FINAL
IN SITU SOIL REMEDIATION TREATABILITY STUDY REPORT

Port of Longview's Maintenance Facility Area Longview, Washington

Prepared for

INTERNATIONAL PAPER

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AAFS	additional action feasibility study
ANS	American Nuclear Society
ASTM	American Society of Testing and Materials
bgs	below ground surface
cPAH	carcinogenic polynuclear aromatic hydrocarbon
CAP	cleanup action plan
COCs	chemicals of concern
cm/sec	centimeters per second
DI	de-ionized
DNAPL	dense non-aqueous phase liquid
DRO	diesel range organics
DW	dangerous waste
EPA	Environmental Protection Agency
ERH	electrical resistive heating
GRS	Global Remediation Solutions LLC
HASP	Health and Safety Plan
HDPE	high-density polyethylene
HWMU	hazardous waste management unit
ISS	*in situ* solidification
ISSS	*in situ* solidification and stabilization
ISTR	*in situ* thermal remediation
ITRC	Interstate Technology Regulatory Council
LNAPL	light non-aqueous phase liquid
msl	mean sea level
MFA	Maintenance Facility Area
MTCA	Model Toxics Control Act
ncPAH	non-carcinogenic polynuclear aromatic hydrocarbon
NAPL	non-aqueous phase liquid
NGVD	National Geodetic Vertical Datum
PAH	polynuclear aromatic hydrocarbon
PCMP	performance and compliance monitoring plan
PCP	pentachlorophenol

PID	photoionization detector
ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
RRO	residual range organics
SPLP	synthetic precipitation leaching procedure
SVOC	semi-volatile organic compound
SWMU	solid waste management unit
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
TSF	tons per square foot
TWP Area	Treated Wood Products Area
UCS	unconfined compressive strength
USCS	unified soil classification system
USGS	United States Geological Survey
VI	vapor intrusion
VOC	volatile organic compound
WAC	Washington Administrative Code

This Final *In Situ* Soil Remediation Treatability Study Report (Report) summarizes activities performed by International Paper Company (International Paper) associated with treatability studies conducted on soil excavated from test pits within the Port of Longview's (Port's) Maintenance Facility Area (MFA). Treatability studies were performed to support evaluation of cleanup action alternatives being considered in a remedial investigation/feasibility study (RI/FS) report that International Paper is currently finalizing.

Activities described in this Report include:

- Excavating two test pits, collecting soil samples, and characterizing site soil;
- Conducting an *in situ* solidification (ISS) treatability study, and evaluating study results; and
- Conducting an *in situ* thermal remediation (ISTR) treatability study, and evaluating study results.

This Report also presents conclusions resulting from the above characterization and evaluation activities, and describes how those conclusions will be incorporated into the Final Revised RI/FS Report.

Two test pits were excavated in two distinct areas within the MFA. Test pit TP-01 was located to the north of the Port's Mechanics Shop in an area previously characterized as less impacted. Test pit TP-02 was located east of the Port's Mechanics Shop in an area previously characterized as more impacted, and where dense non-aqueous phase liquid (DNAPL) would likely be encountered. Field observations made during test pit excavation were recorded on geologic test pit logs, and samples were collected for chemical analysis as well as delivery to treatability laboratories. Test pit TP-02 was observed to be significantly more impacted than test pit TP-01, and free product was observed collecting at the base of test pit TP-02 after excavation was completed.

The ISS treatability study was conducted by Kemron Environmental Services of Atlanta, Georgia in accordance with Interstate Technology Regulatory Council (ITRC) guidance (ITRC 2011). This study included both preliminary ISS evaluation testing of 25 test mixes and additional optimization ISS evaluation testing of variations of one preliminary test mix as well as 6 newly developed test mixes. Tests were performed to evaluate test mixes for strength, leachability, and hydraulic conductivity criteria. Multiple test mixes were identified that could meet these criteria, and this Report presents the following ISS treatability study conclusions:

- ISS results indicate that soil from test pit TP-01 can be expected to meet remediation goals with simple test mixes.
- Soil from test pit TP-02 was also able to meet remediation goals in multiple test mixes, including Mix 28 (8 percent slag cement/2 percent bentonite/0.5 percent caustic soda) and Mix 17 (12.5 percent slag cement/2 percent bentonite/2 percent organoclay).

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

ISTR results indicate that polynuclear aromatic hydrocarbon (PAH) concentrations in highly-impacted soil collected from test pit TP-02 could be reduced by 45 percent with 5 days of steam heating, and that diesel-range organics (DRO) concentrations could be reduced by 50 percent with 5 days of steam heating. Continued heating through 15 days resulted in an additional 23 percent reduction in DRO concentrations, and negligible additional reduction was observed in PAH concentrations. If these treatability study reduction percentages were realized in the MFA during field implementation, 13 of 17 locations that currently exceed the applicable total toxicity equivalent concentration (TTEC) cleanup level would have TTEC concentrations reduced to below the cleanup level. In addition, no special construction requirements were identified during the ISTR treatability study.

The results and conclusions presented in this Report will be incorporated into further evaluation of RI/FS cleanup action alternatives, and this evaluation will be presented in a Final Revised RI/FS Report in August 2014.

This Final *In Situ* Soil Remediation Treatability Study Report (Report) presents the rationale, approach, objectives, methods, and results related to collecting soil samples and performing bench-scale testing of two cleanup action technologies being evaluated for remediation of soil located adjacent to the Treated Wood Products (TWP) Area formerly owned by International Paper Company (International Paper) in Longview, Washington. The primary technology evaluated in this Report includes the recommended cleanup action alternative technology (*in situ* solidification [ISS]) presented in International Paper's Draft Revised Remedial Investigation/Feasibility Study (RI/FS) Report (URS 2011). Solidification is the process of encapsulating contaminants and reducing the mobility of contaminant constituents in a treated material. The second technology evaluated (*in situ* thermal remediation [ISTR]) in this Report was also highly ranked in the RI/FS and was a significant element of other cleanup action alternatives being considered. ISTR uses heat primarily to mobilize contaminants from the subsurface and capture them for treatment and/or disposal at the surface. ISTR affects physical, chemical, and biological processes that can also reduce contaminant concentrations *in situ*.

This Report describes activities that were conducted on the contiguous parcel of land adjacent to and northwest of the former TWP Area, which is known as the Port of Longview's (Port's) Maintenance Facility Area (MFA). Both the TWP Area and the MFA are currently owned by the Port. Historical site activities discussed in this document were conducted first under Agreed Order No. DEHS-S437 (1997) and then under Consent Decree 97-2-01088-9 (1997) between International Paper and the Washington State Department of Ecology (Ecology).

The ISS treatability study described herein was discussed with Ecology and the Port following submittal of the Draft Revised RI/FS report, which included ISS in the preferred cleanup action alternative. A scoping call between International Paper and Ecology was held on June 8, 2011, to discuss details related to sample collection and other details related to the ISS treatability study. The results of that scoping call and subsequent comments were incorporated into the Final ISS Treatability Study Work Plan (Work Plan, URS 2011).

The Work Plan focused on sample collection and ISS treatability study activities. In September 2011, after completion of the Work Plan and field sampling effort, comments were received from Ecology in regards to a separate investigation being conducted at the Port's Mechanics Shop. In addition, comments were also received from Ecology which indicated the Port's desire to include a more aggressive treatment approach to address contamination under the Mechanics Shop. Both ISS and ISTR are being considered to address this concern. Treatment using ISTR technology was considered in two alternatives included in the RI/FS, and one of those included treatment under the Mechanics Shop. A vendor was identified that could perform bench-scale testing of electrical resistive heating (ERH) using soil already excavated for bench testing. In response to comments, International Paper, after communicating with Ecology, determined to also perform a treatability study for ISTR technology. Therefore, treatability study results related to ISTR are also included in this Report.

URS Corporation (URS) is assisting International Paper with development of this Report in accordance with relevant Washington State Model Toxics Control Act (MTCA) regulations (as revised in November 2007) pertaining to treatability studies (WAC 173-340-350(9)(c)).

1.1 REPORT CONTENT

This Report summarizes the background, purpose, objectives, methodology, and results related to treatability study activities that were conducted in the MFA in accordance with the Work Plan (URS, 2011). Information is presented as follows:

- Section 1 Introduction
- Section 2 Field Work Objectives, Methods, and Results
- Section 3 ISS Treatability Study Objectives, Methods, and Results
- Section 4 ISTR Treatability Study Objectives, Methods, Approach, and Results
- Section 5 Treatability Study Conclusions and Future RI/FS Activities
- Section 6 References

1.2 SITE LOCATION AND DESCRIPTION

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

Port maintenance operations border the former TWP Area to the west in the MFA, a formerly active Port grain terminal borders the TWP Area to the south, a paved storage area used by Port tenants is located to the northwest of the TWP Area, and additional vacant Port property is located to the northeast of the TWP Area. The Columbia River is located approximately 300 feet southwest of the former TWP Area.

Vehicles operated by the Port are serviced and washed at the Port's Mechanics Shop in the MFA. The Mechanics Shop measures approximately 15,000 square feet in area, and includes separate areas for maintenance, washing, storage, and office space. According to Port personnel, no underground storage tanks are present beneath or in the vicinity of the building. A security fence surrounds the building, parking lot, and the immediately surrounding area, as shown on Figure 1-2.

The area northeast of the security fence is used by the Port's tenants for storage. The area is flat and paved with asphalt. A linear feature (lineament) observed in historic aerial photographs of this area, taken between 1957 and 1965, has been interpreted to be a trench connecting the former TWP Area wastewater ponds with former off-site impoundments (Figure 1-2).

1.3 SITE GEOLOGY AND HYDROGEOLOGY

Native soil materials are chiefly poorly graded fine to medium sands with layers of silt occurring at three distinct depths. In the vicinity of the site, the Upper Silt is located approximately 10 feet below ground surface (bgs), the Intermediate Silt is located approximately 40 feet bgs, and the Lower Silt is located at approximately 100 feet bgs. The Upper Sand is located above the Upper

Silt, and the Lower Sand is located below the Upper Silt. Two groundwater units are located between the silt layers. Aquifer A is located between the Upper Silt and the Intermediate Silt. Aquifer B is located between the Intermediate Silt and the Lower Silt. Previous investigations have shown that groundwater potentiometric heads fluctuate due to both tidal and seasonal influences, but that groundwater generally flows toward the north-northeast (Woodward-Clyde 1996).

1.4 SITE AND INVESTIGATION HISTORY

The former International Paper Longview facility and the surrounding area were undeveloped in 1919 (USGS 1919). Long Bell operated a saw mill at the site beginning in the early 1920s until 1964. The former TWP Area wood treating facility was active from 1937 to 1982. International Paper purchased Long Bell in 1956. The TWP operation included a treatment building, wastewater plant, boiler house, pentachlorophenol (PCP) mix tank, two PCP work tanks, four creosote and carrier oil tanks, and two unlined surface impoundments (Ponds 1 and 2).

The TWP Area became inactive in 1982. As part of RCRA corrective action and closure activities, soil was removed from several locations within the former TWP Area in 1985; the former ponds and process areas were capped with an engineered cover, including a high-density polyethylene (HDPE) liner in 1989 (J.L. Grant 1990).

In 1997, Ecology requested additional corrective action at the TWP Area that included the physical containment of chemicals of concern (COCs) by construction of a subsurface barrier wall and an additional engineered cover system; removal of light non-aqueous-phase liquids (LNAPL) within the contained area; and *in situ* treatment of contaminants using a combined system of active biosparging wells and passive bioventing wells. These cleanup actions were implemented during 1997 and 1998 and are described in the engineering design report (Woodward-Clyde 1997d) and cleanup action report (URS Greiner Woodward-Clyde 1999e) prepared for the former TWP Area.

In a letter dated November 7, 1997, Ecology noted three areas of concern that were identified during barrier wall construction activities in the fall of 1997. During a conference call on October 24, 2006, Ecology (Ecology 2006) requested that a RI/FS report be produced for the MFA to document the historical investigation and evaluation efforts conducted in accordance with the requirements of both the WAC Dangerous Waste (DW) Regulations (173-303-646) and the MTCA Cleanup Regulations (173-340-350 through 440 and 700 through 760). In January 2007, a draft MFA RI/FS report was submitted to Ecology to summarize historic site activities conducted under both Agreed Order DEHS-S437 (1997) and Consent Decree 97-2-01088-9 (1997). As requested by Ecology, that report presented the results of previous investigations and evaluation efforts conducted for the MFA area, and a table (Table 1-1 of that report) was included to cross-reference between MTCA regulatory requirements and those previous historical site actions that were conducted to satisfy those requirements.

Comments received from Ecology on the January 2007 draft RI/FS report were subsequently received and incorporated into a revised document that was submitted to Ecology in May 2007. International Paper received comments from Ecology in March 2008 that requested additional investigation in the MFA to further delineate affected site media and to further quantify affected media for evaluation of cleanup action alternatives (Kaia Petersen, personal communication 2008). Subsequently, URS prepared an Additional Investigation Work Plan (URS 2008b), which

was submitted to Ecology in June 2008. The results of that additional investigation as well previous investigations and cleanup actions were presented in the Draft Revised RI/FS Report (URS 2011), which also evaluated future cleanup action alternatives for the MFA. Based on previous investigation results and the evaluation of cleanup action alternatives in the Draft Revised RI/FS Report, the selected preferred cleanup action alternative for affected MFA soils was ISS outside the footprint of the Port's Mechanics Shop. Institutional controls and monitored natural attenuation are recommended as the long-term cleanup action alternative for affected groundwater in the MFA following solidification of source soil.

1.5 TREATABILITY STUDY PURPOSE AND OBJECTIVES

The purpose of the treatability studies described in this Report was to evaluate the effectiveness and field parameters associated with *in situ* soil remediation technologies at the International Paper Longview site. Both the preferred cleanup action alternative technology (ISS) and also highly-ranked *in situ* soil remediation technology (ISTR) were evaluated using excavated soil from the site. Treatability studies used representative soil samples that were collected from two different site areas to bracket the range of anticipated cleanup conditions. A list of cleanup alternatives presented in the Draft Revised RI/FS Report (URS 2011) is presented below along with a summary description of the two technologies being evaluated in this treatability study report along with specific treatability objectives.

1.5.1 RI/FS Soil Cleanup Alternatives

This section summarizes the cleanup action technologies and the associated alternatives for soil presented in the Draft Revised RI/FS Report. The cleanup alternative components that were considered and retained for use in developing complete alternatives are listed below.

- Excavation
- ISS
- ERH (one form of *in situ* thermal remediation)
- Containment (but not as a stand-alone cleanup alternative for soil containing dense non-aqueous phase liquid [DNAPL])

Each of the component technologies above were developed into complete alternatives as shown below and discussed further in Section 7.3 of the Draft Revised RI/FS Report.

- Alternative S1 – Baseline Alternative for Soil – Comprehensive Excavation
- Alternative S2 – Comprehensive Excavation Outside Building Footprint
- Alternative S3 – DNAPL Excavation Outside Building Footprint
- Alternative S4 – DNAPL Excavation Outside Building Footprint, Limited Excavation Inside
- Alternative S5 – Solidification Outside Building Footprint
- Alternative S6 – DNAPL Treatment by Electrical Resistance Heating
- Alternative S7 – DNAPL Excavation and Electrical Resistance Heating

1.5.2 ISS – Soil Cleanup Alternative Description and Treatability Study Objective

The Draft Revised RI/FS Report identified Alternative S5 (Solidification Outside Building Footprint) as the preferred soil cleanup action alternative. Alternative S5 consists of in-place mixing of solidifying agents with MFA soil outside the footprint of the Port's Mechanics Shop that contains NAPL and/or the primary COCs (polynuclear aromatic hydrocarbons [PAHs] and diesel-range organics [DRO]) concentrations exceeding associated cleanup levels (Figure 2-1). The mixing agent would be selected to bind the COCs within a modified matrix exhibiting significantly lower permeability compared to the surrounding soil. This treatment reduces the likelihood of contaminant migration by diverting groundwater around the treated matrix and chemically binding the contamination within the matrix. Solidification of soil beneath the Mechanics Shop was not included in this alternative. Residual, unsolidified soil containing COCs would remain beneath the building, with the building structure and the solidified soil outside the building acting as containment to limit water infiltration and thus mobilization of residual COCs.

Alternative S5 for soil included the following estimated quantity assumptions:

- 32,200 square feet of solidification area
- 8,100 cubic yards total volume of site materials within solidification area
- 3,500 cubic yards of clean overburden fill materials to be excavated, segregated, and stockpiled

The main objective for this ISS treatability study was to reduce the permeability of site soil through the use of common and readily available binding reagents. To achieve this two representative soil samples from the site were collected and mixed using different admixtures and ratios to determine the following:

- Hydraulic conductivity
- Leachability of COCs (PAHs and DRO)
- Soil strength
- Other geotechnical properties of treated soil

1.5.3 ISTR – Soil Cleanup Alternatives Description and Treatability Study Objective

The Draft Revised RI/FS Report included two alternatives (S6 and S7) that incorporated ERH technology. These two ERH alternatives ranked high in the RI/FS evaluation, second only to the ISS alternative. Alternative S6 primarily includes soil treatment by ERH throughout the area of DNAPL occurrence (including beneath Mechanics Shop) and preservation of the existing engineered cap (approximately 6 inches of asphalt, 2.5 feet of gravel, and geotextile) over soil containing COCs at concentrations exceeding the cleanup level. Alternative S7 includes excavation and off-site landfill disposal or incineration of soil at the MFA located outside the footprint of the Mechanics Shop that contains DNAPL and ERH treatment of soil within the building footprint.

These alternatives would require installation of an array of electrodes throughout the treatment area and passing electricity into the array. The resistance of the soil to the electrical conduction

between the electrodes results in heating soil and perched groundwater to near boiling (≤100 degrees C), causing transfer of contaminants with lower boiling points into the vapor phase. A multi-phase extraction system (wells, piping, and pumps) removes volatilized contaminants for treatment prior to discharge. Extracted liquids would also be cooled and treated prior to discharge.

The main objective for ISTR treatability study was to determine if conditions are suitable to applying ERH at the site and if heating the samples would reduce COC concentrations to below cleanup levels. Other objectives include the following:

- Determine whether changes occur in NAPL density during ERH treatment
- Determine whether heavier constituents can be steam stripped from the soil matrix
- Determine the degree of COC reduction (PAHs and DRO) that can be achieved during heating
- Evaluate whether volatilization, steam stripping, multi-phase extraction, chemical, and biological are viable treatment processes for implementation of ERH for MFA soil
- Determine the rate of COC reduction to estimate duration of ERH field implementation in the MFA
- Determine whether recovered liquids and vapors solidify upon cooling, and whether any special construction considerations (e.g. heat tracing of process piping) might be necessary for implementation of ERH for MFA soil

This section summarizes the objectives and methods related to field work presented in this Report.

2.1 FIELD WORK OBJECTIVES

The overall objectives for field work related to the treatability study were the following:

- Observe and document the physical characteristics of soil being considered for treatment within open test pits
- Assess the workability of soil being considered for treatment
- Collect representative samples from material being considered for treatment
- Collect enough sample volume as necessary to perform multiple tests

2.2 FIELD WORK METHODS

Two locations were evaluated by advancing test pits to the top of the Upper Silt layer (approximately 6 to 8 feet bgs) using an excavator. One test pit location (TP-01) was excavated within an area where DNAPL has not been encountered. The second location (TP-02) was excavated within an area where DNAPL has been encountered previously. The two test pit locations are shown on Figure 2-1.

2.2.1 Field Work Preparation

Prior to initiating field activities, test pit locations were identified and a private subcontractor (APS of Issaquah, Washington) surveyed the site to identify potential concerns with subsurface structures and/or utilities. In addition to test pit locations TP-01 and TP-02, three contingency test pit locations were also identified and checked for utilities. A public utility locate was also performed (following a 'one-call' notification) prior to field mobilization.

2.2.2 Test Pit Excavation

Excavator operation and other field construction services were performed by Cowlitz Clean Sweep (CCS) of Longview, Washington. Geologic cross-section alignments D-D' and E-E' are identified relative to sampling locations on Figure 2-1. The asphalt surface was saw cut at both test pit locations, and asphalt was removed in an area measuring approximately 10 feet by 10 feet (100 square feet) at each location. Removed asphalt was segregated and transported to an off-site facility for recycling.

A small excavator was then used to slowly remove the upper clean gravel fill materials at test pit TP-01 and stockpile them on plastic sheeting. The upper gravel layer was clearly distinct and separated from the Upper Sand by a layer of geotextile filter fabric. Upper Sand soil from beneath the clean fill layer was then excavated to the top of the Upper Silt. Geologic cross-section D-D' is shown on Figure 2-2 and identifies the approximate thicknesses and locations of geologic layers that were encountered during excavation at test pit TP-01. Soil samples were field screened in the excavator bucket and then placed in a roll-off container. Sample collection details are described in the following Section 2.2.3 Test Pit Characterization. Photographs of each test pit are presented in Appendix A.

Test pit TP-02 was completed in a similar manner as TP-01, by first removing and stockpiling the upper clean gravel fill materials on plastic sheeting. Soil from beneath the clean fill layer was then excavated. Within 1 foot bgs (immediately below the asphalt cover) a concrete pipe was encountered. After consulting with Port personnel, the pipe within the test pit was removed, and excavation continued to the top of the Upper Silt. Upon reaching the top of the Upper Silt, free product was observed flowing into the pit from the test pit sidewalls (see photos in Appendix A). Geologic cross-section E-E' is shown on Figure 2-3 and identifies the approximate thicknesses and locations of geologic layers that were encountered during excavation at test pit TP-02. Soil samples were screened in the excavator bucket and then placed in a roll-off container. Soil containing DNAPL and soil exhibiting stronger field indications (e.g., odor, staining, or elevated photoionization detector [PID] readings) of contamination were kept segregated within the roll-off container. Sample collection details are described in the following section.

2.2.3 Test Pit Characterization and Sampling

Test pit logs were prepared for both test pits, and they are provided in Appendix B. The logs identify soil types and field observations made while screening soil samples collected using the excavator. The test pit logs include observations for the full depth of the Upper Sand. The excavator bucket was used to collect two samples from each test pit after excavation was completed at each test pit, and the excavator bucket was decontaminated between test pit locations. One sample from each test pit was collected across the full depth of Upper Sand material below the clean gravel fill, which is the depth interval being considered for treatment by ISS. This was done by scraping a thin layer of material from the excavation sidewall across the desired depth interval. The second sample from each test pit was taken from material immediately above the Upper Silt layer, which is typically the depth at which highest concentrations have been observed in historical samples. The following samples were taken from the test pits at the depths indicated:

- TP-01 (2 to 7.5 feet bgs)
- TP-01 (7.5 feet bgs)
- TP-02 (2 to 6.5 feet bgs)
- TP-02 (6.5 feet bgs)

Both samples from each test pit were submitted to Columbia Analytical Services (CAS) of Kelso, Washington for laboratory analysis. Soil samples from the entire-depth interval proposed for treatment within the Upper Sand were analyzed for PAHs and total petroleum hydrocarbons (TPH) in both site soil and in leachate resulting from synthetic precipitation leaching procedure (SPLP) and toxicity characteristic leaching procedure (TCLP) extraction methods. The samples from the bottom of each test pit were also analyzed for PAHs and TPH. The purpose of analyzing soil collected from the entire depth interval proposed for treatment was to develop baseline concentrations for comparison against treatability results (both soil and leachate). The purpose of analyzing soil collected from the bottom of the test pits was to develop upper end concentrations to bracket the range of anticipated soil concentrations requiring treatment at those test pit locations (soil only).

Five 1-gallon containers were also filled with soil from each test pit and submitted to Kemron Environmental Services, Inc. (Kemron) of Atlanta, Georgia for the ISS treatability study. The soil submitted to Kemron from each test pit was collected from the full-depth interval of the Upper Sand at each test pit, to be representative of the depth interval being considered for treatment by ISS.

2.2.4 Test Pit Backfilling

Test pit TP-01 was backfilled immediately following the completion of sample collection and backfill was then compacted in lifts using native soil from the roll-off container. A log providing a description of backfilling methods and a record of compaction testing is included as Appendix C. New geotextile fabric was placed over the surface of the native soil materials to overlap the existing surrounding geotextile fabric, and then the upper clean gravel fill was replaced to the elevation of the base of the asphalt surfacing. Test pit TP-01 was backfilled to the base of the asphalt prior to commencing excavation at test pit TP-02. All excavated materials were replaced at test pit location TP-01.

Test pit TP-02 was backfilled following sample collection using compacted lifts. Clean imported fill amended with cement was used as backfill at the bottom of the excavation due to the presence of free-product and perched groundwater. After backfilling above the elevation of the free-product and perched groundwater was completed, backfilling continued using previously excavated native soil stockpiled in the roll-off container. New geotextile fabric was placed over the surface of the native soil materials to overlap the existing surrounding geotextile fabric, and then the upper clean gravel fill was replaced to the elevation of the base of the asphalt surfacing. Approximately five drums of excess soil remained in the roll-off container after backfilling of test pit TP-01 was completed. This soil was drummed and stored within the secure chain-link fenced area containing the MFA remediation system enclosure.

Asphalt restoration was performed the following morning (Thursday, August 23, 2011) by Lakeside Industries of Longview, Washington. Asphalt was placed and compacted in two lifts.

2.3 FIELD WORK RESULTS

This section summarizes the field observations made during test pit excavation and also presents the analytical results for samples collected from the two test pits.

2.3.1 Test Pit Observations

Both test pits generally consist of an asphalt surface 7 to 9 inches thick overlaying a gray, coarse gravel fill to approximately 2 feet bgs. A geotextile fabric is located below the gravel and marks the top of the Upper Sand layer. The Upper Sand geologic unit varies in color from light to dark brown and is gray in places. The sand is fine to medium in size and is moist. The Upper Silt unit is gray in color and is located below the Upper Sand. Some differences observed for subsurface conditions at the two test pits are described below.

No odor was noticed in test pit TP-01; conversely TP-02 was documented to have strong creosote odor, with PID readings of 70 to 170 parts per million (ppm). The Upper Sand unit was found to have a higher percentage of silt (SM vs SP) in test pit TP-01. The Upper Silt unit was

observed at a depth of 7.5 feet bgs in test pit TP-01 and at a depth of 6.5 feet bgs in test pit TP-02. A significant difference in observations between the two test pits was observed near the bottom of test pit TP-02, where significant staining was observed and free product flowed into the excavation from the side walls.

2.3.2 Analytical Chemistry Results

Two soil samples from each test pit TP-01 and TP-02 (four total) as indicated in Section 2.2.3 were collected and submitted to CAS for chemical analyses. These field samples were submitted for analyses indicated in Table 2-1. Analytical results for these field samples submitted to CAS indicate that test pit TP-02 has significantly higher COC concentrations than test pit TP-01. Furthermore, the samples collected at the bottom of the test pits (TP-1 at 7.5 feet bgs and TP-2 at 6.5 feet bgs) generally contained higher COC concentrations than the samples collected from a broader range of depths at the same test pit.

Analytical laboratory results for field soil samples from each test pit are summarized in Table 2-2 and in a more detailed data summary table included in Appendix D. Analytical laboratory reports are provided in Appendix E. Following the receipt of analytical laboratory reports, URS conducted quality assurance reviews of the submitted data. Summaries of these reviews are provided in Appendix F.

As described in Section 2, test pit samples were delivered to Kemron for ISS Treatability Study immediately following test pit excavation on August 22, 2011. This section includes a description of the objectives, methods, approach, and results of the treatability study testing performed by Kemron. A summary of the decisions made during the study are also presented in this section. Specific details of work performed by Kemron are presented in their final report dated September 26, 2012, which is provided in Appendix G. All ISS testing performed during the ISS treatability study was conducted at Kemron's facilities located in Atlanta, Georgia. All analytical testing was performed by CAS located in Kelso, Washington for analytical consistency.

3.1 ISS TREATABILITY STUDY OBJECTIVES

This section describes the objectives of ISS treatability study conducted by Kemron. The primary objective of the treatability study was to evaluate whether amendment of site soil with solidification reagents could achieve typical ISS goals related to reduced hydraulic conductivity and leachability of COCs from the site soil. A secondary objective was to evaluate the improvement of physical properties including unconfined compressive strength (UCS) and volumetric expansion for the treated materials in relation to goals expressed by the Port. The specific goals related to the objectives of reduced hydraulic conductivity, reduced leachability, and optimal strength were identified as follows:

- Reduce hydraulic conductivity (K) to the order of 10^{-6} cm/sec
- Reduce contaminant concentrations in groundwater in contact with solidified soil to below MTCA Method A (TPH) or MTCA Method C (PAHs) cleanup levels for groundwater.
- Achieve soil strengths between 50 and 200 psi to provide enough strength to allow current use for storage of materials and operation of heavy equipment, as well as to allow for future site development using standard excavating equipment.

3.2 ISS TREATABILITY STUDY METHODS

The following sections describe specific test methods that were performed during the ISS treatability study. They are consistent with industry standard practices for ISS site applications and with the example performance tests identified in ITRC guidance (ITRC 2011) and as summarized in Table 3-1.

3.2.1 Physical Properties

The following physical properties were tested by the identified methods during the ISS treatability study:

- Grain Size by ASTM Method D422/D1140
- Moisture Content by ASTM Method D2216
- Loss on Ignition (Organic Content) by ASTM Method D2974
- Volumetric Expansion

Additional details on these properties methods are included in Appendix G. Soil samples also were logged according to soil classification and descriptions by Unified Soil Classification System (USCS) Method D2487.

3.2.2 Strength

Strength testing was performed on ISS test mixes to evaluate whether treatment goals could be met. The following strength tests were performed by the methods identified below during the ISS study:

- Strength by pocket penetrometer
- Strength by the Unconfined Compressive Strength (UCS) by ASTM Method D2166

The pocket penetrometer is a factory-calibrated, hand-held instrument used to determine the relative strength of a solidified or cohesive material. The penetrometer instrument is pressed into the surface of the test specimen, and the resistance to penetration of the specimen is then displayed on the penetrometer in units of tons per square foot (TSF). The penetrometer is typically used as a guide to estimate the potential setting characteristics of a solidified material. The standard penetrometer instrument provides approximate resistance strengths ranging from 0.0 to 4.5 TSF. Materials which exhibit extreme resistance to penetration may display penetrometer strengths greater than 4.5 TSF. Penetrometer testing alone was used to estimate potential initial strengths during initial curing intervals.

UCS is a measure of the shear strength of the treated material. Testing is performed on cylindrical specimens with a diameter to height ratio of 1:2. Typical sample measurements performed by Kemron are 2 inches in diameter and 4 inches in height or 3 inches in diameter and 6 inches in height. As specified by ASTM Method D2166, testing was performed at a strain rate of 1 percent per minute. Testing was terminated at sample failure or at an overall sample deformation of 15 percent, whichever occurred first.

3.2.3 Leachability

Three primary test methods were used for evaluating leachability:

- TCLP by EPA Method 1311
- SPLP by EPA Method 1312
- Mass Flux by American Nuclear Society (ANS) Method ANS 16.1 (Revised and Updated 2008) - Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Test Procedure

The TCLP test was developed to simulate the more aggressive extraction that occurs in municipal landfills where the waste decomposition can produce organic acids. Generally, one of two leaching fluids is used based on the buffering capacity of the material being tested. TCLP procedures include particle-size reduction to pass a 9.5-mm sieve following sample crushing. The test sample is then tumbled in the presence of the appropriate TCLP leaching fluid. The fluid is then separated from the solid portion of the sample and analyzed for the COCs.

The SPLP test is similar to the TCLP test, but uses an inorganic acid that simulates leaching by acid rain, rather than the organic acid that is used in the TCLP test. The SPLP test also requires crushing of the sample to create particles with diameters measuring less than 3/8-inch (approximately 9.5-mm) for the test.

Both the TCLP and SPLP tests are very conservative (results are biased high) for use in evaluating ISS leachability. The crumbling of samples exposes contaminants to leaching which may have been otherwise completely encapsulated in the treated monolith in the field. In addition, the acid used as a leachant in these tests is much more aggressive than would be typical for groundwater at an ISS site. These tests, however, are commonly used for screening and developing relative comparisons between multiple ISS test mixes. More direct comparison to anticipated groundwater concentrations following ISS implementation can be evaluated using mass flux methods such as ANS 16.1.

The ANS 16.1 leaching procedure utilizes 7 leaching intervals, including cumulative times of 2, 7, and 24 hours; and 2, 3, 4, and 5 days. The procedure uses a sample of the treated test mix material which is moved between baths of de-ionized (DI) water at the interval indicated. The resulting leachate can be analyzed for COCs and the solidified test specimen is placed into a new bath of DI water for additional leaching. For this project, chemical analysis was typically performed on the final 5-day interval for all ANS 16.1 tests. Complete ANS 16.1 testing was performed on three optimization test mixes with leachate from each of the seven test intervals indicated above.

Leachate from each of the above three leachability test methods was analyzed by EPA Method 8270 for PAHs and by Ecology Method NWTPH-Dx for TPH, including both DRO and residual-range organics (RRO). URS conducted quality assurance reviews of all analytical data.

3.2.4 Hydraulic Conductivity

Hydraulic conductivity is the quantitative measure of soil's ability to transmit water when subject to a hydraulic gradient. It is a function of both the porous medium (e.g., soil) and a fluid (e.g., groundwater). Hydraulic testing as outlined in ASTM D5084 was performed to estimate the flow rate of water through ISS test mixes under saturated conditions. Kemron performed hydraulic conductivity testing on cylinders measuring approximately 3 inches in diameter and 2 inches in height at an effective confining pressure of 10 psi.

3.3 ISS TREATABILITY STUDY APPOACH

The overall approach guiding typical ISS treatability studies as identified in ITCR guidance (ITCR 2011) can be broken down into three categories as listed below and shown on Figure 3-1:

- Physical Properties Characterization and ISS Reagent Selection (Figure 3-3)
- Preliminary ISS evaluation (Figure 3-4)
- Optimization ISS evaluation (Figure 3-5 and Figure 3-6)

A more detailed overview of the activities performed under each of the above approach categories is provided in a process flow diagram presented in Figure 3-2. Descriptions for each step performed for the ISS treatability study are presented below.

3.3.1 Physical Properties Characterization and ISS Reagent Selection

Following delivery to Kemron, soil samples submitted from each test pit were individually homogenized by blending in an open pan using a stainless steel spoon. These untreated but homogenized samples were then submitted for analytical testing at CAS to develop baseline concentrations against which to measure leachability concentration reductions for future test mixes. The soil samples were analyzed for PAHs, TPH, as well as leachate samples for PAHs and TPH from SPLP and TCLP methods.

In addition to analytical characterization, samples were also characterized for physical properties by testing for moisture content, loss on ignition (carbon content), and particle size distribution.

A process flow diagram representing the activities associated with this phase of the treatability study is presented on Figure 3-3. The diagram includes a list of reagent materials that were delivered to Kemron from various suppliers to be mixed with site soil for the ISS treatability study. The materials selected were based on a combined Kemron and URS evaluation of physical properties, COC concentrations, material availability, and experience on similar projects. The ISS materials selected are commonly utilized in solidification treatment and would be readily available for delivery to the project site during potential field implementation. Detailed descriptions of the reagents selected are included in Appendix G and vendor supplied material safety data sheets are provided in Appendix H.

3.3.2 Preliminary ISS Evaluation

A process flow diagram illustrating the activities associated with the preliminary ISS evaluation and their relationships is presented on Figure 3-4. The preliminary ISS evaluation consisted of first incorporating reagents selected as described above with site soil to create various test mixes. These test mixes were made by precisely measuring reagents, mixing them with water in a commercial blender to create a pumpable slurry, mixing the reagent slurry with site soil, and then pouring that test mix into cylindrical molds for curing. Numerous test mixes were created from reagents by changing the admixture type (different reagent combinations) and dosage (amount of reagent added). Sample material from TP-01 was used to create 9 preliminary ISS test mixes, and 16 preliminary ISS test mixes were created using TP-02 sample material. Therefore, a total of 25 preliminary test mixes were created.

The preliminary ISS evaluation approach included strength testing both by pocket penetrometer and UCS methods. Pocket penetrometer testing was performed on all 25 test mixes following 1, 3, 5, 7, and 14 days of cure time; and UCS testing was performed on 24 of the 25 test mixes after approximately 8 days cure time. One test mix (test mix 0397-007 or “Mix 7”) had extremely low penetrometer data and, therefore, was not tested for UCS. Leachability testing was also conducted during the preliminary ISS evaluation phase and consisted of analyzing leaching from the test mixes for PAHs and TPH using the SPLP method. SPLP testing was performed on 11 of the 16 mixes created from sample material from TP-02. Because TP-01 soil concentrations were much lower than TP-02 concentrations, no SPLP testing was performed on mixes generated from TP-01. Test mixes capable of meeting leachability criteria for TP-02 soil concentrations would also be assumed to be capable of meeting leachability criteria for TP-01 soil concentrations. In the case of five test mixes (Mix 10, Mix 16, Mix 17, Mix 19, and Mix 24), hydraulic conductivity testing was also performed as an extension of the preliminary ISS evaluation.

Additional details regarding preliminary ISS evaluation test methods and approach are included in Appendix G.

3.3.3 Optimization ISS Evaluation

A process flow diagram illustrating the activities associated with the optimization ISS evaluation and their relationships related to Mix 17 (Mix 17Dup and Mix 17A) is presented on Figure 3-5. A similar process flow diagram illustrating the activities associated with the optimization ISS evaluation and their relationships related to the six additional test mixes (Mix 26 to Mix 31) developed for the optimization ISS evaluation is presented on Figure 3-6.

The optimization ISS evaluation consisted of developing new test mixes based upon results obtained from the preliminary ISS evaluation, as well as conducting additional testing on select test mixes previously evaluated during the preliminary ISS evaluation. Based upon information received from organoclay supplier CETCO, additional testing was conducted to further evaluate Mix 17 (Mix 17Dup and Mix 17A), since Mix 17 had yielded the greatest reduction in COCs for preliminary test mixes evaluated for leachability using the SPLP screening evaluation. Testing of Mix 17Dup and Mix 17A was performed to evaluate two different methods for mixing of CETCO's organoclay with the remainder of the test mix materials. Mix 17A differs from Mix 17 in that the organoclay was hydrated separately prior to combining it with the remaining reagents (slag cement and bentonite). Mix 17A also required less water (113 percent by reagent weight) to create a pumpable slurry than Mix 17 (150 percent by reagent weight).

In addition to the optimization testing performed related to Mix 17, six new optimization test mixes (Mix 26 to Mix 31) were developed using TP-02 soil. Optimization test mixes were evaluated for strength, leachability, hydraulic conductivity, and volumetric expansion. All six of the new optimization test mixes (along with Mix 17Dup and Mix 17A) were evaluated for strength, leachability, and volumetric expansion, with UCS and volumetric expansion testing generally being conducted after approximately 7, 14, 28, and 56 days of cure time. Hydraulic conductivity testing was completed on four test mixes (Mix 17A, Mix 26, Mix 27, and Mix 28) during the optimization ISS evaluation.

3.4 ISS TREATABILITY STUDY RESULTS

The following sections summarize results from the various elements of the ISS Treatability Study. A table summarizing analytical results is included in Appendix D.

3.4.1 Test Soil Characterization Results

Results for test pit TP-01 soil that had been homogenized by Kemron and submitted to CAS for the purpose of identifying baseline concentrations in untreated soil are presented in Table 3-2. For comparison, Table 3-2 also includes results for test pit TP-01 soil samples that were submitted directly to CAS from the site immediately following the test pit excavation and sampling. Similar results are presented for test pit TP-02 baseline soil samples in Table 3-3. Physical properties characterization results are presented in Table 3-4.

Baseline analytical results identify significantly higher COC concentrations in test pit TP-02 than in test pit TP-01. Comparison of field samples to Kemron's homogenized samples show that

COC concentrations are similar and that Kemron's baseline COC concentrations are generally representative of site COC concentration. However, two analytes (naphthalene and 2 methylnaphthalene) had substantially higher concentrations (an order of magnitude for naphthalene) in Kemron's test pit TP-02 homogenized soil sample. Large variability in naphthalene concentrations has also been observed in samples collected previously at this site. However, comparison of TCLP and SPLP results between the field soil samples and Kemron's baseline soil samples show no significant differences. In general, Kemron's homogenized soil samples appear representative of site conditions based on field sample results.

Physical property characterization results indicate that soil samples collected from the full treatment interval within the Upper Sand soil in test pit TP-01 and test pit TP-02 yielded similar moisture and carbon contents. Particle size distribution results, however, indicated grain size differences between soil samples collected from the two test pits. Test pit TP-01 soil was determined to have a significantly higher percentage of fines (23 percent) than test pit TP-02 soil (9 percent). The resulting USCS classification for TP-01 is SM, and the resulting USCS classification for TP-02 soil is SP-SM, as presented in Table 3-4.

3.4.2 Preliminary ISS Evaluation Results

The preliminary ISS evaluation included testing of strength and leachability for nearly all test mixes. Strength testing included both pocket penetrometer and UCS methods. Pocket penetrometer testing was performed on all 25 mixes following 1, 3, 5, 7, and 14 days of cure time (Table 3-5). UCS testing was performed on 24 of the 25 mixes after approximately 8 days cure time (Table 3-6). Leachability testing was performed by performing SPLP extraction and analysis of PAHs and DRO for 11 of the 16 test mixes created from TP-02 soil (Table 3-7).

Evaluation of SPLP leachability data (Table 3-7) indicated better results for 4 test mixes (Mix 16, Mix 17, Mix 19, and Mix 24) and the preliminary ISS evaluation was expanded to include additional long-term (67- or 69-day) UCS testing (Table 3-5) and hydraulic conductivity testing (Table 3-8) on those test mixes. Additional testing was also performed on Mix 10 (12.5 percent Portland Cement) to develop a baseline with which to compare other more complex test mixes. Leachability testing was also expanded to include ANS 16.1 mass flux testing on Mix 16 (5-day interval only) and Mix17 (all 7 intervals). ANS 16.1 results are summarized in Table 3-9 (Mix 16) and in Table 3-10 (Mix 17), as well as in the comprehensive table that summarizes all project ANS 16.1 results included as Appendix D. Additional details regarding ANS 16.1 testing methodology and results are included in Appendix G. A discussion of the optimization evaluation is presented in the next section. Preliminary ISS evaluation of Mix 17 was also expanded to include volumetric expansion testing, and those results are presented in Table 3-11.

Preliminary ISS evaluation strength results indicate that most test mixes would likely meet the minimum strength goal of 50 psi. Conversely, multiple test mixes exceed the maximum strength goal of 200 psi or would likely if tested after longer cure times. Strengths of these mixes could be further reduced by decreasing cement percentages in the optimization ISS evaluation.

Leachability testing using the SPLP method on the preliminary test mixes indicated that Mix 17 achieved the highest percent reduction in COCs (DRO and PAHs[naphthalene]) by nearly a factor of two over most test mixes (Figure 3-7). Mix 17 showed an approximately 60 percent reduction in both naphthalene and DRO concentrations when compared to untreated soil from test pit TP-02 (Table 3-7). Naphthalene is presented on Figure 3-7 as a representative indicator

of the most mobile PAHs. The percent reduction was calculated by comparing test mix SPLP concentrations to baseline soil SPLP concentrations. Mix 16, Mix 17, Mix 19, and Mix 24 yielded better SPLP results (Figure 3-7); the preliminary ISS evaluation for these test mixes, along with baseline Mix 10, was expanded to also include additional hydraulic conductivity and long-term strength testing.

3.4.3 Optimization ISS Evaluation Results

The eight test mixes (six new test mixes and two test mixes associated with preliminary Mix 17) included in the optimization ISS evaluation were tested for strength (UCS testing), leachability (SPLP and ANS 16.1), hydraulic conductivity, and volumetric expansion. The non-chemical results (i.e., strength [UCS], hydraulic conductivity, and volumetric expansion) are summarized in Table 3-11.

UCS results for test mixes included in the optimization ISS evaluation ranged between 50 psi and 450 psi at the end of their cure time (see Figure 3-8). All UCS results met the minimum strength goal of 50 psi. Although cement percentages had been reduced during development of new test mixes during the optimization ISS evaluation, some UCS results exceeded the maximum strength goal of 200 psi. Strength could likely be further reduced with additional reduction of cement percentages, as well as with an increase in bentonite percentages. An increase in the amount of bentonite included in an ISS mix would be expected to reduce strength while potentially also reducing hydraulic conductivity and leachability. UCS results for Mix 19, Mix 24, and Mix 26 were within ISS treatability study minimum and maximum strength goals.

Leachability was tested using both SPLP and ANS 16.1 methods during the optimization ISS evaluation. Leachability results indicate that all test mixes significantly reduce leaching of COCs (compared to untreated soil SPLP results). Two test mixes (Mix 16 and Mix 17) yielded leachate concentrations at or below MTCA Method C cleanup levels for groundwater using the ANS 16.1 method. Given the conservative nature of the tests, other test mixes may also meet cleanup levels if implemented at the site.

As shown on Figure 3-9, SPLP results indicate that Mix 17Dup and Mix 17A achieve the highest percent reduction in COCs (DRO and PAHs [as shown by mobile indicator naphthalene]). Complete SPLP results (including other PAHs) for Mix 17A, Mix 17Dup, and Mix 28 are summarized in Table 3-12. Mix 17 and Mix 28 also yielded better SPLP results than other test mixes. These test mixes were selected for further leachability testing using ANS 16.1 methods.

5-Day ANS 16.1 results for Mix 17Dup and Mix 26 are shown in Table 3-13. Analytical data for the 5-day interval indicate that two test mixes, including one duplicate (Mix 16 and Mix 17/Mix 17Dup) were able to reduce leachate concentrations to at or below applicable MTCA Method A or C cleanup levels (see Figure 3-10). Mix 17A and Mix 28 yielded leachate concentrations that met MTCA Method C cleanup levels for PAHs, but contained concentrations of DRO that slightly exceeded MTCA Method A cleanup levels. ANS 16.1 results for the complete seven intervals of testing on Mix 17A are shown on Figure 3-11 to illustrate the decrease in leachate concentrations of DRO and naphthalene over time. Similar concentration trends are presented for Mix 17 and Mix 28 on Figure 3-12 and Figure 3-13, respectively, and complete (seven interval) ANS 16.1 results for Mix 17A and Mix 28 are summarized in Table 3-14 and Table 3-15, respectively. Figure 3-11, Figure 3-12, and Figure 3-13 all illustrate the typical phenomenon identified in the ANS 16.1 test methodology as the "initial rapid removal of mobile

surface contamination (wash off)." The lower concentrations illustrated at later test intervals on Figure 3-11 are indicative of lower long-term diffusion rates, as also described in the ANS methodology. ANS concentrations are related to both the diffusivity rate and the volume of water into which diffusion occurs.

