ship Channel provides ship access from the federal navigation channel to the docks and turning basin. The areas originally proposed for maintenance dredging, shown in Figure 1, are as follows (Integral, 2008a):

   - Salt Dock – at river mile (RM) 64.0. Maintain to 38 ft Columbia River Datum (CRD) for deep-draft shipping.
   - Cargo Dock and Turning Basin – at RM 64.5. Maintain to 38 ft CRD for deep-draft shipping.
   - Export Dock – at RM 65.5. Maintain to 38 ft CRD for deep-draft shipping.
   - Chip Barge Slip – at RM 65.0. Maintain to 14 ft CRD for chip barge handling.
   - Mount Coffin Ship Access Channel – at RM 63.4. Maintain to 42 ft CRD.

   The sampling and analysis plan (SAP) allocated dredged material management units (DMMUs) and field samples to each of these proposed dredging areas. However, during field sampling it was determined that little or no sediment accumulation had occurred above the maintenance depth for the Salt Dock, Cargo Dock, Turning Basin or Export Dock. Only the Chip Barge Slip and Mount Coffin Access Channel required dredging. The remainder of this suitability determination addresses these two portions of the project only.

3. Project Summary. Table 1 includes project summary and tracking information.

Table 1. Project Summary

Project ranking	Low-moderate
Characterized volume	Total: 110,000 cy Chip Barge Slip: 10,000 cy Access Channel: 100,000 cy
Maintenance depth	Chip Barge Slip: 14 ft. CRD Access Channel: 42 ft. CRD
Draft SAP received	August 18, 2008

Draft SAP returned for revisions	August 28, 2008
SAP revisions completed	August 29, 2008
SAP revisions approved	September 1, 2008
Sampling date	September 2, 2008
Final data report received	December 14, 2008
DAIS Tracking number	WEYLO-1-A-F-265
USACE Permit Application Number	Chip Barge Slip: 1999-2-00191 Access Channel: 200200105
Recency Determination (low-moderate rank = 6 years)	September 2014*

*Chip Barge Slip and Access Channel only; the Salt Dock, Cargo Dock/Turning Basin and Export Dock will require sediment characterization prior to the next dredging cycle.

4. Project Ranking and Sampling Requirements. The Weyerhaeuser property in Longview is ranked "low-moderate" (Integral, 2008a). In low-moderate-ranked areas with homogeneous sediment, the minimum numbers of field samples and dredged material management units (DMMUs) are calculated using the following guidelines (DMMP, 2008b):
   - Maximum volume of sediment represented by each field sample = 8,000 cubic yards
   - Maximum volume of sediment represented by each DMMU = 40,000 cubic yards.

   Based on these guidelines, the following numbers of field samples and DMMUs were required:

Dredging Area	Volume (cy)	field samples	DMMUs
Chip Barge Slip	10,000	2	1
Access Channel	100,000	13	3

5. Sampling. Sampling took place September 2-4, 2008 using a van Veen sampler (in areas with homogeneous sediment, surface grab samples are deemed adequate to represent the sediment – DMMP, 2008b). Only minor problems were encountered during sampling for the Access Channel and Chip Barge Slip. The target locations for G8-4 and G10-4 in the Access Channel and G6-2 in the Chip Barge Slip did not have sediment accumulated above the maintenance dredging depth. Therefore, the actual sampling stations were moved to locations with adequate sediment depth.

   In addition to grab samples, core samples were required for collection of z-samples to represent the sediment surface to be exposed by dredging. Weyerhaeuser agreed to collect z-samples in two layers: 0-1' and 1-2' below the proposed dredging depth. A vibracore was used to collect these samples.

   See Figure 2 (Access Channel) and Figure 3 (Chip Barge Slip) for target and actual grab and core sampling locations. Table 2 presents this information in tabular form.

6. Chemical Analysis. The approved sampling and analysis plan was followed and quality control guidelines specified by the PSEP and DMMP programs were met, with only minor quality control deviations (Integral, 2008b). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

   Sediment conventional results (Table 3) show that the proposed dredged material in the Access

Channel is predominantly sand, while that in Chip Barge Slip is sandy silt. The total organic carbon content is less than 0.1 percent in the Access Channel and 0.52 percent in the Chip Barge Slip.

For this project, the DMMP agencies agreed to use the SEF freshwater guidelines (RSET, 2006), supplemented by the DMMP marine guidelines (DMMP, 2008b) for those chemicals of concern for which freshwater guidelines do not exist. The chemical results indicated that there were no exceedances of SEF freshwater or DMMP marine screening levels (Table 4).

In addition to routine DMMP chemicals of concern, analysis of resin acids and guaiacols was required at the Chip Barge Slip due to the probable presence of woody debris associated with unloading operations at that facility. Table 5 includes data for the resin acids and guaiacols, all of which were either undetected or detected at very low concentrations. The detected concentrations were compared to those found in projects in Grays Harbor for which bioassays were conducted. The Weyerhaeuser concentrations were far below concentrations associated with bioassays that passed open-water dispersive suitability guidelines in Grays Harbor.

The analysis of dioxins/furans was required for DMMU 8 and its corresponding z-samples, due to its proximity to potential upland sources of dioxin, including a Kraft batch digestor and a Kaymr continuous Kraft digestor (see Figure 4). The dioxin/furan toxic equivalence (TEQ) concentrations (Table 6) were very low for the three samples tested and are well below the range of concentrations (0.65 to 2.387 pptr) compiled by the Department of Ecology for freshwater samples taken downstream of Puget Island (see Table 7). This range of values can be considered background for the lower Columbia River, therefore the Weyerhaeuser dioxin/furan concentrations are below background.

Based on the overall evaluation of the chemical data, bioassay testing was not required for the dredged material. All four DMMUs met suitability guidelines, based on chemistry alone, for flow-lane disposal in the Columbia River.

7. Sediment Exposed by Dredging. Sediment to be exposed by dredging must be evaluated in accordance with the DMMP antidegradation guidelines (DMMP 2008a). Vibracore samples were taken from 0-1 feet and 1-2 feet below project overdepth for DMMUs 6, 8, 9 and 10. Other than the requirement to test the z-samples from DMMU 8 for dioxins/furans, there were no requirements for immediate testing of the sediment to be exposed by dredging. However, the analytical lab inadvertently tested all z-samples for routine chemicals of concern.

   None of the z-samples exceeded SEF freshwater or DMMP marine guidelines except for the 1-2 foot z-sample associated with DMMU 10. Dimethyl phthalate was detected at 350 ug/kg, exceeding the SEF freshwater guideline of 46 ug/kg. However, as phthalates are common laboratory contaminants and the detected concentration was an order of magnitude higher than the concentration detected in any other project sample, archived sediment for this z-sample was sent to another laboratory for verification. Two subsamples of the archived sediment were extracted and analyzed. Dimethyl phthalate was undetected in both samples. Based on the retest data, the DMMP agencies agreed to set aside the original results. The sediment to be exposed by dredging is deemed to have met the DMMP antidegradation guidelines.

8. Beneficial-Use Analysis. The proposed dredged material had no exceedances of the State of Washington numerical Sediment Quality Standards (see Table 8). (It should be noted that the organic carbon content for DMMUs 8, 9 and 10 was too low to permit carbon normalization. However, the dry-weight concentrations for those chemicals for which the SQS is carbon-normalized were well below the SEF freshwater or DMMP marine guidelines.) Based on the comparison to SQS and agency best professional judgment regarding acceptable dioxin/furan and resin acid/guaiacol concentrations in beneficial use material, sediment from this project may be used for beneficial use in a freshwater or marine environment.

   To assess the suitability for upland beneficial use, the chemical results were compared to the Model Toxics Control Act (MTCA) guidelines (Ecology, 2005). Table 9 indicates that the reported concentration of 1.0 mg/kg for arsenic in DMMU 6 exceeds the Method B guideline for carcinogens for unrestricted use. Therefore, it is possible that DMMU 6 may be unsuitable for some types of upland use. Ecology, DNR and the local health department should be consulted if upland beneficial use is contemplated for this management unit. The other three DMMUs are all suitable for upland beneficial use.

9. Suitability Determination. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Weyerhaeuser property in Longview for flow-lane disposal or beneficial use. The approved sampling and analysis plan was followed (with the exceptions noted previously) and the data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program.

   Based on the results of the previously described testing, the DMMP agencies conclude that **all 110,000 cubic yards are suitable** for flow-lane disposal in the Columbia River or in-water beneficial use. DMMUs 8, 9 and 10 are also suitable for upland beneficial use. However, upland beneficial use of DMMU 6 would require further consultation with Ecology, DNR and the local health department.

   This suitability determination applies only to the Access Channel and Chip Barge Slip. Sediment from the Salt Dock, Cargo Dock, Turning Basin and Export Dock must be characterized prior to any dredging from those areas.

   A pre-dredge conference call with DNR, Ecology and the Corps of Engineers will be required. A dredging quality control plan must be developed and submitted to the Corps of Engineers Regulatory Branch Project Manager for this project at least 7 days prior to the pre-dredge conference call. A DNR site use authorization must also be acquired.

10. References.

DMMP, 2008a. Quality of Post-Dredge Sediment Surfaces (Updated). A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

DMMP, 2008b. *Dredged Material Evaluation and Disposal Procedures (Users Manual)*. Dredged Material Management Program, July 2008.

Ecology, 1995. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, December 1995.

Ecology, 2005. *Model Toxics Control Act – Chapter 70.105D RCW and Cleanup Regulation - Chapter 173-340 WAC*. Washington State Department of Ecology, October 2005.

Integral, 2008a. *Sampling and Analysis Plan, Sediment Characterization, Weyerhaeuser Property, Longview, Washington.* Prepared by Integral Consulting Inc. for Weyerhaeuser Company. September 2008.

Integral, 2008b. *Sediment Characterization Report, Weyerhaeuser Property, Longview, Washington.* Prepared by Integral Consulting Inc. for Weyerhaeuser Company. December 2008.

RSET, 2006. *Northwest Regional Sediment Evaluation Framework, Interim Final.* Northwest Regional Sediment Evaluation Team, September 2006.

11. Agency Signatures.

Concur:

1/2/09 David F. Fox
Date — David Fox, P.E. - Seattle District Corps of Engineers

1/8/09
Date — Erika Hoffman - Environmental Protection Agency

01/08/09 Laura Inouye
Date — Laura Inouye, Ph.D. - Washington Department of Ecology

9-Jan-09 Courtney Wasson
Date — Courtney Wasson - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Seattle District Regulatory PM
Sandy Browning, Integral Consulting
Brian Wood, Weyerhaeuser

Map Document: (O:\Projects\C457_Weyerhaeuser_2008_SP\Working_MXDs\Site_Vicinity_Map.mxd) TWC -- 7/23/2008 -- 1:55:01 PM

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Figure 1.
Weyerhaeuser, Longview, WA
Site Vicinity

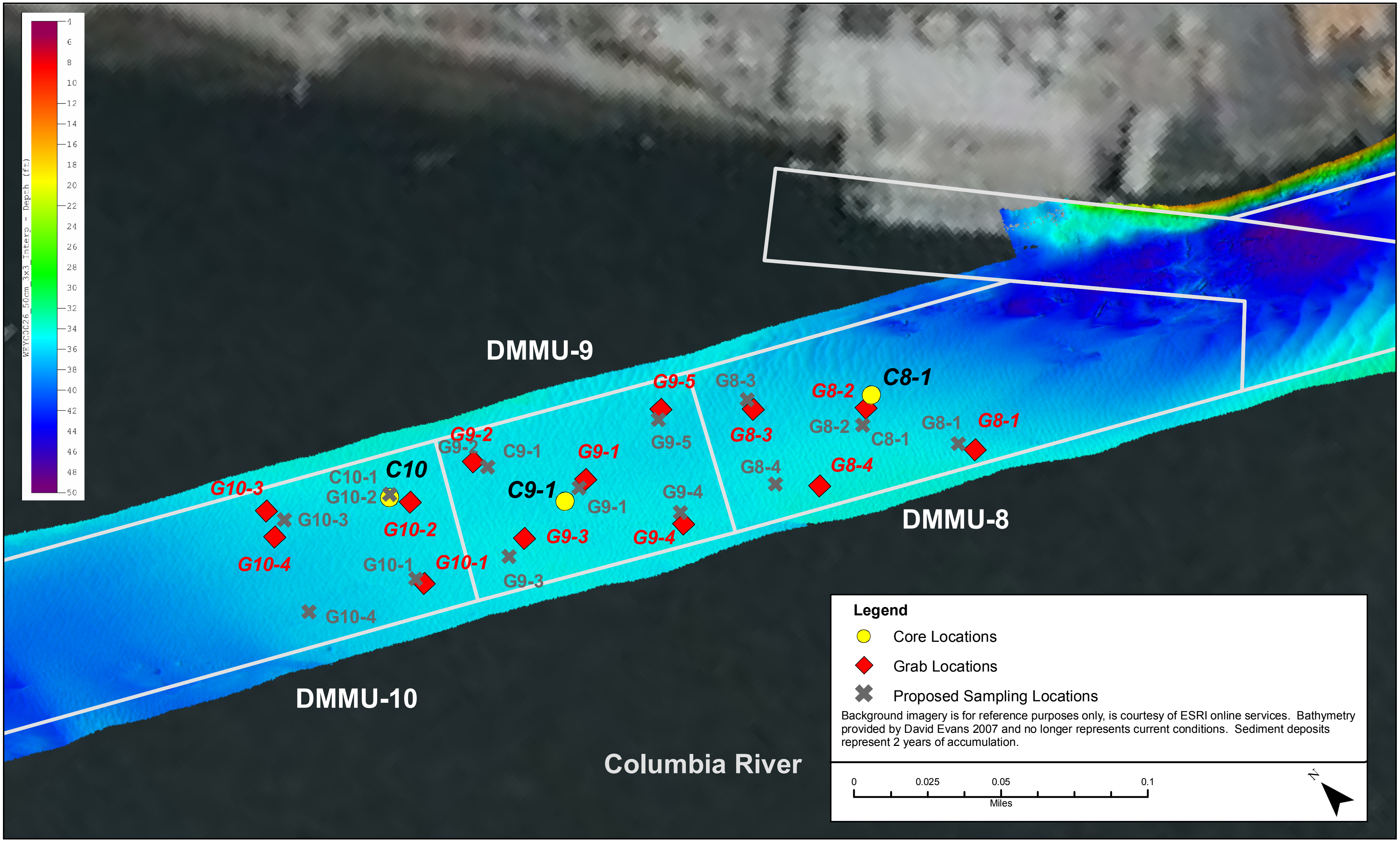

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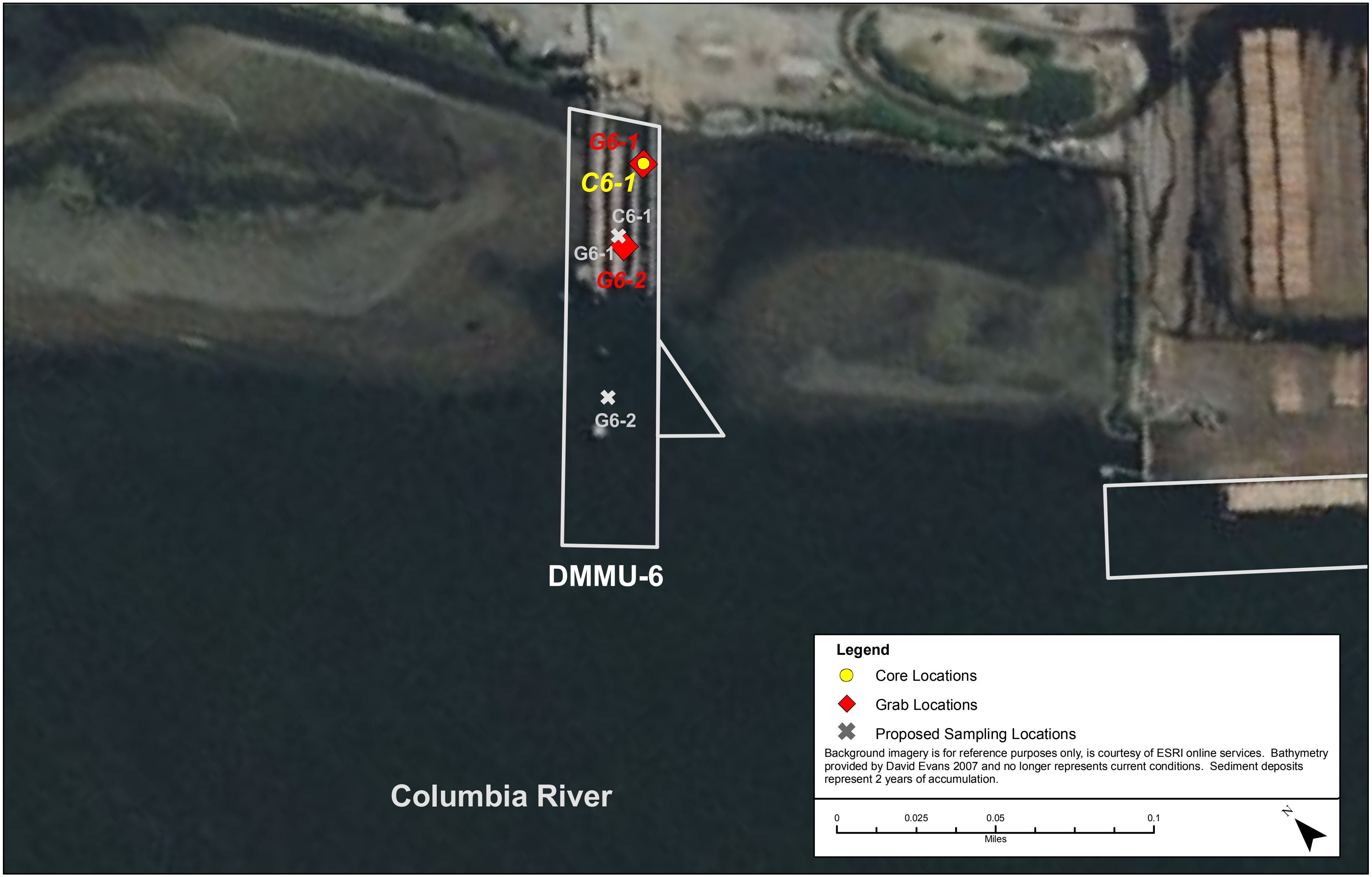
Figure 2.
Weyerhaeuser, Longview, WA
Ship Access Channel Sampling Locations



integral consulting inc.

Figure 3.
Weyerhaeuser, Longview, WA
Chip Barge Area Sampling Locations

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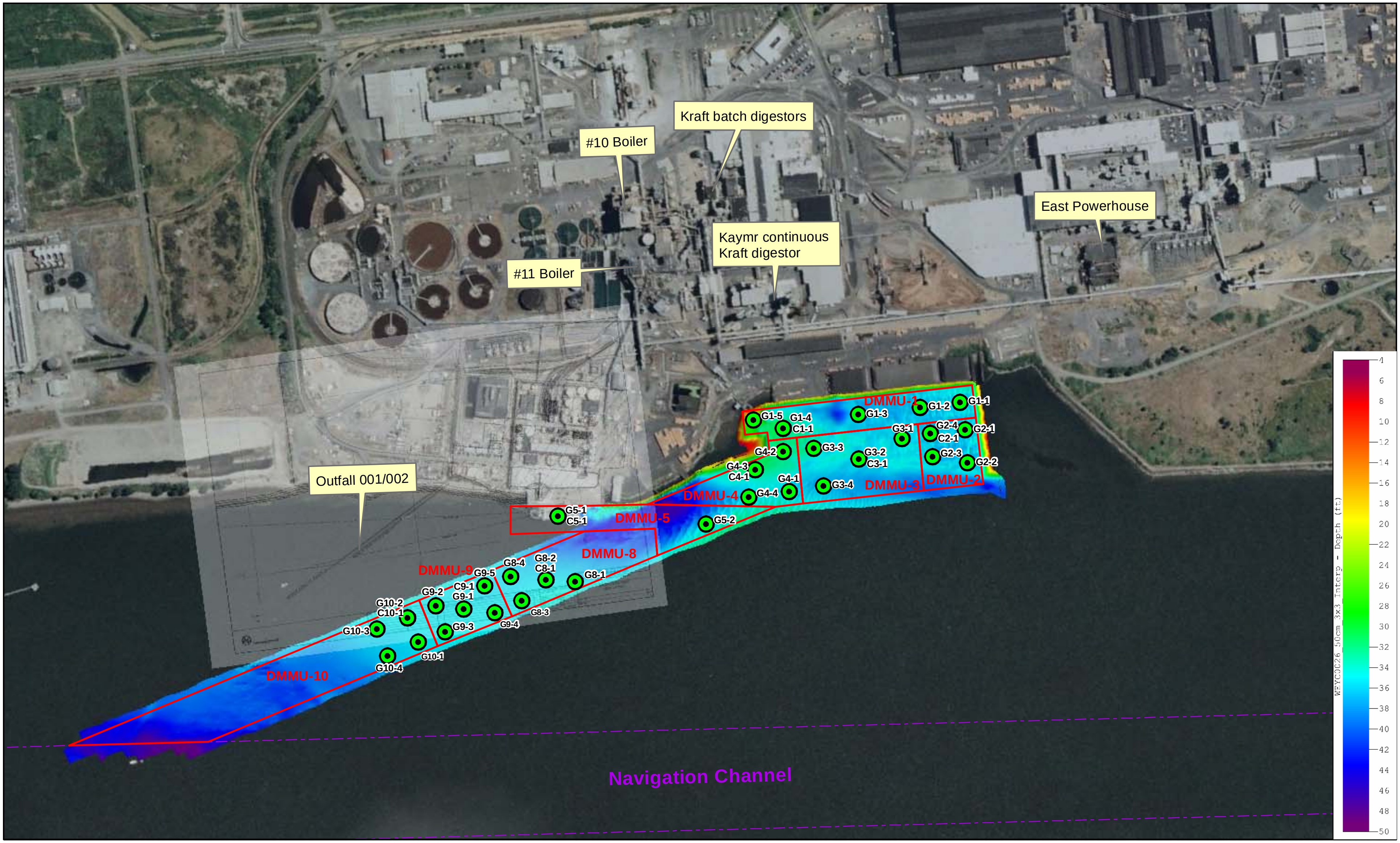


0 0.0375 0.075 0.15
Miles

Background imagery is for reference purposes only, is courtesy of ESRI online services. Bathymetry provided by David Evans 2007 and no longer represents current conditions. Sediment deposits represent 2 years of accumulation.

Proposed Sampling Locations
DMMUs
Navigation Channel

Figure 4.
Weyerhaeuser, Longview, WA
Cargo/Salt Docks, Turning Basin, and Ship Access Channel
Proposed Sampling Locations

Note: DMMUs 1-5 were eliminated due to lack of sediment above the maintenance depth.

Table 2. Sampling Coordinates and Sample Designations.

Location	Sample Designation	Sample Type	Actual Sample Locations		Proposed Sample Locations		Difference (ft)	Location Designations
			Easting	Northing	Easting	Northing		
DMMU-6 Chip Barge	DMMU-6-C6	Grab	1015482.152	294034.887	1015370.117	293974.6236	127	G6-1
		Grab	1015365.47	293956.3319	1015173.769	293789.868	254	G6-2
Z sample 0'-1' Z sample 1'-2'	C6-Z(0-1) C6-Z(1-2)	Core	1015482.871	294034.916	1015370.117	293974.6236	128	C6-1
DMMU-8 Mt. Coffin Channel	DMMU-8-C8	Grab	1008815.868	299674.7229	1008801.859	299703.3857	32	G8-1
		Grab	1008723.62	299863.049	1008698.706	299844.1494	31	G8-2
		Grab	1008574.357	299999.6481	1008578.162	300019.7876	20	G8-3
		Grab	1008567.493	299817.393	1008511.607	299874.0442	80	G8-4
Z sample 0'-1' Z sample 1'-2'	C8-Z(0-1) C8-Z(1-2)	Core	1008746.65	299873.6862	1008698.706	299844.1494	56	C8-1
DMMU-9 Mt. Coffin Channel	DMMU-9-C9	Grab	1008268.036	300112.7717	1008249.718	300109.7508	19	G9-1
		Grab	1008142.511	300272.8878	1008155.439	300249.0967	27	G9-2
		Grab	1008115.71	300109.9063	1008073.004	300105.2551	43	G9-3
		Grab	1008342.885	299934.1878	1008352.223	299952.9677	21	G9-4
		Grab	1008452.791	300113.0537	1008436.95	300102.1219	19	G9-5
Z sample 0'-1' Z sample 1'-2'	C9-Z(0-1) C9-Z(1-2)	Core	1008214.156	300109.7425	1008155.439	300249.0967	151	C9-1
DMMU-10 Mt. Coffin Channel	DMMU-10-C10	Grab	1007928.889	300173.5503	1007923.32	300190.423	18	G10-1
		Grab	1008010.031	300297.9373	1007992.734	300332.9558	39	G10-2
		Grab	1007810.938	300462.1912	1007823.664	300428.6089	36	G10-3
		Grab	1007789.47	300417.8326	1007742.944	300277.9513	147	G10-4
Z sample 0'-1' Z sample 1'-2'	C10-Z(0-1) C10-Z(1-2)	Core	1007988.354	300329.0101	1007992.734	300332.9558	6	C10-1

Table 3. Sediment Conventional Data.

		Chip Barge Slip	Access Channel		
	Lab ID:	DMMU-6-C6	DMMU-8-C8	DMMU-9-C9	DMMU-10-C10
	DAIS ID:	C1	C2	C3	C4
	DMMU #:	DMMU 6	DMMU 8	DMMU 9	DMMU 10
GRAIN SIZE	% Gravel:	2.1	0.7	0.2	0.0
	% Sand:	43.7	98.2	99.8	98.4
	% Silt:	54.2	1.1	0.0	1.6
	% Clay:	0.0	0.0	0.0	0.0
	% Fines (clay+silt):	54.2	1.1	0.0	1.6
	Total Solids (%):	62.2	75.5	67.6	67.9
	Volatile Solids (%):	2.1	0.5	0.5	0.6
	Total Organic Carbon (%):	0.52	0.05	0.02 u	0.08
	Total Sulfides (mg/kg):	17.8	0.8 u	0.9 u	0.9 u
	Total Ammonia (mg N/kg):	18.3	.006 u	1.6	.006 u

Table 4. Chemical results compared to DMMP regulatory guidelines.

						Barge Slip		Access Channel					
					Lab ID:	DMMU-6-C6		DMMU-8-C8		DMMU-9-C9		DMMU-10-C10	
					DAIS ID:	C1		C2		C3		C4	
	SEF Freshwater		DMMP Marine			DMMU 6		DMMU 8		DMMU 9		DMMU 10	
CHEMICAL	SL1	SL2	SL	BT	ML								
METALS (mg/kg dry)						conc	QL	conc	QL	conc	QL	conc	QL
Antimony	---	---	150	---	200	0.05	B	0.04	U	0.05	U	0.05	U
Arsenic	20	51	NA	507	NA	1		0.54	B	0.61	B	0.59	B
Cadmium	1.1	1.5	NA	11.3	NA	0.13		0.022	B	0.028		0.033	
Chromium	95	100	---	267	---	4.1		1.89		2.59		2.33	
Copper	80	830	NA	1,027	NA	17		6.35		7.74		7.04	
Lead	340	430	NA	975	NA	2.9		0.74		0.85		0.87	
Mercury	0.28	0.75	NA	1.5	NA	0.032		0.002	U	0.002	U	0.003	U
Nickel	60	70	NA	370	NA	5.13		4.01		5.8		5.72	
Selenium	---	---	---	3.0	---	0.4	U	0.4	U	0.5	U	0.5	U
Silver	2	2.5	NA	6.1	NA	0.04		0.03		0.03		0.03	
Zinc	130	400	NA	2,783	NA	22.3		10.6		13.3		13.1	
LPAH (ug/kg dry)													
2-Methylnaphthalene	470	560	NA	---	NA	3.9	J	2.2	U	2.2	U	2.5	U
Acenaphthene	1,100	1,300	NA	---	NA	13		1.4	U	1.4	U	1.6	U
Acenaphthylene	470	640	NA	---	NA	1.8	J	1.2	U	1.2	U	1.4	U
Anthracene	1,200	1,600	NA	---	NA	6.8	J	1.6	U	1.6	U	1.8	U
Fluorene	1,000	3,000	NA	---	NA	14		1.1	U	1.1	U	1.3	U
Naphthalene	500	1,300	NA	---	NA	2.3	U	2.3	U	2.3	U	2.6	U
Phenanthrene	6,100	7,600	NA	---	NA	75		1.9	J	1.4	U	1.6	U
Total LPAH	6,600	92,00	NA	---	NA	110	J	1.9	J	2.3	U	2.6	U
HPAH (ug/kg dry)													
Benzo(a)anthracene	4,300	5,800	NA	---	NA	37		1.7	U	1.7	U	1.9	U
Benzo(a)pyrene	3,300	4,800	NA	---	NA	23		1.7	U	1.7	U	1.9	U
Benzo(g,h,i)perylene	4,000	5,200	NA	---	NA	13		1.5	U	1.5	U	1.7	U
Benzofluoranthenes	600	4,000	NA	---	NA	63		1.4	U	1.4	U	1.6	U
Chrysene	5,900	6,400	NA	---	NA	49		1.5	U	1.5	U	1.7	U
Dibenzo(a,h)anthracene	800	840	NA	---	NA	8.7	J	1.5	U	1.5	U	1.7	U
Fluoranthene	11,000	15,000	NA	4,600	NA	90		2.5	J	1.6	U	1.8	U
Indeno(1,2,3-c,d)pyrene	4,100	5,300	NA	---	NA	21		1.5	U	1.5	U	1.7	U
Pyrene	8,800	16,000	NA	11,980	NA	100		1.5	U	1.5	U	1.7	U
Total HPAH	31,000	55,000	NA	---	NA	404.7	J	2.5	J	1.7	U	1.9	U
CHLORINATED HYDROCARBONS (ug/kg dry)													
1,2,4-Trichlorobenzene	---	---	31	---	64	2.6	U	2.6	U	2.6	U	2.9	U
1,2-Dichlorobenzene	---	---	35	---	110	2.9	U	2.9	U	2.9	U	3.3	U
1,3-Dichlorobenzene	---	---	170	---	---	3	U	3	U	3	U	3.4	U
1,4-Dichlorobenzene	---	---	110	---	120	2.9	U	2.9	U	2.9	U	3.3	U
Hexachlorobenzene	---	---	22	168	230	1.2	U	1.2	U	1.2	U	1.4	U

						Barge Slip		Access Channel					
					Lab ID:	DMMU-6-C6		DMMU-8-C8		DMMU-9-C9		DMMU-10-C10	
					DAIS ID:	C1		C2		C3		C4	
	SEF Freshwater		DMMP Marine			DMMU 6		DMMU 8		DMMU 9		DMMU 10	
CHEMICAL	SL1	SL2	SL	BT	ML								
PHTHALATES (ug/kg dry)													
Bis(2-ethylhexyl)phthalate	220	320	NA	---	NA	12	J	7.4	J	10	J	8.4	J
Butyl benzyl phthalate	260	370	NA	---	NA	3.2	U	6.3	J	7.7	J	5.1	J
Di-n-butyl phthalate	---	---	1,400	---	5,100	14	J	21		25		19	J
Di-n-octyl phthalate	26	45	NA	---	NA	1.7	U	1.7	U	1.7	U	1.9	U
Diethyl phthalate	---	---	200	---	1,200	2.6	J	3.3	J	3.4	J	2.3	J
Dimethyl phthalate	46	440	NA	---	NA	1	U	28		17		1.2	U
PHENOLS (ug/kg dry)													
2 Methylphenol	---	---	63	---	77	1.5	U	1.5	U	1.5	U	1.7	U
2,4-Dimethylphenol	---	---	29	---	210	5.5	U	5.5	U	5.5	U	6.2	U
4 Methylphenol	---	---	670	---	3,600	1.5	U	1.5	U	1.5	U	1.7	U
Pentachlorophenol	---	---	400	504	690	20	U	20	U	20	U	23	U
Phenol	---	---	420	---	1,200	2	U	2	U	2	U	2.3	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)													
Benzoic acid	---	---	650	---	760	96	U	96	U	96	U	110	U
Benzyl alcohol	---	---	57	---	870	2.1	U	18	J	16	J	2.4	U
Dibenzofuran	400	440	NA	---	NA	7.7	J	1.2	U	1.2	U	1.4	U
Hexachlorobutadiene	---	---	29	---	270	2.5	U	2.5	U	2.5	U	2.8	U
Hexachloroethane	---	---	1,400	---	14,000	3.1	U	3.1	U	3.1	U	3.5	U
N-Nitrosodiphenylamine	---	---	28	---	130	1.6	U	1.6	U	1.6	U	1.8	U
PESTICIDES AND PCBs (ug/kg dry)													
Aldrin	---	---	10	---	---	0.16	U	0.16	U	0.16	U	0.16	U
Chlordane	---	---	10	37	---	0.12	U	0.12	U	0.12	U	0.12	U
Dieldrin	---	---	10	---	---	0.14	U	0.14	U	0.14	U	0.14	U
Heptachlor	---	---	10	---	---	0.12	U	0.12	U	0.12	U	0.12	U
Lindane	---	---	10	---	---	0.08	U	0.08	U	0.08	U	0.08	U
Total DDT	---	---	6.9	50	69	0.17	U	0.17	U	0.17	U	0.17	U
Total PCBs	60	120	NA	---	NA	2.1	U	2.1	U	2.1	U	2.1	U
Total PCBs (mg/kg OC)	---	---	---	38	---	0.4	U	NA		NA		NA	

B = detected in the blank
J = estimated concentration
U = undetected
QL = laboratory qualifier
OC = organic carbon

SL = screening level
BT = bioaccumulation trigger
ML = maximum level
NA = not applicable

Table 5. Resin acid and guaiacol data.

	Barge Slip	
Lab ID:	DMMU-6-C6	
DAIS ID:	C1	
CHEMICAL	DMMU 6	
RESIN ACIDS (mg/kg dry)	conc	QL
Linoleic acid	0.027	U
Oleic acid	0.15	J
Pimaric acid	0.029	J
Isopimaric acid	0.49	
Dehydroabietic acid	1.6	
Abietic acid	0.33	
9,10-Dichlorostearic acid	0.03	U
12-Chlorodehdroabietic acid	0.0092	U
14-Chlorodehdroabietic acid	0.0083	U
Dichlorodehydroabietic acid	0.017	U
Sandracopimaric acid	0.056	
Neoabietic acid	0.045	U
Palustric acid	0.045	UJ
GUAIACOLS (ug/L)		
4-Chloroguaiacol	1.25	U
3,4-Dichloroguaiacol	2.5	U
4,5-Dichloroguaiacol	2.5	U
4,6-Dichloroguaiacol	2.5	U
3,4,5-Trichloroguaiacol	2.5	U
3,4,6-Trichloroguaiacol	2.5	U
4,5,6-Trichloroguaiacol	2.5	U
Tetrachloroguaiacol	5	U

J = estimated concentration
U = undetected
QL = laboratory qualifier

Table 6. Dioxin/Furan data.