The results summarized above indicate that leachate concentrations would be expected to be lower with increased time, and this is consistent with the discussion in Kemron's report (Appendix G) on page 13, which states "in many cases the contaminant concentrations continue to reduce with extended leaching intervals." In addition, leachate concentrations would be expected to be lower with increased distance from a treated monolith (due to increase leachate volume), as would be the case with a monitoring well located at a typical point of compliance at some distance from the ISS remediation area.

Hydraulic conductivity results met the goal of 1×10^{-6} cm/sec in all test mixes analyzed by at least one order of magnitude, as shown in Table 3-11.

Volumetric expansion results varied from 26 to 48 percent, as shown in Table 3-11. For a 7-foot ISS treatment interval this would equate to an additional 1.8 to 3.4 feet of bulking during treatment. It is important to note, however, that volumetric expansion testing was performed in a small cylinder on a test interval measuring slightly more than one inch in depth and that no compaction was conducted during curing.

In addition to the testing described above, a wipe test was performed on Mix 28. Wipe sampling was performed on a 100 square centimeter area on a cured Mix 28 test cylinder. Results are presented in Table 3-16. PAHs were detected in the wipe sample at quantities generally less than 1 µg (concentrations less than 0.01 $\mu g/cm^2$). However, it is important to note that wipe testing was performed on a sample surface immediately after it had been removed from a mold. This, again, would be biased by "initial rapid removal of mobile surface contamination (wash off)," as identified in the ANS 16.1 test methodology.

As described in Section 2, test pit samples were collected for the ISS treatability study from two test pit excavations on August 22, 2011 and after the completion of backfilling excess soil from test pit TP-02 was drummed on site. Also as previously discussed, comments were received from Ecology in September 2011 indicating that the Port had requested additional development of alternatives to address treatment of contamination beneath the Mechanics Shop. Treatment using ISTR technology had been considered in two alternatives included in the Draft Revised RI/FS Report (URS 2011), and one of those alternatives included treatment of impacted areas beneath the Mechanics Shop. Global Remediation Services (GRS) of Longview, Washington, was retained to perform bench-scale testing of ERH using soil already excavated for bench testing. In response to Ecology comments, International Paper expanded the scope of the treatability study to include evaluation of ISTR technology. Communication regarding the ISTR treatability study included an e-mail from URS to Ecology on behalf of International Paper on May 9, 2012. Drummed soil from the TP-02 excavation, as well as purge water and NAPL from site well BV-13, were transported by CCS to ETEC, LLC of Portland, Oregon in May 2012. Both CCS and GRS are two of several divisions of PNE Corporation of Longview, Washington. ETEC, LLC is a bioremediation services company with treatability laboratory facilities that GRS utilized for this ISTR treatability study.

This section describes the objectives, testing methods, and results for the ISTR treatability study. A summary of ISTR treatability study activities is presented in this Report. Additional details regarding work performed by GRS are presented in their letter report dated September 14, 2012 and summary letter dated November 2, 2012, provided in Appendix I.

4.1 ISTR TREATABILITY STUDY OBJECTIVES

The main objective of ISTR treatability study was to evaluate the use of ISTR to treat site soil and determine if ISTR and included multi-phase extraction (MPE) processes are viable components of future cleanup action alternatives for the site. The following six basic questions and associated test goals were developed to evaluate this main objective:

1. Will DRO and PAHs transition off the soil matrix during heating?
   - Test Goal: Evaluate the effectiveness of bubble floatation and MPE.
2. If so, will a LNAPL or a DNAPL be produced?
   - Test Goal: Evaluate design options for contaminant extraction.
3. How much DRO and PAH can be boiled off the soil matrix?
   - Test Goal: Evaluate the effectiveness of steam stripping during ISTR.
4. Will recovered liquids and vapors solidify upon cooling?
   - Test Goal: Evaluate options for system materials and construction.
5. Is site NAPL primarily lighter or denser than water?
   - Test Goal: Evaluate the effectiveness of MPE and bubble floatation.
6. Does the density of site NAPL change upon heating?
   - Test Goal: Evaluate the effectiveness of MPE and bubble floatation.

GRS conducted treatability testing using methodology as described below to develop data to answer the questions above and evaluate the test goals identified above, and to evaluate the overall objective of evaluating whether ISTR would be effective at treating site soil.

4.2 ISTR TREATABILITY STUDY METHODS

Table 4-1 summarizes the test questions and associated test goals presented above, as well as the associated test methods discussed in this section. GRS initiated treatability testing in May 2012 by sorting drummed soil and characterizing it by degree of impact. Following site soil characterization, soil was submitted for chemical analysis to obtain baseline concentrations against which to compare results of the ISTR treatability study. Next, two types of thermal heating methods were performed to address the six goal questions identified above. One method involved steam heating using boiling flask tests, and one method involved dry heating using soil cell tests. Additional discussion regarding these methods is presented below.

4.2.1 Test Soil Characterization

Soil from test pit TP-02 was prepared for testing by emptying the drums received and segregating soil into the following three categories based upon visual observations, PID readings, and odor characteristics.

- Less-impacted soil
- Impacted soil
- Highly-impacted soil

Soil classified as less-impacted soil was placed back into drums for disposal and was not used for testing. Impacted soil and highly-impacted soil were homogenized separately in large mixing containers. Approximately 600 pounds of impacted soil and 75 pounds of highly-impacted soil were produced for characterization and testing using this method of segregation. Homogenized soil from both the impacted soil and highly-impacted soil categories were sent to an independent analytical laboratory for chemical analysis. Soil samples were submitted for the following analyses.

- DRO by Ecology Method NWTPH-Dx
- PAHs by EPA Method 8270-SIM
- Percent Dry Weight by ASTM D2216-80

A total of five soil samples were submitted for chemical analysis, three samples from the impacted soil category (BL1, BL2, and BL3) and two samples from highly-impacted soil category (BL4 and BL5). Total toxicity equivalent concentrations (TTEC) were calculated for each sample using PAH results. In addition, one sample of highly-impacted soil was also submitted for SPLP extraction by EPA Method 1312 and subsequent chemical analysis of PAH and DRO. A process flow diagram identifying site soil segregation and characterization activities is presented on Figure 4-1.

4.2.2 Boiling Flask Testing

Treatability study boiling flask tests were performed on site soil to address questions 1, 2, 4, 5, and 6 presented both above and in Table 4-1. Two types of boiling flask tests were performed on highly-impacted soil using 500-ml flasks. One test used a half-filled (250 ml of tap water) flask with an additional 50 ml of NAPL to evaluate the effects of heating on NAPL viscosity and density. The second test used a layer of glass beads at the bottom of the flask and covered the beads with highly-impacted soil. The flask was then filled with tap water until the soil was saturated and covered by approximately 1 inch of water. A water-cooled condenser and vacuum source were then attached to the boiling flask in order to evaluate the effects of cooling on extracted vapors.

Boiling flask tests were performed as short-duration tests. Flasks were heated to approximately 100 degrees Celsius while observations were documented. A process flow diagram identifying boiling flask testing activities, their relationships, and associated chemical analyses is shown on Figure 4-2.

Additional details on the boiling flask test methods used by GRS are presented in Appendix I.

4.2.3 Soil Cell Testing

Treatability study soil cell tests were performed on site soil to address question 3 (i.e., *How much DRO and PAH can be boiled off the soil matrix?*) presented both above and in Table 4-1. A total of 12 soil cell tests were performed as part of the treatability study as follows:

- Dry Heating Impacted Soil – 7 tests
- Dry Heating Highly-Impacted Soil – 3 tests
- Steaming Highly-Impacted Soil – 2 tests

The tests listed above were performed on both impacted and highly-impacted soil. Ten of the tests involved dry heating of the soil over different time intervals. In addition, two soil cell tests involved steaming of highly-impacted soil to which water was added to the soil cell throughout testing. A summary of the soil cell testing performed is provided below.

Soil cell tests were performed over 5-, 15-, and 25-day intervals on impacted soil and over 5- and 15-day intervals for highly-impacted soil. Soil cell tests were performed on approximately 1,100 to 1,200 grams of soil. The soil cells were placed in an oil bath heated to approximately 104 degrees Celsius for the time interval specified above; they were then removed for cooling, homogenization, and sampling for chemical analysis. In addition to sampling of soil from the soil cells, one condensate sample recovered from soil cell testing of highly-impacted soil was also submitted for chemical analysis. Soil cell testing activities, their relationships, and associated chemical analyses are also identified in the process flow diagram shown on Figure 4-2.

4.3 ISTR TREATABILITY STUDY RESULTS

4.3.1 Test Soil Characterization Results

Characterization testing results are presented in Table 4-2 for samples of impacted and highly-impacted soil. The average for three impacted soil samples (BL1, BL2, and BL3) submitted for testing indicate baseline DRO concentrations of 1,310 mg/kg and naphthalene (as an indicator of mobile PAHs) concentrations of 2,810 µg/kg. The average baseline concentrations for two highly-impacted soil samples (BL4 and BL5) indicate DRO concentrations of 862 mg/kg and naphthalene concentrations of 800 µg/kg. Baseline results for total PAHs indicated concentrations of 113,036 µg/kg for impacted soil and 137,295 µg/kg for highly-impacted soil. Both impacted soil and highly-impacted soil came from similar soil excavated from test pit TP-02. Sorting of impacted and highly-impacted soil was performed primarily using visual and olfactory observations; and concentrations resulting from chemical analyses did not vary significantly between the two soil types. This was also the case for benzo(a)pyrene results and the TTEC value calculated for cPAHs. The benzo(a)pyrene concentration in impacted soil and the corresponding TTEC value were 4,423 µg/kg and 6,005 µg/kg, respectively, while corresponding results for highly-impacted soil were 4,625 µg/kg and a TTEC value of 6,547 µg/kg, respectively.

4.3.2 Boiling Flask Test Results

Boiling flask test results answer test questions 1, 2, 4, 5, and 6 as follows:

1. Will DRO and PAHs transition off the soil matrix during heating?
   Yes
2. If so, will a LNAPL or a DNAPL be produced?
   LNAPL will be produced
4. Will recovered liquids and vapors solidify upon cooling?
   No
5. Is site NAPL primarily lighter or denser than water?
   NAPL was observed to exist as DNAPL (denser than water) in the field, but to transition off the soil matrix and convert to LNAPL (lighter than water) upon heating to between 80° and 90°C.
6. Does the density of site NAPL change upon heating?
   Yes, the DNAPL present converts to LNAPL and floats

Boiling flask testing results indicates that COCs can be liberated from site soil via heating and that DNAPL converts to LNAPL at temperatures near boiling. The conversion of DNAPL to LNAPL has also been observed when implementing ISTR at other sites impacted with creosote and diesel. This conversion can increase the ease with which that NAPL can be extracted from the subsurface.

In some cases heat tracing of aboveground process piping is required to prevent crystallization of extracted vapors when implementing ISTR, but treatability results indicate that this requirement would not be anticipated during implementation in the MFA.

4.3.3 Soil Cell Test Results

Soil cell test results answer test question 3 as follows:

3. How much DRO and PAH can be boiled off the soil matrix?
   Reductions in concentrations were as follows:
   a. PAH concentrations in impacted soil were reduced by 55 percent with 5 days of dry heating. Continued dry heating produced a 60 percent reduction in 25 days. A 42 percent reduction in PAH concentrations was observed in highly-impacted soil with 5 days of dry heating, and no appreciable additional reductions were observed at subsequent test intervals.
   b. DRO concentrations in impacted soil were reduced by 74 percent with 5 days of dry heating, and by 82 percent with 25 days of dry heating. A 64 percent reduction in DRO concentrations was observed in highly-impacted soil with 5 days of dry heating, and no appreciable additional reductions were observed at subsequent test intervals.
   c. Steaming of highly-impacted soil resulted in greater reduction of both PAH (46 percent) and DRO (73 percent) concentrations at 15 days than for tests involving dry heating only.

A summary of analytical results for soil cell tests for both dry heating of impacted soil and steaming of highly-impacted soil are presented in Table 4-3 and Table 4-4, respectively. Variability of results in test cell C6 was attributed to a 'tar ball,' that was observed in the initial homogenization of test soil. These 'tar balls' were observed to be generally eliminated eventually with longer duration of treatment. The percent reductions in DRO and naphthalene during dry heating of impacted soil, dry heating of highly-impacted soil, and steaming of highly-impacted soil are shown on Figure 4-3, Figure 4-4, and Figure 4-5, respectively. If these percent reductions of COC concentrations observed during the ISTR treatability study were realized in the MFA, site soil TTEC cleanup levels would be reduced to below MTCA Method C cleanup levels for soil at 13 of the 17 boring locations where those values currently exceed those cleanup levels.

The ISTR bench tests described herein indicated that DNAPL will convert to LNAPL during heating, and that NAPL will transition off the soil matrix. Historically, results from ISTR bench tests designed to measure percentage reduction in contaminant concentrations with heating have correlated well with actual results achieved in the field. There is a high probability that the percentage reductions achieved in the laboratory would also be observed in the field. Existing bench test data can be used to design and implement a field application of steam heating technology to incorporate ERH, MPE, and a soil saturation system.

This section summarizes the conclusions of the treatability studies presented in this Report and describes the further evaluation and schedule related to incorporation of treatability results into the Final Revised RI/FS Report.

5.1 TREATABILITY STUDY CONCLUSIONS

Results developed during the ISS and ISTR treatability studies summarized in this Report indicate that both ISS and ISTR could be applicable cleanup technologies warranting further consideration as components of cleanup action alternatives addressing MFA soil. This section provides a summary of results and conclusions for each treatability study.

5.1.1 ISS Treatability Study Results Summary and Conclusions

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

Mix 16, Mix 17, and Mix 28 all appear to be test mixes capable of meeting remediation goals at the site based upon the results of this ISS treatability study. All three of these mixes met hydraulic conductivity criterion, with permeability results of 3.2×10^{-8} cm/sec (Mix 16), 3.0×10^{-8} cm/sec (Mix 17), and 1.9×10^{-7} cm/sec (Mix 28). All three of these mixes also met leachability criterion, with ANS 16.1 5-Day results meeting MTCA Method C groundwater cleanup levels, with the exception of DRO in Mix 28. Finally, these three mixes also had long-term UCS results of 321.5 psi (Mix 16 at 67 days), 443.7 psi (Mix 17 at 101 days), 355.3 psi (Mix 28 at 86 days). All three mixes met the minimum strength criterion, and also met the long-term maximum strength criterion at 28 days. Mixes continued to cure on the bench after 28 days, however. Mix 16 (12.5 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent organoclay). The volumetric expansion result was 43 percent for Mix 17 and 35 percent for Mix 28 at 28 days. This is primarily attributed to the relatively larger quantity of additives in Mix 17 (12.5 percent NewCem slag cement, 2 percent bentonite, and 2 percent organoclay) than in Mix 28 (8 percent NewCem slag cement, 2 percent bentonite, and 0.5 percent caustic soda). In general, the most favorable combination of results (low leachability, low strength, and low volumetric expansion) would likely be attributed to the least amount of additives that still met leachability goals. Mix 16, Mix 17, and Mix 28 all met permeability goals with a safety factor of at least an order of magnitude. A lower percentage of additives, therefore, would likely still meet permeability and leachability criteria while also having more favorable strength and volumetric expansion results.

The relationship between an ISS treatability study and other components of an ISS cleanup action is outlined in the ITRC guidance (ITRC 2011) and is shown on Figure 5-1.

5.1.2 ISTR Treatability Study Results Summary and Conclusions

Based on the results from ISTR treatability study boiling flask tests and soil cell tests, ISTR including subsurface hydration and multi-phase extraction (MPE) also appears to be an applicable cleanup technology warranting further consideration in future evaluation of cleanup action alternatives for vadose zone soil in the MFA. DNAPL was observed to both desorb from soil and to convert to LNAPL during the ISTR study, and this could result in efficient removal of NAPL from the site subsurface. Achieving the equivalent percent reductions in COC concentrations in the field as observed in the ISTR treatability study would be expected to reduce 13 of 17 locations that currently exceed TTEC cleanup levels to below those values. In addition, ISTR treatability study results indicate that no special construction considerations (e.g., heat tracing of process piping) would be required for the COCs located in the MFA.

5.2 FUTURE RI/FS ACTIVITIES

This section describes the incorporation of information gained through the treatability studies presented in this Report into a Final Revised RI/FS Report.

5.2.1 Future Cleanup Action Alternative Evaluation

Draft Revised RI/FS Report Alternative S5 includes ISS, and Alternatives S6 and S7 include ISTR components. Information gained during the treatability study of these two technologies will be incorporated into further evaluation of these three cleanup action alternatives and adjustments made, as appropriate. No additional treatability testing is anticipated during future cleanup action alternative evaluation prior to submittal of the Final Revised RI/FS Report.

5.2.2 Final Revised RI/FS Report Schedule

The following schedule is proposed through delivery of the Final Revised RI/FS Report:

June 28, 2013	Final Treatability Study Report submitted to Ecology
August 30, 2013	Draft Final Revised RI report sections submitted to Ecology
September 20, 2013	Cleanup Action Alternatives Conceptual Technical Memorandum submitted to Ecology
November 13, 2013	Meeting at Port of Longview to discuss Cleanup Action Alternatives Conceptual Technical Memorandum, and operational logistics
February 28, 2014	Draft Final Revised FS report sections submitted to Ecology
June 13, 2014	Draft Final Revised RI/FS Report submitted to Ecology
August 15, 2014	Final Revised RI/FS Report submitted to Ecology

EPA (U.S. Environmental Protection Agency). 1989. Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities – Interim Final Guidance. Office of Solid Waste, Waste Management Division. Washington, D.C. February, 1989.

———. 1992. Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities – Draft Addendum to Interim Final Guidance. Office of Solid Waste, Waste Management Division. Washington, D.C. July, 1992.

———. 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures – Ground Water Issue. Office of Research and Development, Solid Waste and Emergency Response. April, 1996.

International Paper Company. 1985. Closure Plan and RI/FS for Dangerous Waste Impoundments. Longview Treated Wood Products Plant, Longview, Washington.

ITRC. 2011. Development of Performance Specifications for Solidification/Stabilization.

J.L. Grant & Associates. 1990. Closure Certification.

Radian Corporation. 1983. Pre-closure Evaluation of Treated Wood Products Facility and Site C.

URS Corporation (URS). 2000. Off-site Investigation Report and Additional Action Feasibility Study, Port of Longview Maintenance Facility, Longview, Washington.

———. 2002. Work Plan, Additional Action for Port of Longview Maintenance Facility Area, Port of Longview Maintenance Facility, Longview, Washington.

———. 2003a. As-Built Report/Operation and Maintenance Manual – Biosparging/Bioventing System, Maintenance Facility Area, Former International Paper Facility, Longview, Washington.

———.2003b. Fifth Annual Groundwater Performance and Compliance Monitoring Plan Report. Former International Paper Facility, Longview, Washington.

———. 2003c. Annual Operation and Maintenance Report, Former International Paper Facility, Longview, Washington.

———. 2004. 2004 Annual Remedial Operations and Groundwater Monitoring Report, Former International Paper Facility, Longview, Washington.

———. 2005. 2005 Annual Remedial Operations and Groundwater Monitoring Report, Former International Paper Facility, Longview, Washington.

———. 2006. Remediation System Decommissioning Work Plan, Treated Wood Products Area, Former International Paper Facility, Longview, Washington.

———. 2007. Draft Remedial Investigation/Feasibility Study, Maintenance Facility Area, Former International Paper Facility, Longview, Washington.

———. 2011. Draft Revised Remedial Investigation/Feasibility Study, Maintenance Facility Area, Former International Paper Facility, Longview, Washington.

———. 2011. Treatability Study Work Plan, Maintenance Facility Area, Former International Paper Facility, Longview, Washington.

URS Greiner Woodward Clyde. 1998a. Third Quarter 1998 – Groundwater Monitoring Report, International Paper, Longview, Washington

———. 1998b. Investigation of Areas of Soil Impact Outside the Containment Area. International Paper, Longview, Washington.

———. 1999a. Fourth Quarter 1998 – Groundwater Monitoring Report, International Paper, Longview, Washington.

———. 1999b. First Quarter 1999 – Groundwater Monitoring Report, International Paper, Longview, Washington.

———. 1999c. Second Quarter 1999 – Groundwater Monitoring Report, International Paper, Longview, Washington.

———. 1999d. Third Quarter 1999 – Groundwater Monitoring Report, International Paper, Longview, Washington.

———. 1999e. Cleanup Action Report, Groundwater Containment System, Former Treated Wood Products Area, International Paper Facility, Longview, Washington.

———. 1999f. Additional Perimeter Boring Investigation Work Plan, Former Treated Wood Products Area, International Paper Facility, Longview, Washington.

———. 2000a. First Quarter 2000 – Groundwater Monitoring Report, International Paper, Longview, Washington.

———. 2000b. Operations and Maintenance Annual Report. International Paper, Longview, Washington.

———. 2000c. Additional Perimeter Boring Investigation Report and Maintenance Facility Work Plan. International Paper, Longview, Washington.

———. 2000d. Soil and Groundwater Investigation of Eastern Area. International Paper, Longview, Washington.

———. 2000e. Soil and Groundwater Investigation of Western Area. International Paper, Longview, Washington.

———. 1992. Statistical Guidance for Ecology Site Managers. Ecology Publication #92-54.

———. 1994. Natural Background soil metals concentrations in Washington State. Ecology Publication #94-115.

———. 1995. Guidance on Sampling and Data Analysis Methods. Ecology Publication #94-49.

———. 1996. Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC II) Update.

———. 2005. Letter to International Paper and Port of Longview.

———. 2008. *Review of Draft Remedial Investigation/Feasibility Study Report, Port of Longview, Maintenance Facility Area*. Letter to Phil Slowiak of International Paper from Kaia Peterson of Ecology. March 18, 2008.

Woodward-Clyde. 1994. Site Characterization Report. Treated Wood Products Area. International Paper, Longview, Washington.

———. 1995a. Interim Corrective Action Groundwater Containment System 50% Design Report.

———. 1995b. 1995 Update to the Site Characterization Report.

———. 1996a. South Pond 2 Investigation Data Summary Report.

———. 1996b. LNAPL Recovery Evaluation for the Former Treated Wood Products Area.

———. 1996c. Tidal Study Summary Report, Former Treated Wood Products Area, International Paper Facility, Longview, Washington.

———. 1997a. LNAPL Recovery Interim Action for the Former Treated Wood Products Area. Memorandum.

———. 1997b. Cleanup Action Plan. Former Treated Wood Products Area - International Paper Facility, Longview, Washington. July 1997.

———. 1997c. Performance and Compliance Monitoring Plan, Former Treated Wood Products Area, International Paper Facility, Longview, Washington.

———. 1997d. Engineering Design Report – Groundwater Containment System. Former Treated Wood Products Area, International Paper Facility, Longview, Washington.

———. 1997e. Focused Feasibility Study, Former Treated Wood Products Area, International Paper Facility, Longview, Washington.

———. 1998. Off-site Investigation Work Plan, Former Treated Wood Products Area, International Paper Facility, Longview, Washington.

Tables

Table 2-1
Summary of Chemical Analyses for Field Soil Samples

Parameter Analysis (Method)	TP-1 (2 to 7.5 ft bgs)	TP-1 (7.5 ft bgs)	TP-2 (2 to 6.5 ft bgs)	TP-2 (6.5 ft bgs)
PAHs (EPA 8270)	X	X	X	X
TPH (DRO and RRO by NWTPH-Dx)	X	X	X	X
TCLP PAHs (EPA 8270)	X		X	
TCLP TPH (NWTPH-Dx)	X		X	
SPLP PAHs (EPA 8270)	X		X	
SPLP TPH (NWTPH-Dx)	X		X	

Notes:
ft bgs – feet below ground surface
DRO – diesel-range organics
TCLP – toxicity characteristic leaching procedure
TP – test pit
TPH – total petroleum hydrocarbons
PAHs – polynuclear aromatic hydrocarbons
RRO – residual-range organics
SPLP – synthetic precipitation leaching procedure

Table 2-2
Summary of Analytical Results for Field Soil Samples
International Paper Longview Site

Sample ID:	MTCA Screening Levels				Alternative Treatment Standards [1]	TP-01				TP-02			
Sample Depth (ft bgs):						2.0-7.5			7.5	2.0-6.5			6.5
Date Collected:	Method B	Method C				8/22/2011			8/22/2011	8/22/2011			8/22/2011
TPH	**Groundwater (µg/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (µg/L)**	**µg/kg**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (mg/kg)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	45	270 U	250 U	56	**9,000**	25,000	27,000	**9,300**
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	390	530 U	500 U	160 J	1,800 J	500 U	510	**2,000 J**
PAHs	**µg/L**	**µg/kg**	**µg/kg**	**µg/L**	**µg/kg**	**Total (µg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (µg/kg)**	**Total (µg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (µg/kg)**
Naphthalene	160	70,000,000	9,700	350	56,000	110	1.5 J	1.2 J	220	**35,000**	13,000	12,000	**46,000**
Acenaphthylene	NE	NE	210,000	NE	34,000	2.0	0.20 U	0.20 UJ	5.7	1,100	10	10	1,200
Acenaphthene	960	210,000,000	210,000	2,100	34,000	200	1.6 J	1.3 UJ	430	81,000	460	420	82,000
Fluorene	640	140,000,000	220,000	1,400	34,000	84	0.35 J	0.28 UJ	130	85,000	230	210	90,000
Phenanthrene	NE	NE	5,000,000	NE	NE	44	0.20 U	0.20 UJ	110	240,000	210	210	240,000
Anthracene	4,800	1,050,000,000	5,000,000	10,500	34,000	4.3	0.20 U	0.20 UJ	35	45,000	18	31	77,000
Fluoranthene	640	140,000,000	1,400,000	1,400	34,000	7.7	0.20 U	0.20 UJ	380	120,000	21	40	130,000
Pyrene	480	105,000,000	1,400,000	1,050	82,000	5.4	0.20 U	0.20 UJ	260	74,000	11	23	77,000
Benz(a)anthracene [2]	0.12	180,000	8,600	1.2	34,000	1.9	0.20 U	0.20 UJ	80	**17,000**	0.36	3.8	**20,000**
Chrysene [2]	12	18,000,000	960,000	120	34,000	3.1	0.20 U	0.20 UJ	130	14,000	0.35	3.4	17,000
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	68,000	4.7	0.20 U	0.20 UJ	170	7,900	0.20 U	1.7	10,000
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	68,000	1.1 J	0.20 U	0.20 UJ	46	2,700	0.20 U	0.67	3,000
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	34,000	6.1	0.20 U	0.20 UJ	160	**4,400**	0.20 U	1.0	**5,400**
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	34,000	5.8	0.20 U	0.20 UJ	180	1,300	0.20 U	0.36	1,800
Dibenz(a,h)anthracene [2]	0.012	18,000	4,300	0.12	82,000	1.8 U	0.20 U	0.20 UJ	27	310	0.20 U	0.20 U	420
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	18,000	6.1	0.20 U	0.20 UJ	170	1,100	0.20 U	0.39	1,500
2-Methylnaphthalene	32	14,000,000	4,200	70	NE	45	0.33 J	0.23 J	79	**48,000**	1,100	1,000	**38,000**
Dibenzofuran	16	3,500,000	3,700	35	NE	96	0.38 J	0.29 UJ	150	**60,000**	260	240	**58,000**
TTEC (screening criteria based on benzo(a)pyrene)						7.5	NA	NA	212	**7,461**	0.04	1.7	**9,092**

Notes:
Soil (mg/kg or ug/kg) numbers in **bold** font meet or exceed a MTCA soil protection of groundwater cleanup level. Underlined numbers meet or exceed the Alternative Treatment Standard (10 x UTS') for contaminated soils.
ANS 16.1 and BV-13 water numbers in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.
Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC; MTCA Method A, B, and C from Ecology website downloaded November 2011 (https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx). (I) - Industrial land use (R) - Unrestricted land use

[1] Alternative Treatment Standards are 10 times the Universal Treatment Standards (UTS, 40 CFR 268.48) for contaminated soils.

[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.

[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) except for dibenzofuran and 2-methylnaphthalene which were obtained from the J&E model (USEPA 2004).

[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

J - estimated value
ft bgs - feet below ground surface
mg/kg - miligram per kilogram
NA - not applicable, not analyzed, or not available
NE - not established
PAHs - Polynuclear Aromatic Hydrocarbons
SPLP - Synthetic Precipitation Leaching Procedure
TCLP - Toxicicity Characteristic Leaching Procedure
TPH - Total Petroleum Hydrocarbons
TTEC - Total Toxic Equivalent Concentration
µg/kg - microgram per kilogram
µg/L - microgram per liter
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.

Table 3-1
ITRC Example Performance Tests

Performance parameter	Performance measurement	Example performance test(s)
Strength	Compressive Strength	ASTM D1633
Hydraulic Conductivity	Hydraulic Conductivity	ASTM D5084 (constant head) ASTM D5084 (falling head)
Leachability Treatability Study	LSP as function of pH LSP as function of L/S Mass transfer (flux)	PreMethod 1313 PreMethods 1314, 1316 PreMethods 1315, 1315 (modified); ANSI 16.1
Consistency Testing	LSP at natural pH, mass transfer (flux)	PreMethod 1316, SPLP, abbreviated flux tests

Notes:
LSP - liquid-solid partitioning,
L/S - liquid-solid ratio
ITRC - Interstate Technology & Regulatory Council
SPLP - synthetic precipitation leaching procedure

Source: Table 3-3 from Development of Performance Specifications for Solidification/Stabilization, Prepared by the Interstate Technology & Regulatory Council Solidification/Stabilization Team. July 2011.

Table 3-2
Summary of Analytical Results for Untreated Soil from Test Pit TP-01
International Paper Longview Site

Sample ID:	MTCA Screening Levels				Alternative Treatment Standards [1]	TP-01 (Field Samples)				TP-01 (Kemron Samples)		
Sample Depth (ft bgs):						2.0-7.5			7.5			
Date Collected:	Method B	Method C				8/22/2011			8/22/2011	9/1/2011		
TPH	**Groundwater (µg/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (µg/L)**	**µg/kg**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	45	270 U	250 U	56	42	250 UJ	280 U
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	390	530 U	500 U	160 J	120 J	500 UJ	560 U
PAHs	**µg/L**	**µg/kg**	**µg/kg**	**µg/L**	**µg/kg**	**Total (µg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (µg/kg)**	**Total (µg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**
Naphthalene	160	70,000,000	9,700	350	56,000	110	1.5 J	1.2 J	220	140	1.7 U	0.49
Acenaphthylene	NE	NE	210,000	NE	34,000	2.0	0.20 U	0.20 UJ	5.7	11	0.20 U	0.20 U
Acenaphthene	960	210,000,000	210,000	2,100	34,000	200	1.6 J	1.3 UJ	430	220	2.0 U	1.3
Fluorene	640	140,000,000	220,000	1,400	34,000	84	0.35 J	0.28 UJ	130	84	0.57 U	0.39
Phenanthrene	NE	NE	5,000,000	NE	NE	44	0.20 U	0.20 UJ	110	100	0.30 U	0.21
Anthracene	4,800	1,050,000,000	5,000,000	10,500	34,000	4.3	0.20 U	0.20 UJ	35	39	0.20 U	0.20 U
Fluoranthene	640	140,000,000	1,400,000	1,400	34,000	7.7	0.20 U	0.20 UJ	380	100	0.20 U	0.20 U
Pyrene	480	105,000,000	1,400,000	1,050	82,000	5.4	0.20 U	0.20 UJ	260	80	0.20 U	0.20 U
Benz(a)anthracene [2]	0.12	180,000	8,600	1.2	34,000	1.9	0.20 U	0.20 UJ	80	29	0.20 U	0.20 U
Chrysene [2]	12	18,000,000	960,000	120	34,000	3.1	0.20 U	0.20 UJ	130	59	0.20 U	0.20 U
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	68,000	4.7	0.20 U	0.20 UJ	170	290	0.20 U	0.20 U
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	68,000	1.1 J	0.20 U	0.20 UJ	46	49	0.20 U	0.20 U
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	34,000	6.1	0.20 U	0.20 UJ	160	300	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	34,000	5.8	0.20 U	0.20 UJ	180	300	0.20 U	0.20 U
Dibenz(a,h)anthracene [2]	0.012	18,000	4,300	0.12	82,000	1.8 U	0.20 U	0.20 UJ	27	40	0.20 U	0.20 U
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	18,000	6.1	0.20 U	0.20 UJ	170	260	0.20 U	0.20 U
2-Methylnaphthalene	32	14,000,000	4,200	70	NE	45	0.33 J	0.23 J	79	92	0.49 U	0.20 U
Dibenzofuran	16	3,500,000	3,700	35	NE	96	0.38 J	0.29 UJ	150	110	0.74 U	0.50
(screening criteria based on benzo(a)pyrene)						7.5	NA	NA	212	371	NA	NA

Notes:
Soil (mg/kg or µg/kg) results in **bold** font meet or exceed a MTCA soil protection of groundwater cleanup level. Underlined numbers meet or exceed the Alternative Treatment Standard (10 x UTS') for contaminated soils.
Water results in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.
[1] Alternative Treatment Standards are 10 times the Universal Treatment Standards (UTS, 40 CFR 268.48) for contaminated soils.
[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.
[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database
[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

ft bgs - feet below ground surface
J - estimated value
mg/kg - miligram per kilogram
NA - not applicable, not analyzed, or not available
PAHs - Polynuclear Aromatic Hydrocarbons
SPLP - Synthetic Precipitation Leaching Procedure
TCLP - Toxicicity Characteristic Leaching Procedure
TPH - Total Petroleum Hydrocarbons
TTEC - Total Toxic Equivalent Concentration
µg/kg - microgram per kilogram
µg/L - microgram per liter
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.

Table 3-2
Summary of Analytical Results for Untreated Soil from Test Pit TP-01
International Paper Longview Site

Sample ID:	MTCA Screening Levels				Alternative Treatment Standards [1]	TP-01 (Field Samples)				TP-01 (Kemron Samples)		
Sample Depth (ft bgs):						2.0-7.5			7.5			
Date Collected:	Method B	Method C				8/22/2011			8/22/2011	9/1/2011		
TPH	**Groundwater (µg/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (µg/L)**	**µg/kg**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	45	270 U	250 U	56	42	250 UJ	280 U
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	390	530 U	500 U	160 J	120 J	500 UJ	560 U
PAHs	**µg/L**	**µg/kg**	**µg/kg**	**µg/L**	**µg/kg**	**(µg/kg)**	**(µg/L)**	**(µg/L)**	**(µg/kg)**	**(µg/kg)**	**(µg/L)**	**(µg/L)**
Naphthalene	160	70,000,000	9,700	350	56,000	110	1.5 J	1.2 J	220	140	1.7 U	0.49
Acenaphthylene	NE	NE	210,000	NE	34,000	2.0	0.20 U	0.20 UJ	5.7	11	0.20 U	0.20 U
Acenaphthene	960	210,000,000	210,000	2,100	34,000	200	1.6 J	1.3 UJ	430	220	2.0 U	1.3
Fluorene	640	140,000,000	220,000	1,400	34,000	84	0.35 J	0.28 UJ	130	84	0.57 U	0.39
Phenanthrene	NE	NE	5,000,000	NE	NE	44	0.20 U	0.20 UJ	110	100	0.30 U	0.21
Anthracene	4,800	1,050,000,000	5,000,000	10,500	34,000	4.3	0.20 U	0.20 UJ	35	39	0.20 U	0.20 U
Fluoranthene	640	140,000,000	1,400,000	1,400	34,000	7.7	0.20 U	0.20 UJ	380	100	0.20 U	0.20 U
Pyrene	480	105,000,000	1,400,000	1,050	82,000	5.4	0.20 U	0.20 UJ	260	80	0.20 U	0.20 U
Benz(a)anthracene [2]	0.12	180,000	8,600	1.2	34,000	1.9	0.20 U	0.20 UJ	80	29	0.20 U	0.20 U
Chrysene [2]	12	18,000,000	960,000	120	34,000	3.1	0.20 U	0.20 UJ	130	59	0.20 U	0.20 U
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	68,000	4.7	0.20 U	0.20 UJ	170	290	0.20 U	0.20 U
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	68,000	1.1 J	0.20 U	0.20 UJ	46	49	0.20 U	0.20 U
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	34,000	6.1	0.20 U	0.20 UJ	160	300	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	34,000	5.8	0.20 U	0.20 UJ	180	300	0.20 U	0.20 U
Dibenz(a,h)anthracene [2]	0.012	18,000	4,300	0.12	82,000	1.8 U	0.20 U	0.20 UJ	27	40	0.20 U	0.20 U
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	18,000	6.1	0.20 U	0.20 UJ	170	260	0.20 U	0.20 U
2-Methylnaphthalene	32	14,000,000	4,200	70	NE	45	0.33 J	0.23 J	79	92	0.49 U	0.20 U
Dibenzofuran	16	3,500,000	3,700	35	NE	96	0.38 J	0.29 UJ	150	110	0.74 U	0.50
TTEC (screening criteria based on benzo(a)pyrene)						7.5	NA	NA	212	371	NA	NA

Notes:
Soil (mg/kg or µg/kg) results in **bold** font meet or exceed a MTCA soil protection of groundwater cleanup level. Underlined numbers meet or exceed the Alternative Treatment Standard (10 x UTS') for contaminated soils.
Water results in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.
[1] Alternative Treatment Standards are 10 times the Universal Treatment Standards (UTS, 40 CFR 268.48) for contaminated soils.
[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.
[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database
[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

ft bgs - feet below ground surface
J - estimated value
mg/kg - miligram per kilogram
NA - not applicable, not analyzed, or not available
PAHs - Polynuclear Aromatic Hydrocarbons
SPLP - Synthetic Precipitation Leaching Procedure
TCLP - Toxicicity Characteristic Leaching Procedure
TPH - Total Petroleum Hydrocarbons
TTEC - Total Toxic Equivalent Concentration
µg/kg - microgram per kilogram
µg/L - microgram per liter
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.

Table 3-3
Summary of Analytical Results for Untreated Soil from Test Pit TP-02
International Paper Longview Site

Sample ID:	MTCA Screening Levels				Alternative Treatment Standards [1]	TP-02 (Field Samples)				TP-02 (Kemron Samples)		
Sample Depth (ft bgs):						2.0-6.5			6.5			
Date Collected:	Method B	Method C				8/22/2011			8/22/2011	9/1/2011		
TPH	**Groundwater (µg/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (µg/L)**	**µg/kg**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (µg/L)**	**SPLP (µg/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	**9,000**	25,000	27,000	**9,300**	**8,500**	26,000	26,000
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	1,800 J	500 U	510	**2,000 J**	1,600 J	530 U	560 U
PAHs	**µg/L**	**µg/kg**	**µg/kg**	**µg/L**	**µg/kg**	**(µg/kg)**	**(µg/L)**	**(µg/L)**	**(µg/kg)**	**(µg/kg)**	**(µg/L)**	**(µg/L)**
Naphthalene	160	70,000,000	9,700	350	56,000	**35,000**	13,000	12,000	**46,000**	**420,000**	12,000	12,000
Acenaphthylene	NE	NE	210,000	NE	34,000	1,100	10	10	1,200	1,800	11	12
Acenaphthene	960	210,000,000	210,000	2,100	34,000	81,000	460	420	82,000	110,000	460	540
Fluorene	640	140,000,000	220,000	1,400	34,000	85,000	230	210	90,000	97,000	250	300
Phenanthrene	NE	NE	5,000,000	NE	NE	240,000	210	210	240,000	260,000	240	360
Anthracene	4,800	1,050,000,000	5,000,000	10,500	34,000	45,000	18	31	77,000	49,000	25	51
Fluoranthene	640	140,000,000	1,400,000	1,400	34,000	120,000	21	40	130,000	130,000	22	73
Pyrene	480	105,000,000	1,400,000	1,050	82,000	74,000	11	23	77,000	74,000	11	42
Benz(a)anthracene [2]	0.12	180,000	8,600	1.2	34,000	**17,000**	0.36	3.8	**20,000**	**20,000**	0.43	7.9
Chrysene [2]	12	18,000,000	960,000	120	34,000	14,000	0.35	3.4	17,000	17,000	0.41	7.1
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	68,000	7,900	0.20 U	1.7	10,000	9,300	0.20 U	3.3
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	68,000	2,700	0.20 U	0.67	3,000	3,300	0.20 U	1.0
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	34,000	**4,400**	0.20 U	1.0	**5,400**	**5,500**	0.20 U	1.8
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	34,000	1,300	0.20 U	0.36	1,800	1,700	0.20 U	0.38
Dibenz(a,h)anthracene [2]	0.012	18,000	4,300	0.12	82,000	310	0.20 U	0.20 U	420	410	0.20 U	0.20 U
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	18,000	1,100	0.20 U	0.39	1,500	1,400	0.20 U	0.36
2-Methylnaphthalene	32	14,000,000	4,200	70	NE	**48,000**	1,100	1,000	**38,000**	**140,000**	1,100	1,200
Dibenzofuran	16	3,500,000	3,700	35	NE	**60,000**	260	240	**58,000**	**73,000**	280	320
TTEC (screening criteria based on benzo(a)pyrene)						**7,461**	0.04	1.7	**9,092**	**9,141**	0.05	3.1

Notes:
Soil (mg/kg or µg/kg) numbers in **bold** font meet or exceed a MTCA soil cleanup level. Underlined numbers meet or exceed the Alternative Treatment Standard (10 x UTS) for contaminated soils.
Water results in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.
[1] Alternative Treatment Standards are 10 times the Universal Treatment Standards (UTS, 40 CFR 268.48) for contaminated soils.
[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.
[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database
[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

ft bgs - feet below ground surface
J - estimated value
mg/kg - miligram per kilogram
NA - not applicable, not analyzed, or not available
PAHs - Polynuclear Aromatic Hydrocarbons
SPLP - Synthetic Precipitation Leaching Procedure
TCLP - Toxicicity Characteristic Leaching Procedure
TPH - Total Petroleum Hydrocarbons
TTEC - Total Toxic Equivalent Concentration
µg/kg - microgram per kilogram
µg/L - microgram per liter
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.

Table 3-4
Summary of Physical Properties Results for Untreated Soil

Testing Parameter	Test Method	Unit	TP-01 (2-7.5) Results	TP-02 Results
Moisture Content	ASTM D2216			
ASTM Moisture Content		%	31.85	24.72
Percent Solids		%	75.85	80.18
Loss on Ignition	ASTM D2974	%	1.93	1.16
Particle Size Distribution	ASTM D422/D854			
Gravel		%	1.0	0.0
Sand		%	76.5	91.0
Silt		%	21.3	8.3
Clay		%	1.2	0.3
Sample Description	USCS (D2487)		Dark grey silty sand	V. Dk Grey poorly graded sand with silt
Sample Classification	USCS (D2487)		SM	SP-SM

Notes:

% - Percent
Sample descriptions based on the Unified Classification System. Where atterberg limits were not tested, the description is based on an assumed PI < 4.

Sample color determined by the Munsell Soil Color Charts.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-5
Preliminary ISS Evaluations - Penetrometer Results

Kemron Sample No.	Untreated Material Type	Reagent Type	Reagent ID			Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.	Penetrometer Testing (tons/ft^2)				
								1 Day	3 Day	5 Day	7 Day	14 Day
0397-001	TP-01	Portland Cement	842	-	-	7.5	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-002	TP-01	Portland Cement	842	-	-	12.5	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-003	TP-01	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	3.5	4.5	>4.5	>4.5	>4.5
0397-004	TP-01	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	77	1.5	3.25	3.75	3.75	3.75
0397-005	TP-01	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	12.5 / 2 / 0.5	150	>4.5	>4.5	>4.5	>4.5	>4.5
0397-006	TP-01	Portland Cement / Class "C" Flyash	842	921	-	7.5 / 7.5	50	3.75	>4.5	>4.5	>4.5	>4.5
0397-007	TP-01	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	0.0	0.0	0.0	0.0	0.25
0397-008	TP-01	50:50 TerraCem	916	-	-	12.5	50	4.25	>4.5	>4.5	>4.5	>4.5
0397-009	TP-01	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	1.25	3.50	4.25	>4.5	>4.5
0397-010	TP-02	Portland Cement	842	-	-	12.5	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-011	TP-02	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	3.25	>4.5	>4.5	>4.5	>4.5
0397-012	TP-02	Portland Cement / Bentonite	842	807	-	17.5 / 2	125	>4.5	>4.5	>4.5	>4.5	>4.5
0397-013	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	75	3.25	>4.5	>4.5	>4.5	>4.5
0397-014	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 12.5	75	1.25	2.5	3.0	3.75	4.25
0397-015	TP-02	Portland Cement / Hydrated Lime	842	917	-	10 / 12.5	75	2.5	3.75	>4.5	>4.5	>4.5
0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 0.5	150	0.0	0.0	2.5	4.25	>4.5
0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	0.0	0.0	1.25	3.0	>4.5
0397-018	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	17.5 / 2 / 0.5	150	0.5	3.75	>4.5	>4.5	>4.5
0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	10 / 2 / 0.5	150	3.25	4.5	>4.5	>4.5	>4.5
0397-020	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	15 / 2 / 0.5	150	3.25	>4.5	>4.5	>4.5	>4.5
0397-021	TP-02	Portland Cement / Class "C" Flyash	842	921	-	10 / 10	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	920	921	-	10 / 10	50	1.0	1.75	3.25	3.75	3.75
0397-023	TP-02	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	0.0	3.25	4.5	>4.5	>4.5
0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	916	807	922	15 / 2 / 0.5	135	2.75	3.25	4.25	>4.5	>4.5
0397-025	TP-02	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	1.25	2.5	4.0	4.5	>4.5
0397-026	TP-02	Portland Cement #842/Bentonite	842	807	-	8/2	150	4.50	-	>4.5		
0397-027	TP-02	NewCem Slag Cement/ Portland Cement/Bentonite	920	842	807	6/2/2	150	4.25	-	>4.5		
0397-028	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	920	807	926	8/2/0.5	175	0.75	-	>4.5		
0397-029	TP-02	NewCem Slag Cement/Bentonite/Organoclay SS 199/Caustic Soda	920	807	922/926	8/2/0.5/0.5	175	0.75	-	>4.5		
0397-030	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	920	807	926	10/2/0.5	175	1.25	-	>4.5		
0397-031	TP-02	NewCem Slag Cement/Bentonite/OrganoClay SS199 /Caustic Soda	920	807	922/926	10/2/0.5/0.5	175	2.00	-	>4.5		

Notes:

* Mixes 003, 005, 007, 009, 011, 012, 016, 017, 018, 019, 020, 023, 024, and 025-031 were subjected to an initial bentonite slurry where water was added to bentonite and allowed to hydrate under continuous stirring overnight. The additional reagents were added the next day to the hydrated bentonite with the water additions to make a pumpable slurry.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-6
Preliminary ISS Evaluations
UCS Results

Kemron Sample No.	Untreated Material Type	Reagent Type	Reagent ID			Reagent Addition % by 'wet soil wt	Water Addition % by Reagent wt.	Cure Days	Unconfined Compressive Strength (tons/ft2)			
									Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	UCS (lb/in²)
0397-001	TP-01	Portland Cement	842	-	-	7.5	50	9	32.7	111.6	84.1	69.2
0397-002	TP-01	Portland Cement	842	-	-	12.5	50	9	31.7	114.4	86.9	169.3
0397-003	TP-01	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	8	47.4	107.9	73.2	44.9
0397-004	TP-01	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	77	9	39.3	111.5	80.0	27.1
0397-005	TP-01	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	12.5 / 2 / 0.5	150	8	44.4	108.6	75.2	70.3
0397-006	TP-01	Portland Cement / Class "C" Flyash	842	921	-	7.5 / 7.5	50	8	32.3	117.3	88.7	64.5
0397-007	TP-01	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	NT	NT	NT	NT	NT
0397-008	TP-01	50:50 TerraCem	916	-	-	12.5	50	9	34.2	113.8	84.8	58.7
0397-009	TP-01	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	8	48.8	105.6	71.0	29.4
0397-010	TP-02	Portland Cement	842	-	-	12.5	50	9	24.1	127.1	102.4	285.0
								69	23.2	122.8	99.7	306.2
0397-011	TP-02	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	8	39.1	110.7	79.6	47.6
0397-012	TP-02	Portland Cement / Bentonite	842	807	-	17.5 / 2	125	8	41.4	108.8	77.0	78.1
0397-013	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	75	9	30.8	115.1	88.0	32.4
0397-014	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 12.5	75	9	34.2	110.6	82.4	14.9
0397-015	TP-02	Portland Cement / Hydrated Lime	842	917	-	10 / 12.5	75	9	34.3	110.8	82.5	31.9
0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 0.5	150	8	44.5	108.7	75.2	36.4
								67	38.7	91.7	66.1	321.5
0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	8	42.5	107.7	75.6	31.7
								67	41.3	106.6	75.5	326.0
								101	38.3	106.1	76.7	443.7
0397-018	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	17.5 / 2 / 0.5	150	8	42.7	109.0	76.4	76.6
0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	10 / 2 / 0.5	150.0	8	40.3	109.1	77.8	35.2
								67	38.5	100.9	72.8	57.9
0397-020	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	15 / 2 / 0.5	150.0	8	43.1	106.1	74.2	60.8
0397-021	TP-02	Portland Cement / Class "C" Flyash	842	921	-	10 / 10	50.0	8	24.9	121.0	96.9	143.6
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	920	921	-	10 / 10	50.0	8	29.6	118.4	91.3	15.2
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	920	921	-	10 / 10	50.0	17	30.0	122.0	93.8	14.1
0397-023	TP-02	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	8	41.1	107.9	76.5	61.3
0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	916	807	922	15 / 2 / 0.5	135	8	38.4	108.6	78.5	37.7
								67	36.6	105.4	77.2	87.7
0397-025	TP-02	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	8	39.4	110.7	79.4	32.4

Notes:
NT - Not Tested
* Mixes 008, 009, 017, and 018 were subjected to an initial bentonite slurry where water was added to bentonite and allowed to hydrate under continuous stirring overnight. The additional reagents were added the next day to the hydrated bentonite with the water additions to make a pumpable slurry.
Shaded rows indicate mixes that were carried over to the optimization phase.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-7
Preliminary ISS Evaluations
TCLP and SPLP Results

Testing Parameter	Untreated TP-02 2.0-6.5 Homogenized		Treated Mixes with Percent Reduction in Contaminants Compared to Untreated TP-02 sample (2.0-6.5, homogenized)															
	TCLP	SPLP	0397-010 (SPLP)		0397-011 (SPLP)		0397-013 (SPLP)		0397-016 (SPLP)		0397-017 (SPLP)		0397-019 (SPLP)		0397-021 (SPLP)		0397-022 (SPLP)	
PAHs (µg/L)																		
Naphthalene	12,000	12,000	7,500	38%	7,400	38%	7,700	36%	6,800	43%	4,400	63%	6,400	47%	7,000	42%	7,900	34%
2–Methyl naphthalene	1100	1,200	840	30%	890	26%	820	32%	780	35%	460	62%	740	38%	860	28%	770	36%
Acenaphthylene	11	12	9.5	21%	9.1	24%	8.5	29%	7.3	39%	3.6	70%	7.1	41%	8.6	28%	8.7	28%
Acenaphthene	460	540	420	22%	430	20%	380	30%	400	26%	260	52%	380	30%	420	22%	380	30%
Dibenzofuran	280	320	270	16%	270	16%	240	25%	230	28%	98	69%	210	34%	260	19%	240	25%
Fluorene	250	300	240	20%	240	20%	210	30%	210	30%	92	69%	180	40%	230	23%	210	30%
Phenanthrene	240	360	240	33%	250	31%	210	42%	210	42%	15	96%	210	42%	240	33%	220	39%
Anthracene	25	51	35	31%	33	35%	29	43%	30	41%	12	76%	30	41%	31	39%	30	41%
Fluoranthene	22	73	22	70%	20	73%	19	74%	22	70%	6.6	91%	20	73%	19	74%	20	73%
Pyrene	11	42	11	74%	10	76%	9.1	78%	11	74%	0.3	99%	10	76%	9.2	78%	9.3	78%
Benz(a)anthracene	0.43	7.9	0.42	95%	0.57	93%	0.36	95%	0.47	94%	0.23	97%	0.4	95%	0.32	96%	0.35	96%
Chrysene	0.41	7.1	0.4	94%	0.28	96%	0.31	96%	0.38	95%	0.026 J	> 99%	0.35	95%	0.32	95%	0.34	95%
Benzo(b)fluoranthene	< 0.2	3.3	< 0.20	> 94%	0.046 J	> 99%	0.037 J	> 99%	0.062 J	> 98%	< 0.20	> 94%	0.03 J	> 99%	< 0.20	> 94%	0.03 J	> 99%
Benzo(k)fluoranthene	< 0.2	1	< 0.20	> 80%	< 0.20	> 80%	< 0.20	> 80%	0.037 J	> 96%	< 0.20	> 80%	< 0.20	> 80%	< 0.20	> 80%	< 0.20	> 80%
Indeno(1,2,3-cd)pyrene	< 0.2	0.38	< 0.20	> 47%	< 0.20	> 47%	< 0.20	> 47%	0.031 J	> 92%	< 0.20	> 47%	< 0.20	> 47%	< 0.20	> 47%	< 0.20	> 47%
TPH (µg/L)																		
DRO[1]	26,000	26,000	19,000	27%	20,000	23%	20,000	23%	18,000	31%	11,000	58%	17,000	35%	19,000	27%	20,000	23%
RRO[1]	< 530	< 560	< 550	-	570	-	610	-	< 500	-	< 500	-	< 500	-	510	-	660	-

Table 3-7 (Cont.)
Preliminary ISS Evaluations
TCLP and SPLP Results

Testing Parameter	Untreated TP-02 2.0-6.5 Homogenized		Treated Mixes with Percent Reduction in Contaminants Compared to Untreated TP-02 sample (2.0-6.5, homogenized)									
	TCLP	SPLP	0397-023 (SPLP)		0397-024 (SPLP)		0397-025 (SPLP)		0397-28 (TCLP)		0397-28 (SPLP)	
PAHs (µg/L)												
Naphthalene	12,000	12,000	7,300	39%	6,500	46%	9,400	22%	5100	58%	5400	55%
2–Methyl naphthalene	1100	1,200	760	37%	860	28%	800	33%	750	32%	790	34%
Acenaphthylene	11	12	8.7	28%	7.2	40%	8.1	33%	8.4	24%	9	25%
Acenaphthene	460	540	390	28%	400	26%	380	30%	420	9%	440	19%
Dibenzofuran	280	320	220	31%	250	22%	240	25%	260	7%	290	9%
Fluorene	250	300	190	37%	220	27%	210	30%	230	8%	250	17%
Phenanthrene	240	360	210	42%	220	39%	210	42%	260	-8%	270	25%
Anthracene	25	51	34	33%	28	45%	31	39%	31	-24%	36	29%
Fluoranthene	22	73	23	68%	22	70%	18	75%	22	0%	24	67%
Pyrene	11	42	11	74%	11	74%	8.2	80%	13	-18%	13	69%
Benz(a)anthracene	0.43	7.9	0.41	95%	0.41	95%	0.29	96%	0.58	-35%	0.71	91%
Chrysene	0.41	7.1	0.4	94%	0.4	94%	0.29	96%	0.48	-17%	0.46	94%
Benzo(b)fluoranthene	< 0.2	3.3	0.034 J	> 99%	0.044 J	> 99%	0.024 J	> 99%	0.063 J	-	0.049 J	99%
Benzo(k)fluoranthene	< 0.2	1	< 0.20	> 80%	< 0.20	> 80%	< 0.20	> 80%	0.034 J	-	0.028 J	97%
Indeno(1,2,3-cd)pyrene	< 0.2	0.38	< 0.20	> 47%	< 0.20	> 47%	< 0.20	> 47%	0.22	-	0.21	45%
TPH (µg/L)												
DRO[1]	26,000	26,000	18,000	31%	18,000	31%	23,000	12%	15,000	42%	17,000	35%
RRO[1]	< 530	< 560	540	-	< 500	-	580	-	< 540	-	920	-

Notes:

Values represented as “<” (less than) indicate that the compound was not detected at a concentration above the listed detection limit. The “J” qualifier indicates that the compound was detected at the estimated concentration which was between the analytical reporting limit and the method detection limit. A “>” (greater than) indicates that the value was calculated using a detection limit (or a value less than the analytical reporting limit) rather than a known compound concentration because the compound was not detected or was detected below the analytical reporting limit.

[1] – TPH cleanup levels are based on the MTCA Method A industrial cleanup standards.

NE – not established

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-8
Preliminary ISS Evaluations
Hydraulic Conductivity Results

Kemron Sample No.	Untreated Material Type	Reagent Type	Reagent ID			Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.	Cure Days	Hydraulic Conductivity (k) (cm/sec)			
									Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	Hyd. Cond. (cm/sec)
0397-010	TP-02	Portland Cement	842	-	-	12.5	50	69	25.2	123.9	98.9	7.1E-07
*0397-016 **	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 0.5	150	67	39.3	110.2	79.1	3.2E-08
*0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	67	42.6	105.4	73.9	3.0E-08
*0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	10 / 2 / 0.5	150	67	40.2	108.9	77.7	7.4E-07
*0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	916	807	922	15 / 2 / 0.5	135	67	38.7	106.6	76.9	3.0E-07

Notes:
* Mixes 016, 017, 019, and 024 were subjected to an initial bentonite slurry where water was added to bentonite and allowed to hydrate under continuous stirring overnight. The additional reagents were added the next day to the hydrated bentonite with the water additions to make a pumpable slurry.

** Preliminary Data

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-9
Optimization ISS Evaluations
5-Day ANS 16.1 Results
Mix 16

Testing Parameter	MTCA Cleanup Levels, Groundwater (µg/L)		Sample 0397-016 5-Day		
	Method B	Method C	Results (µg/L)	MRL	MDL
TPH					
Diesel Range Organics (DRO)	500 [1]	500 [1]	**500 Z**	260	-
Residual Range Organics (RRO)	500 [1]	500 [1]	< 520	520	-
PAHs					
Naphthalene	160	350	100 D	1,800	370
2-Methylnaphthalene	32	70	780 D	89.0	11.0
Acenaphthylene	NE	NE	0.13	4.50	0.490
Acenaphthene	960	2,100	10 D	89.0	9.40
Dibenzofuran	16	35	6.7 D	89.0	11.0
Fluorene	640	1,400	6.8 D	89.0	11.0
Phenanthrene	NE	NE	17 D	89.0	19.0
Anthracene	4,800	10,500	1.7	4.50	0.380
Fluoranthene	640	1,400	4 D	89.0	12.0
Pyrene	480	1,050	1.7	4.50	1.10
Benz(a)anthracene	0.12	1.2	0.1	4.50	0.450
Chrysene	12	120	0.1	4.50	0.850
Benzo(b)fluoranthene	0.12	1.2	0.013	4.50	0.330
Benzo(k)fluoranthene	1.2	12	0.004 J	4.50	0.540
Benzo(a)pyrene	0.012	0.12	0.0062	4.50	0.540
Indeno(1,2,3-cd)pyrene	0.12	1.2	0.0015 J	4.50	0.580
Dibenz(a,h)anthracene	0.012	0.12	0.00086 J	4.50	0.590
Benzo(g,h,i)perylene	NE	NE	0.0019 J	4.50	0.470

Notes:
[1] - TPH cleanup levels are based on the MTCA Method A cleanup standards.
Bolded values meet or exceed MTCA Method C (PAHs) or MTCA Method A (TPH) groundwater cleanup levels.
MRL - Method Reporting Limit
MDL - Method Detection Limit
PAHs - polynuclear aromatic hydrocarbons
TPH - total petroleum hydrocarbons
µg/L - micrograms per liter
D - The reported result is from a dilution.
J - The result is an estimated value.
Z - The chromatographic fingerprint does not resemble a petroleum product.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-10
Optimization ISS Evaluations
Complete ANS 16.1 Results
Mix 17

Testing Parameter	MTCA Cleanup Levels, Groundwater (µg/L)		Sample 0397-017																			
			2-Hour			7-Hour			24-Hour			2-Day			3-Day			4-Day			5-Day		
	Method B	Method C	Results (µg/L)	MRL	MDL	Results (µg/L)	MRL	MDL	Results (µg/L)	MRL	MDL	Results (µg/L)	MRL	MDL	Results (µg/L)	MRL	MDL	Results (µg/L)	MRL	MDL	Results (µg/L)	MRL	MDL
TPH																						
Diesel Range Organics (DRO)	500 [1]	500 [1]	ND	260		ND	300		**500 Z**	290		**550 Z**	280	12	**600 Z**	280	12	**660 Z**	270	12.00	420 Z	280	
Residual Range Organics (RRO)	500 [1]	500 [1]	ND	520		ND	600		ND	570		75 J	550	21	53 J	550	21	55 J	530	20.00	ND	560	
PAHs																						
Naphthalene	160	350	7 D	0.036	0.0074	23 D	0.068	0.015	84 D	0.180	0.037	110 D	0.44	0.065	150 D	0.46	0.069	140 D	0.42	0.062	68 D	0.43	0.064
2-Methylnaphthalene	32	70	0.890	0.0036	0.00042	3.1 D	0.068	0.008	11 D	0.180	0.021	13 D	0.44	0.050	19 D	0.46	0.053	19 D	0.42	0.048	8.9	0.022	0.0025
Acenaphthylene	NE	NE	0.040	0.0036	0.00039	0.057	0.0034	0.00037	0.130	0.004	0.00039	0.19	0.022	0.0037	0.23	0.023	0.0039	0.22	0.021	0.0036	0.13	0.022	0.0037
Acenaphthene	960	2,100	1.200	0.0036	0.00038	3.1 D	0.068	0.0072	8.9 D	0.180	0.019	11 D	0.44	0.095	15 D	0.46	0.10	14 D	0.42	0.091	8.3	0.022	0.0047
Dibenzofuran	16	35	0.840	0.0036	0.00044	1.7	0.0034	0.00042	5.4 D	0.180	0.022	6.3	0.022	0.0050	8.0	0.023	0.0053	7.7	0.021	0.0048	5 D	0.43	0.098
Fluorene	640	1,400	0.670	0.0036	0.00044	1.3	0.0034	0.00042	3.4 D	0.180	0.022	4.6	0.022	0.0041	5.5	0.023	0.0044	5.0	0.021	0.0040	3.5	0.022	0.0041
Phenanthrene	NE	NE	4.20 D	0.036	0.0075	4.5 D	0.068	0.015	9.0 D	0.180	0.038	11 D	0.44	0.11	13 D	0.46	0.12	12 D	0.420	0.11	10	0.022	0.0054
Anthracene	4,800	10,500	0.590	0.0036	0.0003	0.540	0.0034	0.00029	1.1	0.0036	0.0003	1.2	0.022	0.0039	1.4	0.023	0.0041	1.2	0.021	0.0038	0.30	0.022	0.0039
Fluoranthene	640	1,400	2.40 D	0.036	0.0048	1.1	0.0034	0.00046	1.7	0.0036	0.00048	2.0	0.022	0.0048	2.2	0.023	0.0050	2.0	0.021	0.0046	2.1	0.022	0.0047
Pyrene	480	1,050	1.300	0.0036	0.00081	0.690	0.0034	0.00078	1.1	0.0036	0.00081	1.3	0.022	0.0038	1.3	0.023	0.0040	1.3	0.021	0.0037	1.1	0.022	0.0038
Benz(a)anthracene	0.12	1.2	0.390	0.0036	0.00036	0.120	0.0034	0.00034	0.140	0.0036	0.00036	0.092	0.022	0.0028	0.091	0.023	0.0030	0.079	0.021	0.0027	0.12	0.022	0.0028
Chrysene	12	120	0.360	0.0036	0.00068	0.120	0.0034	0.00065	0.120	0.0036	0.00068	0.052	0.022	0.0037	0.058	0.023	0.0039	0.056	0.021	0.0036	0.092	0.022	0.0037
Benzo(b)fluoranthene	0.12	1.2	0.200	0.0036	0.00026	0.055	0.0034	0.00025	0.052	0.0036	0.00026	0.014 J	0.022	0.0025	0.014 J	0.023	0.0027	0.015 J	0.021	0.0024	0.04 X	0.022	0.0025
Benzo(k)fluoranthene	1.2	12	0.078	0.0036	0.00043	0.019	0.0034	0.00041	0	0.0036	0.00043	0.006 J	0.022	0.0027	0.0048 J	0.023	0.0029	0.0055 J	0.021	0.0026	ND X	0.022	0.0027
Benzo(a)pyrene	0.012	0.12	0.100	0.0036	0.00043	0.031	0.0034	0.00041	0	0.0036	0.00043	0.0062 J	0.022	0.0047	0.0069 J	0.023	0.0049	0.0066 J	0.021	0.0045	0.012 J	0.022	0.0046
Indeno(1,2,3-cd)pyrene	0.12	1.2	0.050	0.0036	0.00046	0.010	0.0034	0.00044	0	0.0036	0.00046	0.0045 J	0.022	0.0028	ND	0.023	0.0030	ND	0.021	0.0027	0.0088 J	0.022	0.0028
Dibenz(a,h)anthracene	0.012	0.12	0.021	0.0036	0.00047	0.0034	0.0034	0.00045	0.0032 J	0.0036	0.00047	ND	0.022	0.0027	ND	0.023	0.0029	ND	0.021	0.0026	ND	0.022	0.0027
Benzo(g,h,i)perylene	NE	NE	0.041	0.0036	0.00038	0.0088	0.0034	0.00036	0.009	0.0036	0.00038	0.0066 J	0.022	0.0032	ND	0.023	0.0033	ND	0.021	0.0030	0.0065 J	0.022	0.0031

Notes:
[1] - TPH cleanup levels are based on the MTCA Method A cleanup standards.
Bolded values meet or exceed MTCA Method C (PAHs) or MTCA Method A (TPH) groundwater cleanup levels
MRL - Method Reporting Limit
MDL - Method Detection Limit
PAHs - Polynuclear Aromatic Hydrocarbons
TPH - Total Petroleum Hydrocarbons
µg/L - micrograms per liter
ND - Not Detected
D - The reported result is from a dilution.
J - estimated value
U - The analyte was analyzed for, but was not detected at or above the MRL/MDL.
X - See case narrative.
Z - The chromatographic fingerprint does not resemble a petroleum product.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-11
Optimization ISS Evaluations
UCS, Hydraulic Conductivity, and Volumetric Expansion Results

Kemron Sample No.	Untreated Material Type	Reagent Type	Reagent ID			Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Cure Days	Volumetric Expansion	Unconfined Compressive Strength (tons/ft^2)				Hydraulic Conductivity (K) (cm/sec)			
										Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)	Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	Perm (cm/sec)
0397-017A	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150*	7		32.3	117.5	88.9	23.7				
								28	30.36	33.2	115.5	86.8	184.5	34.9	105.2	78.0	5.5E-07
0397-017DUP	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	3	48.21								
								7	42.86								
								28	42.86	36.4	106.1	77.8	180.2				
0397-026	TP-02	Portland Cement #842/Bentonite	842	807	-	8/2	150	7	28.57	33.8	103.3	77.2	31.9				
								14		33.0	105.6	79.4	44.9				
								28	31.25	33.2	106.8	80.2	243.3**	30.2	102.0	78.0	2.6E -07
								56	27.55	32.7	104.2	78.5	77.7				
0397-027	TP-02	NewCem Slag Cement/ Portland Cement/Bentonite	920	842	807	6/2/2	150	7	25.80	34.1	106.1	79.1	68.8				
								14		34.1	106.1	79.2	127.7				
								28	29.64	34.6	104.9	78.0	239.8	33.4	106.0	79.5	3.3E-07
								56	31.21	32.7	105.6	79.6	333.1				
0397-028	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	920	807	926	8/2/0.5	175	7	36.61	39.7	100.7	72.1	91.7				
								14		37.9	102.7	74.5	119.1				
								28	34.82	37.6	103.0	74.8	245.5	38.0	102.0	74.1	1.9E-07
								56	36.07	36.0	102.6	75.4	383.5				
								86	25.51	34.9	102.1	75.7	355.3				
0397-029	TP-02	NewCem Slag Cement/Bentonite/Organoclay SS 199/Caustic Soda	920	807	922/926	8/2/0.5/0.5	175	7	35.71	39.7	105.1	75.2	44.8				
								14		38.3	106.3	76.8	117.7				
								28	37.86								
								56	38.21	35.1	103.5	76.6	358.3				
0397-030	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	920	807	926	10/2/0.5	175	7	40.18	39.3	106.1	76.2	120.8				
								14		37.9	104.1	75.5	192.0				
								28	40.80								
								56	40.09	35.8	100.9	74.3	341.1				
0397-031	TP-02	NewCem Slag Cement/Bentonite/OrganoClay SS199 /Caustic Soda	920	807	922/926	10/2/0.5/0.5	175	7	40.18	38.6	106.6	76.9	127.1				
								14		37.8	105.5	76.5	221.5				
								28	40.45								
								56	42.59	35.5	104.6	77.2	433.9				

Notes:
* For Mix 0397-017A, the mixing procedure used by CETCO was replicated. Cetco based on a 150% water addition by Slag Cement weight only. This resulted in a 113.6% water additon rate by total reagent weight
** This result was determined to be inaccurate.

- Not Tested

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-12
Optimization ISS Evaluations
SPLP Results
Mixes 17A, 17Dup, and 28

Testing Parameter	Unit	0397-017A	0397-017 DUP	0397-028
SPLP PAH				
Naphthalene	µg/L	1,800	1,700	5,400 J
Acenaphthylene	µg/L	3.4	3.6	9.0 J
Acenaphthene	µg/L	280	250	440 J
Fluorene	µg/L	99 J	94	250 J
Phenanthrene	µg/L	140	140	270 J
Anthracene	µg/L	17	18	36 J
Fluoranthene	µg/L	16	16	24 J
Pyrene	µg/L	9.3	9.4	13 J
Benz(a)anthracene	µg/L	0.43	0.43	0.71 J
Chrysene	µg/L	0.35	0.38	0.46 J
Benzo(b)fluoranthene	µg/L	0.046 J	0.045 J	0.049 J
Benzo(k)fluoranthene	µg/L	0.20 U	0.20 U	0.028 J
Benzo(a)pyrene	µg/L	0.20 U	0.20 U	0.21 U
Indeno(1,2,3-cd)pyrene	µg/L	0.031 J	0.20 U	0.21 U
Dibenz(a,h)anthracene	µg/L	0.20 U	0.20 U	0.21 U
Benzo(g,h,i)perylene	µg/L	0.040 J	0.20 U	0.21 U
2-Methylnaphthalene	µg/L	380	340	790 J
Dibenzofuran	µg/L	97 J	95	290 J
SPLP TPH				
Diesel Range Organics (DRO)	µg/L	6,700	6,900	17,000 J
Residual Range Organics (RRO)	µg/L	520 U	510 U	920 J

Notes:

PAHs - polynuclear aromatic hydrocarbons
SPLP - synthetic precipitation leaching procedure
TPH - total petroleum hydrocarbons
µg/L - micrograms per liter
J - estimated value
U - The analyte was analyzed for, but was not detected at or above the outlined value.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-13
Optimization ISS Evaluations
5-Day ANS 16.1 Results
Mixes 17 Dup and 26

Testing Parameter	MTCA Cleanup Levels Groundwater (µg/L)		Sample 0397-017 DUP			Sample 0397-026
			5-Day			5-Day
	Method B	Method C	Results (µg/L)	MRL	MDL	Results (µg/L)
TPH						
Diesel Range Organics (DRO)	500 [1]	500 [1]	**500**	260	-	**1,300**
Residual Range Organics (RRO)	500 [1]	500 [1]	ND	550	-	< 560
PAHs						
Naphthalene	160	350	81 D	1.5	0.31	170
2-Methylnaphthalene	32	70	15 D	0.07	0.0087	0.54
Acenaphthylene	NE	NE	0.20	0.0037	0.00041	21
Acenaphthene	960	2,100	15 D	0.074	0.0079	16
Dibenzofuran	16	35	8.2 D	0.074	0.0092	**44**
Fluorene	640	1,400	9.3 D	0.074	0.0092	5.7
Phenanthrene	NE	NE	15 D	0.074	0.016	11
Anthracene	4,800	10,500	1.6	0.0037	0.00032	5.9
Fluoranthene	640	1,400	2.1	0.0037	0.0005	0.56
Pyrene	480	1,050	1.3	0.0037	0.00085	0.47
Benz(a)anthracene	0.12	1.2	0.830	0.0037	0.00037	0.085
Chrysene	12	120	0.0700	0.0037	0.00071	< 0.039
Benzo(b)fluoranthene	0.12	1.2	0.0120	0.0037	0.00028	< 0.039
Benzo(k)fluoranthene	1.2	12	0.0036 J	0.0037	0.00045	< 0.039
Benzo(a)pyrene	0.012	0.12	0.0055	0.0037	0.00045	< 0.039
Indeno(1,2,3-cd)pyrene	0.12	1.2	0.0086 J	0.0037	0.00048	< 0.039
Dibenz(a,h)anthracene	0.012	0.12	ND	0.0037	0.00049	**30**
Benzo(g,h,i)perylene	NE	NE	0.0076 J	0.0037	0.00040	15

Notes:
[1] - TPH cleanup levels are based on the MTCA Method A cleanup standards.
Bolded values meet or exceed MTCA Method C (PAHs) or MTCA Method A (TPH) groundwater cleanup levels.
MRL - Method Reporting Limit
MDL - Method Detection Limit
PAHs - Polynuclear Aromatic Hydrocarbons
TPH - Total Petroleum Hydrocarbons
ug/L - micrograms per liter
D - The reported result is from a dilution.
J - estimated value
"<" indicates that the compound was not detected above the value presented.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-14
Optimization ISS Evaluations
Complete ANS 16.1 Results
Mix 17A

Testing Parameter	MTCA Cleanup Levels Groundwater (µg/L)		Sample 0397-017A													
			2-Hour		7-Hour		24-Hour		2-Day		3-Day		4-Day		5-Day	
	Method B	Method C	Results (µg/L)	MDL	Results (µg/L)	MDL	Results (µg/L)	MDL	Results (µg/L)	MDL	Results (µg/L)	MRL	Results (µg/L)	MRL	Results (µg/L)	MRL
TPH																
Diesel Range Organics (DRO)	500 [1]	500 [1]	390 Z	12.00	**710 Z**	12	**1,600 Z**	12	**1,600 Z**	12	**1,100 Z**	270	**1,100 Z**	270	**570 Z**	290
Residual Range Organics (RRO)	500 [1]	500 [1]	35 J	21.00	33 J	20	53 J	21	56 J	20	ND	540	ND	540	ND	570
PAHs																
Naphthalene	160	350	71 D	0.15	130 D	0.15	340 D	0.29	310 D	0.30	270 D	0.8	310 D	0.77	100 D	1.5
2-Methylnaphthalene	32	70	13 D	0.0042	22 D	0.0840	57 D	0.1700	55 D	0.1700	48 D	0.8	56 D	0.77	17 D	0.074
Acenaphthylene	NE	NE	0.16	0.00039	0.22	0.00039	0.40	0.00038	0.37	0.00039	0.57 D	0.040	0.63 D	0.039	0.23	0.0037
Acenaphthene	960	2,100	12 D	0.0038	16 D	0.0038	41 D	0.150	38 D	0.0076	36 D	0.80	42 D	0.77	16 D	0.074
Dibenzofuran	16	35	6.5 D	0.0044	8.4 D	0.0044	21 D	0.0086	20 D	0.0089	17 D	0.040	19 D	0.039	9.2 D	0.074
Fluorene	640	1,400	8.2 D	0.0044	10 D	0.0044	25 D	0.0086	23 D	0.0089	20 D	0.040	22 D	0.039	11 D	0.074
Phenanthrene	NE	NE	13 D	0.0075	12 D	0.0076	28 D	0.015	28 D	0.016	29 D	0.80	31 D	0.77	18 D	0.074
Anthracene	4,800	10,500	1.7	0.0003	1.5	0.00031	4.3 D	0.006	4.2 D	0.0062	3.8 D	0.040	4.1 D	0.039	2.00	0.0037
Fluoranthene	640	1,400	2.7 D	0.0048	1.8	0.00048	4.1 D	0.0094	4.2 D	0.0097	4.5 D	0.040	4.7 D	0.039	3.5 D	0.074
Pyrene	480	1,050	1.6	0.00081	1.0	0.00082	2 D	0.016	2.2 D	0.017	2.6 D	0.040	2.8 D	0.039	1.7	0.0037
Benz(a)anthracene	0.12	1.2	0.13	0.00036	0.10	0.00036	0.18	0.00035	0.180	0.00036	0.15 D	0.040	0.17 D	0.039	0.11	0.0037
Chrysene	12	120	0.064	0.00068	0.055	0.00068	0.085	0.00067	0.080	0.00069	0.087 D	0.040	0.1 D	0.039	0.088	0.0037
Benzo(b)fluoranthene	0.12	1.2	0.011	0.00026	0.019	0.00027	0.023	0.00026	0.018	0.00027	0.018 J,D	0.040	0.026 J,D	0.039	0.015	0.0037
Benzo(k)fluoranthene	1.2	12	0.0034 J	0.00043	0.0079	0.00043	0.0078	0.00042	0.0048	0.00044	0.0065 J,D	0.040	0.0083 J,D	0.039	0.0047	0.0037
Benzo(a)pyrene	0.012	0.12	0.0066	0.00043	0.013	0.00043	0.013	0.00042	0.0098	0.00044	0.0081 J,D	0.040	0.012 J,D	0.039	0.008	0.0037
Indeno(1,2,3-cd)pyrene	0.12	1.2	0.00078 J	0.00046	0.0036 J	0.00046	0.003 J	0.00045	0.0017 J	0.00047	ND	0.040	ND	0.039	0.0013 J	0.0037
Dibenz(a,h)anthracene	0.012	0.12	ND	0.00047	0.0011 J	0.00047	0.0012 J	0.00046	0.00063 J	0.00048	ND	0.040	ND	0.039	0.00053 J	0.0037
Benzo(g,h,i)perylene	NE	NE	0.00068 J	0.00038	0.0029 J	0.00038	0.0026 J	0.00037	0.0014 J	0.00038	ND	0.040	ND	0.039	0.001 J	0.0037

Notes:
[1] - TPH cleanup levels are based on the MTCA Method A cleanup standards.
Bolded values meet or exceed MTCA Method C (PAHs) or MTCA Method A (TPH) groundwater cleanup levels.
MDL - Method Detection Limit
MRL - Method Reporting Limit
PAHs - polynuclear aromatic hydrocarbons
TPH - total petroleum hydrocarbons
µg/L - micrograms per liter
ND - not detected
D - The reported result is from a dilution.
J - estimated value
Z - The chromatographic fingerprint does not resemble a petroleum product.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-15
Optimization ISS Evaluations
Complete ANS 16.1 Results
Mix 28

Testing Parameter	MTCA Cleanup Levels Groundwater (µg/L)		Sample 0397-028													
			2-Hour		7-Hour		24-Hour		2-Day		3-Day		4-Day		5-Day	
	Method B	Method C	Results (µg/L)	MDL	Results (µg/L)	MDL	Results (µg/L)	MDL	Results (µg/L)	MDL	Results (µg/L)	MRL	Results (µg/L)	MRL	Results (µg/L)	MRL
TPH																
Diesel Range Organics (DRO)	500 [1]	500 [1]	**520 Z**	270	**570 Z**	280	**930 Z**	250	**910 Z**	280	**920 Z**	310	**1,000 Z**	310	**860 Z**	290
Residual Range Organics (RRO)	500 [1]	500 [1]	ND	540	ND	550	ND	500	ND	550	ND	610	ND	610	ND	580
PAHs																
Naphthalene	160	350	30 D	0.015	64 D	0.071	170 D	0.079	120 D	0.071	140 D	0.071	120 D	0.071	100 D	0.071
2-Methylnaphthalene	32	70	61 D	0.008	12 D	0.0400	34 D	0.0440	23 D	0.0400	29 D	0.04	26 D	0.04	22 D	0.04
Acenaphthylene	NE	NE	0.12	0.00037	0.19	0.00037	0.41	0.00041	0.30	0.00037	0.44 D	0.0037	0.390 D	0.0037	0.34 D	0.0037
Acenaphthene	960	2,100	6.0 D	0.0072	11 D	0.036	29 D	0.040	20 D	0.036	24 D	0.0360	19 D	0.0360	17 D	0.0360
Dibenzofuran	16	35	4.1 D	0.0084	6.6 D	0.042	19 D	0.047	14 D	0.042	14 D	0.0042	12 D	0.0042	11 D	0.0042
Fluorene	640	1,400	4.6 D	0.0084	8.3 D	0.042	22 D	0.047	16 D	0.042	16 D	0.0042	14 D	0.0042	13 D	0.0042
Phenanthrene	NE	NE	7.2 D	0.015	13 D	0.072	42 D	0.08	35 D	0.072	41 D	0.072	35 D	0.072	31 D	0.072
Anthracene	4,800	10,500	0.980 D	0.00029	1.4	0.00029	5.6 D	0.032	5.4 D	0.029	5.3 D	0.0029	4.7 D	0.0029	4.4 D	0.0029
Fluoranthene	640	1,400	1.0	0.00046	1.7	0.00046	6.9 D	0.051	7.0 D	0.046	8.2 D	0.0046	7.3 D	0.0046	7.7 D	0.0046
Pyrene	480	1,050	0.660	0.00078	1.1	0.00078	4.3 D	0.086	4.3 D	0.078	4.8 D	0.0078	4.2 D	0.0078	4.5 D	0.0078
Benz(a)anthracene	0.12	1.2	0.094	0.00034	0.12	0.00034	0.33	0.00038	0.350	0.00034	0.390 D	0.0034	0.330 D	0.0034	0.380 D	0.0034
Chrysene	12	120	0.071	0.00027	0.100	0.00027	0.270	0.000372	0.270	0.00027	0.390 D	0.0065	0.320 D	0.0065	0.380 D	0.0065
Benzo(b)fluoranthene	0.12	1.2	0.027	0.00025	0.030	0.00025	0.068	0.00028	0.052	0.00025	0.0065 D	0.0025	0.048 D	0.0025	0.058 D	0.0025
Benzo(k)fluoranthene	1.2	12	0.012	0.00041	0.0110	0.00041	0.0230	0.00046	0.0160	0.00041	0.0026 JD	0.0041	0.022 JD	0.0041	0.025 JD	0.0041
Benzo(a)pyrene	0.012	0.12	0.019	0.00041	0.017	0.00041	0.034	0.00046	0.0240	0.00041	0.0034 D	0.0041	0.023 JD	0.0041	0.029 JD	0.0041
Indeno(1,2,3-cd)pyrene	0.12	1.2	0.0057	0.00044	0.0045	0.00044	0.0095	0.00049	0.0047	0.00044	0.0020 JD	0.0044	0.0096 JD	0.0044	0.0081 JD	0.0044
Dibenz(a,h)anthracene	0.012	0.12	0.0015 J	0.00045	0.0013 J	0.00045	0.0025 J	0.0005	0.0012 J	0.00045	0.0011 JD	0.0045	0.0059 JD	0.0045	ND	0.0045
Benzo(g,h,i)perylene	NE	NE	0.0052	0.00036	0.0041	0.00036	0.0074	0.0004	0.0032 J	0.00036	0.0023 JD	0.0036	0.0097JD	0.0036	0.0088 JD	0.0036

Notes:
[1] - TPH cleanup levels are based on the MTCA Method A cleanup standards.
Bolded values meet or exceed MTCA Method C (PAHs) or MTCA Method A (TPH) groundwater cleanup levels.
MDL - Method Detection Limit
MRL - Method Reporting Limit
PAHs - polynuclear aromatic hydrocarbons
TPH - total petroleum hydrocarbons
µg/L - micrograms per liter
ND - not detected
D - The reported result is from a dilution.
J - estimated value
Z - The chromatographic fingerprint does not resemble a petroleum product.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 3-16
Optimization ISS Evaluations
Other Analytical Results
Mix 28

Testing Parameter	0397-028			
	WIPE Results (µg/Wipe)	Total Results (mg/kg)	TCLP Results (µg/L)	SPLP Results (µg/L)
PAHs				
Naphthalene	0.48 J	150,000 J	5,100 J	5,400 J
Acenaphthylene	0.010	1,300 J	8.4 J	9.0 J
Acenaphthene	0.26 J	91,000 J	420 J	440 J
Fluorene	0.28	86,000 J	230 J	250 J
Phenanthrene	1.1	250,000 J	260 J	270 J
Anthracene	0.21	48,000 J	31 J	36 J
Fluoranthene	0.62	110,000 J	22 J	24 J
Pyrene	0.44	74,000 J	13 J	13 J
Benz(a)anthracene	0.13	17,000 J	0.58 J	0.71 J
Chrysene	0.12	19,000 J	0.48 J	0.46 J
Benzo(b)fluoranthene	0.085	9,600 J	0.063 J	0.049 J
Benzo(k)fluoranthene	0.033	3,600 J	0.034 J	0.028 J
Benzo(a)pyrene	0.090 J	6,100 J	0.22 U	0.21 U
Indeno(1,2,3-cd)pyrene	0.024	2,000 J	0.22 U	0.21 U
Dibenz(a,h)anthracene	0.0065	510 J	0.22 U	0.21 U
Benzo(g,h,i)perylene	0.022	1,600 J	0.22 U	0.21 U
2-Methylnaphthalene	0.18 J	84,000 J	750 J	790 J
Dibenzofuran	0.20	67,000 J	260 J	290 J
TPHs				
Diesel Range Organics (DRO)	500 U	4,300 J	15,000 J	17,000 J
Residual Range Organics (RRO)	560 J	1,000 J	540 U	920 J

Notes:
PAHs - Polynuclear Aromatic Hydrocarbons
SPLP - Synthetic Precipitation Leaching Procedure
TCLP - Toxicity Characteristic Leaching Procedure
TPH - Total Petroleum Hydrocarbons
µg/L - micrograms per liter
J - estimated value
U - The analyte was analyzed for, but was not detected at or above the outlined value.

Source: Kemron Environmental Services, Longview Site Treatability Study Final Report, Prepared for URS Corporation, Seattle, WA, September 26, 2012.

Table 4-1
ISTR Study Test Questions, Methods, and Goals

Test Question	Test Method	Test Goal
1. Will DRO and PAHs transition off the soil matrix during heating?	Heating and visual observations	Evaluate the effectiveness of bubble flotation and MPE
2. If so, will a LNAPL or a DNAPL be produced?	Heating and visual observations	Evaluate design options for contaminant extraction
3. How much DRO and PAH can be boiled off the soil matrix?	Chemical analysis before and after heating	Evaluate the effectiveness of steam stripping during ISTR
4. Will recovered liquids and vapors solidify upon cooling?	Heating, extraction, and visual observations	Evaluate options for system materials and construction
5. Is site NAPL primarily lighter or denser than water?	Heating and visual observations	Evaluate the effectiveness of MPE and bubble flotation
6. Does the density of site NAPL change upon heating?	Heating and visual observations	Evaluate the effectiveness of MPE and bubble flotation

Source: Global Remediation Solutions, LLC Letter Report: ISTR Bench Scale Study - Creosote Site in Washington State. Prepared for URS Corporation, Seattle, WA, September 14, 2012.

Table 4-2
ISTR Baseline Soil Concentrations

Analyte	Unit	Impacted Soil[2] Concentration	Highly-Impacted Soil[3] Concentration	Highly-Impacted SPLP[4] Concentration	Expected Cleanup Target[1]
DRO	mg/kg	1,310	862	5.9	2,000
Benzo(a)pyrene	µg/kg	4,423	4,625	1.9	2,300
Naphthalene	µg/kg	2,810	800	0.52	9,700
Total PAHs	µg/kg	113,036	137,295	NA	NA
TTEC [5]	µg/kg	6,005	6,547	209	2,300

Notes:

[1] - Based upon Washington State Department of Ecology (Ecology) requirements to be protective of groundwater except for DRO which is protective of direct contact.

[2] – Average of three sample results BL1, BL2, and BL3.

[3] – Average of three sample results BL4 and BL5.

[4] – SPLP concentrations are from sample BL4 and are shown in µg/L, except for DRO which is in mg/L.

[5] - Total Toxicity Equivalent Concentration (TTEC) based on benzo(a)pyrene.

DRO – diesel-range organics

NA – not applicable-

PAHs - polynuclear aromatic hydrocarbons

mg/kg – milligrams per kilogram

µg/kg – micrograms per kilogram

Source:

Global Remediation Solutions, LLC Letter Report: ISTR Bench Scale Study - Creosote Site in Washington State. Prepared for URS Corporation, Seattle, WA, September 14, 2012.

Table 4-3
ISTR Dry Heating Test Results – Impacted Soil

Analyte [1]	Unit	Baseline (Avg)[2] Concentration	5 Days [3] Concentration	5 Days[1] (% Reduction)	15 Days Concentration	15 Days[2] (% Reduction)	25 Days Concentration	25-Days[3] (% Reduction)
DRO	mg/kg	1,310	338	74.2%	317	75.8%	237	81.9%
Benzo(a)pyrene	µg/kg	4,423	4,025	9.0%	2,620	40.8%	3,460	21.8%
Naphthalene	µg/kg	2,810	383	86.4%	246	91.2%	375	86.7%
Total PAHs	µg/kg	113,036	50,578	55.3%	56,032	50.4%	45,535	59.7%

Notes:

[1] - Analytical Methods: Diesel = NWTPH-Dx; PAHs = SW8270D.

[2] - Average of three sample results: BL1, BL2, and BL3 for impacted soil.

[3] - Average results from cells C7 and C12.

DRO – diesel-range organics

PAHs - polynuclear aromatic hydrocarbons

mg/kg – milligrams per kilogram

µg/kg – micrograms per kilogram

Source: Global Remediation Solutions, LLC Letter Report: ISTR Bench Scale Study - Creosote Site in Washington State. Prepared for URS Corporation, Seattle, WA, September 14, 2012.

Table 4-4
ISTR Dry Heating Test Results – Highly-Impacted Soil

Analyte[1]	Unit	Baseline Concentration[2]	5 Days Concentration	5 Days (% Reduction)	15 Days Concentration	15 Days (% Reduction)
Diesel	mg/kg	1,030	371	64.0%	418	59.4%
Benzo(a)pyrene	µg/kg	4,990	3,160	36.7%	2,470	50.5%
Naphthalene	µg/kg	807	257	68.2%	127	84.3%
Total PAHs	µg/kg	169,337	98,907	41.6%	99,170	41.4%

Notes:

[1] - Analytical Methods: Diesel = NWTPH-DX; PAHs = SW8270D.

[2] - Results from the analysis of sample BL4 for highly-impacted soil.

DRO – diesel-range organics

PAHs - polynuclear aromatic hydrocarbons

mg/kg – milligrams per kilogram

µg/kg – micrograms per kilogram

Source: Global Remediation Solutions, LLC Letter Report: ISTR Bench Scale Study - Creosote Site in Washington State. Prepared for URS Corporation, Seattle, WA, September 14, 2012.

Table 4-5
ISTR Steaming Test Results – Highly-Impacted Soil

Analyte[1]	Unit	Baseline Concentration[2]	5 Days Concentration	5 Days (% Reduction)	15 Days Concentration	15 Days (% Reduction)
DRO	mg/kg	693	384	44.6%	190	72.6%
Benzo(a)pyrene	µg/kg	4,260	2,180	48.8%	2,890	32.2%
Naphthalene	µg/kg	793	61	92.3%	48	93.9%
Total PAHs	µg/kg	105,253	58,394	44.5%	56,342	46.5%

Notes:

[1] - Analytical Methods: Diesel = NWTPH-DX; PAHs = SW8270D.

[2] - Results from the analysis of sample BL5 for highly impacted soil.