		Access Channel											
	Lab ID:	DMMU-8-C8				C8-Z(0-1)				C8-Z(1-2)			
	DAIS ID:	C2				S3				S4			
CHEMICAL	TEF	DMMU 8				DMMU 8 - Z (0-1 ft)				DMMU 8 - Z (1-2 ft)			
DIOXINS (ng/kg dry)		conc	QL	TEQ (U=½ DL)	TEQ (U=0)	conc	QL	TEQ (U=½ DL)	TEQ (U=0)	conc	QL	TEQ (U=½ DL)	TEQ (U=0)
2,3,7,8-TCDD	1	0.0722	U	0.0361	0	0.0453	U	0.02265	0	0.0393	U	0.01965	0
1,2,3,7,8-PeCDD	1	0.0738	U	0.0369	0	0.0464	U	0.0232	0	0.0462	U	0.0231	0
1,2,3,4,7,8-HxCDD	0.1	0.0572	U	0.00286	0	0.0306	U	0.00153	0	0.0472	U	0.00236	0
1,2,3,6,7,8-HxCDD	0.1	0.0997	U	0.004985	0	0.0435	JKU	0.002175	0	0.0644	U	0.00322	0
1,2,3,7,8,9-HxCDD	0.1	0.0705	U	0.003525	0	0.0325	U	0.001625	0	0.0636	JKU	0.00318	0
1,2,3,4,6,7,8-HpCDD	0.01	0.871	JU	0.004355	0	0.26	BJU	0.0013	0	0.464	BJU	0.00232	0
OCDD	0.0003	7.33	J	0.002199	0.002199	1.35	BJU	0.000203	0	3.03	BJU	0.000455	0
2,3,7,8-TCDF	0.1	0.0765	U	0.003825	0	0.0332	U	0.00166	0	0.0419	U	0.002095	0
1,2,3,7,8-PeCDF	0.03	0.0489	U	0.000734	0	0.0196	U	0.000294	0	0.026	U	0.00039	0
2,3,4,7,8-PeCDF	0.3	0.0507	U	0.007605	0	0.0193	U	0.002895	0	0.0267	U	0.004005	0
1,2,3,4,7,8-HxCDF	0.1	0.0458	U	0.00229	0	0.0256	U	0.00128	0	0.0221	U	0.001105	0
1,2,3,6,7,8-HxCDF	0.1	0.0476	U	0.00238	0	0.0247	U	0.001235	0	0.0215	U	0.001075	0
1,2,3,7,8,9-HxCDF	0.1	0.0536	U	0.00268	0	0.0279	U	0.001395	0	0.0221	U	0.001105	0
2,3,4,6,7,8-HxCDF	0.1	0.0505	U	0.002525	0	0.0273	U	0.001365	0	0.0225	U	0.001125	0
1,2,3,4,6,7,8-HpCDF	0.01	0.233	J	0.00233	0.00233	0.0898	J	0.000898	0.000898	0.107	JKU	0.000535	0
1,2,3,4,7,8,9-HpCDF	0.01	0.0467	U	0.000234	0	0.0389	U	0.000195	0	0.0326	U	0.000163	0
OCDF	0.0003	0.758	JU	0.000114	0	0.301	JKU	4.52E-05	0	0.385	J	0.000116	0.000116
TOTAL TEQ:				0.116	0.005			0.064	0.001			0.066	0.000

J = estimated concentration
K = ion abundance ratio out of range
U = undetected
QL = laboratory qualifier
TEF = toxic equivalency factor (WHO 2005 mammalian)
TEQ = toxic equivalency

Table 7. Columbia River Dioxin/Furan background data from EIM.

User_Study_ID	Study_Location_Name	Field_Activity_Start_Date	Sample_ID	Sample_Source	sum TEQ	Latitude	Longitude
WPRT0698	WP-GC-13	06/04/1998	WP-GC-13	Freshwater Sediment	0.65	46.1461	-123.384
LCBWRS93	RM59	06/25/1993	7-S	Freshwater Sediment	2.87	46.1696	-123.072
LCBWRS93	RM14	06/28/1993	1-S	Freshwater Sediment	2.36	46.1655	-123.829
LCBWRS93	RM29	06/26/1993	5-S	Freshwater Sediment	1.89	46.2236	-123.553
LCBWRS93	RM26	06/26/1993	4-S	Freshwater Sediment	1.64	46.2	-123.588
LCBWRS93	RM36	06/25/1993	6-S	Freshwater Sediment	1.21	46.2244	-123.402
LCBWRS93	RM23	06/27/1993	3-S	Freshwater Sediment	1.19	46.1747	-123.666
LCBWRS93	RM21	06/27/1993	2-S	Freshwater Sediment	1.14	46.1767	-123.701
COLWLR90	CR17/18	05/10/1990	CR17/18	Freshwater Sediment	1.53	46.1924	-123.425
COLWLR90	CR-VC-12	05/10/1990	CRVC12AB	Freshwater Sediment	1.28	46.1461	-123.385
COLWLR90	CR-GC-16	05/10/1990	CR-GC-16	Freshwater Sediment	1.21	46.1686	-123.416
COLWLR90	CR-GC-15	05/10/1990	CR-GC-15	Freshwater Sediment	1.11	46.1699	-123.416

EIM = Environmental Information Management system

Table 8. Chemical results compared to SMS regulatory guidelines.

			Barge Slip		Access Channel					
		Lab ID:	DMMU-6-C6		DMMU-8-C8		DMMU-9-C9		DMMU-10-C10	
		DAIS ID:	C1		C2		C3		C4	
CHEMICAL	SQS	CSL	DMMU 6		DMMU 8		DMMU 9		DMMU 10	
METALS (mg/kg dry)			conc	QL	conc	QL	conc	QL	conc	QL
Arsenic	57	93	1		0.54	B	0.61	B	0.59	B
Cadmium	5.1	6.7	0.13		0.022	B	0.028		0.033	
Chromium	260	270	4.1		1.89		2.59		2.33	
Copper	390	390	17		6.35		7.74		7.04	
Lead	450	530	2.9		0.74		0.85		0.87	
Mercury	0.41	0.59	0.032		0.002	U	0.002	U	0.003	U
Silver	6.1	6.1	0.04		0.03		0.03		0.03	
Zinc	410	960	22.3		10.6		13.3		13.1	
LPAH (mg/kg OC)										
2-Methylnaphthalene	38	64	0.7	J	NA		NA		NA	
Acenaphthene	16	57	2.5		NA		NA		NA	
Acenaphthylene	66	66	0.3	J	NA		NA		NA	
Anthracene	220	1200	1.3	J	NA		NA		NA	
Fluorene	23	79	2.7		NA		NA		NA	
Naphthalene	99	170	0.4	U	NA		NA		NA	
Phenanthrene	100	480	14.4		NA		NA		NA	
Total LPAH	370	780	21.2	J	NA		NA		NA	
HPAH (mg/kg OC)										
Benzo(a)anthracene	110	270	7.1		NA		NA		NA	
Benzo(a)pyrene	99	210	4.4		NA		NA		NA	
Benzo(g,h,i)perylene	34	88	2.5		NA		NA		NA	
Benzofluoranthenes	230	450	12.1		NA		NA		NA	
Chrysene	110	460	9.4		NA		NA		NA	
Dibenzo(a,h)anthracene	12	33	1.7	J	NA		NA		NA	
Fluoranthene	160	1200	17.3		NA		NA		NA	
Indeno(1,2,3-c,d)pyrene	34	88	4.0		NA		NA		NA	
Pyrene	1000	1400	19.2		NA		NA		NA	
Total HPAH	960	5300	77.8	J	NA		NA		NA	
CHLORINATED HYDROCARBONS (mg/kg OC)										
1,2,4-Trichlorobenzene	0.81	1.8	0.50	U	NA		NA		NA	
1,2-Dichlorobenzene	2.3	2.3	0.6	U	NA		NA		NA	
1,4-Dichlorobenzene	3.1	9	0.6	U	NA		NA		NA	
Hexachlorobenzene	0.38	2.3	0.23	U	NA		NA		NA	

			Barge Slip		Access Channel					
		Lab ID:	DMMU-6-C6		DMMU-8-C8		DMMU-9-C9		DMMU-10-C10	
		DAIS ID:	C1		C2		C3		C4	
CHEMICAL	SQS	CSL	DMMU 6		DMMU 8		DMMU 9		DMMU 10	
PHTHALATES (mg/kg OC)										
Bis(2-ethylhexyl)phthalate	47	78	2.3	J	NA		NA		NA	
Butyl benzyl phthalate	4.9	64	0.6	U	NA		NA		NA	
Di-n-butyl phthalate	220	1700	2.7	J	NA		NA		NA	
Di-n-octyl phthalate	58	4500	0.3	U	NA		NA		NA	
Diethyl phthalate	61	110	0.5	J	NA		NA		NA	
Dimethyl phthalate	53	53	0.2	U	NA		NA		NA	
PHENOLS (ug/kg dry)										
2 Methylphenol	63	63	1.5	U	1.5	U	1.5	U	1.7	U
2,4-Dimethylphenol	29	29	5.5	U	5.5	U	5.5	U	6.2	U
4 Methylphenol	670	670	1.5	U	1.5	U	1.5	U	1.7	U
Pentachlorophenol	360	690	20	U	20	U	20	U	23	U
Phenol	420	1200	2	U	2	U	2	U	2.3	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)										
Benzoic acid	650	650	96	U	96	U	96	U	110	U
Benzyl alcohol	57	73	2.1	U	18	J	16	J	2.4	U
MISCELLANEOUS EXTRACTABLES (mg/kg OC)										
Dibenzofuran	15	58	1.5	J	NA		NA		NA	
Hexachlorobutadiene	3.9	6.2	0.5	U	NA		NA		NA	
N-Nitrosodiphenylamine	11	11	0.3	U	NA		NA		NA	
PCBs (mg/kg OC)										
Total PCBs (mg/kg carbon)	12	65	0.4	U	NA		NA		NA	

B = detected in the blank
J = estimated concentration
U = undetected
QL = laboratory qualifier
OC = organic carbon
SMS = Sediment Management Standards
SQS = sediment quality standard
CSL = cleanup screening level
NA = not applicable; organic carbon content is too low to normalize

Table 9. Chemical results compared to MTCA regulatory guidelines.

			Barge Slip		Access Channel					
		Lab ID:	DMMU-6-C6		DMMU-8-C8		DMMU-9-C9		DMMU-10-C10	
		DAIS ID:	C1		C2		C3		C4	
CHEMICAL	Method A[1]	Method B[2]	DMMU 6		DMMU 8		DMMU 9		DMMU 10	
METALS (mg/kg dry)			conc	QL	conc	QL	conc	QL	conc	QL
Arsenic, inorganic	20	0.67	1		0.54	B	0.61	B	0.59	B
Cadmium	2	---	0.13		0.022	B	0.028		0.033	
Chromium (total)	---	---	4.1		1.89		2.59		2.33	
Chromium VI	19	---	---		---		---		---	
Copper	---	---	17		6.35		7.74		7.04	
Lead	250	---	2.9		0.74		0.85		0.87	
Mercury	2	---	0.032		0.002	U	0.002	U	0.003	U
Silver	---	---	0.04		0.03		0.03		0.03	
Zinc	---	---	22.3		10.6		13.3		13.1	
LPAH (ug/kg dry)										
Acenaphthene	---	---	13		1.4	U	1.4	U	1.6	U
Anthracene	---	---	6.8	J	1.6	U	1.6	U	1.8	U
Fluorene	---	---	14		1.1	U	1.1	U	1.3	U
Naphthalene	5,000	---	2.3	U	2.3	U	2.3	U	2.6	U
HPAH (ug/kg dry)										
Benzo(a)anthracene	---	140	37		1.7	U	1.7	U	1.9	U
Benzo(a)pyrene	100	140	23		1.7	U	1.7	U	1.9	U
Benzo(b,k)fluoranthenes	---	---	63		1.4	U	1.4	U	1.6	U
Benzo(b)fluoranthene	---	140	48		1.2	U	1.2	U	1.4	U
Benzo(k)fluoranthenes	---	140	15		1.4	U	1.4	U	1.6	U
Chrysene	---	140	49		1.5	U	1.5	U	1.7	U
Dibenzo(a,h)anthracene	---	140	8.7	J	1.5	U	1.5	U	1.7	U
Fluoranthene	---	---	90		2.5	J	1.6	U	1.8	U
Indeno(1,2,3-c,d)pyrene	---	140	21		1.5	U	1.5	U	1.7	U
Pyrene	---	---	100		1.5	U	1.5	U	1.7	U
CHLORINATED HYDROCARBONS (ug/kg dry)										
1,2,4-Trichlorobenzene	---	---	2.6	U	2.6	U	2.6	U	2.9	U
1,2-Dichlorobenzene	---	---	2.9	U	2.9	U	2.9	U	3.3	U
1,4-Dichlorobenzene	---	42,000	2.9	U	2.9	U	2.9	U	3.3	U
Hexachlorobenzene	---	630	1.2	U	1.2	U	1.2	U	1.4	U
PHTHALATES (ug/kg dry)										
Bis(2-ethylhexyl)phthalate	---	71,000	12	J	7.4	J	10	J	8.4	J
Butyl benzyl phthalate	---	---	3.2	U	6.3	J	7.7	J	5.1	J

			Barge Slip		Access Channel					
		Lab ID:	DMMU-6-C6		DMMU-8-C8		DMMU-9-C9		DMMU-10-C10	
		DAIS ID:	C1		C2		C3		C4	
CHEMICAL	Method A[1]	Method B[2]	DMMU 6		DMMU 8		DMMU 9		DMMU 10	
Di-n-butyl phthalate	---	---	14	J	21		25		19	J
Di-n-octyl phthalate	---	---	1.7	U	1.7	U	1.7	U	1.9	U
Diethyl phthalate	---	---	2.6	J	3.3	J	3.4	J	2.3	J
Dimethyl phthalate	---	---	1	U	28		17		1.2	U
PHENOLS (ug/kg dry)										
2,4-Dimethylphenol	---	---	5.5	U	5.5	U	5.5	U	6.2	U
Pentachlorophenol	---	8,300	20	U	20	U	20	U	23	U
Phenol	---	---	2	U	2	U	2	U	2.3	U
MISCELLANEOUS EXTRACTABLES (ug/kg dry)										
Benzoic acid	---	---	96	U	96	U	96	U	110	U
Benzyl alcohol	---	---	2.1	U	18	J	16	J	2.4	U
Dibenzofuran	---	---	7.7	J	1.2	U	1.2	U	1.4	U
Hexachlorobutadiene	---	13,000	2.5	U	2.5	U	2.5	U	2.8	U
N-Nitrosodiphenylamine	---	200,000	1.6	U	1.6	U	1.6	U	1.8	U
PESTICIDES AND PCBs (ug/kg dry)										
Aldrin	---	59	0.16	U	0.16	U	0.16	U	0.16	U
Chlordane	---	2,900	0.12	U	0.12	U	0.12	U	0.12	U
Dieldrin	---	63	0.14	U	0.14	U	0.14	U	0.14	U
Heptachlor	---	220	0.12	U	0.12	U	0.12	U	0.12	U
Heptachlor epoxide	---	110	---		---		---		---	
Lindane	10	770	0.08	U	0.08	U	0.08	U	0.08	U
Total DDT	---	---	0.17	U	0.17	U	0.17	U	0.17	U
DDT	3,000	2,900	0.17	U	0.17	U	0.17	U	0.17	U
DDE	---	2,900	0.11	U	0.11	U	0.11	U	0.11	U
Total PCBs	1,000	500	2.1	U	2.1	U	2.1	U	2.1	U

[1]Soil, Method A, Unrestricted Land Use, Table Value

[2]Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use

B = detected in the blank

J = estimated concentration

U = undetected

QL = laboratory qualifier

Memorandum: Determination Regarding the Suitability of Proposed Dredged Material from the Weyerhaeuser Cargo Dock, Turning Basin and Salt Dock, Longview, Washington, for Flow-Lane Disposal in the Columbia River

Dredged Material Management Program.
March 26, 2010.

CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD March 26, 2010

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM THE WEYERHAEUSER CARGO DOCK, TURNING BASIN AND SALT DOCK, LONGVIEW, WASHINGTON, FOR FLOW-LANE DISPOSAL IN THE COLUMBIA RIVER.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, and Washington Departments of Ecology and Natural Resources) regarding the suitability of up to 115,300 cubic yards (cy) of dredged material from the Weyerhaeuser property in Longview for flow-lane disposal in the Columbia River.

2. Background. In 2008, Weyerhaeuser submitted a sampling and analysis plan (SAP) for characterization of dredged material from the Mount Coffin ship access channel, salt dock, export dock, chip barge slip, cargo dock and turning basin (Integral, 2008). However, during field sampling it was determined that little or no sediment accumulation had occurred above the maintenance depth for the salt dock, cargo dock, turning basin or export dock. Only the chip barge slip and Mount Coffin access channel required dredging. Sediment from these two areas was characterized and a DMMP suitability determination was issued in January 2009 (DMMP, 2009). In December 2009, Weyerhaeuser notified the Corps of Engineers that the salt dock, cargo dock and turning basin required dredging. Because of the short time available before the end of the in-water work window, the DMMP agencies allowed the 2008 SAP to be used, with minor revisions to reflect current shoaling patterns (Integral, 2010a). The SAP addendum allocated dredged material management units (DMMUs) and field samples to each of the proposed dredging areas (see Figure 1).

3. Project Summary. Table 1 includes project summary and tracking information.

Table 1. Project Summary

Project ranking	Low-moderate
Characterized volume	Total: 115,300 cy Salt Dock: 19,600 cy Cargo Dock: 46,400 cy Turning Basin: 49,300 cy
Maintenance depth	-38 ft. CRD
SAP addendum received	January 13, 2010
SAP addendum approved	January 13, 2010
Sampling dates	January 13-14, 2010
Final data report received	March 25, 2010
DAIS Tracking number	WEYLO-1-A-F-287
USACE Permit Application Number	1999-2-00191
Recency Determination (low-moderate rank = 6 years)	January 2016

4. Project Ranking and Sampling Requirements. The Weyerhaeuser property in Longview is ranked "low-moderate" (Integral, 2008). In low-moderate-ranked areas with homogeneous sediment, the minimum numbers of field samples and dredged material management units (DMMUs) are calculated using the following guidelines (DMMP, 2008b):
   - Maximum volume of sediment represented by each field sample = 8,000 cubic yards
   - Maximum volume of sediment represented by each DMMU = 40,000 cubic yards.

   Based on these guidelines, the proposed dredging volume of 115,300 cy would require a minimum of 15 field samples and 3 DMMUs. The SAP addendum called for 18 field samples and 5 DMMUs – well above the minimum requirement.

5. Sampling. Sampling took place January 13-14, 2010 using a van Veen sampler (in areas with homogeneous sediment, surface grab samples are deemed adequate to represent the sediment – DMMP, 2008b). Only minor problems were encountered during sampling. The target locations for G3-4, G4-1 and G5-1 did not have sediment accumulated above the maintenance dredging depth. Therefore, the sampling stations were moved to locations with adequate sediment depth.

   In addition to grab samples, core samples were required for collection of z-samples to represent the sediment surface to be exposed by dredging. Integral Consulting planned to collect z-samples in two layers: 0-1' and 1-2' below the overdepth. However, the sampling team mistakenly collected the z-samples below the design depth rather than the overdepth. A vibracore was used to collect these samples.

   See Figure 1 for target and actual grab and core sampling locations. Table 3 presents this information in tabular form.

6. Chemical Analysis. The approved sampling and analysis plan was followed and quality control guidelines specified by the PSEP and DMMP programs were met, with only minor quality control deviations (Integral, 2010b). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

   For this project, the DMMP agencies agreed to use the SEF freshwater guidelines (RSET, 2006), supplemented by the DMMP marine guidelines (DMMP, 2008b) for those chemicals of concern for which freshwater guidelines do not exist. The preliminary chemical results included a single exceedance of a SEF freshwater screening level. Bis(2-ethylhexyl)phthalate (BEHP) was detected in DMMU 1 at a concentration of 270 ug/kg (the SL1 is 220 ug/kg). There were no exceedances of DMMP marine screening levels. See Table 2.

   Because BEHP was the only chemical exceeding the screening level and because phthalates are common laboratory contaminants, ARI proactively re-extracted all DMMUs on their own, including DMMUs 1 and 5 in duplicate. The results were highly variable (see Table 2). The DMMP agencies then requested that ARI analyze the archived sample for DMMU 1 in duplicate, along with the z-samples associated with DMMU 1. BEHP was detected at low concentrations in DMMU 1 and was also found at a low level in the method blank. The results for the 0-1 ft z-sample were highly variable. The DMMP agencies discussed the results at length vis-à-vis the need to do bioassays. After much discussion the DMMP agencies agreed that the risk in not doing bioassays for this DMMU was small while the navigational impacts of requiring bioassays were very real (Weyerhaeuser would have missed the work window entirely).

Based on the overall evaluation of the chemical data and application of best professional judgment, bioassay testing was not required for the dredged material. All five DMMUs met suitability guidelines, based on chemistry alone, for flow-lane disposal in the Columbia River.

7. Sediment Exposed by Dredging. Sediment to be exposed by dredging must be evaluated in accordance with the DMMP antidegradation guidelines (DMMP 2008a). Vibracore samples were taken from 0-1 feet and 1-2 feet below the project design depth. Based on the results from analysis of the dredged material, and as indicated in the previous section of this memorandum, the z-samples associated with DMMU 1 were tested for BEHP. The results were highly variable, but the highest concentration detected did not exceed the SL1. While the z-samples should have been taken below the overdepth rather than the design depth, it is highly probable that some of the material in the 1-2 foot stratum below the design depth would be left in place after dredging. The DMMP agencies agreed there was little risk in exposing this sediment to the environment or, should the entire 2-foot overdepth be removed, of exposing sediment beyond the overdepth. The sediment to be exposed by dredging was deemed to have met the DMMP antidegradation guidelines.

8. Suitability Determination. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Weyerhaeuser property in Longview for flow-lane disposal. The approved sampling and analysis plan was followed (with the exceptions noted previously) and the data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program.

Based on the results of the previously described testing, the DMMP agencies conclude that **all 115,300 cubic yards are suitable** for flow-lane disposal in the Columbia River.

9. References.

DMMP, 2008a. Quality of Post-Dredge Sediment Surfaces (Updated). A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

DMMP, 2008b. *Dredged Material Evaluation and Disposal Procedures (Users Manual)*. Dredged Material Management Program, July 2008.

DMMP, 2009. *Determination Regarding the Suitability of Proposed Dredged Material from the Weyerhaeuser Property, Longview, Washington, for Flow-Lane Disposal in the Columbia River or for Beneficial Use*. Dredged Material Management Program, January 2009.

Integral, 2008. *Sampling and Analysis Plan, Sediment Characterization, Weyerhaeuser Property, Longview, Washington.* Prepared by Integral Consulting Inc. for Weyerhaeuser Company. September 2008.

Integral, 2010a. *Sampling and Analysis Plan Addendum, Sediment Characterization, Weyerhaeuser Property, Longview, WA*. Prepared by Integral Consulting Inc. for Weyerhaeuser Company. January 2010.

Integral, 2010b. *Turning Basin Dredged Material Characterization – Field Sediment Sampling Technical Memorandum Summary.* Prepared by Integral Consulting Inc. for Weyerhaeuser NR Company. March 2010.

RSET, 2006. *Northwest Regional Sediment Evaluation Framework, Interim Final.* Northwest Regional Sediment Evaluation Team, September 2006.

10. Agency Signatures.

Concur:

4/1/10 David F. Fox

Date — David Fox, P.E. - Seattle District Corps of Engineers

4/1/10 Erika Hoffman

Date — Erika Hoffman - Environmental Protection Agency

04/01/2010 Laura Inouye

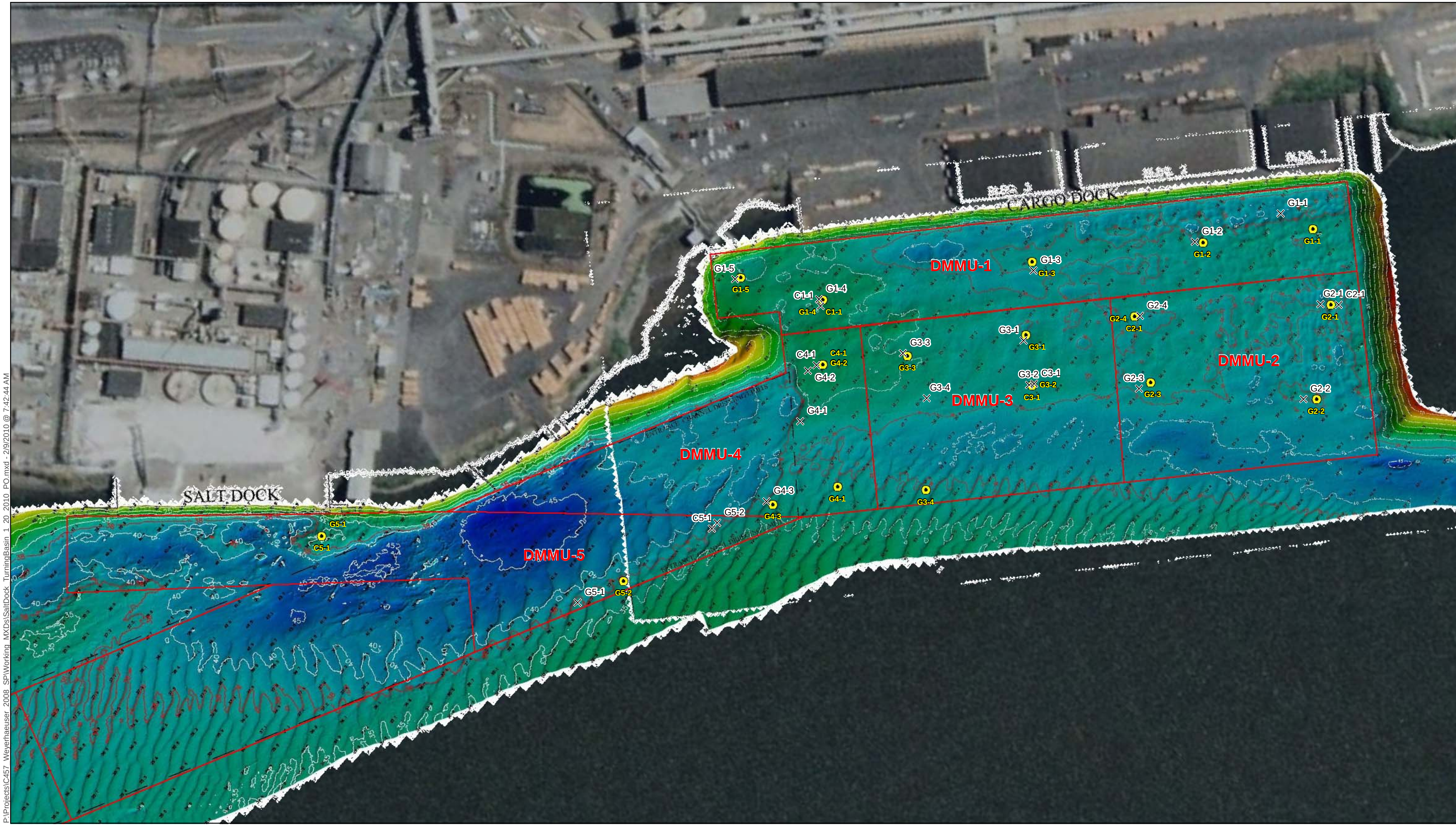
Date — Laura Inouye, Ph.D. - Washington Department of Ecology

04/01/2010 Dave Vagt

Date — Dave Vagt - Washington Department of Natural Resources

Copies furnished:

DMMP signatories
Danette Guy, Corps Regulatory
Sandy Browning, Integral Consulting
Brian Wood, Weyerhaeuser



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integral consulting inc.

0 70 140 280
Feet

× Actual Sample Location

January 2010 Proposed Sampling Location

DMMU

Background imagery is for reference purposes only, is courtesy of ESRI and i-cubed online services. Bathymetry provided by Northwest Hydro Inc. (2009) and no longer represents current conditions.

Figure 1
Weyerhauser, Longview, WA
Cargo/Salt Docks, Turning Basin, and Ship Access Channel
Actual and Proposed Sampling Locations

Table 2. Weyerhaeuser 2010 Sediment Chemistry Results Compared with SEF Guidelines.[a]

	SEF - Freshwater		DMMP - Marine			C1	C1	C1	C1	C1-Z	C1-Z	C1-Z	C1-Z	
Parameter	SL1	SL2	SL	ML	C1	Re-extract	Re-extract Dup.	Archive	Archive Dup.	(0-1)	(0-1) Dup.	(1-2)	(1-2) Dup.	C2
Conventionals														
N-Ammonia (mg-N/kg)	---	---	---	---	12.5	---	---	---	---	---	---	---	---	8.24
Percent Fines (%)	---	---	---	---	52.6	---	---	---	---	36.9	---	40.7	---	21.7
Total organic carbon (%)	---	---	---	---	0.359	---	---	---	---	0.282	---	0.306	---	0.570
Total solids (%)	---	---	---	---	65.6	---	---	---	---	70.9	---	70.3	---	63.3
Total volatile solids (%)	---	---	---	---	1.67	---	---	---	---	---	---	---	---	1.85
Total sulfides (mg/kg)	---	---	---	---	14.3	---	---	---	---	---	---	---	---	19.9
Metals (mg/kg dw)														
Antimony	---	---	150	200	0.3 *UJ*	---	---	---	---	---	---	---	---	0.3 *U*
Arsenic	20	51	NA	NA	1.6	---	---	---	---	---	---	---	---	1.8
Cadmium	1.1	1.5	NA	NA	0.4	---	---	---	---	---	---	---	---	0.3 *U*
Chromium	95	100	---	---	7.7	---	---	---	---	---	---	---	---	8
Copper	80	830	NA	NA	27.3	---	---	---	---	---	---	---	---	26.2
Lead	340	430	NA	NA	2	---	---	---	---	---	---	---	---	3
Mercury	0.28	0.75	NA	NA	0.04 *U*	---	---	---	---	---	---	---	---	0.04 *U*
Nickel	60	70	NA	NA	8.9	---	---	---	---	---	---	---	---	9.2
Selenium[b]	---	---	---	---	0.3 *U*	---	---	---	---	---	---	---	---	0.3 *U*
Silver	2.0	2.5	NA	NA	0.3 *U*	---	---	---	---	---	---	---	---	0.3 *U*
Zinc	130	400	NA	NA	36	---	---	---	---	---	---	---	---	39
SVOCs (µg/kg dw)														
LPAHs														
2-Methylnaphthalene	470	560	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Acenaphthene	1,100	1,300	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Acenaphthylene	470	640	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Anthracene	1,200	1,600	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Fluorene	1,000	3,000	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Naphthalene	500	1,300	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Phenanthrene	6,100	7,600	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Total LPAH	6,600	9,200	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
HPAH														
Fluoranthene	11,000	15,000	NA	NA	13 *J*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	22
Pyrene	8,800	16,000	NA	NA	12 *J*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	24
Benz(a)anthracene	4,300	5,800	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	11 *J*
Chrysene	5,900	6,400	NA	NA	11 *J*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	17 *J*
Benzofluoranthenes (b+k)	600	4,000	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	24 *J*
Benzo(j)fluoranthene	NA	NA	3,200	9,900	--	--	--	---	---	--	--	--	--	--
Benzo(a)pyrene	3,300	4,800	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	16 *J*
Indeno(1,2,3-c,d)pyrene	4,100	5,300	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Dibenz(a,h)anthracene	800	840	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Benzo(g,h,i)perylene	4,000	5,200	NA	NA	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	11 *J*
Total HPAH	31,000	55,000	NA	NA	36 *J*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	125 *J*
Chlorinated hydrocarbons (µg/kg dw)														
1,3-Dichlorobenzene	NA	NA	170	---	1.2 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	1.2 *U*
1,4-Dichlorobenzene	NA	NA	110	120	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
1,2-Dichlorobenzene	NA	NA	35	110	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
1,2,4-Trichlorobenzene	NA	NA	31	64	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*
Hexachlorobenzene (HCB)	NA	NA	168	230	20 *U*	64 *U*	64 *U*	---	---	20 *U*	20 *U*	20 *U*	20 *U*	20 *U*

Table 2. Weyerhaeuser 2010 Sediment Chemistry Results Compared with SEF Guidelines.[a]

	SEF - Freshwater		DMMP - Marine			C1	C1	C1	C1	C1-Z	C1-Z	C1-Z	C1-Z	
Parameter	SL1	SL2	SL	ML	C1	Re-extract	Re-extract Dup.	Archive	Archive Dup.	(0-1)	(0-1) Dup.	(1-2)	(1-2) Dup.	C2
Phthalate esters (µg/kg dw)														
Dimethyl phthalate	46	440	NA	NA	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Diethyl phthalate	NA	NA	200	1,200	20 U	140 B	78 B	---	---	20 U	20 U	20 U	20 U	20 U
Di-n-butyl phthalate	NA	NA	1,400	5,100	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Butyl benzyl phthalate	260	370	NA	NA	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Bis(2-ethylhexyl)phthalate	220	320	NA	NA	270	260 J	64 UJ	18 JB	21 B	160 JB	20 JB	25 B	22 JB	140
Di-n-octyl phthalate	26	45	NA	NA	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Phenols (µg/kg dw)														
Phenol	---	---	420	1,200	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
2-Methylphenol	---	---	63	77	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
4-Methylphenol	---	---	670	3,600	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
2,4-Dimethylphenol	---	---	29	210	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Pentachlorophenol	---	---	400	690	98 U	320 U	320 U	---	---	100 U	99 U	98 U	100 U	98 U
Miscellaneous extractables (µg/kg dw)														
Benzyl alcohol	---	---	57	870	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Benzoic acid	NA	NA	650	760	200 U	640 U	640 U	---	---	200 U	200 U	200 U	200 U	200 U
Dibenzofuran	400	440	NA	NA	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Hexachloroethane	---	---	1,400	14,000	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Hexachlorobutadiene	---	---	29	270	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
N-Nitrosodiphenylamine	---	---	28	130	20 U	64 U	64 U	---	---	20 U	20 U	20 U	20 U	20 U
Pesticides (µg/kg dw)														
Total DDT	NA	NA	6.9	69	1.9 U	---	---	---	---	---	---	---	---	2 U
p,p'-DDE	NA	NA	---	---	1.9 U	---	---	---	---	---	---	---	---	2 U
p,p'-DDD	NA	NA	---	---	1.9 U	---	---	---	---	---	---	---	---	2 U
p,p'-DDT	NA	NA	---	---	1.9 U	---	---	---	---	---	---	---	---	2 U
Aldrin	NA	NA	10	---	0.97 U	---	---	---	---	---	---	---	---	0.99 U
Total Chlordane	NA	NA	10	---	1.9 U	---	---	---	---	---	---	---	---	2 U
Dieldrin	NA	NA	10	---	1.9 U	---	---	---	---	---	---	---	---	2 U
Heptachlor	NA	NA	10	---	1.2 UJ	---	---	---	---	---	---	---	---	0.99 U
Lindane	NA	NA	10	---	0.97 U	---	---	---	---	---	---	---	---	0.99 U
PCB Aroclors (µg/kg dw)														
Total PCB Aroclors	60	120	NA	NA	9.8 U	---	---	---	---	---	---	---	---	10 U