DRO – diesel-range organics

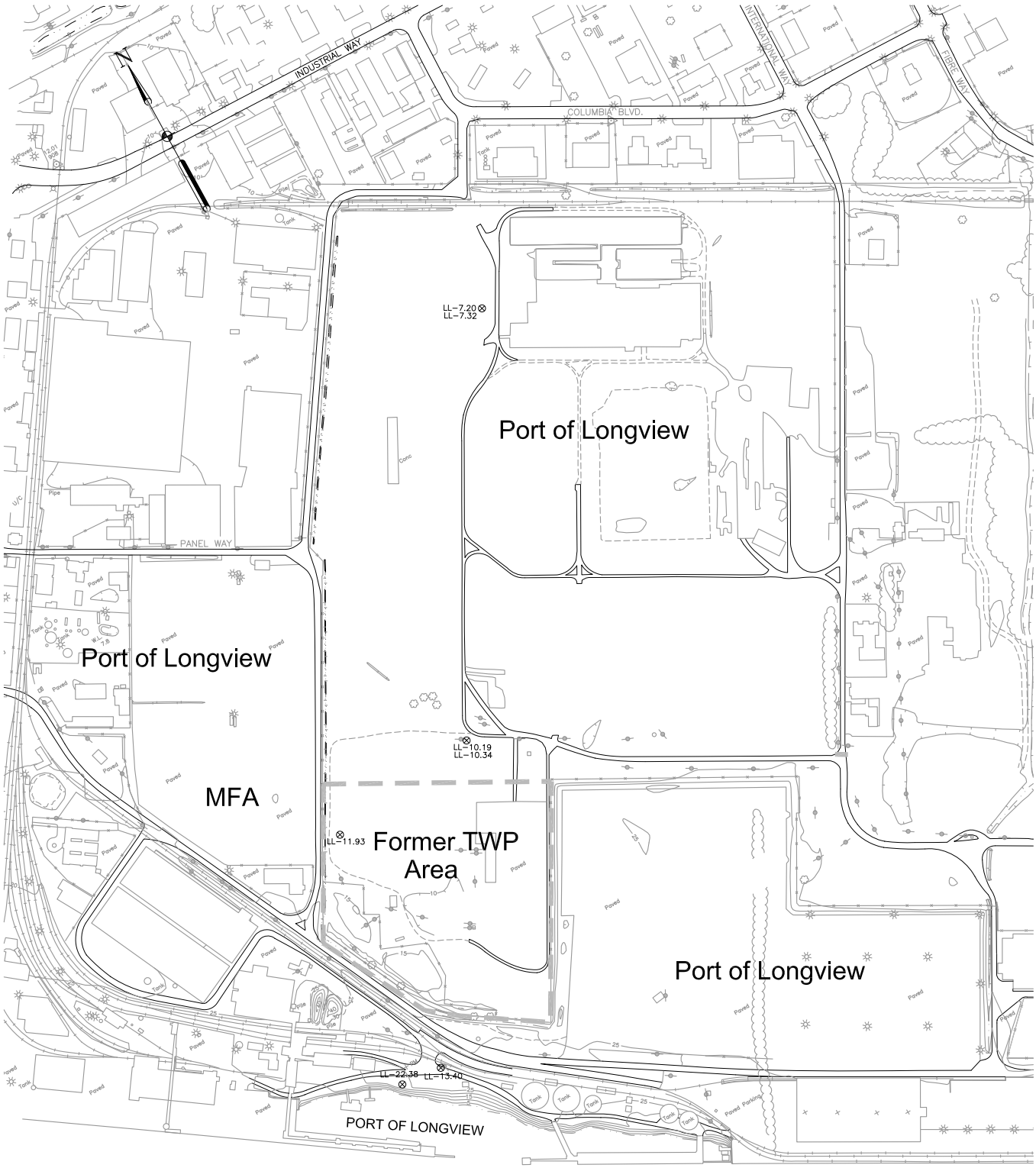
PAHs - polynuclear aromatic hydrocarbons

mg/kg – milligrams per kilogram

µg/kg – micrograms per kilogram

Source: Global Remediation Solutions, LLC Letter Report: ISTR Bench Scale Study - Creosote Site in Washington State. Prepared for URS Corporation, Seattle, WA, September 14, 2012.

Figures



INTERNATIONAL PAPER LONGVIEW, WA	Project No. 33763156	Former International Paper Facility Layout	Figure 1-1
URS			

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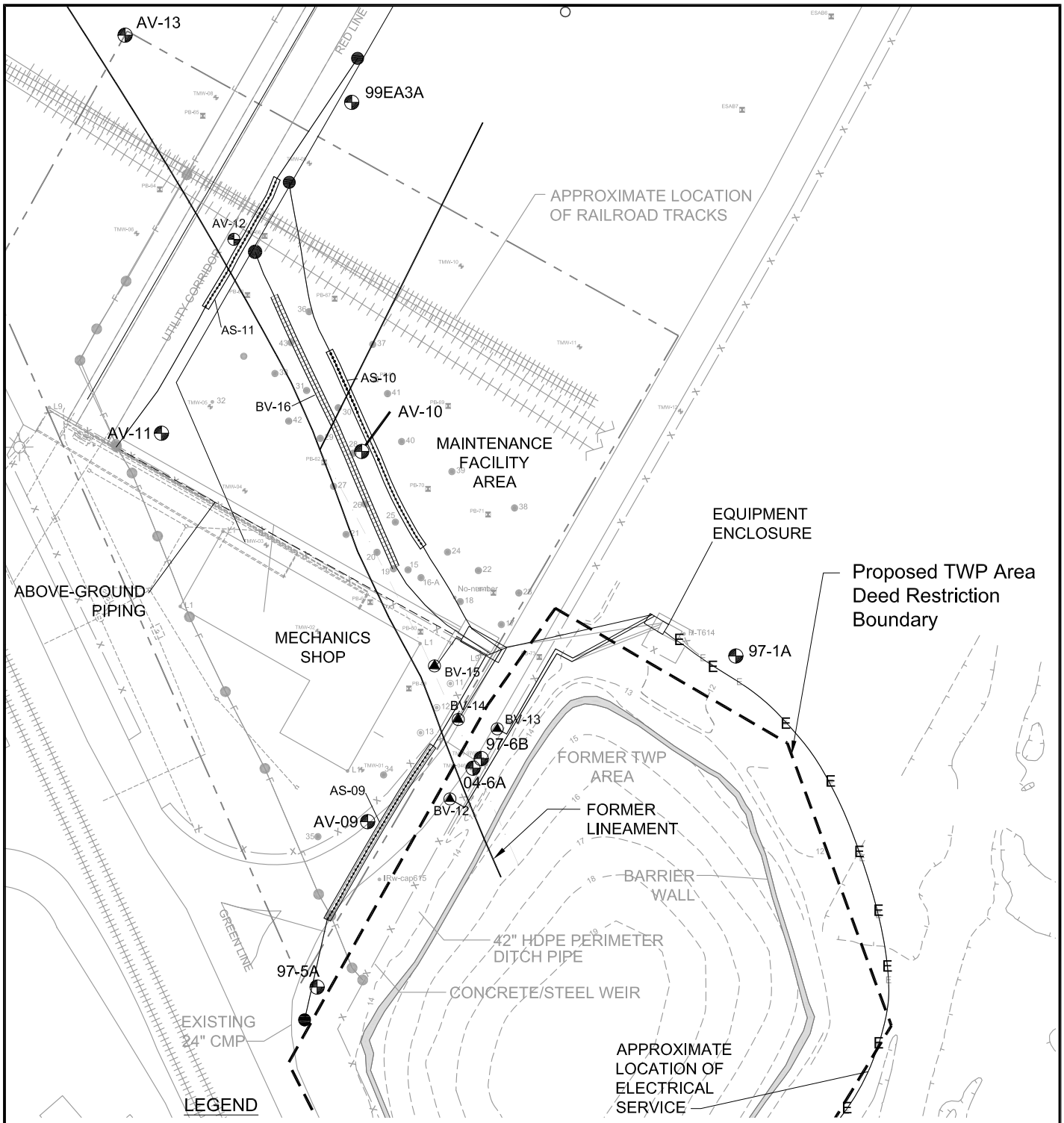

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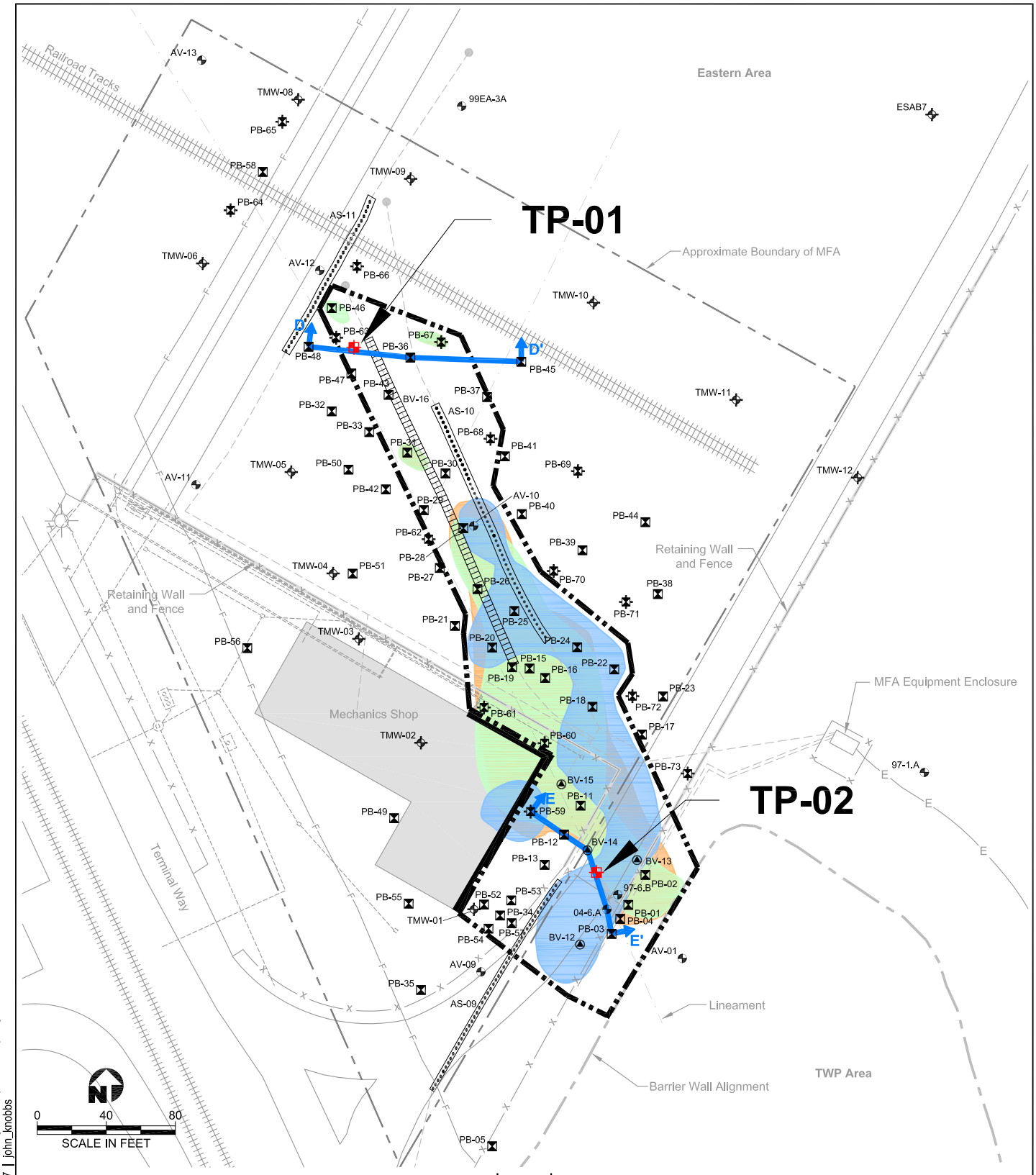
International Paper Longview, WA	Project No. 33763156	Well and Piping Layout - MFA	Figure 1-2
URS			



Legend

- Horizontal Bioventing Well
- Horizontal Biosparging Well
- Horizontal Well Termination Vault
- Groundwater Monitoring Well
- Cross Section Location (D – D')
- Vertical Bioventing Well
- Geoprobe
- 2008 Groundwater Monitoring Well
- 2008 Geoprobe
- Treatability Study Test Pit
- Estimated Limits of Solidification
- Foundation Protection Retaining Wall
- Extent of DNAPL
- Extent of Naphthalene in Soil > MTCA Method C
- Extent of DRO in Soil > MTCA Method A

International Paper Longview, WA	Project No. 33763156	Treatability Study Test Pit Locations
URS		Figure 2-1

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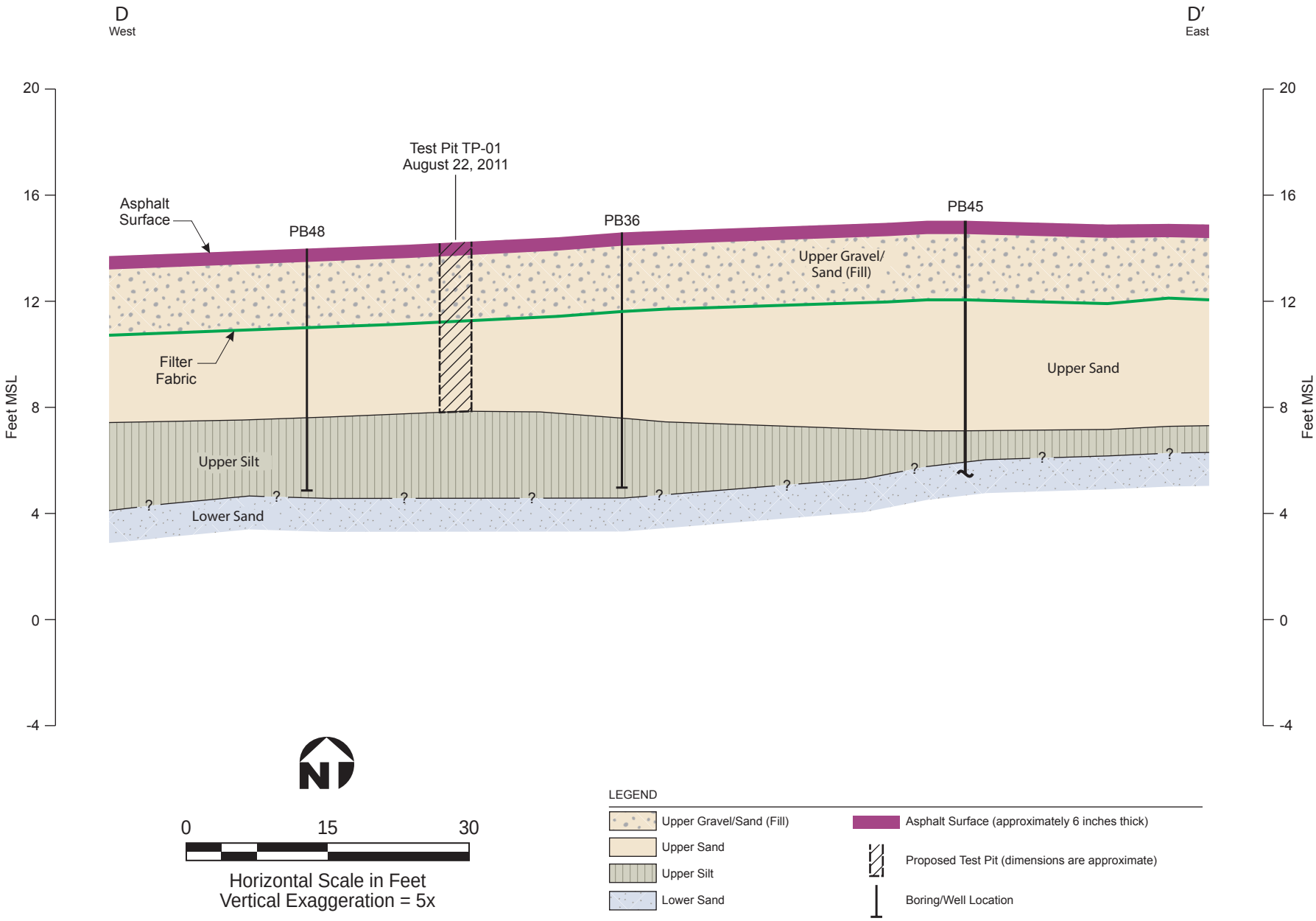
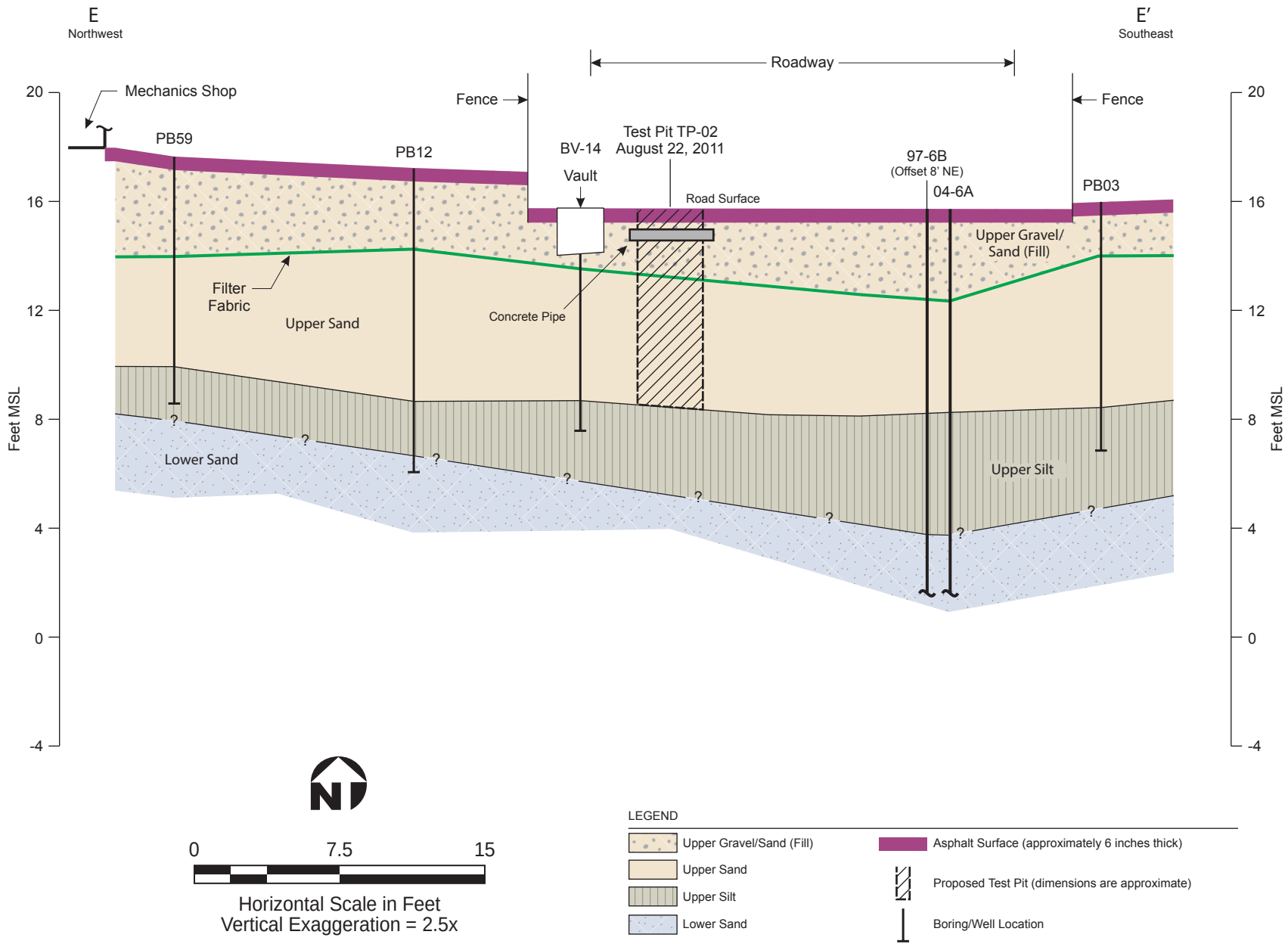


International Paper Longview, WA	Project No. 33763156
URS	

Geologic Cross-Section D-D’

Figure 2-2



International Paper Longview, WA	Project No. 33763156
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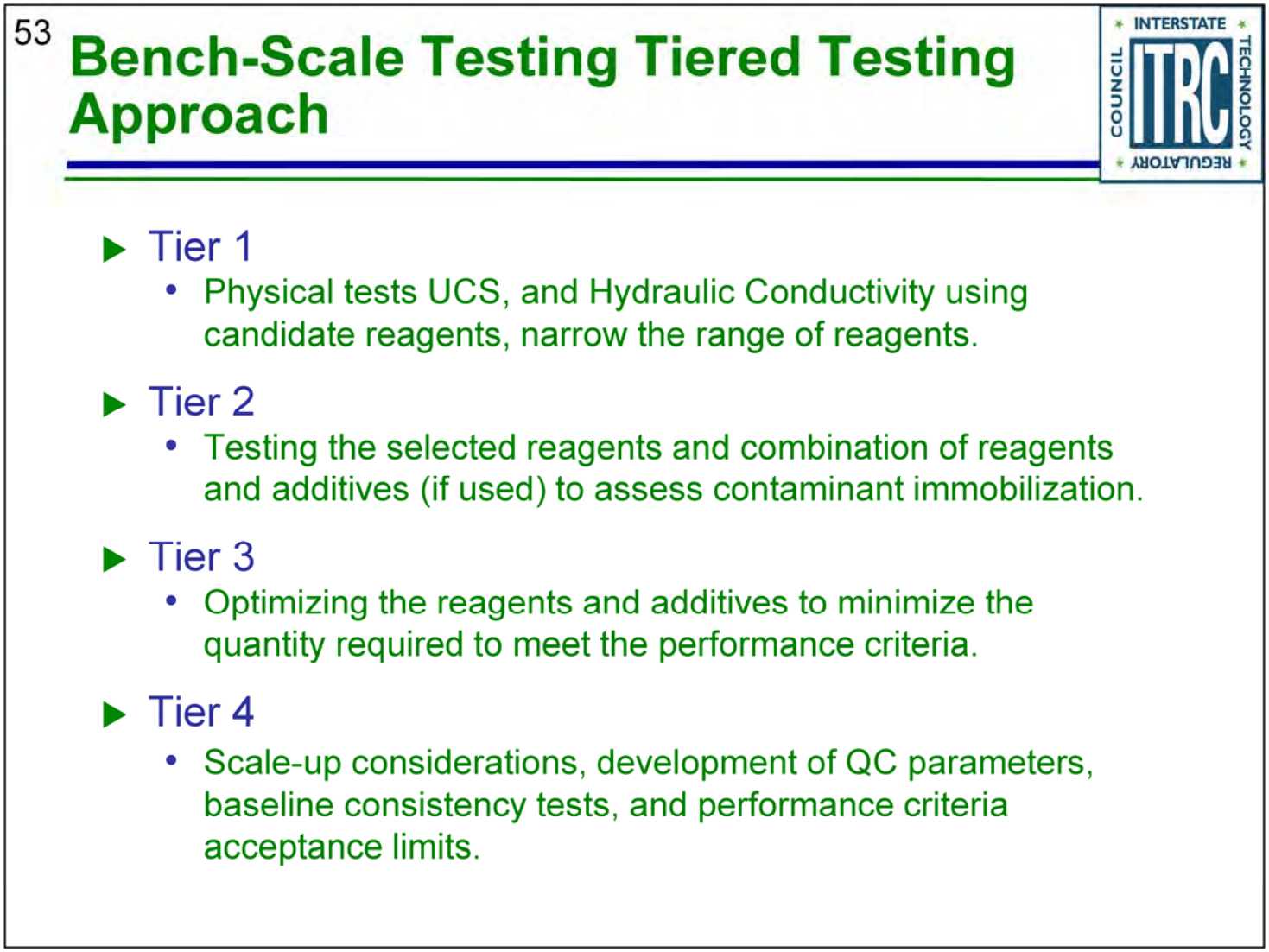
Geologic Cross-Section E-E'

Figure 2-3



Source: Slide 53 from ITRC Training Class Presentation of Solidification/Stabilization. Prepared by Interstate Technology & Regulatory Council Solidification/Stabilization Team, July 2011.

Figure 3-1. ITRC Bench-Scale Testing Tiered Testing Approach

Figure 3-2
ISS TREATABILITY STUDY APPROACH
Process Flow Diagram

Figure 3-3
PHYSICAL PROPERTIES CHARACTERIZATION & ISS REAGENT SELECTION
Process Flow Diagram

↓

Figure 3-4
PRELIMINARY ISS EVALUATION
Process Flow Diagram
Screening of Initial 25 Test Mixes (Mix 1 to Mix 25)

↓

Review Preliminary Results and Compare to
Strength, Leachability, and Hydraulic Conductivity Goals

↓

Figure 3-5
OPTIMIZATION ISS EVALUATION
Process Flow Diagram
Mix 17 (NewCem Slag Cement / Bentonite/ Organoclay SS 199, 12.5 / 2 / 2)

↓

Figure 3-6
OPTIMIZATION ISS EVALUATION
Process Flow Diagram
Additional Mixes (Mix 26 to Mix 31)

↓

Review Optimization Results and Compare to
Strength, Leachability, and Hydraulic Conductivity Goals

Figure 3-3

PHYSICAL PROPERTIES CHARACTERIZATION & ISS REAGENT SELECTION

Process Flow Diagram

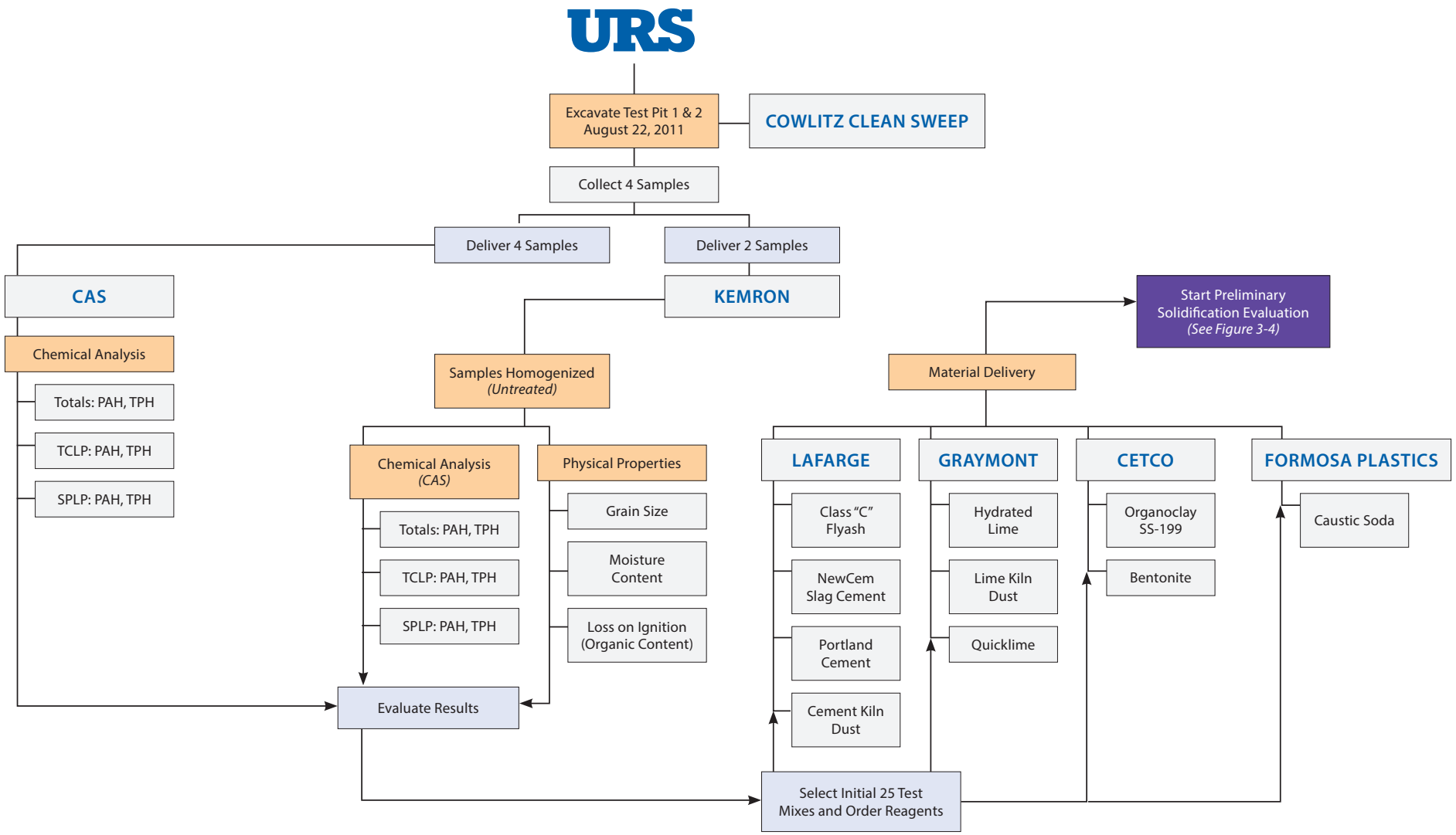


Figure 3-4
PRELIMINARY ISS EVALUATION
Process Flow Diagram

Screening of Initial 25 Test Mixes (Mix 1 to Mix 25)

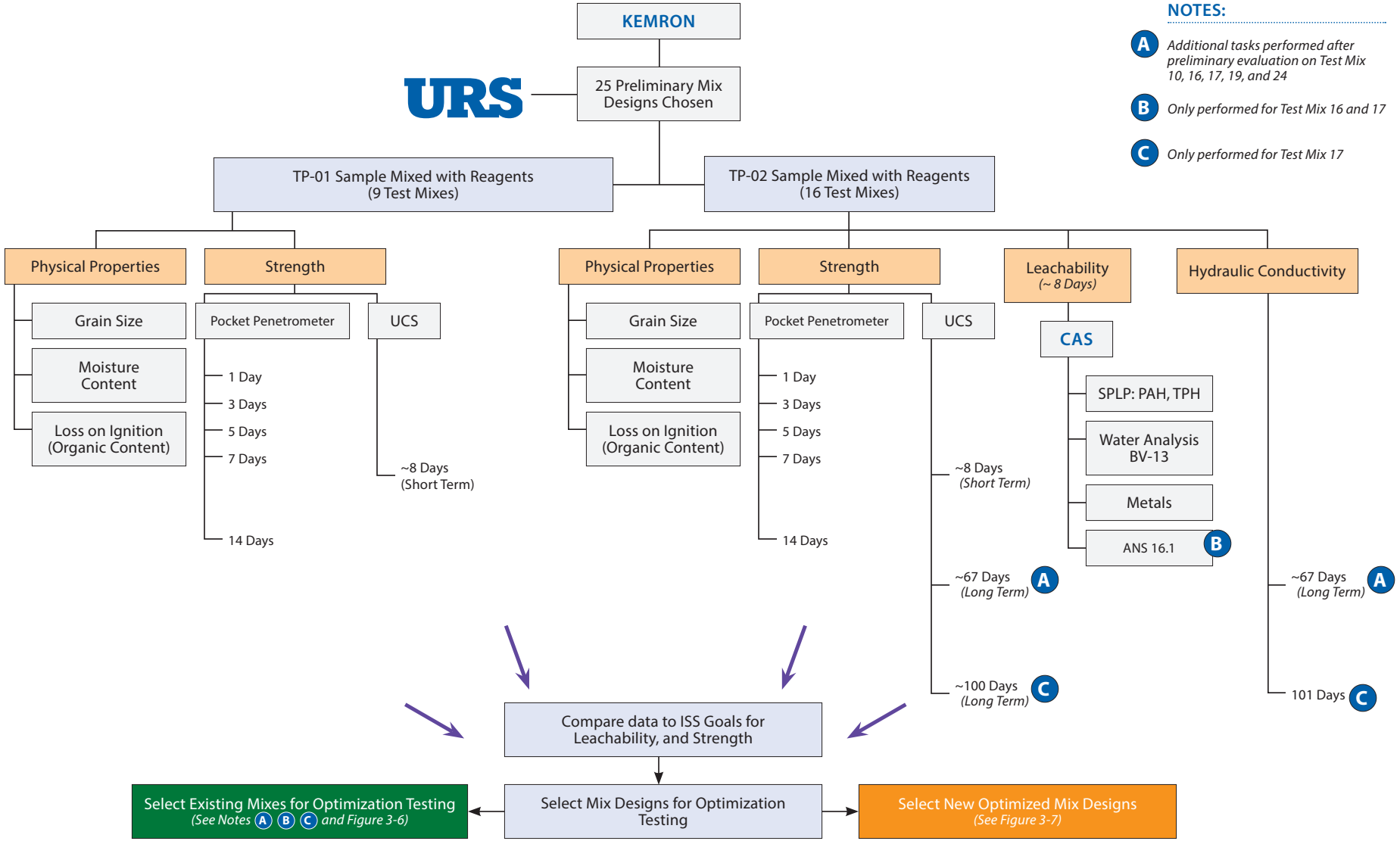


Figure 3-5

OPTIMIZATION ISS EVALUATION

Process Flow Diagram

Mix 17 (NewCem Slag Cement / Bentonite/ Organoclay SS 199, 12.5 / 2 / 2)

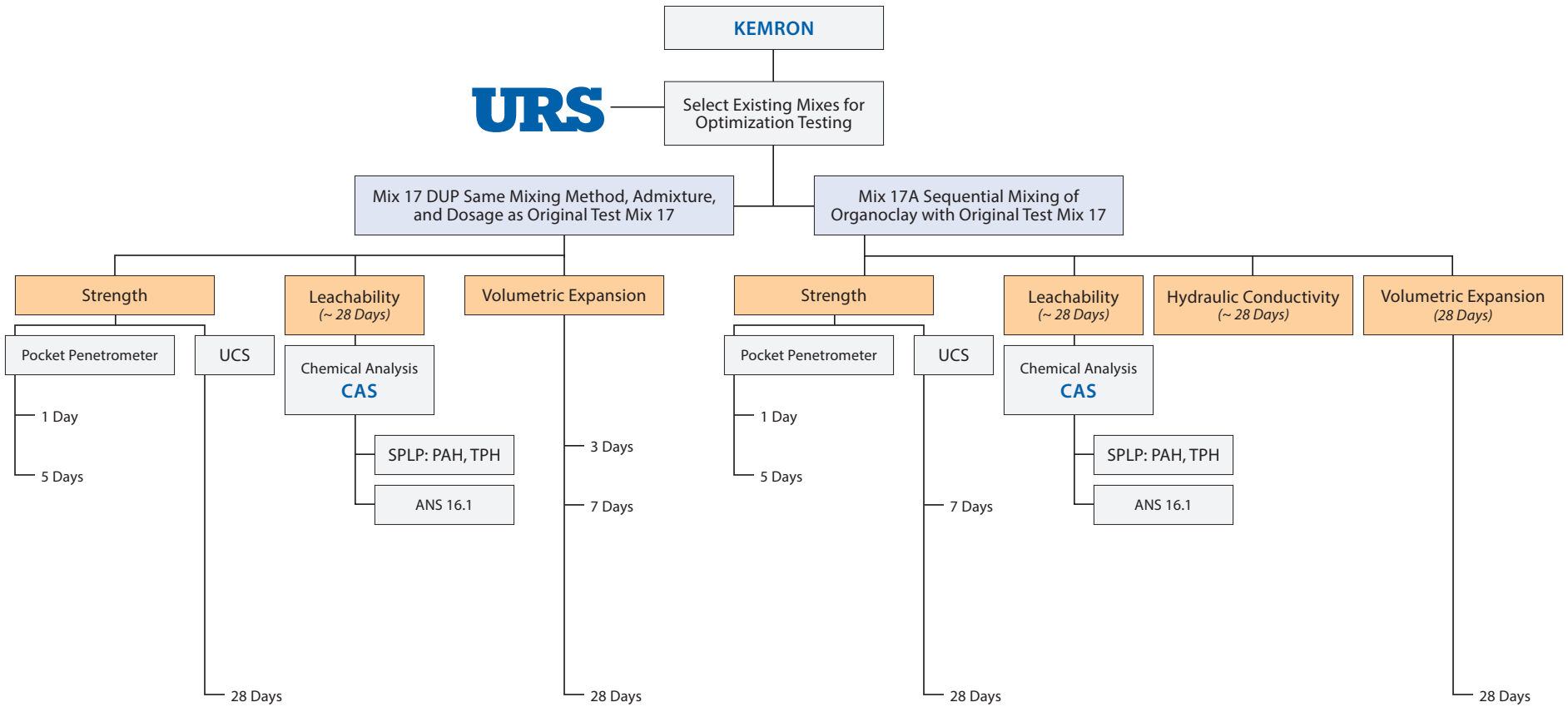


Figure 3-6
OPTIMIZATION ISS EVALUATION
Process Flow Diagram

Additional Mixes (Mix 26 to Mix 31)

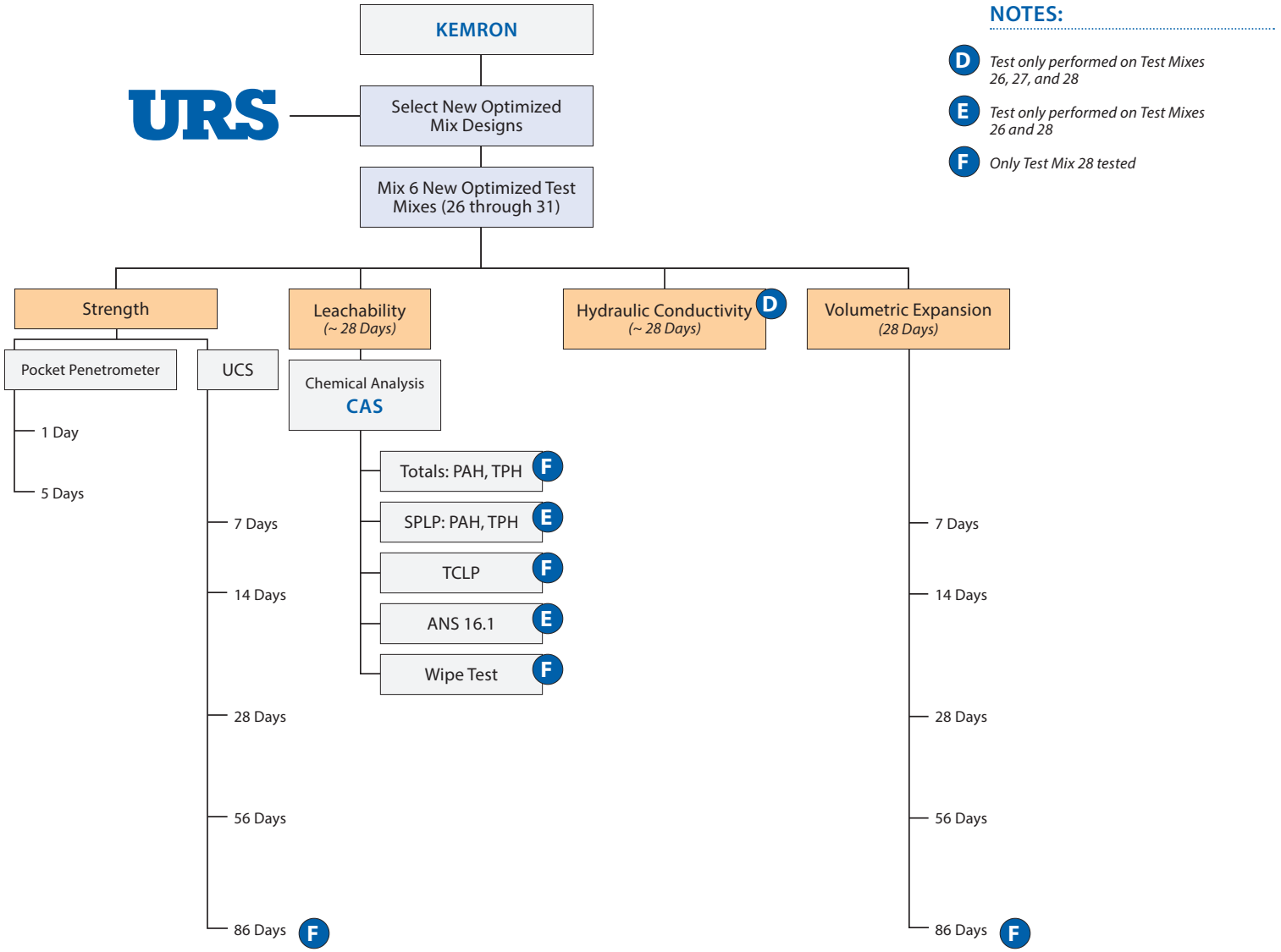


Figure 3-7
Preliminary Leachability Evaluation
after 8 to 9 Day Cure Time - SPLP Results