Table 2. Weyerhaeuser 2010 Sediment Chemistry Results Compared with SEF Guidelines.[a]

	SEF - Freshwater		DMMP - Marine		C2		C3		C4		C5	C5
Parameter	SL1	SL2	SL	ML	Re-extract	C3	Re-extract	C4	Re-extract	C5	Re-extract	Re-extract Dup.
Conventionals												
N-Ammonia (mg-N/kg)	---	---	---	---	---	2.35	---	1.91	---	0.13 *U*	---	---
Percent Fines (%)	---	---	---	---	---	58	---	48.6	---	1	---	---
Total organic carbon (%)	---	---	---	---	---	0.413	---	0.270	---	0.120	---	---
Total solids (%)	---	---	---	---	---	65.8	---	72.3	---	75.5	---	---
Total volatile solids (%)	---	---	---	---	---	1.57	---	0.89	---	0.47	---	---
Total sulfides (mg/kg)	---	---	---	---	---	1.5 *U*	---	1.35 *U*	---	1.28 *U*	---	---
Metals (mg/kg dw)												
Antimony	---	---	150	200	---	0.3 *U*	---	0.3 *U*	---	0.2 *U*	---	---
Arsenic	20	51	NA	NA	---	1.6	---	1.1	---	0.8	---	---
Cadmium	1.1	1.5	NA	NA	---	0.3	---	0.3 *U*	---	0.2 *U*	---	---
Chromium	95	100	---	---	---	6.8	---	5.5	---	4.6	---	---
Copper	80	830	NA	NA	---	24.5	---	16	---	11.8	---	---
Lead	340	430	NA	NA	---	2	---	1	---	1 *U*	---	---
Mercury	0.28	0.75	NA	NA	---	0.03 *U*	---	0.03 *U*	---	0.03 *U*	---	---
Nickel	60	70	NA	NA	---	8.4	---	8.1	---	6.7	---	---
Selenium[b]	---	---	---	---	---	0.3 *U*	---	0.3 *U*	---	0.2 *U*	---	---
Silver	2.0	2.5	NA	NA	---	0.3 *U*	---	0.3 *U*	---	0.2 *U*	---	---
Zinc	130	400	NA	NA	---	32	---	25	---	21	---	---
SVOCs (µg/kg dw)												
LPAHs												
2-Methylnaphthalene	470	560	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Acenaphthene	1,100	1,300	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Acenaphthylene	470	640	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Anthracene	1,200	1,600	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Fluorene	1,000	3,000	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Naphthalene	500	1,300	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Phenanthrene	6,100	7,600	NA	NA	63 *U*	13 *J*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Total LPAH	6,600	9,200	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
HPAH												
Fluoranthene	11,000	15,000	NA	NA	63 *U*	31	61 *U*	11 *J*	66 *U*	19 *U*	64 *U*	64 *U*
Pyrene	8,800	16,000	NA	NA	63 *U*	25	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Benz(a)anthracene	4,300	5,800	NA	NA	63 *U*	20	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Chrysene	5,900	6,400	NA	NA	63 *U*	22	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Benzofluoranthenes (b+k)	600	4,000	NA	NA	63 *U*	81	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Benzo(j)fluoranthene	NA	NA	3,200	9,900	--	--	--	--	--	--	--	--
Benzo(a)pyrene	3,300	4,800	NA	NA	63 *U*	28	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Indeno(1,2,3-c,d)pyrene	4,100	5,300	NA	NA	63 *U*	16 *J*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Dibenz(a,h)anthracene	800	840	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Benzo(g,h,i)perylene	4,000	5,200	NA	NA	63 *U*	19 *J*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	7 *U*
Total HPAH	31,000	55,000	NA	NA	63 *U*	242 *J*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Chlorinated hydrocarbons (µg/kg dw)												
1,3-Dichlorobenzene	NA	NA	170	---	63 *U*	1.2 *U*	61 *U*	1.2 *U*	66 *U*	1.2 *U*	64 *U*	64 *U*
1,4-Dichlorobenzene	NA	NA	110	120	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
1,2-Dichlorobenzene	NA	NA	35	110	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
1,2,4-Trichlorobenzene	NA	NA	31	64	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Hexachlorobenzene (HCB)	NA	NA	168	230	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*

Table 2. Weyerhaeuser 2010 Sediment Chemistry Results Compared with SEF Guidelines.[a]

Parameter	SEF - Freshwater SL1	SEF - Freshwater SL2	DMMP - Marine SL	DMMP - Marine ML	C2 Re-extract	C3	C3 Re-extract	C4	C4 Re-extract	C5	C5 Re-extract	C5 Re-extract Dup.
Phthalate esters (µg/kg dw)												
Dimethyl phthalate	46	440	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Diethyl phthalate	NA	NA	200	1,200	33 *JB*	20 *U*	61 *JB*	19 *U*	66 *U*	19 *U*	64 *U*	86 *B*
Di-n-butyl phthalate	NA	NA	1,400	5,100	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Butyl benzyl phthalate	260	370	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Bis(2-ethylhexyl)phthalate	220	320	NA	NA	63 *U*	120	61 *U*	150	66 *U*	120	64 *U*	64 *U*
Di-n-octyl phthalate	26	45	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Phenols (µg/kg dw)												
Phenol	---	---	420	1,200	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
2-Methylphenol	---	---	63	77	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
4-Methylphenol	---	---	670	3,600	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
2,4-Dimethylphenol	---	---	29	210	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Pentachlorophenol	---	---	400	690	310 *U*	98 *U*	310 *U*	97 *U*	330 *U*	96 *U*	320 *U*	320 *U*
Miscellaneous extractables (µg/kg dw)												
Benzyl alcohol	---	---	57	870	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Benzoic acid	NA	NA	650	760	630 *U*	200 *U*	610 *U*	190 *U*	660 *U*	190 *U*	640 *U*	640 *U*
Dibenzofuran	400	440	NA	NA	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Hexachloroethane	---	---	1,400	14,000	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Hexachlorobutadiene	---	---	29	270	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
N-Nitrosodiphenylamine	---	---	28	130	63 *U*	20 *U*	61 *U*	19 *U*	66 *U*	19 *U*	64 *U*	64 *U*
Pesticides (µg/kg dw)												
Total DDT	NA	NA	6.9	69	---	2 *U*	---	1.9 *U*	---	1.9 *U*	---	---
p,p'-DDE	NA	NA	---	---	---	2 *U*	---	1.9 *U*	---	1.9 *U*	---	---
p,p'-DDD	NA	NA	---	---	---	2 *U*	---	1.9 *U*	---	1.9 *U*	---	---
p,p'-DDT	NA	NA	---	---	---	2 *U*	---	1.9 *U*	---	1.9 *U*	---	---
Aldrin	NA	NA	10	---	---	0.98 *U*	---	0.96 *U*	---	0.97 *U*	---	---
Total Chlordane	NA	NA	10	---	---	2 *U*	---	1.9 *U*	---	1.9 *U*	---	---
Dieldrin	NA	NA	10	---	---	2 *U*	---	1.9 *U*	---	1.9 *U*	---	---
Heptachlor	NA	NA	10	---	---	2.1 *UJ*	---	0.96 *U*	---	0.97 *U*	---	---
Lindane	NA	NA	10	---	---	0.98 *U*	---	0.96 *U*	---	0.97 *U*	---	---
PCB Aroclors (µg/kg dw)												
Total PCB Aroclors	60	120	NA	NA	---	10 *U*	---	10 *U*	---	10 *U*	---	---

Notes:

--- = data not available
DMMP = Dredged Material Management Program
HPAH = high molecular weight polycyclic aromatic hydrocarbon
LPAH = low molecular weight polycyclic aromatic hydrocarbon
ML = maximum level
NA = not applicable
PCB = polychlorinated biphenyl
SEF = Sediment Evaluation Framework
SL = screening level
SVOC = semivolatile organic compound

B = analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
J = estimated concentration when the value is less than ARI's established reporting limits
U = indicates the target analyte was not detected at the reported concentration

mg-N/kg dw = millegrams-Nitrogen/kilograms dry weight
µg/kg dw = micrograms/kilograms dry weight
Bis(2-ethylhexyl)phthalate exceeded the SL1 in composite sample C1.
Per the SAP (2008), VOCs were not analyzed.
Per the SAP Addendum (2010), resin acids, guaiacols, and dioxin/furans were not analyzed.

[a] The SEF freshwater guidelines are used for those chemicals of concern for which they are available. The DMMP marine guidelines are used for those chemicals of concern for which no freshwater guidelines exist.
[b] The DMMP bioaccumulation trigger for selenium is 3 mg/kg.

Table 3. Weyerhaeuser DMMP Sediment Sampling Summary, Winter 2010

Location	Note	Dredge Volume to 40 ft CRD (cubic yards)	Sample Type	Sample ID	Proposed Location		Actual Location		Design Depth (ft CRD)	Mudline Depth (ft CRD)	Core Depth Below Mudline (ft)	
					Long_DDM	Lat_DDM	Long_DDM	Lat_DDM			Z1	Z2
DMMU 1	Cargo Dock	46,400	Grab	G1-1	122° 58.941' W	46° 7.505' N	-122° 58.946' W	46° 07.517' N	38	35.7	--	--
			Grab	G1-2	122° 58.983' W	46° 7.531' N	-122° 58.986' W	46° 07.533' N		35.9	--	--
			Grab	G1-3	122° 59.049' W	46° 7.572' N	-122° 59.052' W	46° 07.569' N		34.6	--	--
			Grab	G1-4	122° 59.135' W	46° 7.618' N	-122° 59.136' W	46° 07.619 N		33.9	--	--
			Grab	G1-5	122° 59.154' W	46° 7.645' N	-122° 59.157' W	46° 07.646' N		33.9	--	--
			Core	C1-1	122° 59.135' W	46° 7.618' N	-122° 59.138' W	46° 07.617' N		33.4	4.5-5.5	5.5-6.5
DMMU 2	Turning Basin	14,000	Grab	G2-1	122° 58.964' W	46° 7.482' N	-122° 58.967' W	46° 07.485' N	38	34.9*	--	--
			Grab	G2-2	122° 59.005' W	46° 7.464' N	-122° 59.009' W	46° 07.467' N		39.5*	--	--
			Grab	G2-3	122° 59.055' W	46° 7.512' N	-122° 59.061' W	46° 07.513' N		37.9*	--	--
			Grab	G2-4	122° 59.035' W	46° 7.531' N	-122° 59.033' W	46° 07.530' N		39.7*	--	--
			Core	C2-1	122° 59.035' W	46° 7.531' N	-122° 58.961' W	46° 07.480' N		35.6*	2.4-3.4	3.4-4.4
DMMU 3	Turning Basin	18,400	Grab	G3-1	122° 59.079' W	46° 7.556' N	-122° 59.082' W	46° 07.555' N	38	38.9*	--	--
			Grab	G3-2	122° 59.096' W	46° 7.542' N	-122° 59.097' W	46° 07.543' N		37.9*	--	--
			Grab	G3-3	122° 59.127' W	46° 7.582' N	-122° 59.128' W	46° 07.584' N		36.8*	--	--
			Grab	G3-4	122° 59.172' W	46° 7.546' N	-122° 59.137' W	46° 07.567' N		38.3*	--	--
			Core	C3-1	122° 59.096' W	46° 7.542' N	-122° 59.095' W	46° 07.542' N		35.2*	2.8-3.8	3.8-4.8
DMMU 4	Turning Basin	16,900	Grab	G4-1	122° 59.201' W	46° 7.570' N	-122° 59.189' W	46° 07.595' N	38	35.6	--	--
			Grab	G4-2	122° 59.160' W	46° 7.603' N	-122° 59.167' W	46° 07.605' N		34.1	--	--
			Grab	G4-3	122° 59.230' W	46° 7.583' N	-122° 59.231' W	46° 07.585' N		35.6	--	--
			Core	C4-1	122° 59.160' W	46° 7.603' N	-122° 59.162' W	46° 07.604' N		34.2	3.8-4.8	4.8-5.8
DMMU 5	Salt Dock	19,600	Grab	G5-1	122° 59.395' W	46° 7.695' N	-122° 59.334' W	46° 07.611' N	38	37.6	--	--
			Grab	G5-2	122° 59.310' W	46° 7.604' N	-122° 59.256' W	46° 07.593' N		36.6	--	--
			Core	C5-1	122° 59.395' W	46° 7.695' N	-122° 59.260' W	46° 07.593' N		36.8	1.2-2.2	2.2-3.2

Notes:

* = Depths less than shown due to one-hour lag in "real-time" tide gage corrections. Water depths confirmed using November 2009 bathymetric survey of Cargo Dock (Northwest Hydro Inc.) and were generally 1.5-2 ft less than "real-time" reading.

-- = not applicable

CRD = Columbia River Datum

DDM = degrees, decimals, minutes

DMMP = dredge management prism

DMMU = dredge management unit

Memorandum: Determination Regarding the Suitability of Proposed Dredged Material from Berth 1 of the Chinook Ventures Facility, Longview, Washington, for Flowlane Disposal in the Columbia River

Dredged Material Management Program. November 4, 2010.

CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD November 4, 2010

SUBJECT: DETERMINATION REGARDING THE SUITABILITY OF PROPOSED DREDGED MATERIAL FROM BERTH 1 OF THE CHINOOK VENTURES FACILITY, LONGVIEW, WASHINGTON, FOR FLOW-LANE DISPOSAL IN THE COLUMBIA RIVER.

1. Introduction. This memorandum reflects the consensus determination of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Environmental Protection Agency, and Washington Departments of Ecology and Natural Resources) regarding the suitability of up to 31,300 cubic yards (cy) of maintenance dredged material from Chinook Ventures Berth 1 in Longview for flow-lane disposal in the Columbia River. See Figure 1 for a vicinity map.

2. Background. Chinook Venture's import/export operations are centered on the existing dock facility, referred to as Berth 1. Prior to Chinook's involvement at the site, Reynolds Metals Company operated Berth 1 and routinely performed maintenance dredging. The last maintenance dredging event occurred in 2000 under USACE Permit No. 97-2-00894. The USACE permit authorized a berth depth of -40 feet Columbia River Datum (CRD) plus an overdredge allowance. Maintenance dredging is necessary at Berth 1 to allow ships continued safe access to its berthing facilities. The proposed dredge depth for Berth 1 is -40 feet CRD, with a 2-foot overdredge allowance (-42 feet CRD total). Berth 1 and its adjacent channel, also referred to as Area A, occupies approximately 14.2 acres and is shown on Figure 2 (Anchor, 2010a). Area B, also shown in Figure 2, is associated with a facility expansion project and may be sampled and characterized at a future date. It is not covered by this suitability determination.

   Concurrent with characterization of maintenance dredged material at Berth 1, the Department of Ecology conducted an investigation into a petroleum coke spill that was alleged to have occurred from the loading facilities associated with Berth 1. One of the areas of investigation was adjacent to the area proposed for maintenance dredging (see Figure 3). Results of that investigation – as they pertain to the suitability of the dredged material for flow-lane disposal – are discussed in section 7 of this suitability determination.

3. Project Summary. Table 1 includes project summary and tracking information.

Table 1. Project Summary

Project ranking	High (for this dredging cycle only)
Characterized volume	31,300 cy
Maintenance depth	-40 ft. CRD
1st draft SAP received	June 3, 2010
DMMP comments on 1st draft	June 21, 2010
Revised SAP received	August 11, 2010
Revised SAP approved	August 13, 2010
Sampling dates	August 31 - September 2, 2010

Data report received	November 2, 2010
DAIS Tracking number	CHINV-1-A-F-298
USACE Permit Application Number	NWS-2010-1220
Recency Determination (moderate rank = 5 years)	September 2015

4. Project Ranking and Sampling Requirements. The Chinook Ventures facility would normally be ranked "moderate", given the type of facility and its location. However, due to the proximity of Ecology's area of investigation, the proposed dredging area was ranked "high" by the DMMP agencies for this round of characterization. The purpose of this ranking was to increase sampling density to investigate the presence or absence of petroleum coke.

   In high-ranked areas with heterogeneous sediment, the minimum numbers of field samples and dredged material management units (DMMUs) are calculated using the following guidelines (DMMP, 2008a):
   - Maximum volume of sediment represented by each field sample = 4,000 cy
   - Maximum volume of sediment represented by each surface DMMU = 4,000 cy
   - Maximum volume of sediment represented by each subsurface DMMU = 12,000 cy

   Based on these guidelines, the proposed dredging volume of 31,300 cy (19,990 cy of surface material and 11,310 cy of subsurface material) would require a minimum of 8 field samples and 6 DMMUs. The SAP called for 9 field samples and 7 DMMUs.

   Note: The sampling and analysis plan originally included 60,500 cy in 15 DMMUs. Subsequent to approval of the SAP, Chinook Ventures decided to scale back the dredging by eliminating DMMUs 7 through 14. Surface DMMUs 1 through 6 and subsurface DMMU 15 remained.

5. Sampling. Sampling took place from August 31 to September 2, 2010 using a vibracore sampler. Dense sand was encountered and vibracore refusal occurred where the deeper cores were planned in DMMU 15. Recovery was also poor at some locations. Anchor QEA consulted the Dredged Material Management Office regarding these problems. The DMMP agencies agreed with Anchor QEA's proposal to take two additional samples (A15 and A16) from locations in subsurface DMMU 15 where the dredge cut was thinner in order to recover adequate material for z-samples. The agencies also agreed that the core samples taken from DMMU 15, while they did not penetrate to the bottom of the dredging prism, were of adequate length to represent this dredging unit.