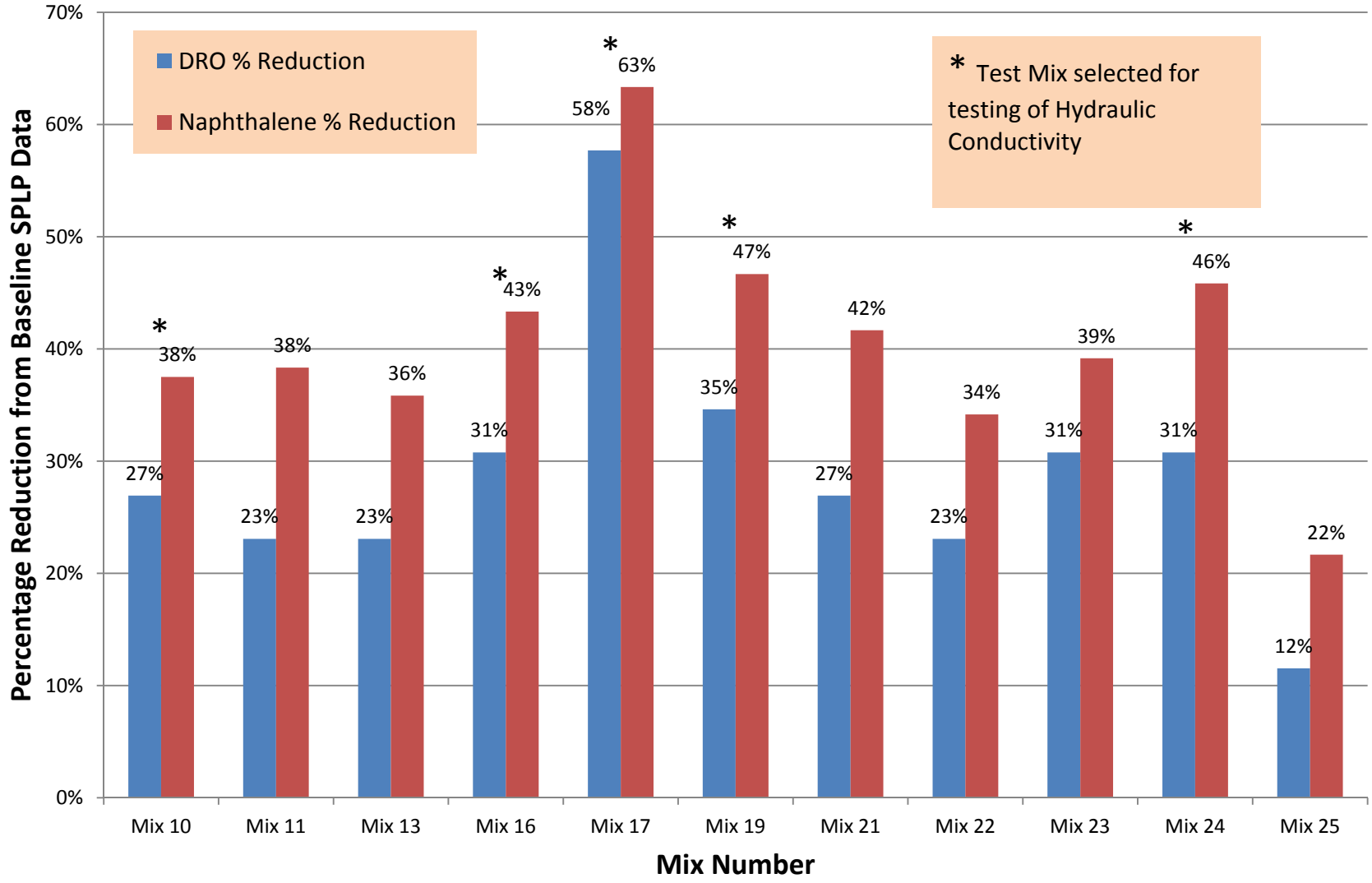


Figure 3-8
Unconfined Compressive Strength vs Cure Time

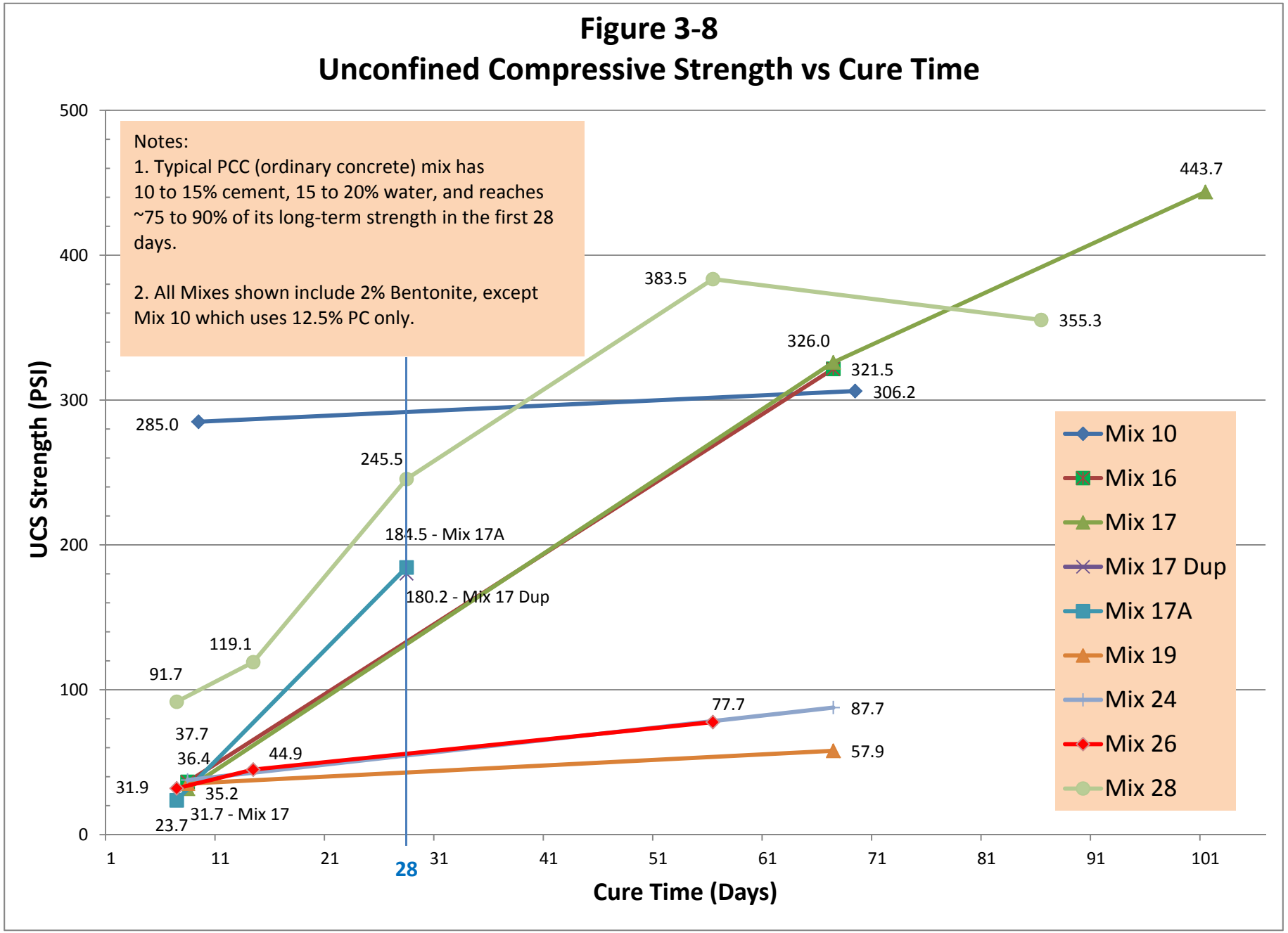


Figure 3-9
Percentage Reduction in DRO and Naphthalene - SPLP Results

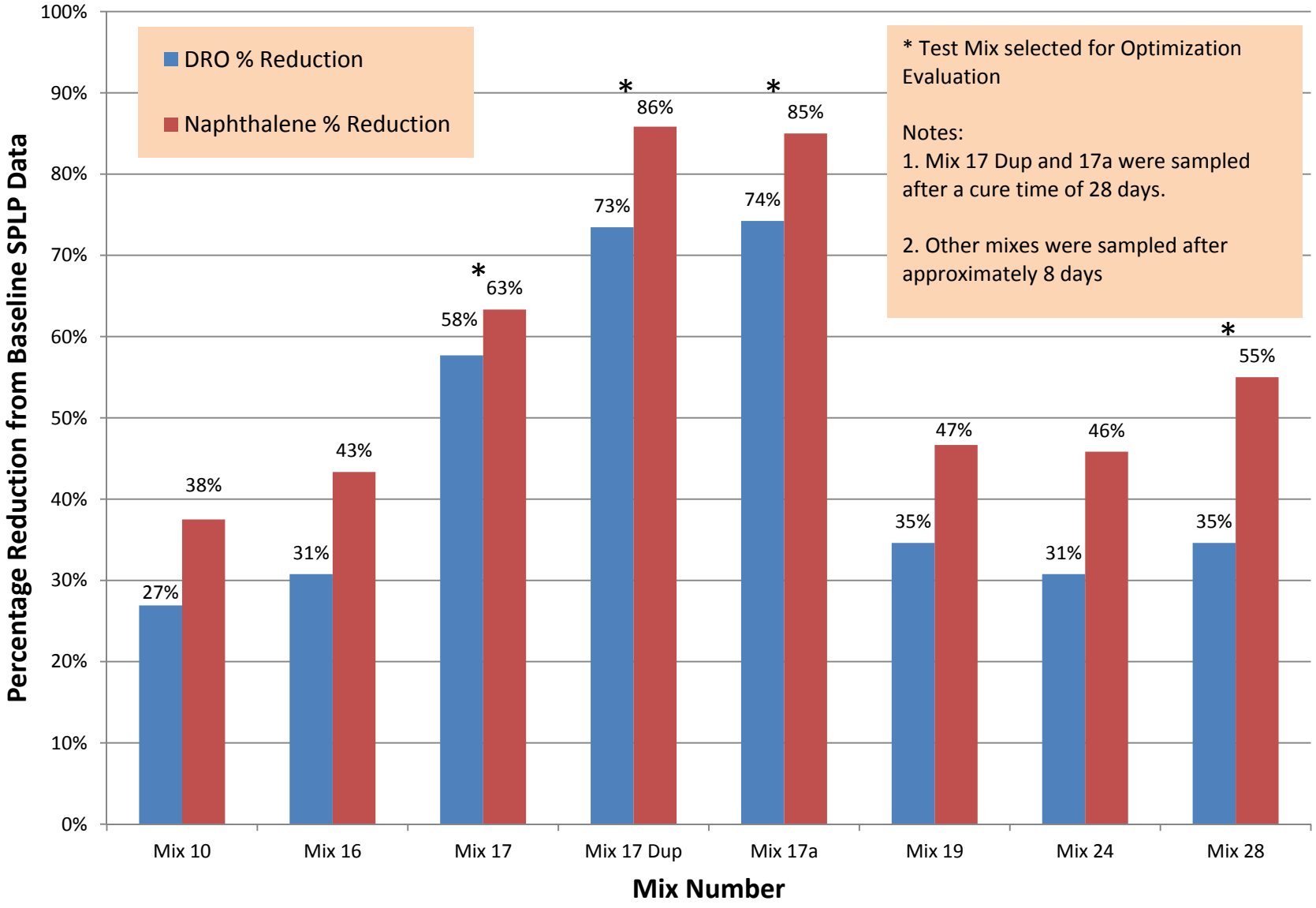


Figure 3-10
5-Day ANS 16.1 DRO and Naphthalene Concentrations

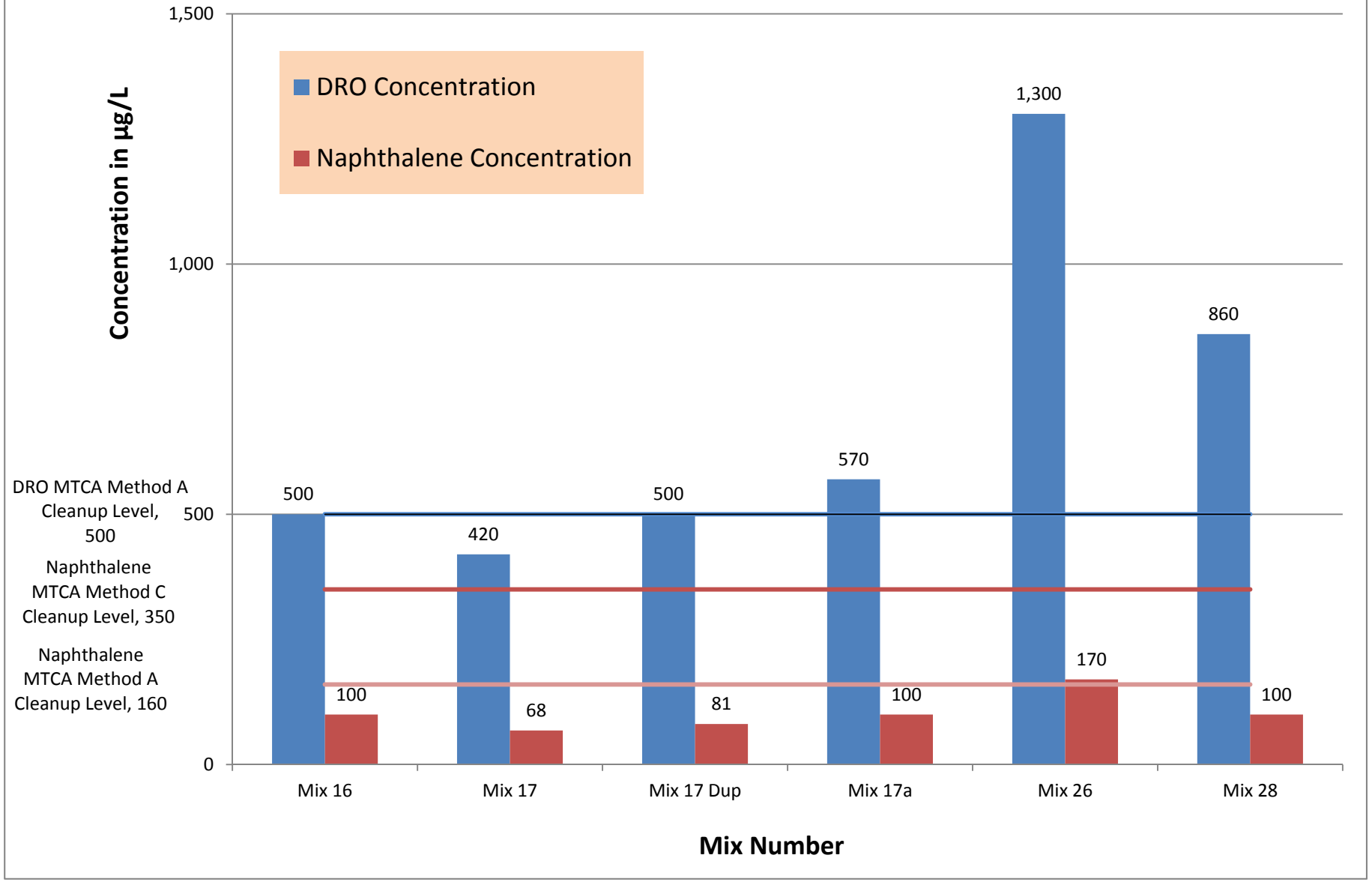


Figure 3-11
Mix 17A ANS 16.1 Results
DRO and Naphthalene Concentrations vs Sample Time

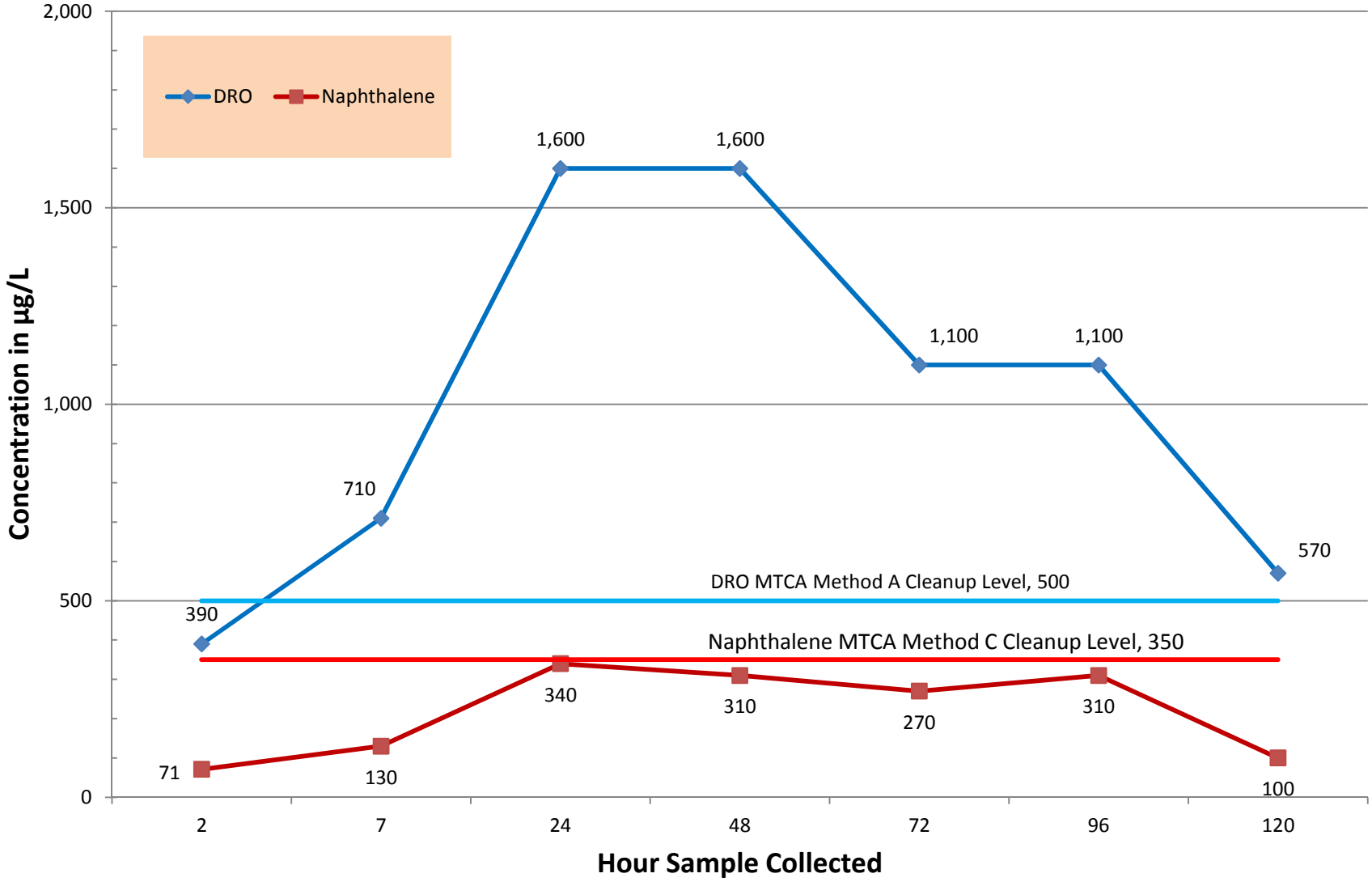


Figure 3-12
Mix 17 ANS 16.1 Results
DRO and Naphthalene Concentrations vs Sample Time

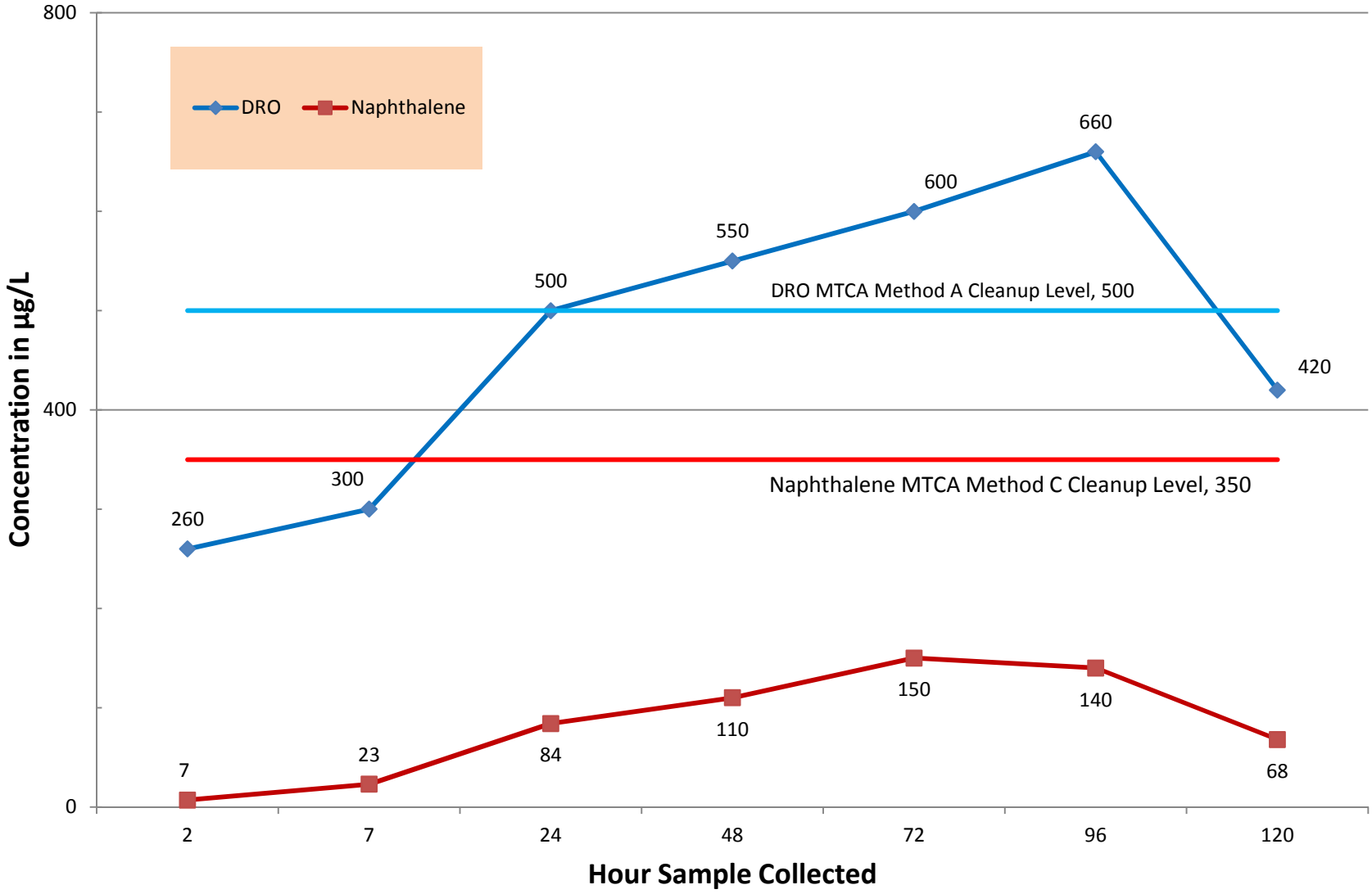


Figure 3-13
Mix 28 ANS 16.1 Results
DRO and Naphthalene Concentrations vs Sample Time

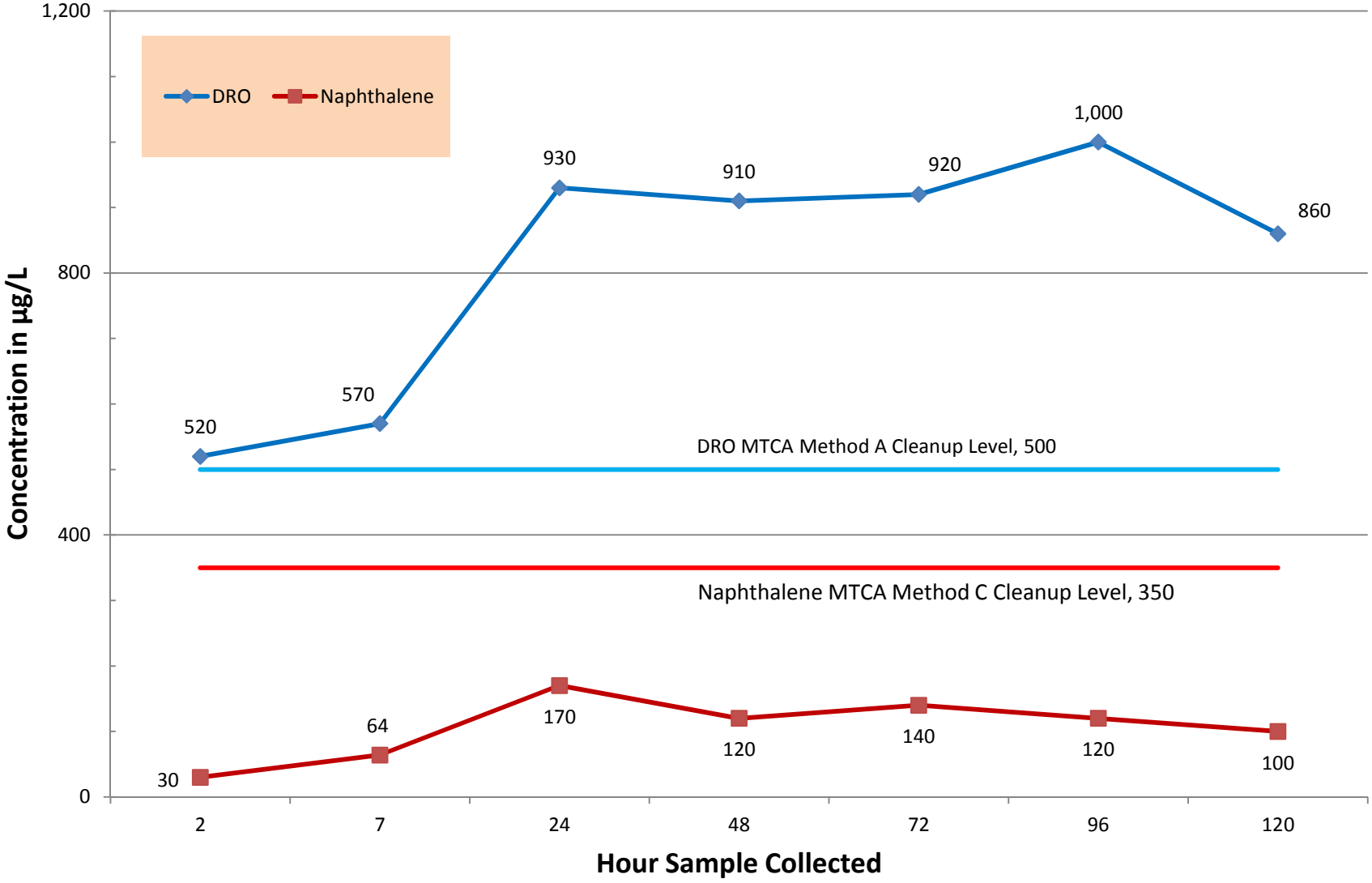


Figure 4-1

ISTR TREATABILITY STUDY SITE SOIL CHARACTERIZATION

Process Flow Diagram

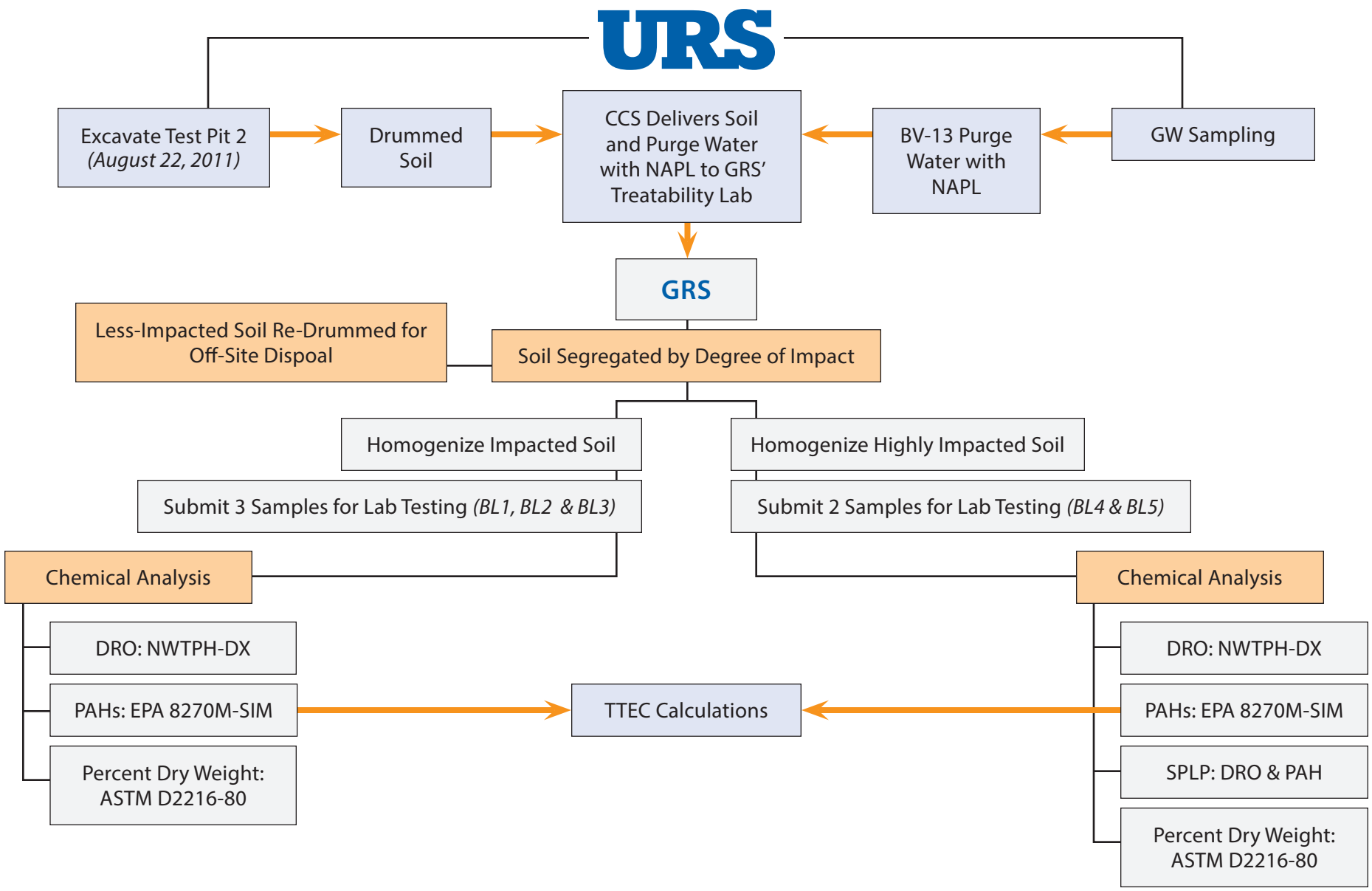


Figure 4-2

ISTR TREATABILITY STUDY APPROACH

Process Flow Diagram

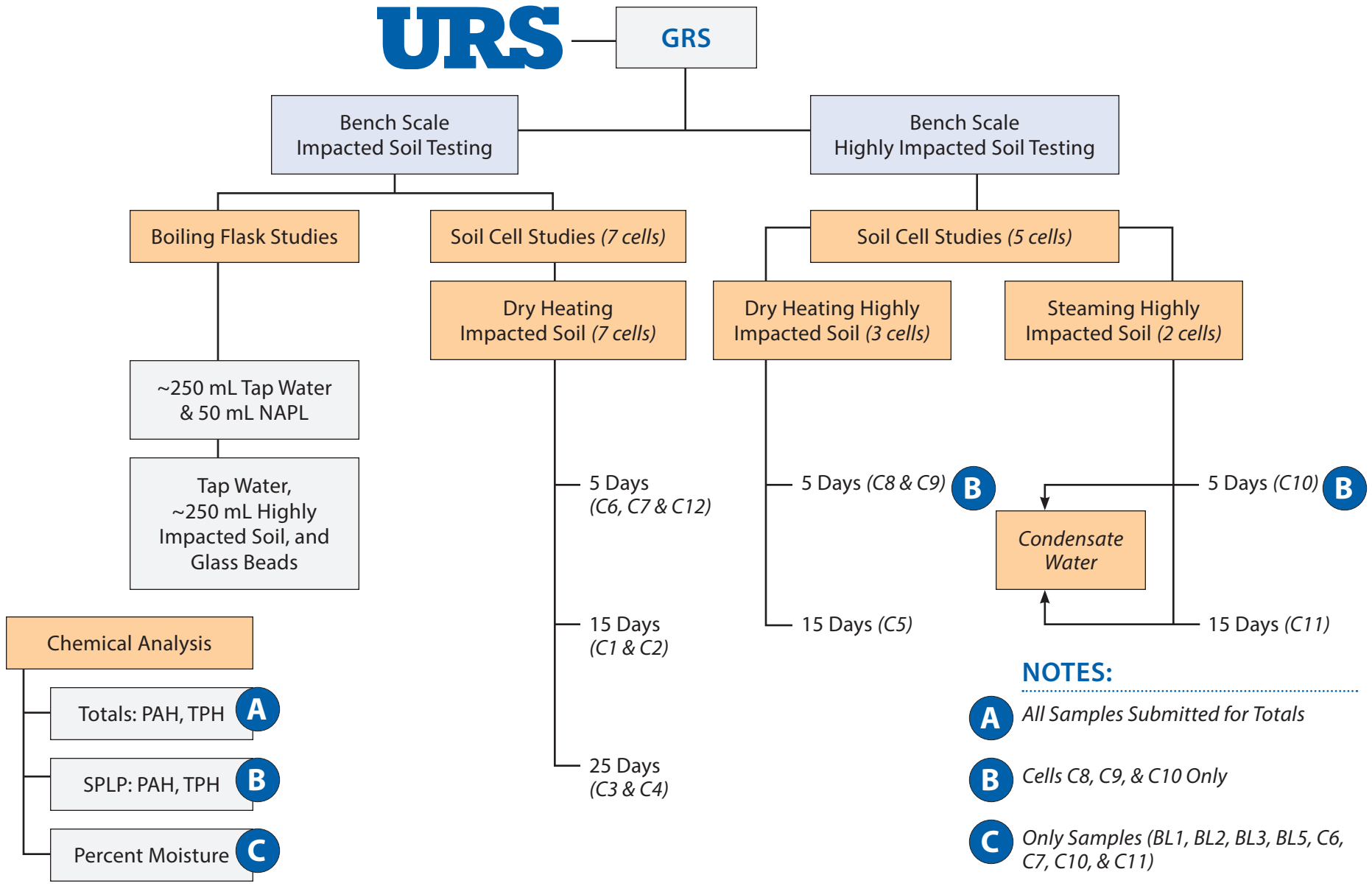


Figure 4-3
Percentage Reductions in DRO and Naphthalene Concentrations for Dry Heating of Impacted Soil

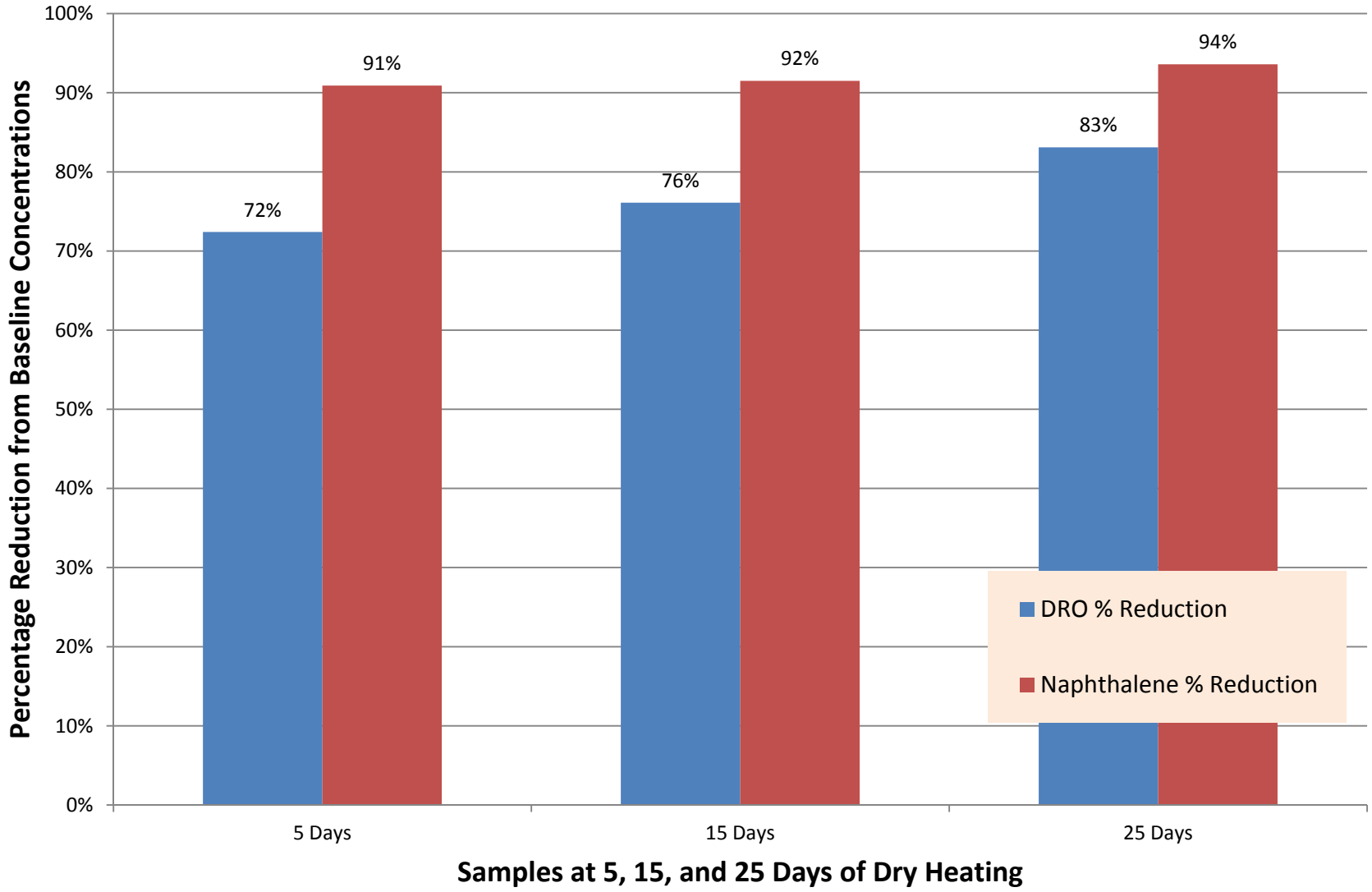


Figure 4-4
Percentage Reductions in DRO and Naphthalene Concentrations for Dry Heating of Highly-Impacted Soil

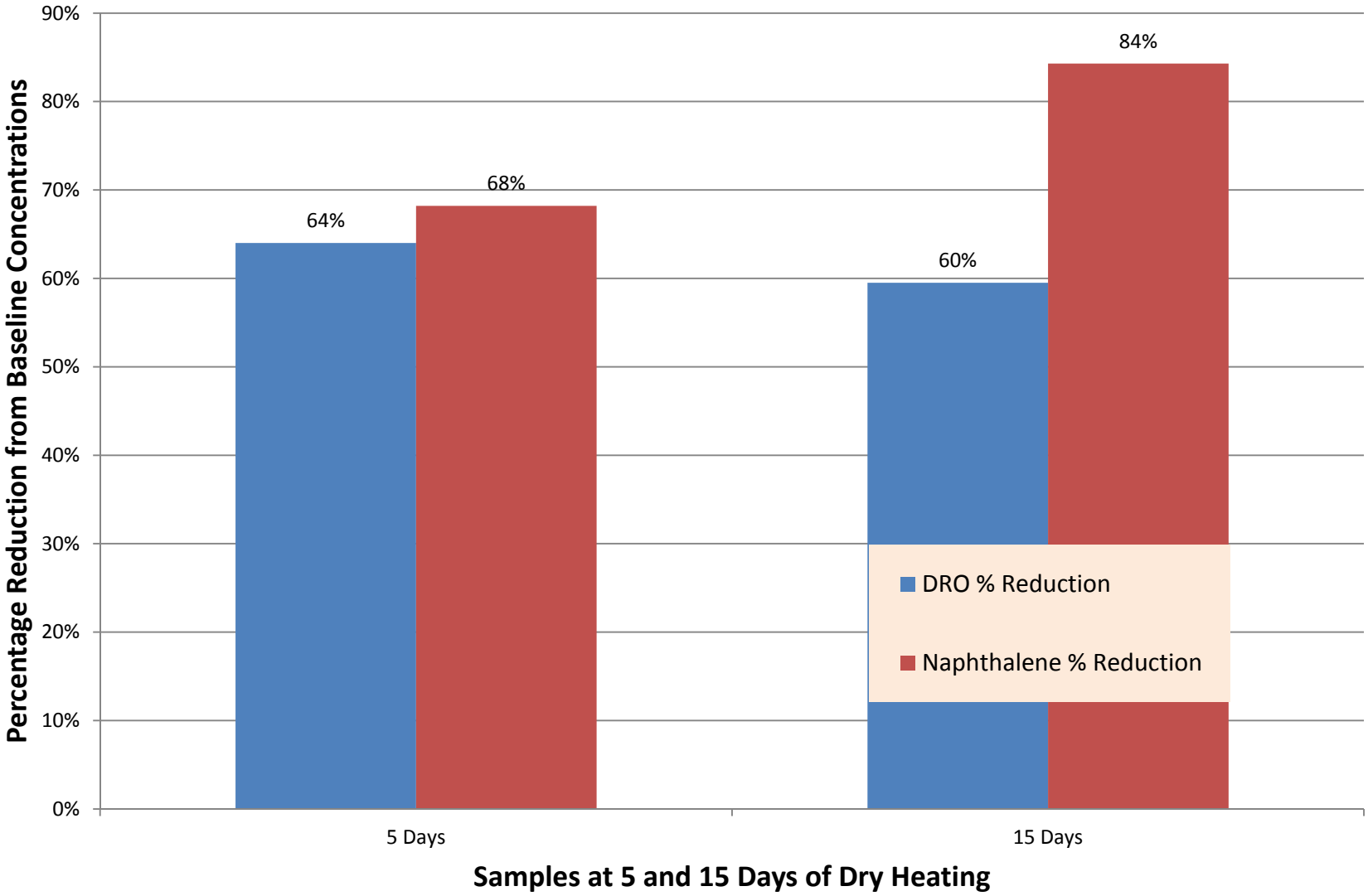
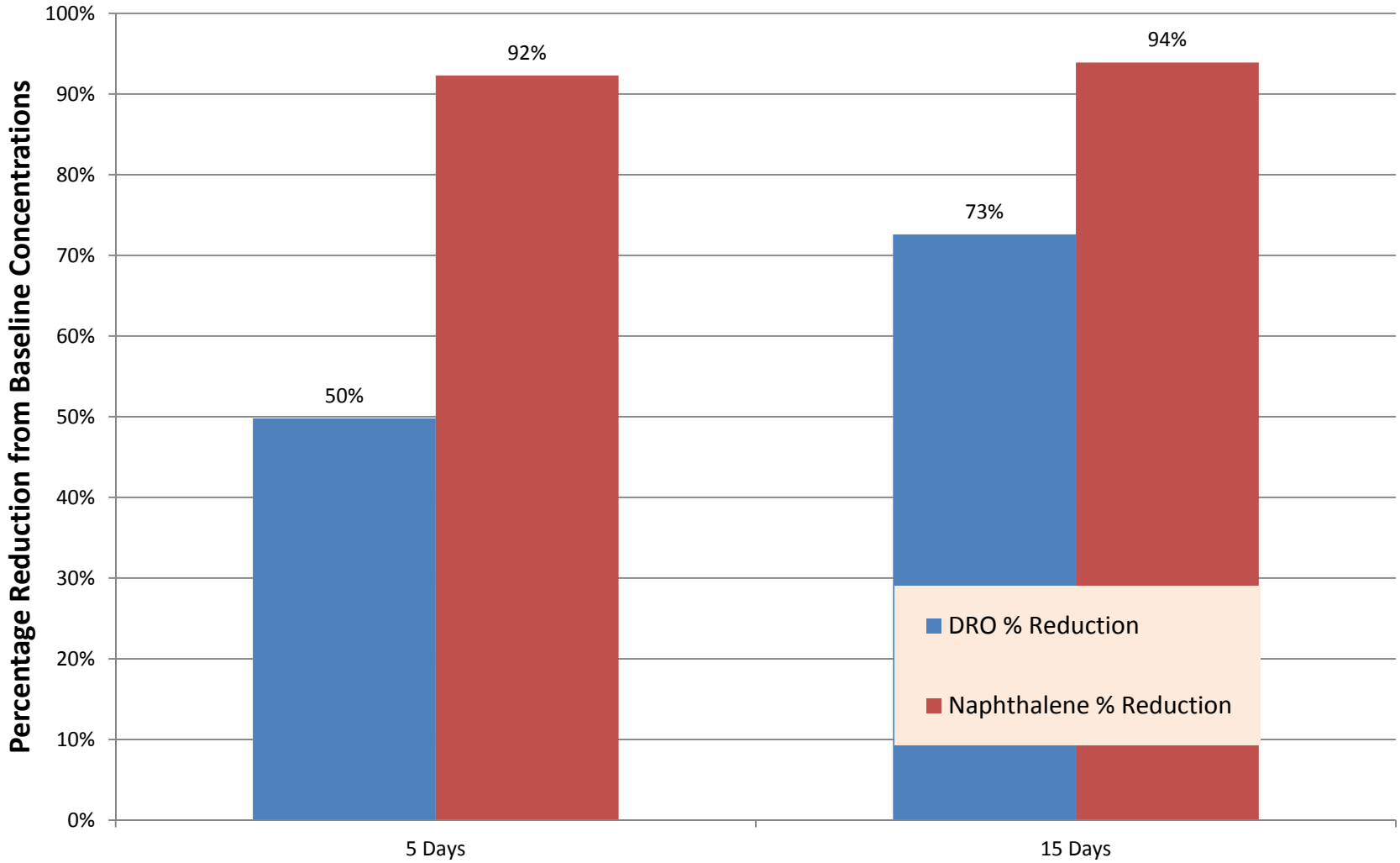
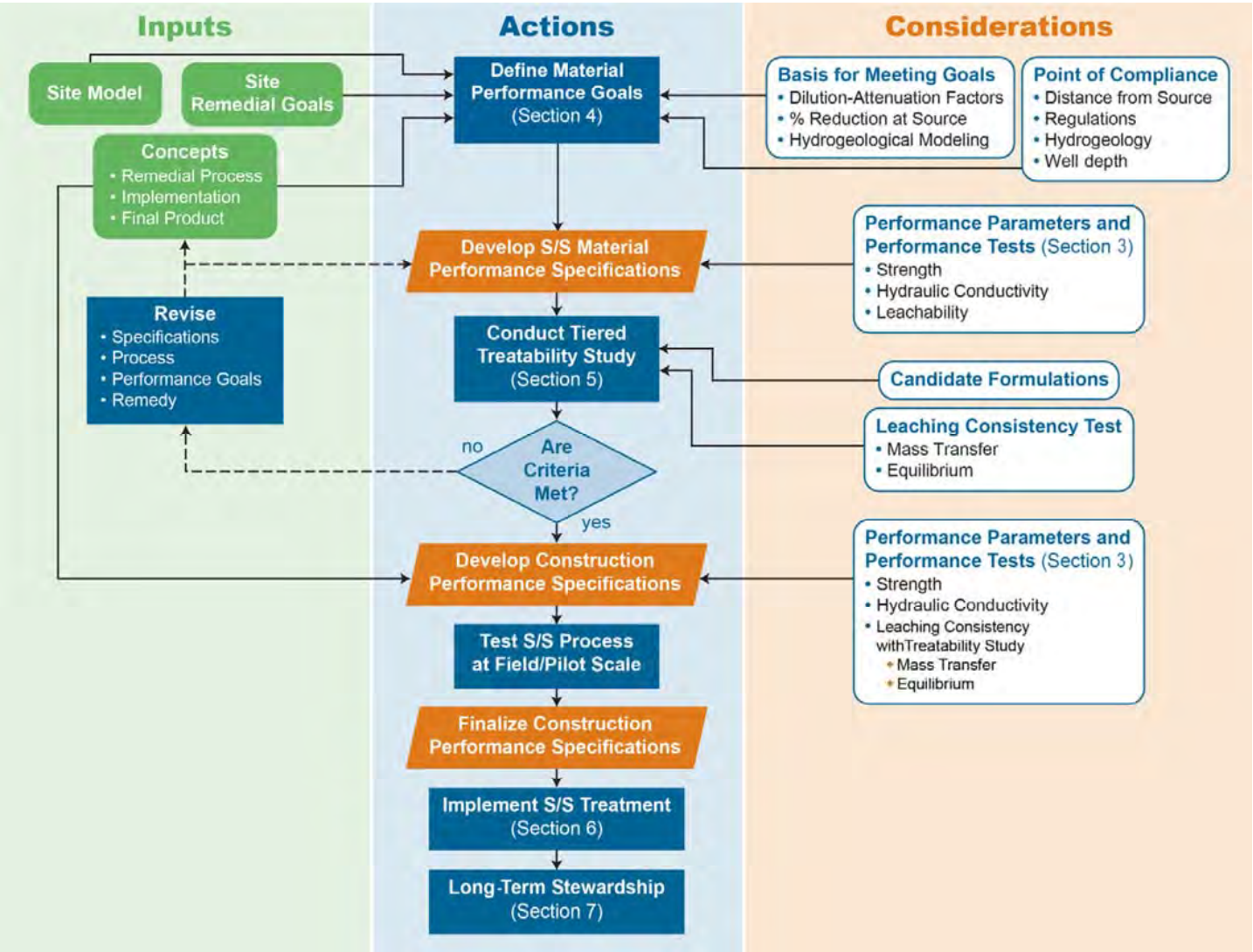


Figure 4-5
Percentage Reductions in DRO and Naphthalene Concentrations for Steam Heating of Highly-Impacted Soil





Source: Figure 4-1, Development of Performance Specifications for Solidification/Stabilization. Prepared by Interstate Technology & Regulatory Council Solidification/Stabilization Team, July 2011.

Figure 5-1. ITRC ISS Design and Implementation Process Diagram

Appendix A
Test Pit Excavation Photo Log

URS

PHOTOGRAPHIC LOG

IP Longview	Test Pit Excavation Port of Longview Maintenance Facility Area Longview, Washington	URS Project No. 33763156 **Date:** August 22, 2011

Photo No. 1

Direction Photo Taken:

Northeast
(in portrait view)

Description:

Test Pit TP-01 after excavating to the bottom of the Upper Sand. Geotextile can be observed at upper left, separating gravel fill above it and Upper Sand below it. No soil staining was observed in the Upper Sand below the geotextile, and no liquids were encountered in this test pit.

Photo No. 2

Direction Photo Taken:

Northwest

Description:

Test Pit TP-02 soon after excavating to the bottom of the Upper Sand. Abandoned pipe that was encountered can be observed below the base of the pavement, and soil staining can be observed below the geotextile underneath the pipe. Dark liquids with sheen can be observed entering the test pit from the sidewalls at the base of the excavation.