   See Figures 4 and 5 for core sampling locations. Table 2 presents this information in tabular form. Table 3 includes compositing information.

6. Chemical Analysis. The approved analysis plan was followed (with minor exceptions) and quality control guidelines specified by the PSEP and DMMP programs were generally met, with only minor quality control deviations (Anchor, 2010b). The data were considered sufficient and acceptable for regulatory decision-making under the DMMP program.

   For this project, the DMMP agencies agreed to use the SEF freshwater guidelines (RSET, 2006), supplemented by the DMMP marine guidelines (DMMP, 2008a) for those chemicals of concern for which freshwater guidelines do not exist. The preliminary chemical results included a single reporting limit exceedance of a SEF freshwater screening level. Di-n-octylphthalate, while undetected in all DMMUs, had reporting limits exceeding the SL1 of 26 ug/kg. The laboratory re-analyzed these samples to achieve lower reporting limits for di-n-octylphthalate and, upon re-analysis, all samples remained undetected and reporting limits were below the SL1 value. There were no other exceedances of the freshwater or marine screening levels. See Table 4 for the chemistry results.

All seven DMMUs met suitability guidelines, based on chemistry alone, for flow-lane disposal in the Columbia River.

7. Ecology's Petroleum Coke Spill Investigation. Grab samples were collected from 7 sampling stations near the loading facilities associated with Berth 1 (see Figure 3) and tested for metals and PAHs. All sediment samples, including the grab samples from the area of investigation and the cores taken from the DMMUs, were visually screened for petroleum coke, alumina and cement during sampling. Quantitative estimates were also made during the grain-size analysis.

   Results of the chemical analysis can be found in Table 5. There were no screening level exceedances for any of the grab samples. Results of the visual inspection and quantitative analysis are included in Table 6. In half the samples there was no petroleum coke, alumina or cement observed during sampling or grain-size analysis. The other samples had detectable quantities of petroleum coke, but in very small amounts. The one exception was SG-05, which was estimated to contain 2% petroleum coke. The sampling location for SG-05 is directly adjacent to the loading line and approximately 150 feet from the Berth 1 dredging area. The results do provide evidence of spillage. However, the consequences for the dredging area appear to be minimal. There were only minute amounts of petroleum coke found in the dredged material samples. On the basis of the evidence, the DMMP agencies agreed there was little risk posed by the dredging and disposal of the proposed dredged material.

8. Sediment Exposed by Dredging. Sediment exposed by dredging must either meet the State of Washington Sediment Quality Standards (SQS) (Ecology, 1995) or the State's antidegradation standard (DMMP, 2008b). Comparison of the proposed dredged material to SQS normally serves as a first-tier indicator for this purpose. However, in the case of the Chinook Ventures project, there are two arguments against the use of SQS. First, the SQS were developed for marine sediment; the Chinook Ventures site is in freshwater. Second, the total organic carbon (TOC) content ranged from 0.03 to 0.16% for the seven DMMUs. The Department of Ecology does not recommend carbon-normalization when TOC is below 0.5 percent. Therefore, the DMMP agencies agreed to use the freshwater SL1 guidelines for those chemicals for which these guidelines exist and the dry-weight-normalized marine SLs for the other chemicals of concern. As indicated in section 6 of this suitability determination, there were no exceedances of either the freshwater SL1s or the marine SLs. On this basis the agencies concluded that the project is in compliance with the State of Washington anti-degradation policy.

9. Suitability Determination. This memorandum documents the evaluation of the suitability of sediment proposed for dredging from the Chinook Ventures Berth 1 in Longview for flow-lane disposal. The approved sampling and analysis plan was followed (with minor exceptions) and the data gathered were deemed sufficient and acceptable for regulatory decision-making under the DMMP program.

   Based on the results of the previously described testing, the DMMP agencies conclude that **all 31,300 cubic yards are suitable** for flow-lane disposal in the Columbia River. The material is also likely acceptable for upland disposal but the applicant should contact the local health district or the

Washington Department of Ecology for guidance in this regard, depending on where the material is placed.

The sediment characterization results do not support continued use of the "high" ranking that was used for this dredging cycle. Therefore, the recency determination period of 5 years is based on the normal ranking of "moderate".

10. References.

Anchor, 2010a. *Sampling and Analysis Plan, Chinook Ventures Sediment Characterization, Longview, Washington.* Prepared by Anchor QEA, LLC for Chinook Ventures, Inc. August 2010.

Anchor, 2010b. *Sediment Characterization Report, Chinook Ventures Area A and Surficial Sediments, Longview, Washington.* Prepared by Anchor QEA, LLC on behalf of Chinook Ventures, Inc. November 2010.

DMMP, 2008a. *Dredged Material Evaluation and Disposal Procedures (Users Manual)*. Dredged Material Management Program, July 2008.

DMMP, 2008b. Quality of Post-Dredge Sediment Surfaces (Updated). A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

Ecology, 1995. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, December 1995.

RSET, 2006. *Northwest Regional Sediment Evaluation Framework, Interim Final.* Northwest Regional Sediment Evaluation Team, September 2006.

10. Agency Signatures.

Concur:

11/4/10 David Fox

Date — David Fox, P.E. - Seattle District Corps of Engineers

11/4/10

Date — Erika Hoffman - Environmental Protection Agency

11/04/2010 Laura Inouye

Date — Laura Inouye, Ph.D. - Washington Department of Ecology

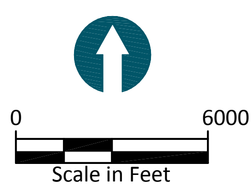
11/04/2010

Date — Dave Vagt - Washington Department of Natural Resources

Copies furnished:

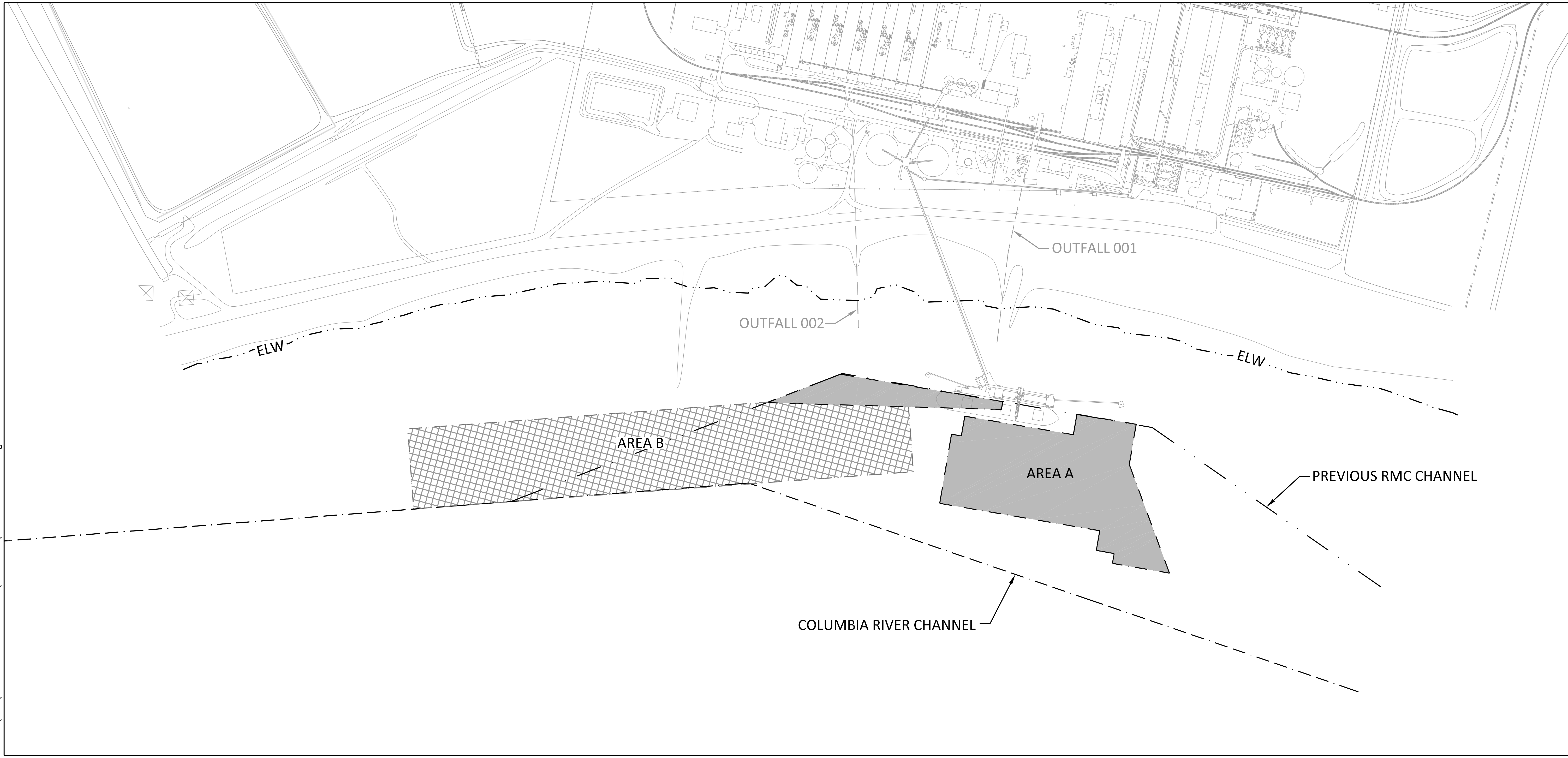
DMMP signatories
Danette Guy, Corps Regulatory
James Keithly, Anchor QEA
Rebecca Desrosiers Gardner, Anchor QEA
Dan Guy, NMFS
Jeremy Buck, USFWS

SOURCE: Aerial Image From Google Earth Pro 2009



ANCHOR QEA

Figure 1
Site Vicinity Map
Sediment Characterization Report
Chinook Ventures



K:\Jobs\100354 Chinook Ventures\100354-01\10035401-RP-030.dwg F2

Nov 03, 2010 8:12am dholmer

SOURCE: Drawing prepared from multibeam bathymetric survey performed by TerraSond, Ltd. on April 29 and 30, 2010.
HORIZONTAL DATUM: Washington State Plane South, NAD83(91), US Survey Feet.
VERTICAL DATUM: Columbia River Datum (CRD) based on published tidal datums for NOAA Tide Station 944-0422 (1983-2001 epoch).
NOTE: Elevation 0.00 feet CRD is accepted as Extreme Low Water and the line between Tide Lands and Bed Lands.

LEGEND:

ELW Extreme Low Water

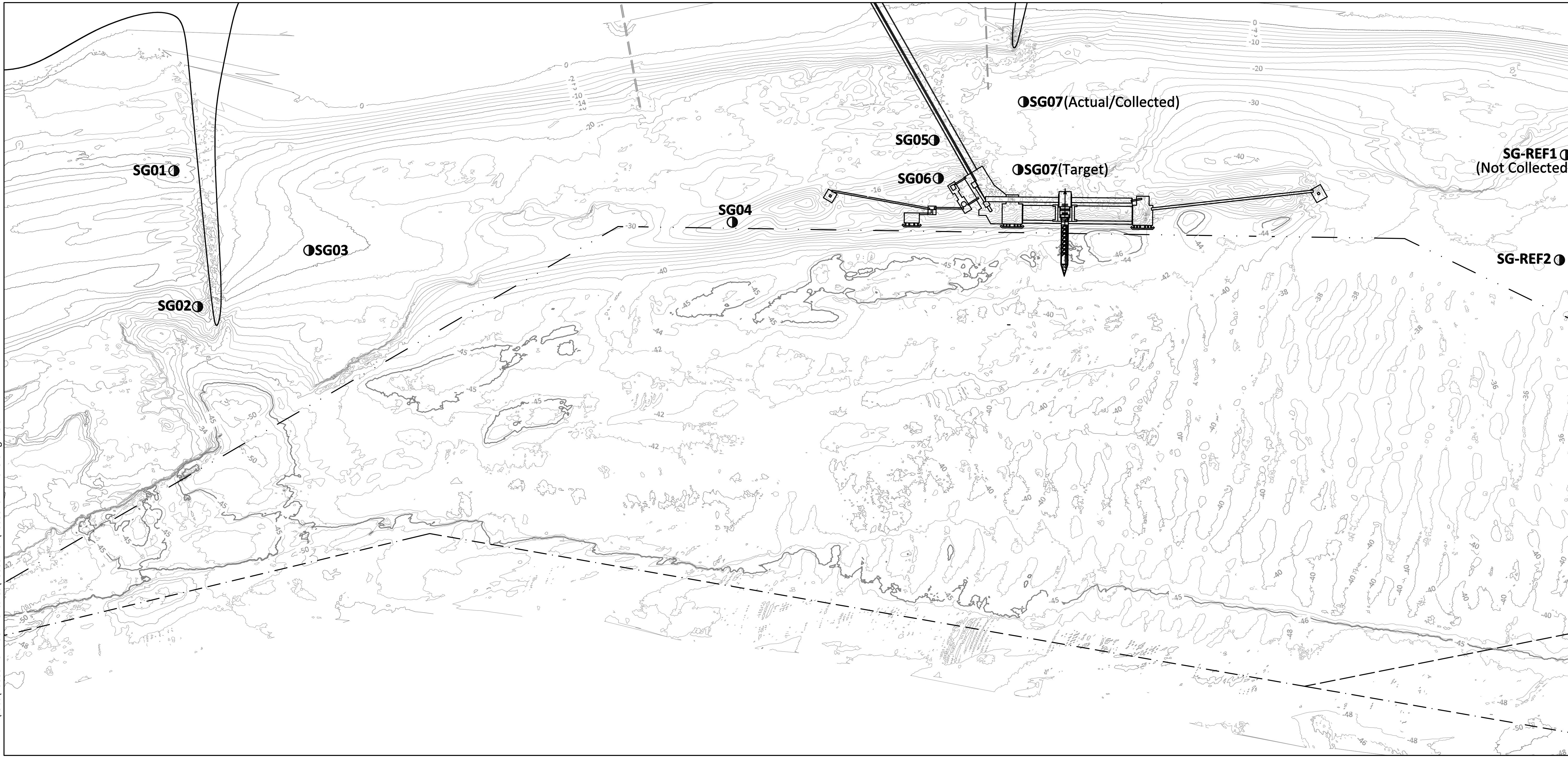
Area A: Current Dredge Area

Area B: Potential Future Dredging

0 500
Scale in Feet

ANCHOR QEA

Figure 2
Original SAP Study Areas
Sediment Characterization Report
Chinook Ventures

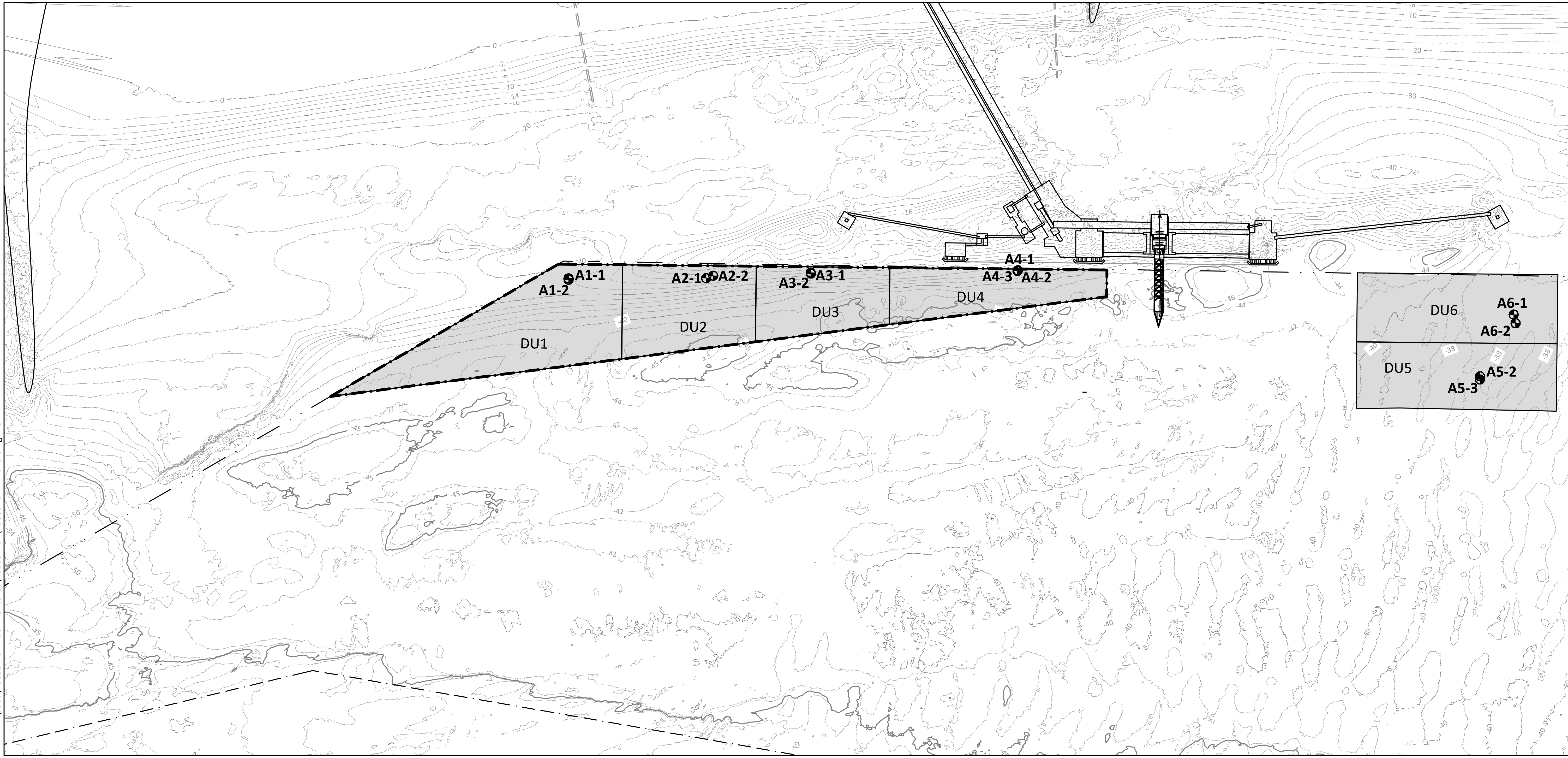


SOURCE: Drawing prepared from multibeam bathymetric survey performed by TerraSond, Ltd. on April 29 and 30, 2010.
HORIZONTAL DATUM: Washington State Plane South, NAD83(91), US Survey Feet.
VERTICAL DATUM: Columbia River Datum (CRD) based on published tidal datums for NOAA Tide Station 944-0422 (1983-2001 epoch).
NOTE: Elevation 0.00 feet CRD is accepted as Extreme Low Water and the line between Tide Lands and Bed Lands.

LEGEND:
SG01 Grab Sample Location and Number

0 200
Scale in Feet

Figure 3
Surface Sediment Grab Sample Locations
Sediment Characterization Report
Chinook Ventures



K:\Jobs\100354 Chinook Ventures\100354-01\10035401-RP-029.dwg FIG 4
Nov 01, 2010 2:29pm cdavidson

SOURCE: Drawing prepared from multibeam bathymetric survey performed by TerraSond, Ltd. on April 29 and 30, 2010.
HORIZONTAL DATUM: Washington State Plane South, NAD83(91), US Survey Feet.
VERTICAL DATUM: Columbia River Datum (CRD) based on published tidal datums for NOAA Tide Station 944-0422 (1983-2001 epoch).
NOTE: Elevation 0.00 feet CRD is accepted as Extreme Low Water and the line between Tide Lands and Bed Lands.

LEGEND:

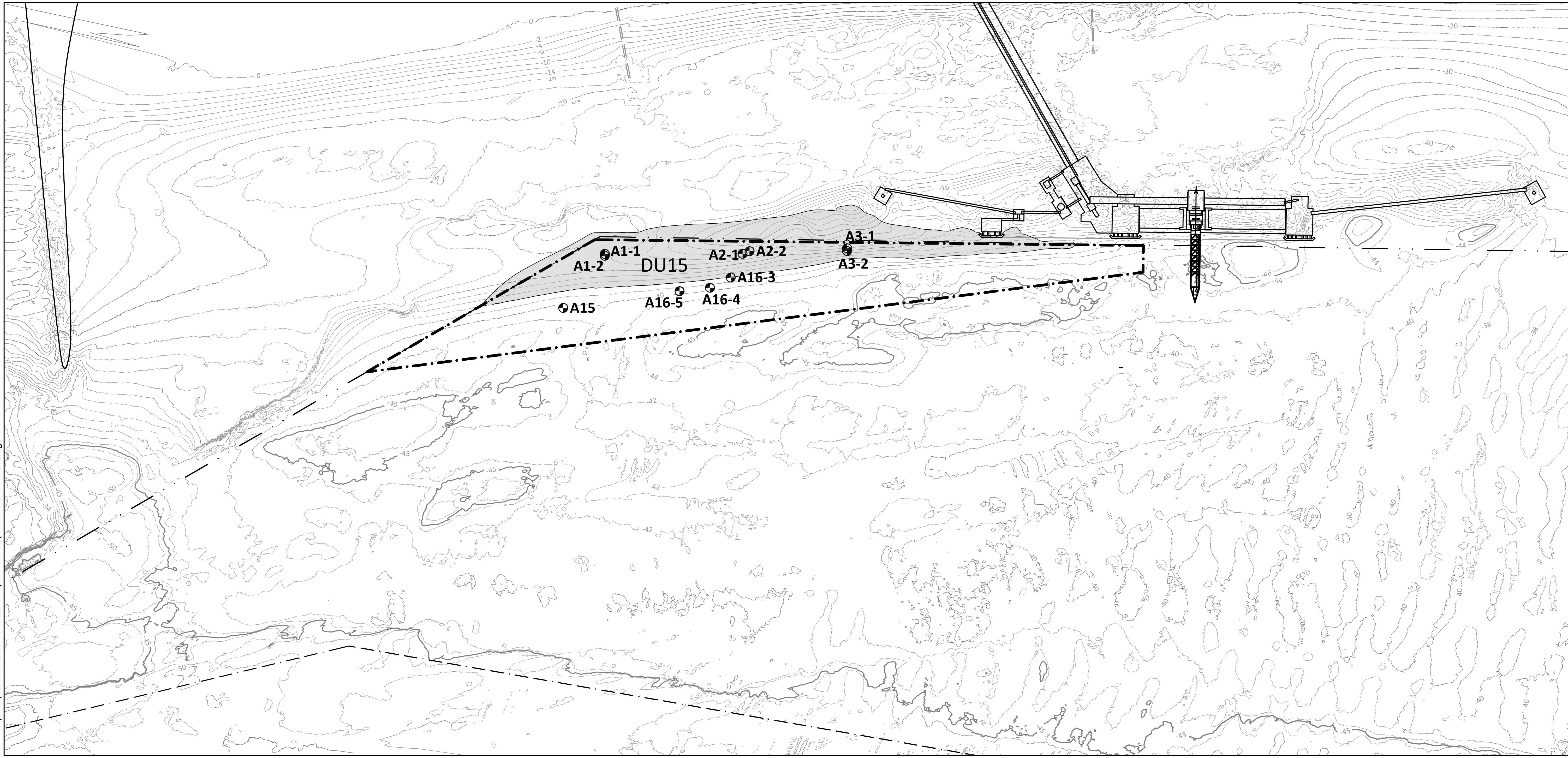
A1 — Core Location and Number

Surface Dredge Unit Boundary and Designation

0 150
Scale in Feet

ANCHOR QEA

Figure 4
Area A Surface DU Core Locations
Sediment Characterization Report
Chinook Ventures



K:\Jobs\100354 Chinook Ventures\100354-01\10035401-RP-029.dwg FIG 5

Nov 11, 2010 2:12pm dholmer

SOURCE: Drawing prepared from multibeam bathymetric survey performed by TerraSond, Ltd. on April 29 and 30, 2010.
HORIZONTAL DATUM: Washington State Plane South, NAD83(91), US Survey Feet.
VERTICAL DATUM: Columbia River Datum (CRD) based on published tidal datums for NOAA Tide Station 944-0422 (1983-2001 epoch).
NOTE: Elevation 0.00 feet CRD is accepted as Extreme Low Water and the line between Tide Lands and Bed Lands.

LEGEND:

A1 Core Location and Number

Area A Dredge Footprint

Subsurface Dredge Unit Boundary and Designation

0 150
Scale in Feet

ANCHOR QEA

Figure 5
Area A Subsurface DU Core Locations
Sediment Characterization Report
Chinook Ventures

Table 2
Core Locations and Mudline Elevations
(adapted from Anchor, 2010b)

Location Name	Observation Date	Latitude	Longitude	Mudline Elevation
A1-1	09/02/2010	46.13649041	123.0047059	-28.4
A1-2	09/02/2010	46.13649041	123.0047059	-28.5
A2-1	09/01/2010	46.13614923	123.0040577	-25.5
A2-2	09/01/2010	46.13614034	123.0040157	-23.9
A3-1	09/01/2010	46.13590807	123.0035461	-29.1
A3-2	09/01/2010	46.13590807	123.0035461	-27.7
A4-1	09/01/2010	46.13540196	123.0025631	-34.2
A4-2	09/01/2010	46.13540196	123.0025631	-34.2
A4-3	09/01/2010	46.13540206	123.002565	-34.4
A5-2	08/31/2010	46.13390869	123.0007672	-38.9
A5-3	08/31/2010	46.13390869	123.0007672	-38.5
A6-1	08/31/2010	46.13402696	123.0003885	-37.5
A6-2	08/31/2010	46.13399421	123.0004103	-37.8
A15	09/02/2010	46.13641708	123.0050943	-40.2
A16-3	09/02/2010	46.13610115	123.0041978	-35.7
A16-4	09/02/2010	46.136119	123.004332	-40.0
A16-5	09/02/2010	46.13618339	123.0044874	-39.5

Notes:

- Mudline elevations are in Columbia River Datum and are corrected for river stage.
- Location Name extention indicates the coring attempt; due to poor recovery not all cores were used

Table 3
Core Recovery, Intervals, and Compositing Scheme
(adapted from Anchor, 2010b)

Dredge Unit	Volume (cy)	Composite Sample ID	Cores Composited	Percent Recovery	Uncorrected Core Interval (feet)	Recovery Corrected Core Interval (feet)	Targeted Sediment Interval (feet)
DU1	3,790	DU1-A-100903	A1-1	33%	0 to 1.3	0 to 3.9	0 to 4.0
			A1-2	55%	0 to 2.2	0 to 4.0	0 to 4.0
DU2	3,120	DU2-A-100902	A2-1	46%	0 to 1.8	0 to 3.9	0 to 4.0
			A2-2	40%	0 to 1.6	0 to 4.0	0 to 4.0
DU3	2,640	DU3-A-100902	A3-1	75%	0 to 3.0	0 to 4.0	0 to 4.0
			A3-2	41%	0 to 1.6	0 to 3.9	0 to 4.0
DU4	2,340	DU4-A-100902	A4-1	63%	0 to 2.5	0 to 4.0	0 to 4.0
			A4-2	56%	0 to 2.2	0 to 4.0	0 to 4.0
			A4-3	60%	0 to 2.4	0 to 4.0	0 to 4.0
DU5	4,050	DU5-A-100901	A5-2	54%	0 to 1.7	0 to 3.1	0 to 3.1
			A5-3	64%	0 to 2.3	0 to 3.6	0 to 3.5
DU6	4,050	DU6-A-100902	A6-1	66%	0 to 2.6	0 to 3.9	0 to 4.5
			A6-2	82%	0 to 3.3	0 to 4.0	0 to 4.2
DU15	11,310	DU15-B-100903	A1-1	33%	1.3 to 3.4	3.9 to 10.3	4.0 to 13.6
			A1-2	55%	2.2 to 5.4	4.0 to 9.8	4.0 to 13.5
			A2-1	46%	1.8 to 4.8	3.9 to 10.4	4.0 to 16.5
			A2-2	40%	1.6 to 3.7	4.0 to 9.3	4.0 to 18.1
			A3-1	75%	3.0 to 4.8	4.0 to 6.4	4.0 to 12.9
			A3-2	41%	1.6 to 3.9	3.9 to 9.5	4.0 to 14.3

Notes:
- Core intervals and targeted sediment intervals do not include z-samples
- Two additional stations not shown here (A15 and A16) were used for z-samples in DU 15

Table 4 - Analytical Results
(from Anchor, 2010b)

Task					Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment
Location ID					A1	A2	A3	A4	A5	A6	DU15/Subsurface
Sample ID					DU1-A-100903	DU2-A-100902	DU3-A-100902	DU4-A-100902	DU5-A-100901	DU6-A-100902	DU15-B-100903
Sample Date	SEF	SEF	SEF	SEF	09/03/2010	09/02/2010	09/02/2010	09/02/2010	09/01/2010	09/02/2010	09/03/2010
Depth	MARINE	MARINE	FRESH	FRESH	0 - 4 ft	0 - 4 ft	0 - 4 ft	0 - 4 ft	0 - 3.6 ft	0 - 4 ft	4 - 10.5 ft
Sample Type	SL1	SL2	SL1	SL2	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Conventional Parameters (mg/kg)											
Ammonia	---	---	---	---	**8.04**	**9.68**	**12.2**	**6.77**	**14.4 J**	**2.97**	**21.7**
Sulfide	---	---	---	---	1.25 U	1.28 U	**1.94**	**1.95**	**1.12**	1.12 U	**1.55**
Conventional Parameters (pct)											
Gravel	---	---	---	---	0.07	0	0	0.01	1.7	3.24	0
Sand (coarse + medium + fine)	---	---	---	---	86.4	79.34	83.2	89.97	96.42	94.67	80.86
Coarse Sand	---	---	---	---	0.03	0	0	0.05	6.6	11.94	0
Medium Sand	---	---	---	---	27.2	15.9	23.4	42.4	85.9	78.4	21.1
Fine Sand	---	---	---	---	59.18	63.43	59.76	47.5	3.9	4.28	59.74
Silt	---	---	---	---	12.24	19.84	15.97	8.83	1.4	1.74	18.83
Clay	---	---	---	---	0.93	0.57	0.51	1.13	0.24	0.12	0
Fines (Silt + Clay)	---	---	---	---	13.17	20.41	16.48	9.96	1.64	1.86	18.83
Total organic carbon	---	---	---	---	**0.155**	**0.101**	**0.0948**	**0.133**	**0.026**	**0.0416**	**0.147**
Total solids	---	---	---	---	**78.3**	**78.4**	**79**	**80.7**	**92.3**	**90.8**	**78.2**
Metals (mg/kg)											
Antimony	150	150	---	---	0.649 UJ	0.653 UJ	0.647 UJ	0.627 UJ	0.552 UJ	0.557 UJ	0.638 UJ
Arsenic	57	93	20	51	**0.707 J**	**0.582 J**	**0.621 J**	**0.671 J**	**0.69 J**	**0.752 J**	**0.759 J**
Cadmium	5.1	6.7	1.1	1.5	0.649 UJ	**0.0719 J**	**0.0712 J**	**0.069 J**	**0.0552 J**	**0.0725 J**	**0.0766 J**
Chromium	260	270	95	100	**3.52 J**	**3.08 J**	**4.5 J**	**3.32 J**	**3.33 J**	**3.93 J**	**4.15 J**
Copper	390	390	80	830	**11.5**	**13.6**	**12.8**	**11.4**	**8.85**	**8.87**	**13.5**
Lead	450	530	340	430	**0.798**	**0.778**	**0.9**	**0.903**	**0.761**	**2.36**	**0.925**
Mercury	0.41	0.59	0.28	0.75	0.0519 U	0.0523 U	0.0518 U	0.0502 U	0.0441 U	0.0446 U	0.051 U
Nickel	---	---	60	70	**5.01 J**	**4.69 J**	**5.49 J**	**5.46 J**	**6.13 J**	**6.17 J**	**5.53 J**
Silver	6.1	6.1	2	2.5	0.649 U	0.653 U	0.647 U	0.627 U	0.552 U	0.557 U	0.638 U
Zinc	410	960	130	400	**15.9**	**19.5**	**19.4**	**16.9**	**17.2**	**19.5**	**17.1**
Aromatic Hydrocarbons (µg/kg)											
Total LPAH (U = 1/2)	5200	5200	6600	9200	**9.1**	6.73 U	**12.0**	**14.7**	2.88 U	**13.2**	**11.8**
Naphthalene	2100	2100	500	1300	6.72 UJ	6.73 UJ	6.61 UJ	6.61 UJ	2.88 UJ	5.87 UJ	6.77 UJ
Acenaphthylene	560	1300	470	640	3.35 U	3.35 U	3.29 U	3.29 U	1.43 U	2.92 U	3.37 U
Acenaphthene	500	500	1100	1300	3.35 U	3.35 U	3.29 U	3.29 U	1.43 U	2.92 U	3.37 U
Fluorene	540	540	1000	3000	3.35 UJ	3.35 UJ	3.29 UJ	3.29 UJ	1.43 UJ	2.92 UJ	3.37 UJ
Phenanthrene	1500	1500	6100	7600	**2.37 J**	3.35 U	**5.34**	**5.9**	1.43 U	**7.37**	**5.03**
Anthracene	960	960	1200	1600	3.35 U	3.35 U	3.29 U	3.29 U	1.43 U	2.92 U	3.37 U
2-Methylnaphthalene	670	670	470	560	6.72 UJ	6.73 UJ	6.61 UJ	3.8 UJ	2.88 UJ	5.87 UJ	6.77 UJ
Total HPAH (U = 1/2)	12000	17000	31000	55000	**24.7**	**21.8**	**50.4**	**32.0**	2.16 U	**33.1**	**103.3**
Fluoranthene	1700	2500	11000	15000	**4.18**	**3.26 J**	**6.9**	**7.13**	1.43 U	**8.71**	**16.6**
Pyrene	2600	3300	8800	16000	**3.64**	**2.88 J**	**5.58**	**6.11**	1.43 U	**7.88**	**15.7**
Benzo(a)anthracene	1300	1600	4300	5800	**2.34 J**	**2.14 J**	**3.95**	**2.87 J**	1.43 U	**3.21**	**9.28**

Table 4 - Analytical Results
(from Anchor, 2010b)