Appendix B
Test Pit Geologic Logs

Project: IP Longview Treatability Study
Project Location: Longview, Washington
Project Number: 33763156

Log of Test Pit TP-01

Sheet 1 of 1

Date(s) Excavated	**8/22/11**	Logged By	**IPV**	Checked By	
Excavation Equipment	**CAT KCS1770**	Excavation Contractor	**CCS**	Total Depth of Test Pit	**8 feet**
Excavation Dimensions	**ft x ft**	Pit Alignment		Ground Surface Elevation	
Groundwater Level		Sampling Method(s)			
Location					

Elevation feet / Depth, feet	Type / Number	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
0				Asphalt surface				
			GP	Gray coarse GRAVEL (dry) (fill)				
2				Geotextile fabric at 2'				
			ML	Gray SILT with trace fine sand (dry) (no odor)				
			SM	Dark brown silty fine SAND (moist) (no odor)				
4			SP	Light gray fine SAND (moist) (no odor)				
	TP01-S-2.0-7.5-082211			Grading light brown				
6			SM	Gray silty fine SAND (moist) (no odor)				
			ML	Gray SILT with trace fine sand (moist) (no odor)				
8	TP01-S-7.5-082211			Test pit was completed to 8' bgs.				
10								

GEO_SEA_TP2 T:\ONEWORLD\33763156 IP LONGVIEW\33763156LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 11/27/12

URS

Project: IP Longview Treatability Study
Project Location: Longview, Washington
Project Number: 33763156

Log of Test Pit TP-02

Sheet 1 of 1

Date(s) Excavated	**8/22/11**	Logged By	**IPV**	Checked By	
Excavation Equipment	**CAT KCS1770**	Excavation Contractor	**CCS**	Total Depth of Test Pit	**6.5 feet**
Excavation Dimensions	**ft x ft**	Pit Alignment		Ground Surface Elevation	
Groundwater Level		Sampling Method(s)			
Location					

Elevation feet / Depth, feet	Type / Number	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
0				Asphalt surface				
			GP	Gray coarse GRAVEL (moist) (fill/bare rock)				
2			SP	Dark brown fine to medium SAND				
				Grading dark gray (moist)				
4	TP02-S-2.0-6.5-082211							
				Grading (wet) (strong creosote odor)				
6				Grading (staining and free product)				
	TP02-S-6.5-082211			Test pit was completed to 6.5' bgs.				
8								
10								

GEO_SEA_TP2 T:\ONEWORLD\33763156 IP LONGVIEW\33763156LOGS.GPJ URSSEA3B.GLB URSSEA3.GDT 11/27/12

URS

Appendix C
Test Pit Backfilling Log

URS

DAILY FIELD REPORT

Date: 8/22/2011

Client or Owner: IP	Project Name: IP Longview In-situ Soil Stabilization	URS Inspector: J. Dabkowski / S. Bonnart
Job Location: Longview, Washington	Project No. 33763156	Day of Week : Monday
General Contractor: CCS	Grading Contractor:	Weather: P. Cloudy, 70's
GC Representative:	Grading Foreman:	Report Sequence:

Source and Description of Fill Material: 5/8"-0 Base Rock **(137.0 PCF @ 11% moiture, ASTM D-1557)**

TEST NO.	TEST LOCATION	DEPTH (IN., BGS*)	REQUIRED % OF MAXIMUM DRY DENSITY	MAXIMUM DRY DENSITY (lbs/cu. ft.)	FILL MOISTURE (%)	TEST DRY DENSITY (lbs/cu. Ft.)	% OF MAXIMUM DRY DENSITY	REMARKS
Test Pit 1								
1	Insitu Density (SILT with sand)	36.0	n/a	n/a	38.6	73.7	n/a	
2	Backfilled Sand	36.0	n/a	n/a	21.9	91.3	n/a	with minimal compaction
3	Backfilled Sand	36.0	n/a	n/a	19.5	99.2	n/a	after additional compaction
4	Backfilled Sand	28.0	n/a	n/a	20.7	93.4	n/a	
5	Backfilled Sand	20.0	n/a	n/a	15.3	104.1	n/a	
6	Import Aggregate	8.0	95%	137.0	3.2	131.7	96.1%	
Test Pit 2								
7	Backfilled Sand	30.0	n/a	n/a	9.9	114.1	n/a	
8	Backfilled Sand	26.0	n/a	n/a	16.3	111.6	n/a	
9	Backfilled Sand	20.0	n/a	n/a	16.1	104.7	n/a	
10	Import Aggregate	8.0	95%	137.0	3.3	126.6	92.4%	Fail
10a	Import Aggregate	8.0	95%	137.0	5.1	133.4	97.4%	Retest/Pass

* Below Ground Surface

SUPPLEMENTARY REPORT (Describe equipment used for hauling, spreading, watering, conditioning & compacting, also report thickness of lifts & number of roller trips)

Sebastien Bonnart (URS Portland) arrived on-site at 0730 hrs, Jim Dabkowski (URS Portland) at 0900 hrs to observe the excavation, sampling, backfilling and compaction of material within two test pits at the Port of Longview Maintenance Facility Area, a former IP site. Notes on excavating and sampling of the test pits are not provided in this daily field report. Please see field reports by others for this information.

Test Pit #1 was backfilled from the completion of the excavation to within 20 inches of the ground surface with excavated silt and sand. Compaction tests were recorded to assess the inplace density of the material. A proctor result was not available for the excavated material to determin a percent compaction. The general level of effort used to compact the material was observed and met typical visual compaction standards. A woven geotextile and geogrid was placed at the subgrade elevation spanning the width of the pavement sawcut. 4 inches of 5/8-inch aggregate was placed and compacted. An additional layer of geogrid was placed at this location. The remaining 8 inches of aggregate was then placed and compacted to the bottom of the pavement elevation. Density tests on this material met project specifications.

Test Pit #2 encountered free product at the bottom of the excavation, and the larger, existing aggregate base material was used to stabilize the bottom 12 inches of the excavation. Additional, import 5/8-inch material was then used to backfill the test pit above the surface of the free product. Five, 80 lb bags of cement was added to the placed material, mixed in place and compacted. The addition of the cement adsorbed the moisture and allowed for reasonable visual compactive effort to be applied. Over time this zone will become harder as the cement hardens. The remainder of the excavation was backfilled with excavated silty sand material. Compaction tests were recorded to assess the inplace density of the material. A proctor result was not available for the excavated material to determin a percent compaction. The general level of effort used to compact the material was observed and met typical visual compaction standards. A woven geotextile and geogrid was placed at the subgrade elevation spanning the width of the pavement sawcut. 4 inches of 5/8-inch aggregate was placed and compacted. An additional layer of geogrid was placed at this location. The remaining 8 inches of aggregate was then placed and compacted to the bottom of the pavement elevation. Density tests on this material met project specifications.

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Proctor Report

Project: IP Land Fill
Project #: 11S105-01
Client: CCS-PNE Corp
Source: Stordahl Pit
Sample#: 11-479

Date Received: 18-Aug-11
Sampled By: CA
Date Tested: 23-Aug-11
Tested By: FP/MG

Unified Soils Classification System, ASTM D-2487
SW-SC, Well-graded Sand with Silty Clay and Gravel, Crushed
Sample Color
Grey

Sample Prepared:	Moist: X	Manual:	
	Dry:	Mechanical: X	
Test Standard:	ASTM D698:	AASHTO T 99:	Method
	ASTM D 1557: X	AASHTO T 180:	C

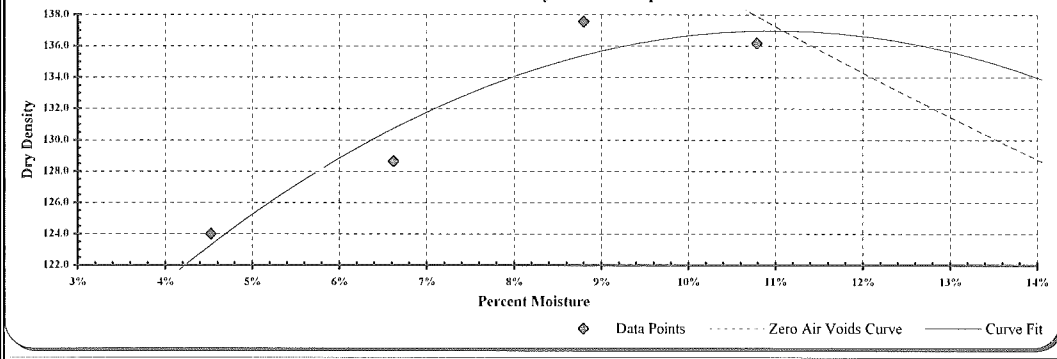
Assumed Sp. Gr.	Point Number	Percent Moisture	Dry Density
2.90	1	4.5 %	124.0
	2	6.6 %	128.6
	3	8.8 %	137.6
	4	10.8 %	136.2

Uncorrected Proctor Value
Max. Dry Density **137.0** lbs/ft³ **Optimum Moist.** **11.0 %**

Value w/ Oversize Correction Applied
Max. Dry Density **N/A** lbs/ft³ **Optimum Moist.** **N/A**

ACCREDITED
Certificate #: 1368.01, 1368.02 & 1368.03

Moisture Density Relationship



ASTM D-4718, Misc. Oversize Correction Values — **% Oversize Mat'l:** 0%

% Oversize Retained	Corrected Density	Optimum Moisture	% Oversize Retained	Corrected Density	Optimum Moisture
5%	138.7	10.5%	20%	144.0	8.9%
10%	140.4	10.0%	25%	145.8	8.4%
15%	142.2	9.4%	30%	147.8	7.9%

ASTM C-136

Sieve US	Size mm	Percent Passing	Specifications Max	Specifications Min
12.00"	300.00			
10.00"	250.00			
8.00"	200.00			
6.00"	150.00			
4.00"	100.00			
3.00"	75.00			
2.50"	63.00			
2.00"	50.00			
1.75"	45.00			
1.50"	37.50			
1.25"	31.50			
1.00"	25.00			
3/4"	19.00	100 %	100.0 %	100.0 %
5/8"	16.00	100 %		
1/2"	12.50	96 %	100.0 %	80.0 %
3/8"	9.50	89 %		
1/4"	6.30	75 %		
#4	4.75	66 %	66.0 %	46.0 %
#8	2.36			
#10	2.00	48 %		
#16	1.18			
#20	0.850	31 %		
#30	0.600			
#40	0.425	22 %	24.0 %	8.0 %
#50	0.300			
#60	0.250	17 %		
#80	0.180	15 %		
#100	0.150	13 %		
#140	0.106			
#170	0.090			
#200	0.075	9.7 %	10.0 %	0.0 %

Specs: **Meets Specs? Yes**
2010 WSDOT 9-03.9(3) Top Course

% Gravel:	34.0%	$D_{(10)}$:	0.080
% Sand:	56.2%	$D_{(30)}$:	0.801
% Silt&Clay:	9.7%	$D_{(60)}$:	3.856
C_C:	2.07	LL:	n/a
C_U:	47.99	PL:	n/a
FM:	4.01	PI:	n/a
Fracture %:	99.9%	Sand Eq.:	62

Comments: _____

Reviewed by: _____
Mark Gordon, WABO Supervising Laboratory Manager, SW Region

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Appendix D

ISS Treatability Study Data Summary Table

Appendix D
ISS Treatability Study Data Summary Table

Sample Type:							UNTREATED				UNTREATED			TREATED (PRELIMINARY MIXES)							
Sample ID:	MTCA Screening Levels				Universal Treatment Standards [1]	Alternate Treatment Sandards (10xUTS)	TP-01			TP-01	TP-01			0397-001	0397-002	0397-003	0397-004	TP-01 2.0-7.5 0397-005	0397-006	0397-007	0397-008	0397-009
Sample Depth (ft bgs):							2.0-7.5		7.5		2.0-7.5											
Kemron Sample Number:																						
Kemron Reagent Type							Non-Homogenized				Homogenized			Portland Cement	Portland Cement	Portland Cement / Bentonite	Portland Cement / Hydrated Lime	Portland Cement / Bentonite / Organoclay SS-199	Portland Cement / Class "C" Flyash	NewCem Slag Cement / Bentonite	50:50 TerraCem	50:50 TerraCem / Bentonite
Reagent Addition % by wet soil wt.														7.5	12.5	12.5 / 2	7.5 / 7.5	12.5 / 2 / 0.5	7.5 / 7.5	15 / 2	12.5	15 / 2
Date Test Mix Prepared:														10/5/2011	10/5/2011	10/6/2011	10/5/2011	10/5/2011	10/6/2011	10/6/2011	10/5/2011	10/6/2011
Date Sample Collected:	Method B	Method C					8/22/2011		8/22/2011		9/1/2011			NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH	**Groundwater (ug/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (ug/L)**	**ug/kg**	**ug/kg**	**Total (mg/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	45	270 U	250 U	56	42	250 UJ	280 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	390	530 U	500 U	160 J	120 J	500 UJ	560 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAHs	**ug/L**	**ug/kg**	**ug/kg**	**ug/L**	**ug/kg**	**ug/kg**	**Total (ug/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**Total (ug/kg)**	**Total (ug/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**
Naphthalene	160	70,000,000	9,700	350	5,600	56,000	110	1.5 J	1.2 J	220	140	1.7 U	0.49	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methyl Naphthalene	32	14,000,000	4,200	70	NE	NE	45	0.33 J	0.23 J	79	92	0.49 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NE	NE	210,000	NE	3,400	34,000	2.0	0.20 U	0.20 UJ	5.7	11	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	960	210,000,000	210,000	2,100	3,400	34,000	200	1.6 J	1.3 UJ	430	220	2.0 U	1.3	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	16	3,500,000	3,700	35	NE	NE	96	0.38 J	0.29 UJ	150	110	0.74 U	0.50	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	640	140,000,000	220,000	1,400	3,400	34,000	84	0.35 J	0.28 UJ	130	84	0.57 U	0.39	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NE	NE	5,000,000	NE	NE	NE	44	0.20 U	0.20 UJ	110	100	0.30 U	0.21	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	4,800	1,050,000,000	5,000,000	10,500	3,400	34,000	4.3	0.20 U	0.20 UJ	35	39	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	640	140,000,000	1,400,000	1,400	3,400	34,000	7.7	0.20 U	0.20 UJ	380	100	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	480	105,000,000	1,400,000	1,050	8,200	82,000	5.4	0.20 U	0.20 UJ	260	80	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene [2]	0.12	180,000	8,600	1.2	3,400	34,000	1.9	0.20 U	0.20 UJ	80	29	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene [2]	12	18,000,000	960,000	120	3,400	34,000	3.1	0.20 U	0.20 UJ	130	59	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	6,800	68,000	4.7	0.20 U	0.20 UJ	170	290	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	6,800	68,000	1.1 J	0.20 U	0.20 UJ	46	49	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	3,400	34,000	6.1	0.20 U	0.20 UJ	160	300	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	3,400	34,000	5.8	0.20 U	0.20 UJ	180	300	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene [2]	0.012	18,000	4,300	0.12	8,200	82,000	1.8 U	0.20 U	0.20 UJ	27	40	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	1,800	18,000	6.1	0.20 U	0.20 UJ	170	260	0.20 U	0.20 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
TTEC (screening criteria based on benzo(a)pyrene)							7.5	NA	NA	212	371	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals	**ug/L**	**mg/kg**	**mg/kg**	**ug/L**	**TCLP (mg/L)**	**TCLP (mg/L)**	**Total (mg/kg)**	**TCLP (mg/L)**	**SPLP (mg/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**
Arsenic	0.058	88	0.34	0.58	5	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	3,200	700,000	5,768	7,000	21	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	16	NE	4.8	35	0.11	1.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	24,000 (Cr^{+3}) / 48 (Cr^{+6})	5,250,000 (Cr^{+3}) / 10,500 (Cr^{+6})	1,050,210 (Cr^{+3}) / 40 (Cr^{+6})	52,500 (Cr^{+3}) / 105 (Cr^{+6})	0.60 (total)	0.60 (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NE	NE	NE	NE	0.75	7.50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NE	NE	NE	NE	0.025	0.250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	80	17,500	18	175	5.7	57.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	80	17,500	30	175	0.14	1.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cure Days	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	9	9	8	9	8	8	NA	9	8
Unconfined Compressive Strength																						
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	32.7	31.7	47.4	39.3	44.4	32.3	NA	34.2	48.8
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	111.6	114.4	107.9	111.5	108.6	117.3	NA	113.8	105.6
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	84.1	86.9	73.2	80.0	75.2	88.7	NA	84.8	71.0
UCS (lb/in^2)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	69.2	169.3	44.9	27.1	70.3	64.5	NA	58.7	29.4
Permeability (k)																						
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Perm (cm/sec)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cure Days	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Volumetric Expansion (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Estimated Costs [5]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	$82,800	$138,000	$161,040	$264,600	$351,060	$132,300	$163,440	$120,000	$167,040

Notes:

Soil (mg/kg or ug/kg) numbers in **bold** font meet or exceed a MTCA soil cleanup level. Underlined numbers meet or exceed the Universal Treatment Standard.

ANS 16.1 and BV-13 water numbers in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.

Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC; MTCA Method A, B, and C from Ecology website downloaded November 2011 (https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx). (I) - Industrial land use (R) - Unrestricted land use

[1] Universal Treatment Standards (UTS, 40 CFR 268.48) for nonwastewaters.

[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.

[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) except for dibenzofuran and 2-methylnaphthalene which were obtained from the J&E model (USEPA 2004).

[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

[5] See Table 3 for estimated costs calculation details

[6] Laboratory was unable to differenate between benzo(b)fluoranthene and benzo(k)fluoranthene. Laboratory reported result as benzo(b)fluoranthene.

J - estimated value
mg/kg - miligram per kilogram
NE - not established
SPLP - Synthetic Precipitation Leaching Procedure
TPH - Total Petroleum Hydrocarbons
ug/kg - microgram per kilogram
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.

ft bgs - feet below ground surface
NA - not applicable, not analyzed, or not available
PAHs - Polynuclear Aromatic Hydrocarbons
TCLP - Toxicicity Characteristic Leaching Procedure
TTEC - Total Toxic Equivalent Concentration
ug/L - microgram per liter

Appendix D
ISS Treatability Study Data Summary Table

Sample Type:							UNTREATED				UNTREATED			TREATED (PRELIMINARY MIXES)							
Sample ID:	MTCA Screening Levels				Universal Treatment Standards [1]	Alternate Treatment Sandards (10xUTS)	TP-02				TP-02			TP-02							
Sample Depth (ft bgs):							2.0-6.5			6.5	2.0-6.5			2.0-6.5							
Kemron Sample Number:														0397-010	0397-011	0397-012	0397-013	0397-014	0397-015	0397-016	
Kemron Reagent Type							Non-Homogenized				Homogenized			Portland Cement	Portland Cement / Bentonite	Portland Cement / Bentonite	Portland Cement / Hydrated Lime	Portland Cement / Hydrated Lime	Portland Cement / Hydrated Lime	NewCem Slag Cement / Bentonite / Organoclay SS-199	
Reagent Addition % by wet soil wt.														12.5	12.5 / 2	17.5 / 2	7.5 / 7.5	7.5 / 12.5	10 / 12.5	12.5 / 2 / 0.5	
Date Test Mix Prepared:														10/5/2011	10/6/2011	10/7/2011	10/5/2011	10/5/2011	10/5/2011	10/7/2011	
Date Sample Collected:	Method B	Method C					8/22/2011			8/22/2011	9/1/2011			10/24/2011	10/24/2011	NA	10/24/2011	NA	NA	10/24/2011	Start Date 02/13/2012
TPH	**Groundwater (ug/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (ug/L)**	**ug/kg**	**ug/kg**	**Total (mg/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**5 Day (ug/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	**9,000**	25,000	27,000	**9,300**	**8,500**	26,000	26,000	19,000	20,000	NA	20,000	NA	NA	18,000	**500**
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	1,800 J	500 U	510	**2,000 J**	1,600 J	530 U	560 U	550 U	570	NA	610	NA	NA	500 U	520 U
PAHs	**ug/L**	**ug/kg**	**ug/kg**	**ug/L**	**ug/kg**	**ug/kg**	**Total (ug/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**Total (ug/kg)**	**Total (ug/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**5 Day (ug/L)**
Naphthalene	160	70,000,000	9,700	350	5,600	56,000	**35,000**	13,000	12,000	**46,000**	**420,000**	12,000	12,000	7,500	7,400	NA	7,700	NA	NA	6,800	100
2-Methyl Naphthalene	32	14,000,000	4,200	70	NE	NE	**48,000**	1,100	1,000	**38,000**	**140,000**	1,100	1,200	840	890	NA	820	NA	NA	780	13
Acenaphthylene	NE	NE	210,000	NE	3,400	34,000	1,100	10	10	1,200	1,800	11	12	9.5	9.1	NA	8.5	NA	NA	7.3	0.13
Acenaphthene	960	210,000,000	210,000	2,100	3,400	34,000	81,000	460	420	82,000	110,000	460	540	420	430	NA	380	NA	NA	400	10
Dibenzofuran	16	3,500,000	3,700	35	NE	NE	**60,000**	260	240	**58,000**	**73,000**	280	320	270	270	NA	240	NA	NA	230	6.7
Fluorene	640	140,000,000	220,000	1,400	3,400	34,000	85,000	230	210	90,000	97,000	250	300	240	240	NA	210	NA	NA	210	6.8
Phenanthrene	NE	NE	5,000,000	NE	NE	NE	240,000	210	210	240,000	260,000	240	360	240	250	NA	210	NA	NA	210	17
Anthracene	4,800	1,050,000,000	5,000,000	10,500	3,400	34,000	45,000	18	31	77,000	49,000	25	51	35	33	NA	29	NA	NA	30	1.7
Fluoranthene	640	140,000,000	1,400,000	1,400	3,400	34,000	120,000	21	40	130,000	130,000	22	73	22	20	NA	19	NA	NA	22	4.0
Pyrene	480	105,000,000	1,400,000	1,050	8,200	82,000	74,000	11	23	77,000	74,000	11	42	11	10	NA	9.1	NA	NA	11	1.7
Benzo(a)anthracene [2]	0.12	180,000	8,600	1.2	3,400	34,000	**17,000**	0.36	3.8	**20,000**	**20,000**	0.43	7.9	0.42	0.57	NA	0.36	NA	NA	0.47	0.1
Chrysene [2]	12	18,000,000	960,000	120	3,400	34,000	14,000	0.35	3.4	17,000	17,000	0.41	7.1	0.40	0.28	NA	0.31	NA	NA	0.38	0.1
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	6,800	68,000	7,900	0.20 U	1.7	10,000	9,300	0.20 U	3.3	0.20 U	0.046 J	NA	0.037 J	NA	NA	0.062 J	0.013
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	6,800	68,000	2,700	0.20 U	0.67	3,000	3,300	0.20 U	1.0	0.20 U	0.20 U	NA	0.20 U	NA	NA	0.037 J	0.004 J
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	3,400	34,000	**4,400**	0.20 U	1.0	**5,400**	**5,500**	0.20 U	1.8	0.20 U	0.20 U	NA	0.20 U	NA	NA	0.20 U	0.0062
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	3,400	34,000	1,300	0.20 U	0.36	1,800	1,700	0.20 U	0.38	0.20 U	0.20 U	NA	0.20 U	NA	NA	0.031 J	0.0015 J
Dibenzo(a,h)anthracene [2]	0.012	18,000	4,300	0.12	8,200	82,000	310	0.20 U	0.20 U	420	410	0.20 U	0.20 U	0.20 U	0.20 U	NA	0.20 U	NA	NA	0.20 U	0.00086 J
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	1,800	18,000	1,100	0.20 U	0.39	1,500	1,400	0.20 U	0.36	0.20 U	0.20 U	NA	0.20 U	NA	NA	0.20 U	0.0019 J
TTEC (screening criteria based on benzo(a)pyrene)							**7,461**	0.04	1.7	**9,092**	**9,141**	0.05	3.1	0.046	0.064	NA	0.043	NA	NA	0.064	0.019
Metals	**ug/L**	**mg/kg**	**mg/kg**	**ug/L**	**TCLP (mg/L)**	**TCLP (mg/L)**	**Total (mg/kg)**	**TCLP (mg/L)**	**SPLP (mg/L)**	**Total (mg/kg)**	**Total (mg/kg)**	**TCLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**5 Day (mg/L)**
Arsenic	0.058	88	0.34	0.58	5	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	3,200	700,000	5,768	7,000	21	210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	16	NE	4.8	35	0.11	1.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	24,000 (Cr^{+3}) / 48 (Cr^{+6})	5,250,000 (Cr^{+3}) / 10,500 (Cr^{+6})	1,050,210 (Cr^{+3}) / 40 (Cr^{+6})	52,500 (Cr^{+3}) / 105 (Cr^{+6})	0.60 (total)	0.60 (total)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NE	NE	NE	NE	0.75	7.50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NE	NE	NE	NE	0.025	0.250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	80	17,500	18	175	5.7	57.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	80	17,500	30	175	0.14	1.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cure Days	NA	NA	NA	NA	NA	NA								9	69	8	8	9	9	9	8	67	
Unconfined Compressive Strength																							
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.1	23.2	39.1	41.4	30.8	34.2	34.3	44.5	38.7	NA
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	127.1	122.8	110.7	108.8	115.1	110.6	110.8	108.7	91.7	NA
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	102.4	99.7	79.6	77.0	88.0	82.4	82.5	75.2	66.1	NA
UCS (lb/in^2)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	285.0	306.2	47.6	78.1	32.4	14.9	31.9	36.4	321.5	NA
Permeability (k)																							
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25.2	NA	NA	NA	NA	NA	NA	39.3	NA
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	123.9	NA	NA	NA	NA	NA	NA	110.2	NA
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.9	NA	NA	NA	NA	NA	NA	79.1	NA
Perm (cm/sec)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.1E-07	NA	NA	NA	NA	NA	NA	3.2E-08	NA
Cure Days	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		NA
Volumetric Expansion (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		NA
Estimated Costs [5]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	$138,000		$161,040	$216,240	$264,600	$385,800	$413,400	$330,060		

Notes:

Soil (mg/kg or ug/kg) numbers in **bold** font meet or exceed a MTCA soil cleanup level. Underlined numbers meet or exceed the Universal Treatment Standard.

ANS 16.1 and BV-13 water numbers in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.

Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC; MTCA Method A, B, and C from Ecology website downloaded November 2011 (https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx). (I) - Industrial land use (R) - Unrestricted land use

[1] Universal Treatment Standards (UTS, 40 CFR 268.48) for nonwastewaters.

[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.

[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) except for dibenzofuran and 2-methylnaphthalene which were obtained from the J&E model (USEPA 2004).

[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

[5] See Table 3 for estimated costs calculation details

[6] Laboratory was unable to differenate between benzo(b)fluoranthene and benzo(k)fluoranthene. Laboratory reported result as benzo(b)fluoranthene.

J - estimated value
mg/kg - miligram per kilogram
NE - not established
SPLP - Synthetic Precipitation Leaching Procedure
TPH - Total Petroleum Hydrocarbons
ug/kg - microgram per kilogram
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.
ft bgs - feet below ground surface
NA - not applicable, not analyzed, or not available
PAHs - Polynuclear Aromatic Hydrocarbons
TCLP - Toxicicity Characteristic Leaching Procedure
TTEC - Total Toxic Equivalent Concentration
ug/L - microgram per liter

Appendix D
ISS Treatability Study Data Summary Table

Sample Type:	MTCA Screening Levels				Universal Treatment Standards [1]	Alternate Treatment Sandards (10xUTS)	GW	TREATED (PRELIMINARY MIX WITH ADDITIONAL TESTING)								TREATED (OPTIMIZATION TESTING ON ORIGINAL MIX DESIGN)									
Sample ID:							BV-13	TP-02 (continued)								TP-02								TP-02	
Sample Depth (ft bgs):							NA	2.0-6.5 (continued)								2.0-6.5								2.0-6.5	
Kemron Sample Number:							BV-13	0397-017								0397-017A								0397-017DUP	
Kemron Reagent Type								NewCem Slag Cement / Bentonite / Organoclay SS-199								NewCem Slag Cement / Bentonite / Organoclay SS-199								NewCem Slag Cement / Bentonite / Organoclay SS-199	
Reagent Addition % by wet soil wt.								12.5 / 2 / 2								12.5 / 2 / 2								12.5 / 2 / 2	
Date Test Mix Prepared:							NA	10/7/2011								1/17/2012								1-17-12	
Date Sample Collected:	Method B	Method C					2/16/2012	10/24/2011	ANS 16.1 Start Date 01/16/2012							2/15/2012	ANS 16.1 Start Date 2/13/2012							2/15/2012	ANS 16.1 Start Date 02/13/2012
TPH	**Groundwater (ug/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (ug/L)**	**ug/kg**	**ug/kg**	**Groundwater (ug/L)**	**SPLP (ug/L)**	**2 HR (ug/L)**	**7 HR (ug/L)**	**24 HR (ug/L)**	**2 Day (ug/L)**	**3 Day (ug/L)**	**4 Day (ug/L)**	**5 Day (ug/L)**	**28 Day SPLP (ug/L)**	**2 HR (ug/L)**	**7 HR (ug/L)**	**24 HR (ug/L)**	**2 Day (ug/L)**	**3 Day (ug/L)**	**4 Day (ug/L)**	**5 Day (ug/L)**	**5 Day DUP (ug/L)**	**28 Day SPLP (ug/L)**	**5 Day (ug/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	**19,000**	11,000	260 U	300 U	**500**	**550**	**600**	**660**	420	6,700	390	**710**	**1,600**	**1,600**	**1,100**	**1,100**	**570**	**500**	6,900	**500**
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	**890**	500 U	520 U	600 U	570 U	75 J	53 J	55 J	560 U	520 U	35 J	33 J	53 J	56 J	540 U	540 U	570 U	550 U	510 U	550 U
PAHs	**ug/L**	**ug/kg**	**ug/kg**	**ug/L**	**ug/kg**	**ug/kg**	**Groundwater (ug/L)**	**SPLP (ug/L)**	**2 HR (ug/L)**	**7 HR (ug/L)**	**24 HR (ug/L)**	**2 Day (ug/L)**	**3 Day (ug/L)**	**4 Day (ug/L)**	**5 Day (ug/L)**	**SPLP (ug/L)**	**2 HR (ug/L)**	**7 HR (ug/L)**	**24 HR (ug/L)**	**2 Day (ug/L)**	**3 Day (ug/L)**	**4 Day (ug/L)**	**5 Day (ug/L)**	**5 Day (ug/L)**	**SPLP (ug/L)**	**5 Day (ug/L)**
Naphthalene	160	70,000,000	9,700	350	5,600	56,000	**5,300**	4,400	7	23	84	110	150	140	68	1,800	71	130	340	310	270	310	100	81	1,700	81
2-Methyl Naphthalene	32	14,000,000	4,200	70	NE	NE	**580**	460	0.89	3.1	11	13	19	19	8.9	380	13	22	57	55	48	56	17	15	340	15
Acenaphthylene	NE	NE	210,000	NE	3,400	34,000	8.2	3.6	0.04	0.057	0.13	0.19	0.23	0.22	0.13	3.4	0.16	0.22	0.4	0.37	0.57	0.63	0.23	0.20	3.6	0.2
Acenaphthene	960	210,000,000	210,000	2,100	3,400	34,000	400	260	1.2	3.1	8.9	11	15	14	8.3	280	12	16	41	38	36	42	16	15	250	15
Dibenzofuran	16	3,500,000	3,700	35	NE	NE	**270**	98	0.84	1.7	5.4	6.3	8.0	7.7	5.0	97 J	6.5	8.4	21	20	17	19	9.2	8.2	95	8.2
Fluorene	640	140,000,000	220,000	1,400	3,400	34,000	270	92	0.67	1.3	3.4	4.6	5.5	5.0	3.5	99 J	8.2	10	25	23	20	22	11	9.3	94	9.3
Phenanthrene	NE	NE	5,000,000	NE	NE	NE	300	15	4.2	4.5	9	11	13	12	10	140	13	12	28	28	29	31	18	15	140	15
Anthracene	4,800	1,050,000,000	5,000,000	10,500	3,400	34,000	42	12	0.59	0.54	1.1	1.2	1.4	1.2	0.30	17	1.7	1.5	4.3	4.2	3.8	4.1	2.0	1.6	18	1.6
Fluoranthene	640	140,000,000	1,400,000	1,400	3,400	34,000	99	6.6	2.4	1.1	1.7	2.0	2.2	2.0	2.1	16	2.7	1.8	4.1	4.2	4.5	4.7	3.5 J	2.1 J	16	2.1
Pyrene	480	105,000,000	1,400,000	1,050	8,200	82,000	62	0.30	1.3	0.69	1.1	1.3	1.3	1.3	1.1	9.3	1.6	1.0	2.0	2.2	2.6	2.8	1.7	1.3	9.4	1.3
Benzo(a)anthracene [2]	0.12	180,000	8,600	1.2	3,400	34,000	**15**	0.23	0.39	0.12	0.14	0.092	0.091	0.079	0.12	0.43	0.13	0.1	0.18	0.18	0.15	0.17	0.11	0.083	0.43	0.083
Chrysene [2]	12	18,000,000	960,000	120	3,400	34,000	13	0.026 J	0.36	0.12	0.12	0.052	0.058	0.056	0.092	0.35	0.064	0.055	0.085	0.08	0.087	0.10	0.088	0.070	0.38	0.070
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	6,800	68,000	**7.0**	0.20 U	0.2	0.055	0.052	0.014 J	0.014 J	0.015 J	0.040 J	0.046 J	0.011	0.019	0.023	0.018	0.018 J	0.026 J	0.015	0.012	0.045 J	0.012
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	6,800	68,000	3.8 J	0.20 U	0.078	0.019	0.019	0.0060 J	0.0048 J	0.0055 J	NA [6]	0.20 U	0.0034 J	0.0079	0.0078	0.0048	0.0065 J	0.0083 J	0.0047	0.0036 J	0.20 U	0.0036 J
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	3,400	34,000	**3.6 J**	0.20 U	0.1	0.031	0.029	0.0062 J	0.0069 J	0.0066 J	0.012 J	0.20 U	0.0066	0.013	0.013	0.0098	0.0081 J	0.012 J	0.0075	0.0055	0.20 U	0.0055
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	3,400	34,000	**1.5 J**	0.20 U	0.050	0.010	0.011	0.0045 J	0.023 U	0.021 U	0.0088 J	0.031 J	0.00078 J	0.0036 J	0.003 J	0.0017 J	0.04 U	0.039 U	0.0013 J	0.0009 J	0.20 U	0.00086 J
Dibenzo(a,h)anthracene [2]	0.012	18,000	4,300	0.12	8,200	82,000	**0.72 J**	0.20 U	0.021	0.0034	0.0032 J	0.022 U	0.023 U	0.021 U	0.022 U	0.20 U	0.0036 U	0.0011 J	0.0012 J	0.00063 J	0.04 U	0.039 U	0.00053 J	0.00370 U	0.20 U	0.0037 U
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	1,800	18,000	1.5 J	0.20 U	0.041	0.0088	0.0089	0.0066 J	0.023 U	0.021 U	0.0065 J	0.040 J	0.00068 J	0.0029 J	0.0026 J	0.0014 J	0.04 U	0.039 U	0.001 J	0.00076 J	0.20 U	0.00076 J
TTEC (screening criteria based on benzo(a)pyrene)							**6.5**	0.023	**0.18**	0.053	0.053	0.018	0.018	0.017	0.030	0.054	0.022	0.027	0.035	0.031	0.026	0.033	0.022	0.022	0.051	0.016
Metals	**ug/L**	**mg/kg**	**mg/kg**	**ug/L**	**TCLP (mg/L)**	**TCLP (mg/L)**	**Groundwater (ug/L)**	**SPLP (mg/L)**	**2 HR (mg/L)**	**7 HR (mg/L)**	**24 HR (mg/L)**	**2 Day (mg/L)**	**3 Day (mg/L)**	**4 Day (mg/L)**	**5 Day (mg/L)**	**SPLP (mg/L)**	**2 HR (mg/L)**	**7 HR (mg/L)**	**24 HR (mg/L)**	**2 Day (mg/L)**	**3 Day (mg/L)**	**4 Day (mg/L)**	**5 Day (mg/L)**	**5 Day (mg/L)**	**SPLP (mg/L)**	**5 Day (mg/L)**
Arsenic	0.058	88	0.34	0.58	5	50	NA	NA	NA							NA	NA								NA	NA
Barium	3,200	700,000	5,768	7,000	21	210	NA	NA	NA							NA	NA								NA	NA
Cadmium	16	NE	4.8	35	0.11	1.10	NA	NA	NA							NA	NA								NA	NA
Chromium	24,000 (Cr^{+3}) / 48 (Cr^{+6})	5,250,000 (Cr^{+3}) / 10,500 (Cr^{+6})	1,050,210 (Cr^{+3}) / 40 (Cr^{+6})	52,500 (Cr^{+3}) / 105 (Cr^{+6})	0.60 (total)	0.60 (total)	NA	NA	NA							NA	NA								NA	NA
Lead	NE	NE	NE	NE	0.75	7.50	NA	NA	NA							NA	NA								NA	NA
Mercury	NE	NE	NE	NE	0.025	0.250	NA	NA	NA							NA	NA								NA	NA
Selenium	80	17,500	18	175	5.7	57.0	NA	NA	NA							NA	NA								NA	NA
Silver	80	17,500	30	175	0.14	1.40	NA	NA	NA							NA	NA								NA	NA
Cure Days	NA	NA	NA	NA	NA	NA		8	67	101						7	28								3	7	28	
Unconfined Compressive Strength																												
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA	42.5	41.3	38.3						32.3	33.2								NA	NA	36.4	NA
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	107.7	106.6	106.1						117.5	115.5								NA	NA	106.1	NA
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	75.6	75.5	76.7						88.9	86.8								NA	NA	77.8	NA
UCS (lb/in^2)	NA	NA	NA	NA	NA	NA	NA	31.7	326.0	443.7						23.7	184.5								NA	NA	180.2	NA
Permeability (k)																												
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA	NA	42.6	NA						NA	34.9									NA		NA
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	105.4	NA						NA	105.2									NA		NA
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	73.9	NA						NA	78.0									NA		NA
Perm (cm/sec)	NA	NA	NA	NA	NA	NA	NA	NA	3.0E-08	NA						NA	5.5E-07									NA		NA
Cure Days	NA	NA	NA	NA	NA	NA	NA	0	3	7						7	28								3	7	28	NA
Volumetric Expansion (%)	NA	NA	NA	NA	NA	NA	NA	0	48.21	42.86						NA	30.36								48.21	42.86	42.86	NA
Estimated Costs [5]	NA	NA	NA	NA	NA	NA	NA	$921,120								$921,120									$921,120			

Notes:

Soil (mg/kg or ug/kg) numbers in **bold** font meet or exceed a MTCA soil cleanup level. Underlined numbers meet or exceed the Universal Treatment Standard.

ANS 16.1 and BV-13 water numbers in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.

Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC; MTCA Method A, B, and C from Ecology website downloaded November 2011 (https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx). (I) - Industrial land use (R) - Unrestricted land use

[1] Universal Treatment Standards (UTS, 40 CFR 268.48) for nonwastewaters.

[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.

[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) except for dibenzofuran and 2-methylnaphthalene which were obtained from the J&E model (USEPA 2004).

[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

[5] See Table 3 for estimated costs calculation details

[6] Laboratory was unable to differenate between benzo(b)fluoranthene and benzo(k)fluoranthene. Laboratory reported result as benzo(b)fluoranthene.

J - estimated value
ft bgs - feet below ground surface
mg/kg - miligram per kilogram
NA - not applicable, not analyzed, or not available
NE - not established
PAHs - Polynuclear Aromatic Hydrocarbons
SPLP - Synthetic Precipitation Leaching Procedure
TCLP - Toxicicity Characteristic Leaching Procedure
TPH - Total Petroleum Hydrocarbons
TTEC - Total Toxic Equivalent Concentration
ug/kg - microgram per kilogram
ug/L - microgram per liter
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.

Appendix D
ISS Treatability Study Data Summary Table

Sample Type:	MTCA Screening Levels				Universal Treatment Standards [1]	Alternate Treatment Sandards (10xUTS)	TREATED (PRELIMINARY MIXES)								TREATED (OPTIMIZATION MIXES)	
Sample ID:							TP-02 (continued)								TP-02 (continued)	
Sample Depth (ft bgs):							2.0-6.5 (continued)								2.0-6.5 (continued)	
Kemron Sample Number:							0397-018	0397-019	0397-020	0397-021	0397-022	0397-023	0397-024	0397-025	0397-026	0397-027
Kemron Reagent Type							NewCem Slag Cement / Bentonite / Organoclay SS-199	Portland Cement / Bentonite / Organoclay SS-199	Portland Cement / Bentonite / Organoclay SS-199	Portland Cement / Class "C" Flyash	NewCem Slag Cement / Class "C" Flyash	NewCem Slag Cement / Bentonite	50:50 TerraCem / Bentonite / Organoclay SS-199	50:50 TerraCem / Bentonite	Portland Cement #842 / Bentonite	NewCem Slag Cement / Portland Cement / Bentonite
Reagent Addition % by wet soil wt.							17.5 / 2 / 0.5	10 / 2 / 0.5	15 / 2 / 0.5	10 / 10	10 / 10	15 / 2	15 / 2 / 0.5	15 / 2	8 / 2	6 / 2 / 2
Date Test Mix Prepared:							10/7/2011	10/7/11	10/7/2011	10/6/11	10/7/11	10/6/11	10/7/11	10/6/11	4/11/12	4/11/12
Date Sample Collected:	Method B	Method C					NA	10/24/2011	NA	10/24/2011	10/24/2011	10/24/2011	10/24/2011	10/24/2011	ANS 16.1 Start Date 6/18/2012	NA
TPH	**Groundwater (ug/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (ug/L)**	**ug/kg**	**ug/kg**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**5 Day (ug/L)**	**SPLP (ug/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	NA	17,000	NA	19,000	20,000	18,000	18,000	23,000	1,300	NA
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	NA	500 U	NA	510	660	540	500 U	580	560 U	NA
PAHs	**ug/L**	**ug/kg**	**ug/kg**	**ug/L**	**ug/kg**	**ug/kg**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**SPLP (ug/L)**	**5 Day (ug/L)**	**SPLP (ug/L)**
Naphthalene	160	70,000,000	9,700	350	5,600	56,000	NA	6,400	NA	7,000	7,900	7,300	6,500	9,400	170	NA
2-Methyl Naphthalene	32	14,000,000	4,200	70	NE	NE	NA	740	NA	860	770	760	860	800	30	NA
Acenaphthylene	NE	NE	210,000	NE	3,400	34,000	NA	7.1	NA	8.6	8.7	8.7	7.2	8.1	0.54	NA
Acenaphthene	960	210,000,000	210,000	2,100	3,400	34,000	NA	380	NA	420	380	390	400	380	21	NA
Dibenzofuran	16	3,500,000	3,700	35	NE	NE	NA	210	NA	260	240	220	250	240	15	NA
Fluorene	640	140,000,000	220,000	1,400	3,400	34,000	NA	180	NA	230	210	190	220	210	16	NA
Phenanthrene	NE	NE	5,000,000	NE	NE	NE	NA	210	NA	240	220	210	220	210	44	NA
Anthracene	4,800	1,050,000,000	5,000,000	10,500	3,400	34,000	NA	30	NA	31	30	34	28	31	5.7	NA
Fluoranthene	640	140,000,000	1,400,000	1,400	3,400	34,000	NA	20	NA	19	20	23	22	18	11	NA
Pyrene	480	105,000,000	1,400,000	1,050	8,200	82,000	NA	10	NA	9.2	9.3	11	11	8.2	5.9	NA
Benzo(a)anthracene [2]	0.12	180,000	8,600	1.2	3,400	34,000	NA	0.40	NA	0.32	0.35	0.41	0.41	0.29	0.56	NA
Chrysene [2]	12	18,000,000	960,000	120	3,400	34,000	NA	0.35	NA	0.32	0.34	0.40	0.40	0.29	0.47	NA
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	6,800	68,000	NA	0.030 J	NA	0.20 U	0.030 J	0.034 J	0.044 J	0.024 J	0.085	NA
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	6,800	68,000	NA	0.20 U	NA	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.039 U	NA
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	3,400	34,000	NA	0.20 U	NA	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.039 U	NA
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	3,400	34,000	NA	0.20 U	NA	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.039 U	NA
Dibenzo(a,h)anthracene [2]	0.012	18,000	4,300	0.12	8,200	82,000	NA	0.20 U	NA	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.039 U	NA
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	1,800	18,000	NA	0.20 U	NA	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.039 U	NA
TTEC (screening criteria based on benzo(a)pyrene)							NA	0.047	NA	0.035	0.041	0.048	0.049	0.034	0.069	NA
Metals	**ug/L**	**mg/kg**	**mg/kg**	**ug/L**	**TCLP (mg/L)**	**TCLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**	**SPLP (mg/L)**
Arsenic	0.058	88	0.34	0.58	5	50	NA	NA	NA	0.007 U	0.007 U	NA	NA	NA	NA	NA
Barium	3,200	700,000	5,768	7,000	21	210	NA	NA	NA	5.2	0.3 J	NA	NA	NA	NA	NA
Cadmium	16	NE	4.8	35	0.11	1.10	NA	NA	NA	0.0003 U	0.0003 U	NA	NA	NA	NA	NA
Chromium	24,000 (Cr^{+3}) / 48 (Cr^{+6})	5,250,000 (Cr^{+3}) / 10,500 (Cr^{+6})	1,050,210 (Cr^{+3}) / 40 (Cr^{+6})	52,500 (Cr^{+3}) / 105 (Cr^{+6})	0.60 (total)	0.60 (total)	NA	NA	NA	0.004 J	0.013	NA	NA	NA	NA	NA
Lead	NE	NE	NE	NE	0.75	7.50	NA	NA	NA	0.004 U	0.004 U	NA	NA	NA	NA	NA
Mercury	NE	NE	NE	NE	0.025	0.250	NA	NA	NA	0.0004 U	0.0004 U	NA	NA	NA	NA	NA
Selenium	80	17,500	18	175	5.7	57.0	NA	NA	NA	0.02 U	0.02 U	NA	NA	NA	NA	NA
Silver	80	17,500	30	175	0.14	1.40	NA	NA	NA	0.006 U	0.006 U	NA	NA	NA	NA	NA
Cure Days	NA	NA	NA	NA	NA	NA	8	8	67	8	8	8	17	8	8	67	8	7	14	28	56	7	14	28	56
Unconfined Compressive Strength																									
Moisture Content (%)	NA	NA	NA	NA	NA	NA	42.7	40.3	38.5	43.1	24.9	29.6	30.0	41.1	38.4	36.6	39.4	33.8	33.0	33.2	32.7	34.1	34.1	34.6	32.7
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	109.0	109.1	100.9	106.1	121.0	118.4	122.0	107.9	108.6	105.4	110.7	103.3	105.6	106.8	104.2	106.1	106.1	104.9	105.6
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	76.4	77.8	72.8	74.2	96.9	91.3	93.8	76.5	78.5	77.2	79.4	77.2	79.4	80.2	78.5	79.1	79.2	78.0	79.6
UCS (lb/in^2)	NA	NA	NA	NA	NA	NA	76.6	35.2	57.9	60.8	143.6	15.2	14.1	61.3	37.7	87.7	32.4	31.9	44.9	NA	77.7	68.8	127.7	239.8	333.1
Permeability (k)																									
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA	NA	40.2	NA	NA	NA		NA	NA	38.7	NA	NA		30.2	NA	NA		33.4	NA
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	108.9	NA	NA	NA		NA	NA	106.6	NA	NA		102.0	NA	NA		106.0	NA
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA	NA	77.7	NA	NA	NA		NA	NA	76.9	NA	NA		78.0	NA	NA		79.5	NA
Perm (cm/sec)	NA	NA	NA	NA	NA	NA	NA	NA	7.4E-07	NA	NA	NA		NA	NA	3.0E-07	NA	NA		2.6E-07	NA	NA		3.3E-07	NA
Cure Days	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA		NA	NA		NA	7	14	28	56	7	14	28	56
Volumetric Expansion (%)	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA		NA	NA		NA	28.57	NA	31.25	27.55	25.80	NA	29.64	31.21
Estimated Costs [5]	NA	NA	NA	NA	NA	NA	$376,860	$323,460		$378,660	$176,400	$159,600		$163,440	$357,060		$166,080	$111,360				$101,280			

Notes:

Soil (mg/kg or ug/kg) numbers in **bold** font meet or exceed a MTCA soil cleanup level. Underlined numbers meet or exceed the Universal Treatment Standard.

ANS 16.1 and BV-13 water numbers in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.

Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC; MTCA Method A, B, and C from Ecology website downloaded November 2011 (https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx). (I) - Industrial land use (R) - Unrestricted land use

[1] Universal Treatment Standards (UTS, 40 CFR 268.48) for nonwastewaters.

[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.

[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) except for dibenzofuran and 2-methylnaphthalene which were obtained from the J&E model (USEPA 2004).

[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

[5] See Table 3 for estimated costs calculation details

[6] Laboratory was unable to differenate between benzo(b)fluoranthene and benzo(k)fluoranthene. Laboratory reported result as benzo(b)fluoranthene.

J - estimated value
mg/kg - miligram per kilogram
NE - not established
SPLP - Synthetic Precipitation Leaching Procedure
TPH - Total Petroleum Hydrocarbons
ug/kg - microgram per kilogram
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.
ft bgs - feet below ground surface
NA - not applicable, not analyzed, or not available
PAHs - Polynuclear Aromatic Hydrocarbons
TCLP - Toxicicity Characteristic Leaching Procedure
TTEC - Total Toxic Equivalent Concentration
ug/L - microgram per liter

Appendix D
ISS Treatability Study Data Summary Table

Sample Type:	MTCA Screening Levels				Universal Treatment Standards [1]	Alternate Treatment Sandards (10xUTS)	TREATED (OPTIMIZATION MIXES)																
Sample ID:							TP-02 (continued)																
Sample Depth (ft bgs):							2.0-6.5 (continued)																
Kemron Sample Number:							0397-028												0397-029		0397-030		0397-031
Kemron Reagent Type							NewCem Slag Cement / Bentonite / Caustic Soda												NewCem Slag Cement / Bentonite / Organoclay SS-199 / Caustic Soda		NewCem Slag Cement / Bentonite / Caustic Soda		NewCem Slag Cement / Bentonite / Organoclay SS-199 / Caustic Soda
Reagent Addition % by wet soil wt.							8 / 2 / 0.5												8 / 2 / 0.5 / 0.5		10 / 2 / 0.5		10 / 2 / 0.5 / 0.5
Date Test Mix Prepared:							4/11/12												4/11/12		4/11/12		4/11/12
Date Sample Collected:	Method B	Method C					7/6/2012			7/11/2012	ANS 16.1 Start Date 7/9/2012								NA		NA		NA
TPH	**Groundwater (ug/L)**	**Soil - Direct Contact (mg/kg)**	**Soil - Protection of Groundwater (mg/kg) [3]**	**Groundwater (ug/L)**	**ug/kg**	**ug/kg**	**Total (mg/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**Wipe (ug/100 cm^2)**	**2 HR (ug/L)**	**7 HR (ug/L)**	**24 HR (ug/L)**	**2 Day (ug/L)**	**3 Day (ug/L)**	**4 Day (ug/L)**	**5 Day (ug/L)**		**SPLP (ug/L)**		**SPLP (ug/L)**		**SPLP (ug/L)**
Diesel	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	**4,300**	15,000 J	17,000 J	500 U	**520**	**570**	**930**	**910**	**920**	**1,000**	**860**		NA		NA		NA
Oil	500 [4]	2,000 [4]	NE	500 [4]	NE	NE	1,000	540 UJ	920 J	560	540 U	550 U	500 U	550 U	610 U	610 U	580 U		NA		NA		NA
PAHs	**ug/L**	**ug/kg**	**ug/kg**	**ug/L**	**ug/kg**	**ug/kg**	**Total (ug/kg)**	**TCLP (ug/L)**	**SPLP (ug/L)**	**Wipe (ug/100 cm^2)**	**2 HR (ug/L)**	**7 HR (ug/L)**	**24 HR (ug/L)**	**2 Day (ug/L)**	**3 Day (ug/L)**	**4 Day (ug/L)**	**5 Day (ug/L)**		**SPLP (ug/L)**		**SPLP (ug/L)**		**SPLP (ug/L)**
Naphthalene	160	70,000,000	9,700	350	5,600	56,000	**150,000 J**	5,100	5,400	0.48 J	30	64	170	120	140	120	100		NA		NA		NA
2-Methyl Naphthalene	32	14,000,000	4,200	70	NE	NE	**84,000 J**	750	790	0.18 J	6.1	12	34	23	29	26	22		NA		NA		NA
Acenaphthylene	NE	NE	210,000	NE	3,400	34,000	1,300 J	8.4	9.0	0.010 J	0.12	0.19	0.41	0.3	0.44	0.39	0.34		NA		NA		NA
Acenaphthene	960	210,000,000	210,000	2,100	3,400	34,000	91,000 J	420	440	0.26 J	6	11	29	20	24	19	17		NA		NA		NA
Dibenzofuran	16	3,500,000	3,700	35	NE	NE	**67,000 J**	260	290	0.20 J	4.1	6.6	19	14	14	12	11		NA		NA		NA
Fluorene	640	140,000,000	220,000	1,400	3,400	34,000	86,000 J	230	250	0.28 J	4.6	8.3	22	16	16	14	13		NA		NA		NA
Phenanthrene	NE	NE	5,000,000	NE	NE	NE	250,000 J	260	270	1.1	7.2	13	42	35	41	35	31		NA		NA		NA
Anthracene	4,800	1,050,000,000	5,000,000	10,500	3,400	34,000	48,000 J	31	36	0.21	0.98	1.4	5.6	5.4	5.3	4.7	4.4		NA		NA		NA
Fluoranthene	640	140,000,000	1,400,000	1,400	3,400	34,000	110,000 J	22	24	0.62	1	1.7	6.9	7	8.2	7.3	7.7		NA		NA		NA
Pyrene	480	105,000,000	1,400,000	1,050	8,200	82,000	74,000 J	13	13	0.44	0.66	1.1	4.3	4.3	4.8	4.2	4.5		NA		NA		NA
Benzo(a)anthracene [2]	0.12	180,000	8,600	1.2	3,400	34,000	**17,000 J**	0.58	0.71	0.13	0.094	0.12	0.33	0.35	0.39	0.33	0.38		NA		NA		NA
Chrysene [2]	12	18,000,000	960,000	120	3,400	34,000	19,000 J	0.48	0.46	0.12	0.071	0.1	0.27	0.27	0.39	0.32	0.38		NA		NA		NA
Benzo(b)fluoranthene [2]	0.12	180,000	30,000	1.2	6,800	68,000	9,600 J	0.063 J	0.049 J	0.085	0.027	0.03	0.068	0.052	0.065	0.048	0.058		NA		NA		NA
Benzo(k)fluoranthene [2]	1.2	1,800,000	300,000	12	6,800	68,000	3,600 J	0.034 J	0.028 J	0.033	0.012	0.011	0.023	0.016	0.026 J	0.022 J	0.025 J		NA		NA		NA
Benzo(a)pyrene [2]	0.012	18,000	2,300	0.12	3,400	34,000	**6,100 J**	0.22	0.21	0.090 J	0.019	0.017	0.034	0.024	0.034	0.023 J	0.029 J		NA		NA		NA
Indeno(1,2,3-cd)pyrene [2]	0.12	180,000	83,000	1.2	3,400	34,000	2,000 J	0.22	0.21	0.024	0.0057	0.0045	0.0095	0.0047	0.02 J	0.0096 J	0.0081 J		NA		NA		NA
Dibenzo(a,h)anthracene [2]	0.012	18,000	4,300	0.12	8,200	82,000	510 J	0.22	0.21	0.0065	0.00034 U	0.00034 U	0.00038 U	0.00034 U	0.011 J	0.0059 J	0.033 U		NA		NA		NA
Benzo(g,h,i)perylene	NE	NE	1,400,000	NE	1,800	18,000	1,600 J	0.22	0.21	0.022	0.0052	0.0041	0.0074	0.00034 U	0.023 J	0.0097 J	0.0088 J		NA		NA		NA
TTEC (screening criteria based on benzo(a)pyrene)							**9,600**	0.073	0.083	0.12	0.034	0.035	0.080	0.069	0.089	0.068	0.083		NA		NA		NA
Metals	**ug/L**	**mg/kg**	**mg/kg**	**ug/L**	**TCLP (mg/L)**	**TCLP (mg/L)**	**Total (mg/kg)**	**TCLP (mg/L)**	**SPLP (mg/L)**	**Wipe (ug/100 cm^2)**	**2 HR (mg/L)**	**7 HR (mg/L)**	**24 HR (mg/L)**	**2 Day (mg/L)**	**3 Day (mg/L)**	**4 Day (mg/L)**	**5 Day (mg/L)**		**SPLP (mg/L)**		**SPLP (mg/L)**		**SPLP (mg/L)**
Arsenic	0.058	88	0.34	0.58	5	50	NA	NA	NA	NA				NA					NA		NA		NA
Barium	3,200	700,000	5,768	7,000	21	210	NA	NA	NA	NA				NA					NA		NA		NA
Cadmium	16	NE	4.8	35	0.11	1.10	NA	NA	NA	NA				NA					NA		NA		NA
Chromium	24,000 (Cr^{+3}) / 48 (Cr^{+6})	5,250,000 (Cr^{+3}) / 10,500 (Cr^{+6})	1,050,210 (Cr^{+3}) / 40 (Cr^{+6})	52,500 (Cr^{+3}) / 105 (Cr^{+6})	0.60 (total)	0.60 (total)	NA	NA	NA	NA				NA					NA		NA		NA
Lead	NE	NE	NE	NE	0.75	7.50	NA	NA	NA	NA				NA					NA		NA		NA
Mercury	NE	NE	NE	NE	0.025	0.250	NA	NA	NA	NA				NA					NA		NA		NA
Selenium	80	17,500	18	175	5.7	57.0	NA	NA	NA	NA				NA					NA		NA		NA
Silver	80	17,500	30	175	0.14	1.40	NA	NA	NA	NA				NA					NA		NA		NA
Cure Days	NA	NA	NA	NA	NA	NA	7	14	28	56	86								7	14	28	56	
Unconfined Compressive Strength																							
Moisture Content (%)	NA	NA	NA	NA	NA	NA	39.7	37.9	37.6	36.0	34.9			NA					39.7	38.3	NA	35.1	
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	100.7	102.7	103.0	102.6	102.1			NA					105.1	106.3	NA	103.5	
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	72.1	74.5	74.8	75.4	75.7			NA					75.2	76.8	NA	76.6	
UCS (lb/in^2)	NA	NA	NA	NA	NA	NA	91.7	119.1	245.5	383.5	355.3			NA					44.8	117.7	NA	358.3	
Permeability (k)																							
Moisture Content (%)	NA	NA	NA	NA	NA	NA	NA		38.0	NA				NA					NA				
Bulk Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA		102.0	NA				NA					NA				
Dry Density (lb/ft^3)	NA	NA	NA	NA	NA	NA	NA		74.1	NA				NA					NA				
Perm (cm/sec)	NA	NA	NA	NA	NA	NA	NA		1.9E-07	NA				NA					NA				
Cure Days	NA	NA	NA	NA	NA	NA	7	14	28	56	86			NA					7	14	28	56	
Volumetric Expansion (%)	NA	NA	NA	NA	NA	NA	36.61	NA	34.82	36.07	25.51			NA					35.71	NA	37.86	38.21	
Estimated Costs [5]	NA	NA	NA	NA	NA	NA	$167,220												$287,940				

Sample Type:	TREATED (OPTIMIZATION MIXES)																						
Sample ID:	TP-02 (continued)																						
Sample Depth (ft bgs):	2.0-6.5 (continued)																						
Kemron Sample Number:	0397-032																						
Kemron Reagent Type	NewCem Slag Cement / Bentonite / Caustic Soda																						
Reagent Addition % by wet soil wt.	8 / 2 / 0.5																						
Date Test Mix Prepared:	4/11/12																						
Date Sample Collected:	NA																						
TPH	**SPLP (ug/L)**				**SPLP (ug/L)**				**SPLP (ug/L)**														
Diesel	NA				NA				NA														
Oil	NA				NA				NA														
PAHs	**SPLP (ug/L)**				**SPLP (ug/L)**				**SPLP (ug/L)**														
Naphthalene	NA				NA				NA														
2-Methyl Naphthalene	NA				NA				NA														
Acenaphthylene	NA				NA				NA														
Acenaphthene	NA				NA				NA														
Dibenzofuran	NA				NA				NA														
Fluorene	NA				NA				NA														
Phenanthrene	NA				NA				NA														
Anthracene	NA				NA				NA														
Fluoranthene	NA				NA				NA														
Pyrene	NA				NA				NA														
Benzo(a)anthracene [2]	NA				NA				NA														
Chrysene [2]	NA				NA				NA														
Benzo(b)fluoranthene [2]	NA				NA				NA														
Benzo(k)fluoranthene [2]	NA				NA				NA														
Benzo(a)pyrene [2]	NA				NA				NA														
Indeno(1,2,3-cd)pyrene [2]	NA				NA				NA														
Dibenzo(a,h)anthracene [2]	NA				NA				NA														
Benzo(g,h,i)perylene	NA				NA				NA														
TTEC (screening criteria based on benzo(a)pyrene)	NA				NA				NA														
Metals	**SPLP (mg/L)**				**SPLP (mg/L)**				**SPLP (mg/L)**														
Arsenic	NA				NA				NA														
Barium	NA				NA				NA														
Cadmium	NA				NA				NA														
Chromium	NA				NA				NA														
Lead	NA				NA				NA														
Mercury	NA				NA				NA														
Selenium	NA				NA				NA														
Silver	NA				NA				NA														
Cure Days	7	14	28	56	7	14	28	56	7	14	28	56											
Unconfined Compressive Strength																							
Moisture Content (%)	38.6	37.8	NA	35.5	39.3	37.9	NA	35.8	38.6	37.8	NA	35.5											
Bulk Density (lb/ft^3)	106.6	105.5	NA	104.6	106.1	104.1	NA	100.9	106.6	105.5	NA	104.6											
Dry Density (lb/ft^3)	76.9	76.5	NA	77.2	76.2	75.5	NA	74.3	76.9	76.5	NA	77.2											
UCS (lb/in^2)	127.1	221.5	NA	433.9	120.8	192.0	NA	341.1	127.1	221.5	NA	433.9											
Permeability (k)																							
Moisture Content (%)	NA				NA				NA														
Bulk Density (lb/ft^3)	NA				NA				NA														
Dry Density (lb/ft^3)	NA				NA				NA														
Perm (cm/sec)	NA				NA				NA														
Cure Days	7	14	28	56	7	14	28	56	7	14	28	56											
Volumetric Expansion (%)	40.18	NA	40.80	40.09	40.18	NA	40.80	40.09	40.18	NA	40.45	42.59											
Estimated Costs [5]	$185,940				$306,660																		

Notes:

Soil (mg/kg or ug/kg) numbers in **bold** font meet or exceed a MTCA soil cleanup level. Underlined numbers meet or exceed the Universal Treatment Standard.

ANS 16.1 and BV-13 water numbers in **bold** font meet or exceed a MTCA C groundwater cleanup level. TCLP and SPLP numbers are not bolded.

Model Toxics Control Act (MTCA) Cleanup Regulation, chapter 173-340 WAC; MTCA Method A, B, and C from Ecology website downloaded November 2011 (https://fortress.wa.gov/ecy/clarc/Reporting/CLARCReporting.aspx). (I) - Industrial land use (R) - Unrestricted land use

[1] Universal Treatment Standards (UTS, 40 CFR 268.48) for nonwastewaters.

[2] These compounds are carcinogenic PAHs and are subject to TTEC calculations.

[3] Values were calculated using MTCA workbook tools with default parameters. Chemical specific properties were obtained from the CLARC database (http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) except for dibenzofuran and 2-methylnaphthalene which were obtained from the J&E model (USEPA 2004).

[4] TPH Cleanup levels are based on the MTCA Method A industrial cleanup standards.

[5] See Table 3 for estimated costs calculation details

[6] Laboratory was unable to differenate between benzo(b)fluoranthene and benzo(k)fluoranthene. Laboratory reported result as benzo(b)fluoranthene.

J - estimated value
mg/kg - miligram per kilogram
NE - not established
SPLP - Synthetic Precipitation Leaching Procedure
TPH - Total Petroleum Hydrocarbons
ug/kg - microgram per kilogram
U - Compound was analyzed for but not detected above the reporting limit shown.
UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.
ft bgs - feet below ground surface
NA - not applicable, not analyzed, or not available
PAHs - Polynuclear Aromatic Hydrocarbons
TCLP - Toxicicity Characteristic Leaching Procedure
TTEC - Total Toxic Equivalent Concentration
ug/L - microgram per liter

Appendix E
Analytical Laboratory Reports

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

September 26, 2011 Analytical Report for Service Request No: K1107780

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP Longview Treatability Study/33763156

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on August 23, 2011. For your reference, these analyses have been assigned our service request number K1107780.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/jw

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, hut was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1108987
Project:	IP Longview	**Date Received:**	8/23/11
Sample Matrix:	Soils		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Four soil samples were received for analysis at Columbia Analytical Services on 8/23/11. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

As received
Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Residual Range Organics (RRO) in sample TP01-S-7.5-082211 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Elevated Detection Limits:
Samples TP02-S-2.0-6.5-082211 and TP02-S-6.5-082211 required dilution due to the presence of elevated levels of non-target analyte. The reporting limits were adjusted to reflect the dilution.

Surrogate Exceptions:
The control criteria for o-Terphenyl in samples TP02-S-2.0-6.5-082211 and TP02-S-6.5-082211 were not applicable. The chromatogram indicated the presence non-target background components that masked the surrogate, which prevented adequate resolution for quantitation. No corrective action was appropriate.

After TCLP Leaching
No anomalies with the analysis of these samples were observed.

After SPLP Leaching
No anomalies with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

As received
Matrix Spike Recovery Exceptions:
The matrix spike recovery of Dibenzofuran for sample TP01-S-2.0-7.5-082211DMS was outside control criteria. Recovery in the Laboratory Control Sample (LCS) was acceptable, which indicated the analytical batch was in control. The matrix spike outlier suggested a potential low bias in this matrix. No further corrective action was appropriate.

Approved by EMW **Date** 9/26/11

Elevated Detection Limits:
Samples TP02-S-2.0-6.5-082211 and TP02-S-6.5-082211 required dilution due to the presence of elevated levels of target analytes. The reporting limits were adjusted to reflect the dilution.

The Relative Percent Difference (RPD) criterion for the replicate analysis of Residual Range Organics (RRO) in sample TP01-S-7.5-082211 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Elevated Detection Limits:
Samples TP02-S-2.0-6.5-082211 and TP02-S-6.5-082211 required dilution due to the presence of elevated levels of non-target analyte. The reporting limits were adjusted to reflect the dilution.

Surrogate Exceptions:
The control criteria for o-Terphenyl in samples TP02-S-2.0-6.5-082211 and TP02-S-6.5-082211 were not applicable. The chromatogram indicated the presence non-target background components that masked the surrogate, which prevented adequate resolution for quantitation. No corrective action was appropriate.

After TCLP Leaching
Calibration Verification Exceptions:
The upper control criterion was exceeded for Indeno(1,2,3-cd)pyrene and Dibenz(a,h)anthracene in Continuing Calibration Verification (CCV) MS11\0909F002.D. The field samples analyzed in this sequence were dilutions for analytes other than those in question. The data quality was not significantly affected. No further corrective action was required.

Method Blank Exceptions:
The Method Blank KWG11089078-4 contained significant levels of numerous analytes above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated. The samples were not re-extracted and re-analyzed because TCLP leach fluid is not controlled for the analytes in question at the levels detected by PAH_SIM analysis. A deionized water blank was extracted at was ND for the analytes in question. No further corrective action was required.

Surrogate Exceptions:
The upper control criterion was exceeded for the surrogates in sample TP01-S-2.0-7.5-082211. The error associated with an elevated recovery equated to a potential high bias. No further corrective action was taken.

The control criteria were exceeded for the surrogates in LCS KWG1108792-1. The associated spike recoveries of target compounds were in control, indicating the analysis was in control. The surrogate outlier was flagged accordingly. No further corrective action was appropriate.

Internal Standard Exceptions:
The internal standard recovery of Naphthalene-d8 in sample TP02-S-2.0-6.5-082211 was outside control criteria because of extremely high levels of target compounds. The sample was reanalyzed at a dilution. The internal standard in question was within control criteria in the diluted analysis. All affected analytes were reported from the diluted analysis due to their very high concentration.

Sample Notes and Discussion:
A Matrix Spike/Matrix Spike Duplicate (MS/MSD) was not extracted with this sample batch. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

The equipment and procedures used for the TCLP leachate preparation have not been evaluated for PAHs detected by the SIM_PAH analysis.

Approved by EMW **Date** 9/26/11

After SPLP Leaching
Calibration Verification Exceptions:
The upper control criterion was exceeded for Indeno(1,2,3-cd)pyrene and Dibenz(a,h)anthracene in Continuing Calibration Verification (CCV) MS11\0909F002.D. The field samples analyzed in this sequence were dilutions for analytes other than those in question. The data quality was not significantly affected. No further corrective action was required.

Method Blank Exceptions:
The Method Blanks KWG11089078-3 and KWG1108792-3 contained significant levels of numerous analytes above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated. The samples were not re-extracted and re-analyzed because SPLP leach fluid is not controlled for the analytes in question at the levels detected by PAH_SIM analysis. A deionized water blank was extracted at was ND for the analytes in question. No further corrective action was required.

Surrogate Exceptions:
The upper control criterion was exceeded for the surrogates in sample TP01-S-2.0-7.5-082211. The error associated with an elevated recovery equated to a potential high bias. No further corrective action was taken.

The control criteria were exceeded for the surrogates in LCS KWG1108792-1. The associated spike recoveries of target compounds were in control, indicating the analysis was in control. The surrogate outlier was flagged accordingly. No further corrective action was appropriate.

Internal Standard Exceptions:
The internal standard recovery of Naphthalene-d8 in sample TP02-S-2.0-6.5-082211 was outside control criteria because of extremely high levels of target compounds. The sample was reanalyzed at a dilution. The internal standard in question was within control criteria in the diluted analysis. All affected analytes were reported from the diluted analysis due to their very high concentration.

Sample Notes and Discussion:
A Matrix Spike/Matrix Spike Duplicate (MS/MSD) was not extracted with this sample batch. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

The equipment and procedures used for the SPLP leachate preparation have not been evaluated for PAHs detected by the SIM_PAH analysis.

Approved by EMW **Date** 9/26/11

Columbia Analytical Services

CHAIN OF CUSTODY

SR#: K1107780

1317 South 13th Ave, Kelso, WA 98626 | 360.577.7222 | 800.695.7222 | 360.636.1068 (fax)

PAGE 1 OF 1 COC #

PROJECT NAME: IP LONGVIEW TREATABILITY STUDY
PROJECT NUMBER: 33763156
PROJECT MANAGER: PAUL KALINA
COMPANY/ADDRESS: URS 1501 4TH AVE STE 1400
CITY/STATE/ZIP: SEATTLE WA 98101
E-MAIL ADDRESS: PAUL_KALINA@URSCORP.COM
PHONE #: 206 438 2700 FAX #:
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS		Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☒ Oil☒	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	8270D SIM ULL	8270D SIM STANDARD	TCLP METALS ARSENIC CHROMIUM		REMARKS
TP01-S-2.0-7.5-082211	8/22/11	1120		SOIL	1				X											X					
TP01-S-7.5-082211	↓	1130		"	1				X											X					
TP02-S-2.0-6.5-082211		1600		"	1				X											X					
TP02-S-6.5-082211		1620		"	1				X											X					
ROLLOFFCONT. 1A-082211		1650		"	1				X												X	X			RUSH
" 1B-082211		1700		"	1				X												X	X			TURN-
" 1C-082211		1710		"	1				X												X	X			AROUND

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. # ______

Bill To: ______

TURNAROUND REQUIREMENTS

____ 24 hr. ____ 48 hr.

____ 5 Day

____ Standard (10-15 working days)

____ Provide FAX Results

______ Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al (As) Sb Ba Be B Ca Cd Co (Cr) Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg ~~Mn Mo~~ Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI (NORTHWEST) OTHER:______ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

- ROLLOFF CONT SAMPLES ON RUSH TURN AROUND
- OTHER SAMPLES ON STANDARD

ALL SAMPLE EXCEPT TP01 LIKELY VERY HOT

☐ Sample Shipment contains USDA regulated soil samples (check box if applicable)

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 8/22/11 1635	Signature: [signature] Date/Time: 8-22-11 18:35	Signature: Date/Time:	Signature: [signature] Date/Time: 8/23/11 0800
Printed Name: IAN VERMEEREN Firm: URS	Printed Name: Joshua Wyant Firm:	Printed Name: Firm:	Printed Name: Karla Smith Firm: CAS

RCOC #1 03/10

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed

Client / Project: IP/Longview / URS Service Request *K11* 7780

Received: 8/22/11 Opened: 8/23/11 By: AB Unloaded: 8/23/11 By: AB

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
5.4	3.1	315			

7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

Page 1 of _____

Polynuclear Aromatic Hydrocarbons

Client: URS Corporation **Service Request:** K1107780
Project: IP Longview Treatability Study/33763156

Cover Page - Organic Analysis Data Package
Polynuclear Aromatic Hydrocarbons

Sample Name	Lab Code	Date Collected	Date Received
TP01-S-2.0-7.5-082211	K1107780-001	08/22/2011	08/23/2011
TP01-S-7.5-082211	K1107780-002	08/22/2011	08/23/2011
TP02-S-2.0-6.5-082211	K1107780-003	08/22/2011	08/23/2011
TP02-S-6.5-082211	K1107780-004	08/22/2011	08/23/2011
TP01-S-2.0-7.5-082211MS	KWG1108421-1	08/22/2011	08/23/2011
TP01-S-2.0-7.5-082211DMS	KWG1108421-2	08/22/2011	08/23/2011

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Carl Dagnan

Date: 9/7/11 Title: Senior Engineer

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TP01-S-2.0-7.5-082211	K1107780-001	74	77	86
TP01-S-7.5-082211	K1107780-002	70	77	77
TP02-S-2.0-6.5-082211	K1107780-003	75 D	79 D	93 D
TP02-S-6.5-082211	K1107780-004	80 D	85 D	100 D
Method Blank	KWG1108421-5	75	75	86
TP01-S-2.0-7.5-082211MS	KWG1108421-1	75	71	80
TP01-S-2.0-7.5-082211DMS	KWG1108421-2	54	51	58
Lab Control Sample	KWG1108421-3	70	69	77
Duplicate Lab Control Sample	KWG1108421-4	76	72	83

Surrogate Recovery Control Limits (%)

Sur1	= Fluorene-d10	17-104
Sur2	= Fluoranthene-d10	27-106
Sur3	= Terphenyl-d14	35-109

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG1108421-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	1.3	0.60	1	08/24/11	08/29/11	KWG1108421	
2-Methylnaphthalene	ND	U	1.3	0.46	1	08/24/11	08/29/11	KWG1108421	
Acenaphthylene	ND	U	1.3	0.59	1	08/24/11	08/29/11	KWG1108421	
Acenaphthene	ND	U	1.3	0.76	1	08/24/11	08/29/11	KWG1108421	
Fluorene	ND	U	1.3	0.61	1	08/24/11	08/29/11	KWG1108421	
Dibenzofuran	ND	U	1.3	0.63	1	08/24/11	08/29/11	KWG1108421	
Phenanthrene	ND	U	1.4	1.4	1	08/24/11	08/29/11	KWG1108421	
Anthracene	ND	U	1.3	0.58	1	08/24/11	08/29/11	KWG1108421	
Fluoranthene	ND	U	1.3	0.98	1	08/24/11	08/29/11	KWG1108421	
Pyrene	ND	U	1.3	0.76	1	08/24/11	08/29/11	KWG1108421	
Benzo(b)fluoranthene	ND	U	1.3	0.92	1	08/24/11	08/29/11	KWG1108421	
Benzo(k)fluoranthene	ND	U	1.3	0.87	1	08/24/11	08/29/11	KWG1108421	
Benz(a)anthracene	ND	U	1.3	0.72	1	08/24/11	08/29/11	KWG1108421	
Chrysene	ND	U	1.3	0.80	1	08/24/11	08/29/11	KWG1108421	
Benzo(a)pyrene	ND	U	1.3	0.76	1	08/24/11	08/29/11	KWG1108421	
Indeno(1,2,3-cd)pyrene	ND	U	1.3	0.87	1	08/24/11	08/29/11	KWG1108421	
Dibenz(a,h)anthracene	ND	U	1.3	0.80	1	08/24/11	08/29/11	KWG1108421	
Benzo(g,h,i)perylene	ND	U	1.3	0.85	1	08/24/11	08/29/11	KWG1108421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	17-104	08/29/11	Acceptable
Fluoranthene-d10	75	27-106	08/29/11	Acceptable
Terphenyl-d14	86	35-109	08/29/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Polynuclear Aromatic Hydrocarbons

Sample Name:	TP01-S-2.0-7.5-082211	**Units:**	ug/Kg
Lab Code:	K1107780-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**110**		1.8	0.60	1	08/24/11	08/29/11	KWG1108421	
2-Methylnaphthalene	**45**		1.8	0.46	1	08/24/11	08/29/11	KWG1108421	
Acenaphthylene	**2.0**		1.8	0.59	1	08/24/11	08/29/11	KWG1108421	
Acenaphthene	**200**		1.8	0.76	1	08/24/11	08/29/11	KWG1108421	
Fluorene	**84**		1.8	0.61	1	08/24/11	08/29/11	KWG1108421	
Dibenzofuran	**96**		1.8	0.63	1	08/24/11	08/29/11	KWG1108421	
Phenanthrene	**44**		1.8	1.4	1	08/24/11	08/29/11	KWG1108421	
Anthracene	**4.3**		1.8	0.58	1	08/24/11	08/29/11	KWG1108421	
Fluoranthene	**7.7**		1.8	0.98	1	08/24/11	08/29/11	KWG1108421	
Pyrene	**5.4**		1.8	0.76	1	08/24/11	08/29/11	KWG1108421	
Benzo(b)fluoranthene	**4.7**		1.8	0.92	1	08/24/11	08/29/11	KWG1108421	
Benzo(k)fluoranthene	**1.1**	J	1.8	0.87	1	08/24/11	08/29/11	KWG1108421	
Benz(a)anthracene	**1.9**		1.8	0.72	1	08/24/11	08/29/11	KWG1108421	
Chrysene	**3.1**		1.8	0.80	1	08/24/11	08/29/11	KWG1108421	
Benzo(a)pyrene	**6.1**		1.8	0.76	1	08/24/11	08/29/11	KWG1108421	
Indeno(1,2,3-cd)pyrene	**5.8**		1.8	0.87	1	08/24/11	08/29/11	KWG1108421	
Dibenz(a,h)anthracene	ND	U	1.8	0.80	1	08/24/11	08/29/11	KWG1108421	
Benzo(g,h,i)perylene	**6.1**		1.8	0.85	1	08/24/11	08/29/11	KWG1108421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	17-104	08/29/11	Acceptable
Fluoranthene-d10	77	27-106	08/29/11	Acceptable
Terphenyl-d14	86	35-109	08/29/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Polynuclear Aromatic Hydrocarbons

Sample Name:	TP01-S-7.5-082211	**Units:**	ug/Kg
Lab Code:	K1107780-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**220**		1.9	0.60	1	08/24/11	08/29/11	KWG1108421	
2-Methylnaphthalene	**79**		1.9	0.46	1	08/24/11	08/29/11	KWG1108421	
Acenaphthylene	**5.7**		1.9	0.59	1	08/24/11	08/29/11	KWG1108421	
Acenaphthene	**430**		1.9	0.76	1	08/24/11	08/29/11	KWG1108421	
Fluorene	**130**		1.9	0.61	1	08/24/11	08/29/11	KWG1108421	
Dibenzofuran	**150**		1.9	0.63	1	08/24/11	08/29/11	KWG1108421	
Phenanthrene	**110**		1.9	1.4	1	08/24/11	08/29/11	KWG1108421	
Anthracene	**35**		1.9	0.58	1	08/24/11	08/29/11	KWG1108421	
Fluoranthene	**380**		1.9	0.98	1	08/24/11	08/29/11	KWG1108421	
Pyrene	**260**		1.9	0.76	1	08/24/11	08/29/11	KWG1108421	
Benzo(b)fluoranthene	**170**		1.9	0.92	1	08/24/11	08/29/11	KWG1108421	
Benzo(k)fluoranthene	**46**		1.9	0.87	1	08/24/11	08/29/11	KWG1108421	
Benz(a)anthracene	**80**		1.9	0.72	1	08/24/11	08/29/11	KWG1108421	
Chrysene	**130**		1.9	0.80	1	08/24/11	08/29/11	KWG1108421	
Benzo(a)pyrene	**160**		1.9	0.76	1	08/24/11	08/29/11	KWG1108421	
Indeno(1,2,3-cd)pyrene	**180**		1.9	0.87	1	08/24/11	08/29/11	KWG1108421	
Dibenz(a,h)anthracene	**27**		1.9	0.80	1	08/24/11	08/29/11	KWG1108421	
Benzo(g,h,i)perylene	**170**		1.9	0.85	1	08/24/11	08/29/11	KWG1108421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	70	17-104	08/29/11	Acceptable
Fluoranthene-d10	77	27-106	08/29/11	Acceptable
Terphenyl-d14	77	35-109	08/29/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Polynuclear Aromatic Hydrocarbons

Sample Name:	TP02-S-2.0-6.5-082211	**Units:**	ug/Kg
Lab Code:	K1107780-003	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**35000**	D	610	73	50	08/24/11	08/30/11	KWG1108421	
2-Methylnaphthalene	**48000**	D	610	56	50	08/24/11	08/30/11	KWG1108421	
Acenaphthylene	**1100**	D	61	7.1	5	08/24/11	08/30/11	KWG1108421	
Acenaphthene	**81000**	D	610	92	50	08/24/11	08/30/11	KWG1108421	
Fluorene	**85000**	D	610	74	50	08/24/11	08/30/11	KWG1108421	
Dibenzofuran	**60000**	D	610	76	50	08/24/11	08/30/11	KWG1108421	
Phenanthrene	**240000**	D	610	170	50	08/24/11	08/30/11	KWG1108421	
Anthracene	**45000**	D	610	70	50	08/24/11	08/30/11	KWG1108421	
Fluoranthene	**120000**	D	610	120	50	08/24/11	08/30/11	KWG1108421	
Pyrene	**74000**	D	610	92	50	08/24/11	08/30/11	KWG1108421	
Benzo(b)fluoranthene	**7900**	D	61	12	5	08/24/11	08/30/11	KWG1108421	
Benzo(k)fluoranthene	**2700**	D	61	11	5	08/24/11	08/30/11	KWG1108421	
Benz(a)anthracene	**17000**	D	61	8.7	5	08/24/11	08/30/11	KWG1108421	
Chrysene	**14000**	D	61	9.7	5	08/24/11	08/30/11	KWG1108421	
Benzo(a)pyrene	**4400**	D	61	9.2	5	08/24/11	08/30/11	KWG1108421	
Indeno(1,2,3-cd)pyrene	**1300**	D	61	11	5	08/24/11	08/30/11	KWG1108421	
Dibenz(a,h)anthracene	**310**	D	61	9.7	5	08/24/11	08/30/11	KWG1108421	
Benzo(g,h,i)perylene	**1100**	D	61	11	5	08/24/11	08/30/11	KWG1108421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	17-104	08/30/11	Acceptable
Fluoranthene-d10	79	27-106	08/30/11	Acceptable
Terphenyl-d14	93	35-109	08/30/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Polynuclear Aromatic Hydrocarbons

Sample Name:	TP02-S-6.5-082211	**Units:**	ug/Kg
Lab Code:	K1107780-004	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**46000**	D	680	82	50	08/24/11	08/30/11	KWG1108421	
2-Methylnaphthalene	**38000**	D	680	63	50	08/24/11	08/30/11	KWG1108421	
Acenaphthylene	**1200**	D	68	8.0	5	08/24/11	08/30/11	KWG1108421	
Acenaphthene	**82000**	D	680	110	50	08/24/11	08/30/11	KWG1108421	
Fluorene	**90000**	D	680	83	50	08/24/11	08/30/11	KWG1108421	
Dibenzofuran	**58000**	D	680	86	50	08/24/11	08/30/11	KWG1108421	
Phenanthrene	**240000**	D	680	190	50	08/24/11	08/30/11	KWG1108421	
Anthracene	**77000**	D	680	79	50	08/24/11	08/30/11	KWG1108421	
Fluoranthene	**130000**	D	680	140	50	08/24/11	08/30/11	KWG1108421	
Pyrene	**77000**	D	680	110	50	08/24/11	08/30/11	KWG1108421	
Benzo(b)fluoranthene	**10000**	D	68	13	5	08/24/11	08/30/11	KWG1108421	
Benzo(k)fluoranthene	**3000**	D	68	12	5	08/24/11	08/30/11	KWG1108421	
Benz(a)anthracene	**20000**	D	68	9.8	5	08/24/11	08/30/11	KWG1108421	
Chrysene	**17000**	D	68	11	5	08/24/11	08/30/11	KWG1108421	
Benzo(a)pyrene	**5400**	D	68	11	5	08/24/11	08/30/11	KWG1108421	
Indeno(1,2,3-cd)pyrene	**1800**	D	68	12	5	08/24/11	08/30/11	KWG1108421	
Dibenz(a,h)anthracene	**420**	D	68	11	5	08/24/11	08/30/11	KWG1108421	
Benzo(g,h,i)perylene	**1500**	D	68	12	5	08/24/11	08/30/11	KWG1108421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	17-104	08/30/11	Acceptable
Fluoranthene-d10	85	27-106	08/30/11	Acceptable
Terphenyl-d14	100	35-109	08/30/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Extracted:**	08/24/2011
Sample Matrix:	Soil	**Date Analyzed:**	08/29/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	ug/Kg
Analysis Method:	8270D SIM	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG1108421

	Lab Control Sample KWG1108421-3 Lab Control Spike			Duplicate Lab Control Sample KWG1108421-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	149	250	60	163	250	65	43-99	9	40
2-Methylnaphthalene	152	250	61	163	250	65	44-111	7	40
Acenaphthylene	151	250	61	163	250	65	41-110	7	40
Acenaphthene	148	250	59	161	250	64	44-104	8	40
Fluorene	158	250	63	169	250	68	49-105	7	40
Dibenzofuran	151	250	61	163	250	65	43-113	7	40
Phenanthrene	151	250	60	162	250	65	47-104	7	40
Anthracene	167	250	67	178	250	71	47-112	7	40
Fluoranthene	172	250	69	178	250	71	51-111	4	40
Pyrene	160	250	64	178	250	71	48-113	10	40
Benzo(b)fluoranthene	178	250	71	191	250	77	51-113	7	40
Benzo(k)fluoranthene	173	250	69	186	250	74	56-114	7	40
Benz(a)anthracene	165	250	66	177	250	71	51-111	7	40
Chrysene	169	250	68	181	250	72	54-111	7	40
Benzo(a)pyrene	161	250	64	174	250	69	52-118	7	40
Indeno(1,2,3-cd)pyrene	170	250	68	182	250	73	42-123	7	40
Dibenz(a,h)anthracene	166	250	66	177	250	71	44-119	6	40
Benzo(g,h,i)perylene	162	250	65	173	250	69	46-114	6	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Extracted:**	08/24/2011
Sample Matrix:	Soil	**Date Analyzed:**	08/29/2011

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	TP01-S-2.0-7.5-082211	**Units:**	ug/Kg
Lab Code:	K1107780-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM	**Extraction Lot:**	KWG1108421

Analyte Name	Sample Result	TP01-S-2.0-7.5-082211MS KWG1108421-1 Matrix Spike			TP01-S-2.0-7.5-082211DMS KWG1108421-2 Duplicate Matrix Spike			%Rec Limits	RPD	RPD Limit
		Result	Expected	%Rec	Result	Expected	%Rec			
Naphthalene	110	248	172	82	230	172	72	11-119	7	40
2-Methylnaphthalene	45	168	172	72	174	172	76	17-123	4	40
Acenaphthylene	2.0	116	172	66	78.6	172	45	32-106	38	40
Acenaphthene	200	292	172	56	258	172	36	29-110	12	40
Fluorene	84	201	172	69	141	172	33	29-117	35	40
Dibenzofuran	96	195	172	58	139	172	25 *	31-110	34	40
Phenanthrene	44	136	172	54	104	172	35	19-128	27	40
Anthracene	4.3	125	172	70	87.3	172	48	31-115	35	40
Fluoranthene	7.7	128	172	70	87.4	172	46	22-138	38	40
Pyrene	5.4	126	172	70	87.3	172	48	11-148	37	40
Benzo(b)fluoranthene	4.7	135	172	76	93.7	172	52	15-136	36	40
Benzo(k)fluoranthene	1.1	127	172	73	88.2	172	51	29-126	36	40
Benz(a)anthracene	1.9	125	172	72	85.6	172	49	25-128	37	40
Chrysene	3.1	130	172	74	90.8	172	51	25-132	35	40
Benzo(a)pyrene	6.1	126	172	70	88.1	172	48	24-131	36	40
Indeno(1,2,3-cd)pyrene	5.8	141	172	79	103	172	57	20-136	31	40
Dibenz(a,h)anthracene	ND	124	172	72	82.9	172	48	29-124	40	40
Benzo(g,h,i)perylene	6.1	137	172	76	102	172	56	24-127	29	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Polynuclear Aromatic Hydrocarbons on TCLP Leachate

COLUMBIA ANALYTICAL SERVICES, INC.