Task					Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment	Area A Sediment
Location ID					A1	A2	A3	A4	A5	A6	DU15/Subsurface
Sample ID					DU1-A-100903	DU2-A-100902	DU3-A-100902	DU4-A-100902	DU5-A-100901	DU6-A-100902	DU15-B-100903
Sample Date	SEF	SEF	SEF	SEF	09/03/2010	09/02/2010	09/02/2010	09/02/2010	09/01/2010	09/02/2010	09/03/2010
Depth	MARINE	MARINE	FRESH	FRESH	0 - 4 ft	0 - 4 ft	0 - 4 ft	0 - 4 ft	0 - 3.6 ft	0 - 4 ft	4 - 10.5 ft
Sample Type	SL1	SL2	SL1	SL2	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Chrysene	1400	2800	5900	6400	**2.52 J**	**1.77 J**	**7.92**	**3.53**	1.43 U	**2.93**	**10.9**
Benzo(b)fluoranthene	3200	3600	600	4000	**4.21 J**	**4.13 J**	**9.37**	**4.41 J**	2.16 U	**3.36 J**	**15.6**
Benzo(k)fluoranthene	3200	3600	600	4000	5.03 U	5.04 U	**4.48 J**	4.95 U	2.16 U	4.39 U	**6.07**
Benzo(a)pyrene	1600	1600	3300	4800	**4 J**	**3.82 J**	**6.75**	**4.23 J**	2.16 U	**3.75 J**	**14.4**
Indeno(1,2,3-c,d)pyrene	600	690	4100	5300	3.35 U	3.35 U	**2.57 J**	3.29 U	1.43 U	2.92 U	**7.11**
Dibenzo(a,h)anthracene	230	230	800	840	3.35 U	3.35 U	3.29 U	3.29 U	1.43 U	2.92 U	3.37 U
Benzo(g,h,i)perylene	670	720	4000	5200	3.35 U	3.35 U	**2.02 J**	3.29 U	1.43 U	2.92 U	**6.81**
Total PAH (U = 1/2)					**33.8**	**29.4**	**62.3**	**46.7**	2.88 UJ	**46.4**	**115.1**
Chlorinated Hydrocarbons (µg/kg)											
1,4-Dichlorobenzene	110	110	---	---	3.35 U	3.35 U	3.29 U	3.29 U	1.43 U	2.92 U	3.37 U
1,2-Dichlorobenzene	35	50	---	---	3.35 U	3.35 U	3.29 U	3.29 U	1.43 U	2.92 U	3.37 U
1,2,4-Trichlorobenzene	31	51	---	---	4.18 U	4.18 U	4.11 U	4.11 U	1.79 U	3.65 U	4.21 U
Hexachlorobenzene	22	70	---	---	1.01 UJ	**1.9**	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
Phthalates (µg/kg)											
Dimethyl phthalate	71	160	46	440	10.1 U	10.1 U	9.91 U	9.9 U	4.31 U	8.79 U	10.1 U
Diethyl phthalate	200	200	---	---	10.1 U	10.1 U	9.91 U	9.9 U	4.31 U	8.79 U	10.1 U
Di-n-butyl phthalate	1400	1400	---	---	20.1 U	20.2 U	19.8 U	19.8 U	11.5 U	17.6 U	20.3 U
Butylbenzyl phthalate	63	900	260	370	20.1 U	20.2 U	19.8 U	19.8 U	11.6 U	17.6 U	20.3 U
Bis(2-ethylhexyl) phthalate	1300	1900	220	320	33.7 U	33.8 U	33.2 U	33.2 U	19.1 U	29.4 U	34 U
Di-n-octyl phthalate	6200	6200	26	45	16.7 U	16.8 U	16.5 U	16.5 U	14.4 U	14.6 U	16.9 U
Phenols (µg/kg)											
Phenol	420	1200	---	---	20.1 U	20.2 U	19.8 U	19.8 U	8.62 U	17.6 U	20.3 U
2-Methylphenol (o-Cresol)	63	63	---	---	6.72 U	6.73 U	6.61 U	6.61 U	2.88 U	5.87 U	6.77 U
4-Methylphenol and 3-methylphenol (m&p-Cresol)	670	670	---	---	6.72 U	6.73 U	6.61 U	6.61 U	2.88 U	5.87 U	6.77 U
2,4-Dimethylphenol	29	29	---	---	6.72 U	6.73 U	6.61 U	6.61 U	2.88 U	5.87 U	6.77 U
Pentachlorophenol	400	690	---	---	16.8 U	16.8 U	16.5 U	16.5 U	7.19 U	14.7 U	16.9 U
Miscellaneous Extractables (µg/kg)											
Benzyl alcohol	57	73	---	---	6.72 U	6.73 U	6.61 U	6.61 U	2.88 U	5.87 U	6.77 U
Benzoic acid	650	650	---	---	134 U	135 U	132 U	132 U	57.5 U	117 U	135 U
Dibenzofuran	540	540	400	440	3.35 U	3.35 U	3.29 U	3.29 U	1.43 U	2.92 U	3.37 U
Hexachlorobutadiene	11	120	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
N-Nitrosodiphenylamine	28	40	---	---	6.69 U	6.71 U	6.59 U	6.58 U	2.87 U	5.84 U	6.74 U
Pesticides (µg/kg)											
4,4'-DDD (p,p'-DDD)	16	28	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
4,4'-DDE (p,p'-DDE)	9	9.3	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
4,4'-DDT (p,p'-DDT)	12	34	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
Aldrin	9.5	9.5	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
Total Chlordanes (sum of alpha, gamma, and oxy)	2.8	4.5	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ

Table 4 - Analytical Results
(from Anchor, 2010b)

Task Location ID Sample ID Sample Date Depth Sample Type	SEF MARINE SL1	SEF MARINE SL2	SEF FRESH SL1	SEF FRESH SL2	Area A Sediment A1 DU1-A-100903 09/03/2010 0 - 4 ft Normal	Area A Sediment A2 DU2-A-100902 09/02/2010 0 - 4 ft Normal	Area A Sediment A3 DU3-A-100902 09/02/2010 0 - 4 ft Normal	Area A Sediment A4 DU4-A-100902 09/02/2010 0 - 4 ft Normal	Area A Sediment A5 DU5-A-100901 09/01/2010 0 - 3.6 ft Normal	Area A Sediment A6 DU6-A-100902 09/02/2010 0 - 4 ft Normal	Area A Sediment DU15/Subsurface DU15-B-100903 09/03/2010 4 - 10.5 ft Normal
alpha-Chlordane (cis-Chlordane)	---	---	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
gamma-Chlordane	---	---	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
Oxychlordane	---	---	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
Dieldrin	1.9	3.5	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
Heptachlor	1.5	2	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
gamma-Hexachlorocyclohexane (Lindane)	---	---	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
cis-Nonachlor	---	---	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
trans-Nonachlor	---	---	---	---	1.01 UJ	1.07 U	1.02 U	0.906 U	0.869 U	0.928 U	1.08 UJ
PCB Aroclors (µg/kg)											
Aroclor 1016	---	---	---	---	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U
Aroclor 1221	---	---	---	---	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U
Aroclor 1232	---	---	---	---	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U
Aroclor 1242	---	---	---	---	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U
Aroclor 1248	---	---	---	---	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U
Aroclor 1254	---	---	---	---	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U
Aroclor 1260	---	---	---	---	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U
Total PCBs (U=0)	130	1000	60	120	6.3 U	6.34 U	6.12 U	6.18 U	5.38 U	5.34 U	6.2 U

Notes:

Bold = Detected result

J = Estimated value

U = Compound analyzed, but not detected above detection limit

UJ = Compound analyzed, but not detected above estimated detection limit

All undetect results are reported at the **reporting limit**

Totals are calculated as the sum of all detected results and half of the **detection limit** of undetected results (U=1/2)

Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest reporting limit value is reported as the sum

Total LPAH (Low PAH) are the total of 2-Methylnapthalene, Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene

Total HPAH (High PAH) are the total of Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(x)fluoranthenes, Benzo(a)pyrene, Indeno(1,2,3-c,d)pyrene, Dibenzo(a,h)anthracene, and Benzo(g,h,i)perylene

Gravel = particles larger than 2.0 mm; sand = 2.0 to 0.063 mm; coarse sand = 2.0 to 0.85 mm; medium sand = 0.85 to 0.15 mm; fine sand = 0.15 to 0.063 mm; silt = 0.063 to 0.0039 mm; clay = finer than 0.0039 mm

Table 5
Surface Sediment Grab Sample Analytical Results
(from Anchor, 2010b)

Task Location ID Sample ID Sample Date Depth Sample Type	SEF MARINE SL1	SEF MARINE SL2	SEF FRESH SL1	SEF FRESH SL2	Area A Sediment SG01 SG01-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG01 SG51-100830 08/30/2010 0 - 10 cm Field Duplicate	Area A Sediment SG02 SG02-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG03 SG03-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG04 SG04-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG05 SG05-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG06 SG06-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG07 SG07-100830 08/30/2010 0 - 10 cm Normal
Conventional Parameters (pct)												
Gravel	---	---	---	---	0.2	0.1	0.1	0.1	0.1	1.7	0.1	0.0
Sand (coarse + medium + fine)	---	---	---	---	87.1	87.3	56.8	91.9	85.8	81.3	70.0	17.8
Coarse Sand	---	---	---	---	0.1	0.1	0.0	0.0	0.1	0.4	0.0	1.1
Medium Sand	---	---	---	---	17.9	19.0	17.3	36.4	22.3	23.7	7.4	7.5
Fine Sand	---	---	---	---	69.2	68.2	39.5	55.5	63.5	57.1	62.6	9.2
Silt	---	---	---	---	12.3	11.4	42.8	7.6	12.8	14.8	27.6	44.0
Clay	---	---	---	---	0.0	1.0	0.1	0.1	1.0	1.1	2.1	19.9
Fines (Silt + Clay)	---	---	---	---	12.33	12.37	42.92	7.75	13.83	15.84	29.69	63.92
Total organic carbon	---	---	---	---	**0.0941**	**0.128**	**0.128**	**0.123**	**0.156**	**0.181**	**0.255**	**5.44**
Total solids	---	---	---	---	**76.2**	**76.4**	**76.4**	**76.1**	**75.2**	**75.8**	**71.6**	**46.3**
Metals (mg/kg)												
Antimony	150	150	---	---	**0.101 J**	**0.209 J**	**0.18 J**	**0.0793 J**	0.683 U	**0.291 J**	**0.0921 J**	**0.393 J**
Arsenic	57	93	20	51	**0.908 J**	**0.85 J**	**0.76 J**	**0.767 J**	**0.799 J**	**0.948 J**	**0.892 J**	**8.49**
Cadmium	5.1	6.7	1.1	1.5	**0.114 J**	**0.0877 J**	**0.0933 J**	**0.0793 J**	**0.0751 J**	**0.108 J**	**0.12 J**	**0.525 J**
Chromium	260	270	95	100	**4.61 J**	**6.19 J**	**5.21 J**	**6.52 J**	**4.8 J**	**5.44 J**	**5.12 J**	**24.5 J**
Copper	390	390	80	830	**11.9**	**12.4**	**11.2**	**11.8**	**12.3**	**14.6**	**18.6**	**33.2**
Lead	450	530	340	430	**1.11**	**1.06**	**1.05**	**1.04**	**1.02**	**1.08**	**1.29**	**7.9**
Mercury	0.41	0.59	0.28	0.75	0.0538 U	0.054 U	0.0533 U	0.0529 U	0.0546 U	0.0542 U	0.0567 U	0.0874 U
Nickel	---	---	60	70	**6.29 J**	**7.68 J**	**6.8 J**	**8.02 J**	**6.32 J**	**6.66 J**	**6.28 J**	**25.3 J**
Silver	6.1	6.1	2	2.5	0.672 U	0.675 U	0.666 U	0.661 U	0.683 U	0.677 U	0.708 U	1.09 U
Zinc	410	960	130	400	**17.9**	**17.8**	**18.7**	**19.5**	**23.7**	**23.4**	**22.6**	**65.7**
Aromatic Hydrocarbons (µg/kg)												
Total LPAH (U = 1/2)	5200	5200	6600	9200	**97.9**	**123.6**	**4.8**	**23.6**	**6.9**	**27.8**	**17.1**	5.62 U
Naphthalene	2100	2100	500	1300	**2.73 J**	**2.42 J**	3.38 UJ	3.49 UJ	3.49 UJ	8.74 UJ	3.7 UJ	5.6 UJ
Acenaphthylene	560	1300	470	640	1.64 U	1.62 U	1.69 U	1.74 U	1.74 U	4.37 U	1.85 U	2.8 U
Acenaphthene	500	500	1100	1300	**15.4**	**16.9**	1.69 U	**3.95**	1.74 U	4.37 U	**1.88**	2.8 U
Fluorene	540	540	1000	3000	**4.7 J**	**6.28 J**	1.69 UJ	**2.83 J**	1.74 UJ	4.37 UJ	**1.75 J**	2.8 UJ
Phenanthrene	1500	1500	6100	7600	**57.1**	**75.3**	**1.42 J**	**12.5**	**2.46**	**14.6**	**9.46**	2.8 U
Anthracene	960	960	1200	1600	**16.7**	**21.5**	1.69 U	**2.12**	**1.4 J**	**3.28 J**	**1.74 J**	2.8 U
2-Methylnaphthalene	670	670	470	560	3.29 UJ	3.25 UJ	3.4 UJ	3.5 UJ	3.5 UJ	**4.44 J**	3.71 UJ	5.62 UJ
Total HPAH (U = 1/2)	12000	17000	31000	55000	**869.2**	**1127.3**	**12.9**	**60.9**	**49.6**	**138.4**	**76.2**	28 U
Fluoranthene	1700	2500	11000	15000	**134**	**176 J**	**2.5**	**13**	**16.2**	**31**	**21.7**	2.8 U
Pyrene	2600	3300	8800	16000	**133**	**165 J**	**2.24**	**10.8**	**12.9**	**28**	**19.4**	2.8 U
Benzo(a)anthracene	1300	1600	4300	5800	**81.2**	**111**	**1.4 J**	**5.04**	**4.81**	**13.9**	**6.18**	2.8 U
Chrysene	1400	2800	5900	6400	**89.9**	**127**	**1.45 J**	**4.57**	**6.72**	**14.6**	**6.96**	2.8 U
Benzo(b)fluoranthene	3200	3600	600	4000	**110**	**150 J**	**1.62 J**	**6.12**	**3.04**	**13.1**	**7.45**	4.21 U

Table 5
Surface Sediment Grab Sample Analytical Results
(from Anchor, 2010b)

Task / Location ID / Sample ID / Sample Date / Depth / Sample Type	SEF MARINE SL1	SEF MARINE SL2	SEF FRESH SL1	SEF FRESH SL2	Area A Sediment SG01 SG01-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG01 SG51-100830 08/30/2010 0 - 10 cm Field Duplicate	Area A Sediment SG02 SG02-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG03 SG03-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG04 SG04-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG05 SG05-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG06 SG06-100830 08/30/2010 0 - 10 cm Normal	Area A Sediment SG07 SG07-100830 08/30/2010 0 - 10 cm Normal
Benzo(k)fluoranthene	3200	3600	600	4000	**41.5**	**50.4**	2.54 U	**2.02 J**	2.62 U	**3.8 J**	**2.48 J**	4.21 U
Benzo(a)pyrene	1600	1600	3300	4800	**98.7 J**	**128 J**	2.54 UJ	**5.38 J**	**2.09 J**	**13.1 J**	**4.54 J**	4.21 UJ
Indeno(1,2,3-c,d)pyrene	600	690	4100	5300	**81.3**	**104**	**0.983 J**	**6.3**	**1.35 J**	**6.66**	**3.21**	28 U
Dibenzo(a,h)anthracene	230	230	800	840	**17.6**	**23**	1.69 U	**1.27 J**	1.74 U	**4.22 J**	**0.984 J**	28 U
Benzo(g,h,i)perylene	670	720	4000	5200	**82**	**92.9**	**1.06 J**	**6.44**	**1.42 J**	**10 J**	**3.33**	28 U
Total PAH (U = 1/2)	---	---	---	---	**967.1**	**1250.9**	**17.8**	**84.5**	**56.5**	**166.2**	**93.4**	28 U

Notes:
Bold = Detected result
J = Estimated value
U = Compound analyzed, but not detected above detection limit
UJ = Compound analyzed, but not detected above estimated detection limit
All undetect results are reported at the **reporting limit**
Totals are calculated as the sum of all detected results and half of the **detection limit** of undetected results (U=1/2)
Totals are calculated as the sum of all detected results (U=0). If all results are not detected, the highest reporting limit value is reported as the sum
Total LPAH (Low PAH) are the total of 2-Methylnapthalene, Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene
Total HPAH (High PAH) are the total of Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(x)fluoranthenes, Benzo(a)pyrene, Indeno(1,2,3-c,d)pyrene, Dibenzo(a,h)anthracene, and Benzo(g,h,i)perylene
Gravel = particles larger than 2.0 mm; sand = 2.0 to 0.063 mm; coarse sand = 2.0 to 0.85 mm; medium sand = 0.85 to 0.15 mm; fine sand = 0.15 to 0.063 mm; silt = 0.063 to 0.0039 mm; clay = finer than 0.0039 mm

Table 6
Petroleum Coke Observations in Grab and Core Samples
(from Anchor, 2010b)

Sample ID	Field or Core Processing Observation	Laboratory Observation	Laboratory Approximate Quantity
Grab Sample Observations			
SG01-100830	None Observed	Possible petroleum coke in +20 fraction	0.09% of total sample
SG51-100830 (field duplicate of SG01)	None Observed	Petroleum coke observed in +10 and possible petroleum coke in +20 fraction	0.18% of total sample
SG02-100830	None Observed	None Observed	NA
SG03-100830	None Observed	None Observed	NA
SG04-100830	None Observed	None Observed	NA
SG05-100830	Petroleum Coke Observed; <5% by volume	Petroleum coke observed in +4 fraction; +10 and +20 fractions are predominantly petroleum coke	2.0% of total sample
SG06-100830	None Observed	None Observed	NA
SG07-100830	None Observed	None Observed	NA
Core Observations			
DU1-A-100903	None Observed	1 to 2 spheres of petroleum coke in +20 fraction	0.03% of total sample
DU2-A-100902	None Observed	None Observed	NA
DU3-A-100902	None Observed	Possible petroleum coke in +20 fraction	1 grain, 0.01 grams, 0% of total sample
DU4-A-100902	None Observed	Petroleum coke (2 pieces) in +20 fraction	2 grains, 0.05% of total sample
DU5-A-100901	None Observed	Possible petroleum coke in +20 fraction	Not quantified
DU6-A-100902	None Observed	None Observed	NA
DU15/Subsurface	None Observed	None Observed	NA

Note:
NA = Not applicable