Client: URS Corporation
Project: IP Longview Treatability Study/33763156

Service Request: K1107780

Cover Page - Organic Analysis Data Package
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name	Lab Code	Date Collected	Date Received
TP01-S-2.0-7.5-082211	K1107780-001	08/22/2011	08/23/2011
TP02-S-2.0-6.5-082211	K1107780-003	08/22/2011	08/23/2011

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Carl Degen

Date: 9/23/11 Title: Group Supervisor

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780

Surrogate Recovery Summary
Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1		Sur2		Sur3	
TP01-S-2.0-7.5-082211	K1107780-001	105	*	128	*	124	*
TP02-S-2.0-6.5-082211	K1107780-003	82		86		92	
Method Blank	KWG1108709-4	72		79		89	
Method Blank	KWG1108792-4	78		97		95	
Lab Control Sample	KWG1108709-1	83		83		89	
Duplicate Lab Control Sample	KWG1108709-2	81		80		86	
Lab Control Sample	KWG1108792-1	105	*	124	*	114	*
Duplicate Lab Control Sample	KWG1108792-2	88		103		97	

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	28-98
Sur2 = Fluoranthene-d10	31-105
Sur3 = Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780
Date Collected: NA
Date Received: NA
Date Prepared: 08/30/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name: Method Blank
Lab Code: KWG1108709-4

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**63**		0.20	1	09/03/11	09/07/11	KWG1108709	
2-Methylnaphthalene	**9.4**		0.20	1	09/03/11	09/07/11	KWG1108709	
Acenaphthylene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Acenaphthene	**4.5**		0.20	1	09/03/11	09/07/11	KWG1108709	
Dibenzofuran	**3.0**		0.20	1	09/03/11	09/07/11	KWG1108709	
Fluorene	**3.0**		0.20	1	09/03/11	09/07/11	KWG1108709	
Phenanthrene	**3.8**		0.20	1	09/03/11	09/07/11	KWG1108709	
Anthracene	**0.48**		0.20	1	09/03/11	09/07/11	KWG1108709	
Fluoranthene	**0.61**		0.20	1	09/03/11	09/07/11	KWG1108709	
Pyrene	**0.31**		0.20	1	09/03/11	09/07/11	KWG1108709	
Benz(a)anthracene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Chrysene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(b)fluoranthene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(k)fluoranthene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(a)pyrene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	28-98	09/07/11	Acceptable
Fluoranthene-d10	79	31-105	09/07/11	Acceptable
Terphenyl-d14	89	27-112	09/07/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	09/02/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1108792-4	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
2-Methylnaphthalene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenzofuran	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Fluorene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Phenanthrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benz(a)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Chrysene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(b)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(k)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(a)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	78	28-98	09/09/11	Acceptable
Fluoranthene-d10	97	31-105	09/09/11	Acceptable
Terphenyl-d14	95	27-112	09/09/11	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780
Date Collected: 08/22/2011
Date Received: 08/23/2011
Date Prepared: 09/02/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name: TP01-S-2.0-7.5-082211
Lab Code: K1107780-001

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.5**		0.20	1	09/07/11	09/09/11	KWG1108792	
2-Methylnaphthalene	**0.33**		0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthene	**1.6**		0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenzofuran	**0.38**		0.20	1	09/07/11	09/09/11	KWG1108792	
Fluorene	**0.35**		0.20	1	09/07/11	09/09/11	KWG1108792	
Phenanthrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benz(a)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Chrysene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(b)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(k)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(a)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	105	28-98	09/09/11	Outside Control Limits
Fluoranthene-d10	128	31-105	09/09/11	Outside Control Limits
Terphenyl-d14	124	27-112	09/09/11	Outside Control Limits

Comments:

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780
Date Collected: 08/22/2011
Date Received: 08/23/2011
Date Prepared: 08/30/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name: TP02-S-2.0-6.5-082211
Lab Code: K1107780-003

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**13000**	D	100	500	09/03/11	09/09/11	KWG1108709	
2-Methylnaphthalene	**1100**	D	20	100	09/03/11	09/09/11	KWG1108709	
Acenaphthylene	**10**		0.20	1	09/03/11	09/07/11	KWG1108709	
Acenaphthene	**460**	D	20	100	09/03/11	09/09/11	KWG1108709	
Dibenzofuran	**260**	D	20	100	09/03/11	09/09/11	KWG1108709	
Fluorene	**230**	D	20	100	09/03/11	09/09/11	KWG1108709	
Phenanthrene	**210**	D	20	100	09/03/11	09/09/11	KWG1108709	
Anthracene	**18**		0.20	1	09/03/11	09/07/11	KWG1108709	
Fluoranthene	**21**		0.20	1	09/03/11	09/07/11	KWG1108709	
Pyrene	**11**		0.20	1	09/03/11	09/07/11	KWG1108709	
Benz(a)anthracene	**0.36**		0.20	1	09/03/11	09/07/11	KWG1108709	
Chrysene	**0.35**		0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(b)fluoranthene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(k)fluoranthene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(a)pyrene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	82	28-98	09/07/11	Acceptable
Fluoranthene-d10	86	31-105	09/07/11	Acceptable
Terphenyl-d14	92	27-112	09/07/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Prepared:**	08/30/2011
Sample Matrix:	Soil	**Date Extracted:**	09/03/2011
		Date Analyzed:	09/07/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Extraction Method:	EPA 1311/EPA 3520C	**Units:**	ug/L
Analysis Method:	8270D SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1108709

	Lab Control Sample KWG1108709-1 Lab Control Spike			Duplicate Lab Control Sample KWG1108709-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	19.6	25.0	78	19.6	25.0	78	39-110	0	30
2-Methylnaphthalene	18.9	25.0	75	19.1	25.0	76	39-115	1	30
Acenaphthylene	21.2	25.0	85	21.3	25.0	85	44-115	0	30
Acenaphthene	20.2	25.0	81	20.7	25.0	83	44-113	2	30
Dibenzofuran	20.4	25.0	82	20.5	25.0	82	46-116	0	30
Fluorene	22.0	25.0	88	22.0	25.0	88	48-118	0	30
Phenanthrene	21.9	25.0	88	21.1	25.0	84	47-120	4	30
Anthracene	22.7	25.0	91	22.1	25.0	88	44-117	3	30
Fluoranthene	24.2	25.0	97	23.4	25.0	94	48-128	3	30
Pyrene	24.2	25.0	97	23.6	25.0	94	42-133	2	30
Benz(a)anthracene	23.0	25.0	92	22.2	25.0	89	48-125	3	30
Chrysene	23.8	25.0	95	23.1	25.0	92	50-128	3	30
Benzo(b)fluoranthene	24.6	25.0	98	24.1	25.0	97	49-131	2	30
Benzo(k)fluoranthene	24.9	25.0	100	24.3	25.0	97	54-131	3	30
Benzo(a)pyrene	25.3	25.0	101	24.9	25.0	100	43-124	2	30
Indeno(1,2,3-cd)pyrene	24.5	25.0	98	24.0	25.0	96	45-133	2	30
Dibenz(a,h)anthracene	24.2	25.0	97	24.2	25.0	97	49-133	0	30
Benzo(g,h,i)perylene	23.1	25.0	93	23.3	25.0	93	51-124	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780
Date Prepared: 09/02/2011
Date Extracted: 09/07/2011
Date Analyzed: 09/09/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Extraction Method: EPA 1311/EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1108792

	Lab Control Sample KWG1108792-1 Lab Control Spike			Duplicate Lab Control Sample KWG1108792-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	20.3	25.0	81	20.4	25.0	81	39-110	0	30
2-Methylnaphthalene	19.4	25.0	78	19.9	25.0	79	39-115	2	30
Acenaphthylene	21.5	25.0	86	21.1	25.0	85	44-115	2	30
Acenaphthene	21.1	25.0	84	20.5	25.0	82	44-113	3	30
Dibenzofuran	20.2	25.0	81	20.3	25.0	81	46-116	1	30
Fluorene	22.0	25.0	88	21.8	25.0	87	48-118	1	30
Phenanthrene	22.1	25.0	89	21.7	25.0	87	47-120	2	30
Anthracene	23.8	25.0	95	23.3	25.0	93	44-117	2	30
Fluoranthene	27.6	25.0	110	26.5	25.0	106	48-128	4	30
Pyrene	22.8	25.0	91	22.5	25.0	90	42-133	2	30
Benz(a)anthracene	23.8	25.0	95	23.3	25.0	93	48-125	2	30
Chrysene	24.0	25.0	96	23.3	25.0	93	50-128	3	30
Benzo(b)fluoranthene	25.6	25.0	102	25.0	25.0	100	49-131	2	30
Benzo(k)fluoranthene	25.6	25.0	102	24.8	25.0	99	54-131	3	30
Benzo(a)pyrene	26.2	25.0	105	25.7	25.0	103	43-124	2	30
Indeno(1,2,3-cd)pyrene	27.0	25.0	108	26.3	25.0	105	45-133	3	30
Dibenz(a,h)anthracene	27.5	25.0	110	26.8	25.0	107	49-133	2	30
Benzo(g,h,i)perylene	25.5	25.0	102	25.0	25.0	100	51-124	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Service Request: K1107780

Cover Page - Organic Analysis Data Package
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name	Lab Code	Date Collected	Date Received
TP01-S-2.0-7.5-082211	K1107780-001	08/22/2011	08/23/2011
TP02-S-2.0-6.5-082211	K1107780-003	08/22/2011	08/23/2011

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Carl Dagen

Date: 9/23/11 Title: Supervisor

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1		Sur2		Sur3	
TP01-S-2.0-7.5-082211	K1107780-001	102	*	128	*	120	*
TP02-S-2.0-6.5-082211	K1107780-003	74		77		86	
Method Blank	KWG1108709-3	76		81		91	
Method Blank	KWG1108792-3	65		81		76	
Lab Control Sample	KWG1108709-1	83		83		89	
Duplicate Lab Control Sample	KWG1108709-2	81		80		86	
Lab Control Sample	KWG1108792-1	105	*	124	*	114	*
Duplicate Lab Control Sample	KWG1108792-2	88		103		97	

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	28-98
Sur2 = Fluoranthene-d10	31-105
Sur3 = Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780
Date Collected: NA
Date Received: NA
Date Prepared: 08/30/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: Method Blank
Lab Code: KWG1108709-3

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**6.1**		0.20	1	09/03/11	09/07/11	KWG1108709	
2-Methylnaphthalene	**1.1**		0.20	1	09/03/11	09/07/11	KWG1108709	
Acenaphthylene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Acenaphthene	**0.77**		0.20	1	09/03/11	09/07/11	KWG1108709	
Dibenzofuran	**0.64**		0.20	1	09/03/11	09/07/11	KWG1108709	
Fluorene	**0.74**		0.20	1	09/03/11	09/07/11	KWG1108709	
Phenanthrene	**1.3**		0.20	1	09/03/11	09/07/11	KWG1108709	
Anthracene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Fluoranthene	**0.21**		0.20	1	09/03/11	09/07/11	KWG1108709	
Pyrene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benz(a)anthracene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Chrysene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(b)fluoranthene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(k)fluoranthene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(a)pyrene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-98	09/07/11	Acceptable
Fluoranthene-d10	81	31-105	09/07/11	Acceptable
Terphenyl-d14	91	27-112	09/07/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	09/02/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1108792-3	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
2-Methylnaphthalene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthene	**0.21**		0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenzofuran	**0.68**		0.20	1	09/07/11	09/09/11	KWG1108792	
Fluorene	**0.76**		0.20	1	09/07/11	09/09/11	KWG1108792	
Phenanthrene	**4.0**		0.20	1	09/07/11	09/09/11	KWG1108792	
Anthracene	**0.46**		0.20	1	09/07/11	09/09/11	KWG1108792	
Fluoranthene	**2.4**		0.20	1	09/07/11	09/09/11	KWG1108792	
Pyrene	**1.3**		0.20	1	09/07/11	09/09/11	KWG1108792	
Benz(a)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Chrysene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(b)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(k)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(a)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	65	28-98	09/09/11	Acceptable
Fluoranthene-d10	81	31-105	09/09/11	Acceptable
Terphenyl-d14	76	27-112	09/09/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011
		Date Prepared:	09/02/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	TP01-S-2.0-7.5-082211	**Units:**	ug/L
Lab Code:	K1107780-001	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.2**		0.20	1	09/07/11	09/09/11	KWG1108792	
2-Methylnaphthalene	**0.23**		0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Acenaphthene	**1.3**	B	0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenzofuran	**0.29**	B	0.20	1	09/07/11	09/09/11	KWG1108792	
Fluorene	**0.28**	B	0.20	1	09/07/11	09/09/11	KWG1108792	
Phenanthrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benz(a)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Chrysene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(b)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(k)fluoranthene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(a)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/07/11	09/09/11	KWG1108792	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	102	28-98	09/09/11	Outside Control Limits
Fluoranthene-d10	128	31-105	09/09/11	Outside Control Limits
Terphenyl-d14	120	27-112	09/09/11	Outside Control Limits

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011
		Date Prepared:	08/30/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	TP02-S-2.0-6.5-082211	**Units:**	ug/L
Lab Code:	K1107780-003	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**12000**	D	100	500	09/03/11	09/09/11	KWG1108709	
2-Methylnaphthalene	**1000**	D	20	100	09/03/11	09/09/11	KWG1108709	
Acenaphthylene	**10**		0.20	1	09/03/11	09/07/11	KWG1108709	
Acenaphthene	**420**	D	20	100	09/03/11	09/09/11	KWG1108709	
Dibenzofuran	**240**	D	20	100	09/03/11	09/09/11	KWG1108709	
Fluorene	**210**	D	20	100	09/03/11	09/09/11	KWG1108709	
Phenanthrene	**210**	D	20	100	09/03/11	09/09/11	KWG1108709	
Anthracene	**31**		0.20	1	09/03/11	09/07/11	KWG1108709	
Fluoranthene	**40**		0.20	1	09/03/11	09/07/11	KWG1108709	
Pyrene	**23**		0.20	1	09/03/11	09/07/11	KWG1108709	
Benz(a)anthracene	**3.8**		0.20	1	09/03/11	09/07/11	KWG1108709	
Chrysene	**3.4**		0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(b)fluoranthene	**1.7**		0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(k)fluoranthene	**0.67**		0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(a)pyrene	**1.0**		0.20	1	09/03/11	09/07/11	KWG1108709	
Indeno(1,2,3-cd)pyrene	**0.36**		0.20	1	09/03/11	09/07/11	KWG1108709	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/03/11	09/07/11	KWG1108709	
Benzo(g,h,i)perylene	**0.39**		0.20	1	09/03/11	09/07/11	KWG1108709	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	28-98	09/07/11	Acceptable
Fluoranthene-d10	77	31-105	09/07/11	Acceptable
Terphenyl-d14	86	27-112	09/07/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Prepared:**	08/30/2011
Sample Matrix:	Soil	**Date Extracted:**	09/03/2011
		Date Analyzed:	09/07/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Extraction Method:	EPA 1312/EPA 3520C	**Units:**	ug/L
Analysis Method:	8270D SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1108709

	Lab Control Sample KWG1108709-1 Lab Control Spike			Duplicate Lab Control Sample KWG1108709-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	19.6	25.0	78	19.6	25.0	78	39-110	0	30
2-Methylnaphthalene	18.9	25.0	75	19.1	25.0	76	39-115	1	30
Acenaphthylene	21.2	25.0	85	21.3	25.0	85	44-115	0	30
Acenaphthene	20.2	25.0	81	20.7	25.0	83	44-113	2	30
Dibenzofuran	20.4	25.0	82	20.5	25.0	82	46-116	0	30
Fluorene	22.0	25.0	88	22.0	25.0	88	48-118	0	30
Phenanthrene	21.9	25.0	88	21.1	25.0	84	47-120	4	30
Anthracene	22.7	25.0	91	22.1	25.0	88	44-117	3	30
Fluoranthene	24.2	25.0	97	23.4	25.0	94	48-128	3	30
Pyrene	24.2	25.0	97	23.6	25.0	94	42-133	2	30
Benz(a)anthracene	23.0	25.0	92	22.2	25.0	89	48-125	3	30
Chrysene	23.8	25.0	95	23.1	25.0	92	50-128	3	30
Benzo(b)fluoranthene	24.6	25.0	98	24.1	25.0	97	49-131	2	30
Benzo(k)fluoranthene	24.9	25.0	100	24.3	25.0	97	54-131	3	30
Benzo(a)pyrene	25.3	25.0	101	24.9	25.0	100	43-124	2	30
Indeno(1,2,3-cd)pyrene	24.5	25.0	98	24.0	25.0	96	45-133	2	30
Dibenz(a,h)anthracene	24.2	25.0	97	24.2	25.0	97	49-133	0	30
Benzo(g,h,i)perylene	23.1	25.0	93	23.3	25.0	93	51-124	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Prepared:**	09/02/2011
Sample Matrix:	Soil	**Date Extracted:**	09/07/2011
		Date Analyzed:	09/09/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Extraction Method:	EPA 1312/EPA 3520C	**Units:**	ug/L
Analysis Method:	8270D SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1108792

	Lab Control Sample KWG1108792-1 Lab Control Spike			Duplicate Lab Control Sample KWG1108792-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	20.3	25.0	81	20.4	25.0	81	39-110	0	30
2-Methylnaphthalene	19.4	25.0	78	19.9	25.0	79	39-115	2	30
Acenaphthylene	21.5	25.0	86	21.1	25.0	85	44-115	2	30
Acenaphthene	21.1	25.0	84	20.5	25.0	82	44-113	3	30
Dibenzofuran	20.2	25.0	81	20.3	25.0	81	46-116	1	30
Fluorene	22.0	25.0	88	21.8	25.0	87	48-118	1	30
Phenanthrene	22.1	25.0	89	21.7	25.0	87	47-120	2	30
Anthracene	23.8	25.0	95	23.3	25.0	93	44-117	2	30
Fluoranthene	27.6	25.0	110	26.5	25.0	106	48-128	4	30
Pyrene	22.8	25.0	91	22.5	25.0	90	42-133	2	30
Benz(a)anthracene	23.8	25.0	95	23.3	25.0	93	48-125	2	30
Chrysene	24.0	25.0	96	23.3	25.0	93	50-128	3	30
Benzo(b)fluoranthene	25.6	25.0	102	25.0	25.0	100	49-131	2	30
Benzo(k)fluoranthene	25.6	25.0	102	24.8	25.0	99	54-131	3	30
Benzo(a)pyrene	26.2	25.0	105	25.7	25.0	103	43-124	2	30
Indeno(1,2,3-cd)pyrene	27.0	25.0	108	26.3	25.0	105	45-133	3	30
Dibenz(a,h)anthracene	27.5	25.0	110	26.8	25.0	107	49-133	2	30
Benzo(g,h,i)perylene	25.5	25.0	102	25.0	25.0	100	51-124	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Diesel and Residual Range Organics

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Service Request: K1107780

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
TP01-S-2.0-7.5-082211	K1107780-001	08/22/2011	08/23/2011
TP02-S-2.0-6.5-082211	K1107780-003	08/22/2011	08/23/2011
TP01-S-2.0-7.5-082211	KWG1108812-1	08/22/2011	08/23/2011

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Signature: Lorna E. Portwood
Name: Lorna Portwood
Date: 9/13/11
Title: Scientist

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
TP01-S-2.0-7.5-082211	K1107780-001	119	123
TP02-S-2.0-6.5-082211	K1107780-003	139	110
TP01-S-2.0-7.5-082211DUP	KWG1108812-1	99	103
Method Blank	KWG1108812-3	100	103
Method Blank	KWG1108812-4	91	95
Lab Control Sample	KWG1108812-2	116	117

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	08/30/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1108812-3	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/01/11	09/10/11	KWG1108812	
Residual Range Organics (RRO)	ND	U	500	500	1	09/01/11	09/10/11	KWG1108812	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	100	50-150	09/10/11	Acceptable
n-Triacontane	103	50-150	09/10/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	08/30/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1108812-4	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/01/11	09/10/11	KWG1108812	
Residual Range Organics (RRO)	ND	U	500	500	1	09/01/11	09/10/11	KWG1108812	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	91	50-150	09/10/11	Acceptable
n-Triacontane	95	50-150	09/10/11	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780
Date Collected: 08/22/2011
Date Received: 08/23/2011
Date Prepared: 08/30/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: TP01-S-2.0-7.5-082211
Lab Code: K1107780-001

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/01/11	09/10/11	KWG1108812	
Residual Range Organics (RRO)	ND	U	500	500	1	09/01/11	09/10/11	KWG1108812	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	119	50-150	09/10/11	Acceptable
n-Triacontane	123	50-150	09/10/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011
		Date Prepared:	08/30/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	TP02-S-2.0-6.5-082211	**Units:**	ug/L
Lab Code:	K1107780-003	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**27000**	Z	250	250	1	09/01/11	09/10/11	KWG1108812	
Residual Range Organics (RRO)	**510**	Z	500	500	1	09/01/11	09/10/11	KWG1108812	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	139	50-150	09/10/11	Acceptable
n-Triacontane	110	50-150	09/10/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Extracted:**	09/01/2011
Sample Matrix:	Soil	**Date Analyzed:**	09/10/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TP01-S-2.0-7.5-082211	**Units:**	ug/L
Lab Code:	K1107780-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1108812

Analyte Name	MRL	MDL	Sample Result	TP01-S-2.0-7.5-082211DUP KWG1108812-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	250	250	ND	ND	ND	-	30
Residual Range Organics (RRO)	500	500	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Prepared:**	08/30/2011
Sample Matrix:	Soil	**Date Extracted:**	09/01/2011
		Date Analyzed:	09/10/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 1312/EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1108812

	Lab Control Sample KWG1108812-2 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	3960	3200	124	46-140
Residual Range Organics (RRO)	1680	1600	105	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Diesel and Residual Range Organics

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Service Request: K1107780

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
TP01-S-2.0-7.5-082211	K1107780-001	08/22/2011	08/23/2011
TP02-S-2.0-6.5-082211	K1107780-003	08/22/2011	08/23/2011
TP01-S-2.0-7.5-082211	KWG1108746-1	08/22/2011	08/23/2011

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Signature: Lorn E Pethtel
Name: Lorn Pethtel
Date: 9/13/11
Title: Scientist

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780

Surrogate Recovery Summary
Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Preparation Method: EPA 1311
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
TP01-S-2.0-7.5-082211	K1107780-001	116	121
TP02-S-2.0-6.5-082211	K1107780-003	141	112
TP01-S-2.0-7.5-082211DUP	KWG1108746-1	122	124
Method Blank	KWG1108746-3	100	108
Method Blank	KWG1108746-4	94	97
Lab Control Sample	KWG1108746-2	104	100

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780
Date Collected: NA
Date Received: NA
Date Prepared: 08/30/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1108746-3

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**260**	Z	250	250	1	09/01/11	09/09/11	KWG1108746	
Residual Range Organics (RRO)	ND	U	500	500	1	09/01/11	09/09/11	KWG1108746	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	100	50-150	09/09/11	Acceptable
n-Triacontane	108	50-150	09/09/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	08/30/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1108746-4	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/01/11	09/09/11	KWG1108746	
Residual Range Organics (RRO)	ND	U	500	500	1	09/01/11	09/09/11	KWG1108746	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	94	50-150	09/09/11	Acceptable
n-Triacontane	97	50-150	09/09/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011
		Date Prepared:	08/30/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name:	TP01-S-2.0-7.5-082211	**Units:**	ug/L
Lab Code:	K1107780-001	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	270	270	1	09/01/11	09/09/11	KWG1108746	
Residual Range Organics (RRO)	ND	U	530	530	1	09/01/11	09/09/11	KWG1108746	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	116	50-150	09/09/11	Acceptable
n-Triacontane	121	50-150	09/09/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011
		Date Prepared:	08/30/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name:	TP02-S-2.0-6.5-082211	**Units:**	ug/L
Lab Code:	K1107780-003	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**25000**	Z	250	250	1	09/01/11	09/09/11	KWG1108746	
Residual Range Organics (RRO)	ND	U	500	500	1	09/01/11	09/09/11	KWG1108746	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	141	50-150	09/09/11	Acceptable
n-Triacontane	112	50-150	09/09/11	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Extracted:**	09/01/2011
Sample Matrix:	Soil	**Date Analyzed:**	09/09/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TP01-S-2.0-7.5-082211	**Units:**	ug/L
Lab Code:	K1107780-001	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1108746

Analyte Name	MRL	MDL	Sample Result	TP01-S-2.0-7.5-082211DUP KWG1108746-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	270	270	ND	ND	ND	-	30
Residual Range Organics (RRO)	530	530	ND	ND	ND	-	30

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Prepared:**	08/30/2011
Sample Matrix:	Soil	**Date Extracted:**	09/01/2011
		Date Analyzed:	09/09/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	EPA 1311/EPA 3510C	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1108746

	Lab Control Sample KWG1108746-2 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	3280	3200	103	46-140
Residual Range Organics (RRO)	1390	1600	87	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Diesel and Residual Range Organics

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Service Request: K1107780

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
TP01-S-2.0-7.5-082211	K1107780-001	08/22/2011	08/23/2011
TP01-S-7.5-082211	K1107780-002	08/22/2011	08/23/2011
TP02-S-2.0-6.5-082211	K1107780-003	08/22/2011	08/23/2011
TP02-S-6.5-082211	K1107780-004	08/22/2011	08/23/2011
TP01-S-7.5-082211	KWG1108323-1	08/22/2011	08/23/2011

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Signature: Lorn E Pathwood Name: Lorn Pathwood

Date: 9/13/11 Title: Scientist

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
TP01-S-2.0-7.5-082211	K1107780-001	111	122
TP01-S-7.5-082211	K1107780-002	95	95
TP02-S-2.0-6.5-082211	K1107780-003	172 D *	124 D
TP02-S-6.5-082211	K1107780-004	185 D *	148 D
TP01-S-7.5-082211DUP	KWG1108323-1	93	95
Method Blank	KWG1108323-4	91	95
Lab Control Sample	KWG1108323-3	100	97

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG1108323-4	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**3.4**	J	25	1.2	1	08/24/11	08/30/11	KWG1108323	
Residual Range Organics (RRO)	**10**	J	99	2.9	1	08/24/11	08/30/11	KWG1108323	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	91	50-150	08/30/11	Acceptable
n-Triacontane	95	50-150	08/30/11	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Diesel and Residual Range Organics

Sample Name:	TP01-S-2.0-7.5-082211	**Units:**	mg/Kg
Lab Code:	K1107780-001	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**45**	Z	35	1.7	1	08/24/11	09/10/11	KWG1108323	
Residual Range Organics (RRO)	**390**	Z	140	4.0	1	08/24/11	09/10/11	KWG1108323	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	111	50-150	09/10/11	Acceptable
n-Triacontane	122	50-150	09/10/11	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Diesel and Residual Range Organics

Sample Name:	TP01-S-7.5-082211	**Units:**	mg/Kg
Lab Code:	K1107780-002	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**56**	Z	37	1.8	1	08/24/11	08/30/11	KWG1108323	
Residual Range Organics (RRO)	**160**	Z	150	4.3	1	08/24/11	08/30/11	KWG1108323	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	95	50-150	08/30/11	Acceptable
n-Triacontane	95	50-150	08/30/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Diesel and Residual Range Organics

Sample Name:	TP02-S-2.0-6.5-082211	**Units:**	mg/Kg
Lab Code:	K1107780-003	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**9000**	DZ	610	30	20	08/24/11	09/10/11	KWG1108323	
Residual Range Organics (RRO)	**1800**	JDZ	2500	71	20	08/24/11	09/10/11	KWG1108323	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	172	50-150	09/10/11	Outside Control Limits
n-Triacontane	124	50-150	09/10/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011

Diesel and Residual Range Organics

Sample Name:	TP02-S-6.5-082211	**Units:**	mg/Kg
Lab Code:	K1107780-004	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**9300**	DZ	680	33	20	08/24/11	09/10/11	KWG1108323	
Residual Range Organics (RRO)	**2000**	JDZ	2800	79	20	08/24/11	09/10/11	KWG1108323	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	185	50-150	09/10/11	Outside Control Limits
n-Triacontane	148	50-150	09/10/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Extracted:**	08/24/2011
Sample Matrix:	Soil	**Date Analyzed:**	08/30/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TP01-S-7.5-082211	**Units:**	mg/Kg
Lab Code:	K1107780-002	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1108323

Analyte Name	MRL	MDL	Sample Result	TP01-S-7.5-082211DUP KWG1108323-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	37	1.8	56	52	54	7 #	40
Residual Range Organics (RRO)	150	4.3	160	290	230	55 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent reeoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Extracted:**	08/24/2011
Sample Matrix:	Soil	**Date Analyzed:**	08/30/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	Method	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG1108323

	Lab Control Sample KWG1108323-3 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	285	267	107	56-124
Residual Range Organics (RRO)	121	133	90	60-135

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Metals

TCLP Extraction Worksheet

Service Request Number(s): K1107780 Lachat 9/6/11

If Autofluff sample is used please place an X in this box ☐ Prep Run: _____

Method: TCLP 1311 ☑ SPLP 1312 ☐ Wet Ext. ☐ MEP ☐

Sample Number	Sample Description (**S**olid, **L**iquid, **M**ultiphasic)	Partical Size < 1cm ?	Solution Determination Weight (g)	Initial pH	Aliquot of 1N HCl (mL)	Final pH	Solution To Be Used	Extraction Weight (g)	Extraction Solution Volume (mL)	Post-Extraction pH
Blank TCLP 1									9-2-11 ~~2000~~ 1000	
K1107780-001							1	50	1000	4.99

pH Meter Calibrated at pH4 & pH7 Today? (Yes) / No Balance I.D. 28 Date Balanced Checked: 9-2-11 Check Box if Auto Fluff sample used

Extraction Solution Prep date: 8-15-11 Tumbler # 4

Extraction Solution pH: 4.91 See previous solution determination

Extraction Started Time: 3:00 pm Date: 9-2-11

Extraction Finished Time: 10:05 AM Date: 9/3/11

Tumbler Rotational Speed (28 - 32 rpm): 28.8

Room Temperature at the Beginning of Extraction (Temp. Range 21° C - 25°C): 23.8

Analyst: _____ Date: 9-2-11 Reviewer: _____ Date: 9/6/11

r:\icp\misc\digforms\TCLP1

TCLP Extraction Worksheet

Service Request Number(s): K1107780 K2 extract 9/6/11

If Autofluff sample is used please place an X in this box ☐ Prep Run: _____

Method: TCLP 1311 ☐ SPLP 1312 ☑ Wet Ext. ☐ MEP ☐

Sample Number	Sample Description (**S**olid, **L**iquid, **M**ultiphasic)	Partical Size < 1cm ?	Solution Determination Weight (g)	Initial pH	Aliquot of 1N HCl (mL)	Final pH	Solution To Be Used	Extraction Weight (g)	Extraction Solution Volume (mL)	Post-Extraction pH
SPLP WEST Blank								8000 1000		
K1107780-001								50.00	1000	7.33

pH Meter Calibrated at pH4 & pH7 Today? (Yes) / No Balance I.D. 28 Date Balanced Checked: 9-2-11 Check Box if Auto Fluff sample used

Extraction Solution Prep date: 8-30-11 Tumbler # 4

Extraction Solution pH: 5.02

Extraction Started Time: 3:00 pm Date: 9-2-11

Extraction Finished Time: 10:05 Am. Date: 9/3/11

Tumbler Rotational Speed (28 - 32 rpm): 28.8

Room Temperature at the Beginning of Extraction (Temp. Range 21° C - 25°C): 23.8

Analyst: _____ Date: 9-2-11 Reviewer: _____ Date: 9/6/11

r:\icp\misc\digforms\TCLP1

Total Solids

Client: URS Corporation
Project: IP Longview Treatability Study/33763156
Sample Matrix: Soil

Service Request: K1107780

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
TP01-S-2.0-7.5-082211	K1107780-001	08/22/2011	08/23/2011	08/23/2011	72.7	
TP01-S-7.5-082211	K1107780-002	08/22/2011	08/23/2011	08/23/2011	67.7	
TP02-S-2.0-6.5-082211	K1107780-003	08/22/2011	08/23/2011	08/23/2011	82.1	
TP02-S-6.5-082211	K1107780-004	08/22/2011	08/23/2011	08/23/2011	73.4	

Client:	URS Corporation	**Service Request:**	K1107780
Project:	IP Longview Treatability Study/33763156	**Date Collected:**	08/22/2011
Sample Matrix:	Soil	**Date Received:**	08/23/2011
		Date Analyzed:	08/23/2011

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
TP01-S-2.0-7.5-082211	K1107780-001	72.7	71.8	72.3	1	

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

September 27, 2011 Analytical Report for Service Request No: K1108452

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: Longview Treatability Study

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on September 09, 2011. For your reference, these analyses have been assigned our service request number K1108452.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/afs

cc: Tressa Pearson-Franks (URS Corporation), Seattle, WA

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1108452
Project:	IP Longview	**Date Received:**	9/9/11
Sample Matrix:	Soils		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Two soil samples were received for analysis at Columbia Analytical Services on 9/9/11. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

As received
Surrogate Exceptions:
The control criteria for o-Terphenyl in sample TP-02 were not applicable. The chromatogram indicated the presence of target background components that masked the surrogate, which prevented adequate resolution for quantitation. No corrective action was appropriate.

Elevated Detection Limits:
Sample TP-02 required dilution due to the presence of elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of DRO and RRO in sample Batch QC was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

After TCLP Leaching
Holding Time Exceptions:
The TCLP extraction of sample TP-01 was initially performed within the recommended holding time. The chromatographic fingerprint of the TCLP extract was inconsistent with that of the SPLP extract and the original soil analysis. The TCLP extraction was repeated 5 days past the recommended holding time. The chromatographic fingerprint of the TCLP re-extract was consistent with that of the SPLP extract and the original soil analysis. The results from the TCLP re-extract were reported. The data was flagged to indicate the holding time violation. No further corrective action was feasible.

After SPLP Leaching
No anomalies with the analysis of these samples were observed.

Approved by EMW **Date** 9/30/11

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

As received
Surrogate Exceptions:
The control criteria were exceeded for Terphenyl-d14 in sample TP-02 due to matrix interference. The presence of non-target background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). An MS and Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) were analyzed and reported in lieu of the MS/MSD for these samples.

After TCLP Leaching
Method Blank Exceptions:
The Method Blank KWG1109056-3 contained significant levels of numerous analytes above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated. The samples were not re-extracted and re-analyzed because TCLP leach fluid is not controlled for the analytes in question at the levels detected by PAH_SIM analysis. A deionized water blank was extracted at the same time was ND for the analytes in question. No further corrective action was required.

Internal Standard Exceptions:
The internal standard recovery of Naphthalene-d8 in sample TP02 was outside control criteria because of extremely high levels of target compounds. The sample was reanalyzed at a dilution. The internal standard in question was within control criteria in the diluted analysis. All affected analytes were reported from the diluted analysis due to their very high concentration.

Sample Notes and Discussion:
A Matrix Spike/Matrix Spike Duplicate (MS/MSD) was not extracted with this sample batch. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

The equipment and procedures used for the TCLP leachate preparation have not been evaluated for PAHs detected by the SIM_PAH analysis.

After SPLP Leaching
Method Blank Exceptions:
The Leachate Fluid Method Blank extracted with the samples in this batch was lost due to a laboratory accident. The deionized water blank which was extracted concurrently was reported. A separate leachate blank of the same fluid originally used was extracted and reported separately (KWG1109277-3). The re-extracted blank of leachate fluid showed elevated levels of Naphthalene and 2-Methylnaphthalene above the Method Reporting Level (MRL).

Internal Standard Exceptions:
The internal standard recovery of Naphthalene-d8 in sample TP02 was outside control criteria because of extremely high levels of target compounds. The sample was reanalyzed at a dilution. The internal standard in question was within control criteria in the diluted analysis. All affected analytes were reported from the diluted analysis due to their very high concentration.

Sample Notes and Discussion:
A Matrix Spike/Matrix Spike Duplicate (MS/MSD) was not extracted with this sample batch. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

The equipment and procedures used for the SPLP leachate preparation have not been evaluated for PAHs detected by the SIM_PAH analysis.

Approved by EWW **Date** 9/30/11

K1108492

Columbia Analytical Services™
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS
1501 Fourth Ave, Suite 1400
Seattle Washington 98101

Project Manager: Paul Kalina

Project: Longview Treatability Study

Telephone No.: 206-438-2700

Fax No.:

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Pls copy Results to: Paul.Kalina@urscorp… tjordan@Kemron.com

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	Total PAH 8270SIM	Total TPH-DRO NWTPH-Dx	TCLP PAH 1311/8270SIM	TCLP TPH DRO 1311 NWTPH-Dx	Turn Around Time (working days): RUSH 7-day	Remarks
TP-01		2	X					X	9/6/11	1540	X	X	X	X		
TP-02		2	X					X	9/6/11	1615	X	X	X	X		TP-02 is HOT!

Sample Received Intact: Yes No

Temperature received: Ice No ice

	Date	Time		Date	Time
Relinq. by sampler (Sign & Print Name): [signature] Tommy Jordan	9/8/11	9:51	Received by (Sign & Print Name)		
Relinquished by			Received by		
Relinquished by			Received by		
Relinquished by			Received by laboratory: [signature] CAS	9/9/11	0915

Lab Work No.

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed

Client / Project: Kennecott Service Request K11 8452

Received: 9/9/11 Opened: 9/9/11 By: AJ Unloaded: 9/9/11 By: AJ

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where?_____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.4	0.8	294			X

7. Packing material used. *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Sleeves* *Other*_____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA (Y) N
15. Was C12/Res negative? NA (Y) N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Notes, Discrepancies, & Resolutions:*_____

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TP-01	K1108452-001	85	92	95
TP-02	K1108452-002	88	96	100
Method Blank	KWG1109149-4	89	96	102
Method Blank	KWG1109277-3	83	91	95
Lab Control Sample	KWG1109149-1	86	91	95
Duplicate Lab Control Sample	KWG1109149-2	89	96	97
Lab Control Sample	KWG1109277-1	85	94	96
Duplicate Lab Control Sample	KWG1109277-2	85	92	92

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	28-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Collected: NA
Date Received: NA
Date Prepared: 09/14/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: Method Blank
Lab Code: KWG1109149-4

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
2-Methylnaphthalene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Acenaphthylene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Acenaphthene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Dibenzofuran	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Fluorene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Phenanthrene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Anthracene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Fluoranthene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Pyrene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benz(a)anthracene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Chrysene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(b)fluoranthene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(k)fluoranthene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(a)pyrene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	89	28-98	09/22/11	Acceptable
Fluoranthene-d10	96	31-105	09/22/11	Acceptable
Terphenyl-d14	102	27-112	09/22/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Prepared:	09/14/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1109277-3	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**8.5**		0.20	1	09/19/11	09/23/11	KWG1109277	
2-Methylnaphthalene	**0.64**		0.20	1	09/19/11	09/23/11	KWG1109277	
Acenaphthylene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Acenaphthene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Dibenzofuran	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Fluorene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Phenanthrene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Anthracene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Fluoranthene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Pyrene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Benz(a)anthracene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Chrysene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Benzo(b)fluoranthene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Benzo(k)fluoranthene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Benzo(a)pyrene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/19/11	09/23/11	KWG1109277	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	83	28-98	09/23/11	Acceptable
Fluoranthene-d10	91	31-105	09/23/11	Acceptable
Terphenyl-d14	95	27-112	09/23/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/01/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011
		Date Prepared:	09/14/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	TP-01	**Units:**	ug/L
Lab Code:	K1108452-001	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.49**		0.20	1	09/15/11	09/22/11	KWG1109149	
2-Methylnaphthalene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Acenaphthylene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Acenaphthene	**1.3**		0.20	1	09/15/11	09/22/11	KWG1109149	
Dibenzofuran	**0.50**		0.20	1	09/15/11	09/22/11	KWG1109149	
Fluorene	**0.39**		0.20	1	09/15/11	09/22/11	KWG1109149	
Phenanthrene	**0.21**		0.20	1	09/15/11	09/22/11	KWG1109149	
Anthracene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Fluoranthene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Pyrene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benz(a)anthracene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Chrysene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(b)fluoranthene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(k)fluoranthene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(a)pyrene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	85	28-98	09/22/11	Acceptable
Fluoranthene-d10	92	31-105	09/22/11	Acceptable
Terphenyl-d14	95	27-112	09/22/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/06/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011
		Date Prepared:	09/14/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	TP-02	**Units:**	ug/L
Lab Code:	K1108452-002	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**12000**	D	40	200	09/15/11	09/22/11	KWG1109149	
2-Methylnaphthalene	**1200**	D	40	200	09/15/11	09/22/11	KWG1109149	
Acenaphthylene	**12**		0.20	1	09/15/11	09/22/11	KWG1109149	
Acenaphthene	**540**	D	2.0	10	09/15/11	09/22/11	KWG1109149	
Dibenzofuran	**320**	D	2.0	10	09/15/11	09/22/11	KWG1109149	
Fluorene	**300**	D	2.0	10	09/15/11	09/22/11	KWG1109149	
Phenanthrene	**360**	D	2.0	10	09/15/11	09/22/11	KWG1109149	
Anthracene	**51**		0.20	1	09/15/11	09/22/11	KWG1109149	
Fluoranthene	**73**		0.20	1	09/15/11	09/22/11	KWG1109149	
Pyrene	**42**		0.20	1	09/15/11	09/22/11	KWG1109149	
Benz(a)anthracene	**7.9**		0.20	1	09/15/11	09/22/11	KWG1109149	
Chrysene	**7.1**		0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(b)fluoranthene	**3.3**		0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(k)fluoranthene	**1.0**		0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(a)pyrene	**1.8**		0.20	1	09/15/11	09/22/11	KWG1109149	
Indeno(1,2,3-cd)pyrene	**0.38**		0.20	1	09/15/11	09/22/11	KWG1109149	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/15/11	09/22/11	KWG1109149	
Benzo(g,h,i)perylene	**0.36**		0.20	1	09/15/11	09/22/11	KWG1109149	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	88	28-98	09/22/11	Acceptable
Fluoranthene-d10	96	31-105	09/22/11	Acceptable
Terphenyl-d14	100	27-112	09/22/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Prepared:**	09/14/2011
Sample Matrix:	Soil	**Date Extracted:**	09/15/2011
		Date Analyzed:	09/22/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Extraction Method:	EPA 1312/EPA 3520C	**Units:**	ug/L
Analysis Method:	8270D SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1109149

	Lab Control Sample KWG1109149-1 Lab Control Spike			Duplicate Lab Control Sample KWG1109149-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	21.7	25.0	87	19.9	25.0	80	39-110	8	30
2-Methylnaphthalene	21.2	25.0	85	19.4	25.0	78	39-115	9	30
Acenaphthylene	23.0	25.0	92	21.2	25.0	85	44-115	8	30
Acenaphthene	22.5	25.0	90	20.9	25.0	84	44-113	7	30
Dibenzofuran	22.1	25.0	89	20.6	25.0	83	46-116	7	30
Fluorene	23.9	25.0	96	22.0	25.0	88	48-118	8	30
Phenanthrene	22.5	25.0	90	21.7	25.0	87	47-120	4	30
Anthracene	23.3	25.0	93	22.4	25.0	90	44-117	4	30
Fluoranthene	25.8	25.0	103	24.4	25.0	98	48-128	5	30
Pyrene	25.0	25.0	100	23.2	25.0	93	42-133	7	30
Benz(a)anthracene	24.7	25.0	99	22.9	25.0	92	48-125	7	30
Chrysene	24.6	25.0	98	23.3	25.0	93	50-128	5	30
Benzo(b)fluoranthene	25.9	25.0	103	24.3	25.0	97	49-131	6	30
Benzo(k)fluoranthene	25.7	25.0	103	24.5	25.0	98	54-131	5	30
Benzo(a)pyrene	26.6	25.0	106	25.2	25.0	101	43-124	5	30
Indeno(1,2,3-cd)pyrene	27.3	25.0	109	25.9	25.0	104	45-133	5	30
Dibenz(a,h)anthracene	27.2	25.0	109	26.0	25.0	104	49-133	5	30
Benzo(g,h,i)perylene	25.6	25.0	102	24.6	25.0	98	51-124	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Prepared:**	09/14/2011
Sample Matrix:	Water	**Date Extracted:**	09/19/2011
		Date Analyzed:	09/23/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Extraction Method:	EPA 1312/EPA 3520C	**Units:**	ug/L
Analysis Method:	8270D SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1109277

	Lab Control Sample KWG1109277-1 Lab Control Spike			Duplicate Lab Control Sample KWG1109277-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	21.6	25.0	86	19.6	25.0	79	39-110	9	30
2-Methylnaphthalene	21.5	25.0	86	19.2	25.0	77	39-115	11	30
Acenaphthylene	22.1	25.0	88	20.8	25.0	83	44-115	6	30
Acenaphthene	21.8	25.0	87	20.5	25.0	82	44-113	6	30
Dibenzofuran	21.4	25.0	86	20.5	25.0	82	46-116	4	30
Fluorene	22.9	25.0	92	22.1	25.0	88	48-118	3	30
Phenanthrene	22.7	25.0	91	21.7	25.0	87	47-120	4	30
Anthracene	23.3	25.0	93	22.5	25.0	90	44-117	3	30
Fluoranthene	25.9	25.0	104	24.9	25.0	99	48-128	4	30
Pyrene	24.8	25.0	99	23.2	25.0	93	42-133	7	30
Benz(a)anthracene	24.5	25.0	98	23.2	25.0	93	48-125	5	30
Chrysene	25.3	25.0	101	23.8	25.0	95	50-128	6	30
Benzo(b)fluoranthene	25.9	25.0	104	25.1	25.0	100	49-131	3	30
Benzo(k)fluoranthene	25.6	25.0	103	24.5	25.0	98	54-131	5	30
Benzo(a)pyrene	26.2	25.0	105	25.2	25.0	101	43-124	4	30
Indeno(1,2,3-cd)pyrene	25.4	25.0	102	24.2	25.0	97	45-133	5	30
Dibenz(a,h)anthracene	24.3	25.0	97	23.4	25.0	94	49-133	4	30
Benzo(g,h,i)perylene	24.2	25.0	97	23.2	25.0	93	51-124	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TP-01	K1108452-001	71	86	89
TP-02	K1108452-002	73 D	78 D	111 D *
Method Blank	KWG1108952-5	73	82	89
Lab Control Sample	KWG1108952-3	70	79	86
Duplicate Lab Control Sample	KWG1108952-4	59	67	73

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	17-104
Sur2 =	Fluoranthene-d10	27-106
Sur3 =	Terphenyl-d14	35-109

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG1108952-5	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	2.5	0.60	1	09/12/11	09/13/11	KWG1108952	
2-Methylnaphthalene	ND	U	2.5	0.46	1	09/12/11	09/13/11	KWG1108952	
Acenaphthylene	ND	U	2.5	0.59	1	09/12/11	09/13/11	KWG1108952	
Acenaphthene	ND	U	2.5	0.76	1	09/12/11	09/13/11	KWG1108952	
Fluorene	ND	U	2.5	0.61	1	09/12/11	09/13/11	KWG1108952	
Dibenzofuran	ND	U	2.5	0.63	1	09/12/11	09/13/11	KWG1108952	
Phenanthrene	ND	U	2.5	1.4	1	09/12/11	09/13/11	KWG1108952	
Anthracene	ND	U	2.5	0.58	1	09/12/11	09/13/11	KWG1108952	
Fluoranthene	ND	U	2.5	0.98	1	09/12/11	09/13/11	KWG1108952	
Pyrene	ND	U	2.5	0.76	1	09/12/11	09/13/11	KWG1108952	
Benzo(b)fluoranthene	ND	U	2.5	0.92	1	09/12/11	09/13/11	KWG1108952	
Benzo(k)fluoranthene	ND	U	2.5	0.87	1	09/12/11	09/13/11	KWG1108952	
Benz(a)anthracene	ND	U	2.5	0.72	1	09/12/11	09/13/11	KWG1108952	
Chrysene	ND	U	2.5	0.80	1	09/12/11	09/13/11	KWG1108952	
Benzo(a)pyrene	ND	U	2.5	0.76	1	09/12/11	09/13/11	KWG1108952	
Indeno(1,2,3-cd)pyrene	ND	U	2.5	0.87	1	09/12/11	09/13/11	KWG1108952	
Dibenz(a,h)anthracene	ND	U	2.5	0.80	1	09/12/11	09/13/11	KWG1108952	
Benzo(g,h,i)perylene	ND	U	2.5	0.85	1	09/12/11	09/13/11	KWG1108952	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	17-104	09/13/11	Acceptable
Fluoranthene-d10	82	27-106	09/13/11	Acceptable
Terphenyl-d14	89	35-109	09/13/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/01/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011

Polynuclear Aromatic Hydrocarbons

Sample Name:	TP-01	**Units:**	ug/Kg
Lab Code:	K1108452-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**140**		3.3	0.60	1	09/12/11	09/13/11	KWG1108952	
2-Methylnaphthalene	**92**		3.3	0.46	1	09/12/11	09/13/11	KWG1108952	
Acenaphthylene	**11**		3.3	0.59	1	09/12/11	09/13/11	KWG1108952	
Acenaphthene	**220**		3.3	0.76	1	09/12/11	09/13/11	KWG1108952	
Fluorene	**84**		3.3	0.61	1	09/12/11	09/13/11	KWG1108952	
Dibenzofuran	**110**		3.3	0.63	1	09/12/11	09/13/11	KWG1108952	
Phenanthrene	**100**		3.3	1.4	1	09/12/11	09/13/11	KWG1108952	
Anthracene	**39**		3.3	0.58	1	09/12/11	09/13/11	KWG1108952	
Fluoranthene	**100**		3.3	0.98	1	09/12/11	09/13/11	KWG1108952	
Pyrene	**80**		3.3	0.76	1	09/12/11	09/13/11	KWG1108952	
Benzo(b)fluoranthene	**290**		3.3	0.92	1	09/12/11	09/13/11	KWG1108952	
Benzo(k)fluoranthene	**49**		3.3	0.87	1	09/12/11	09/13/11	KWG1108952	
Benz(a)anthracene	**29**		3.3	0.72	1	09/12/11	09/13/11	KWG1108952	
Chrysene	**59**		3.3	0.80	1	09/12/11	09/13/11	KWG1108952	
Benzo(a)pyrene	**300**		3.3	0.76	1	09/12/11	09/13/11	KWG1108952	
Indeno(1,2,3-cd)pyrene	**300**		3.3	0.87	1	09/12/11	09/13/11	KWG1108952	
Dibenz(a,h)anthracene	**40**		3.3	0.80	1	09/12/11	09/13/11	KWG1108952	
Benzo(g,h,i)perylene	**260**		3.3	0.85	1	09/12/11	09/13/11	KWG1108952	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	71	17-104	09/13/11	Acceptable
Fluoranthene-d10	86	27-106	09/13/11	Acceptable
Terphenyl-d14	89	35-109	09/13/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/06/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011

Polynuclear Aromatic Hydrocarbons

Sample Name:	TP-02	**Units:**	ug/Kg
Lab Code:	K1108452-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**420000**	D	2600	310	200	09/12/11	09/13/11	KWG1108952	
2-Methylnaphthalene	**140000**	D	2600	240	200	09/12/11	09/13/11	KWG1108952	
Acenaphthylene	**1800**	D	130	16	10	09/12/11	09/13/11	KWG1108952	
Acenaphthene	**110000**	D	2600	400	200	09/12/11	09/13/11	KWG1108952	
Fluorene	**97000**	D	2600	320	200	09/12/11	09/13/11	KWG1108952	
Dibenzofuran	**73000**	D	2600	330	200	09/12/11	09/13/11	KWG1108952	
Phenanthrene	**260000**	D	2600	720	200	09/12/11	09/13/11	KWG1108952	
Anthracene	**49000**	D	2600	300	200	09/12/11	09/13/11	KWG1108952	
Fluoranthene	**130000**	D	2600	510	200	09/12/11	09/13/11	KWG1108952	
Pyrene	**74000**	D	2600	400	200	09/12/11	09/13/11	KWG1108952	
Benzo(b)fluoranthene	**9300**	D	130	24	10	09/12/11	09/13/11	KWG1108952	
Benzo(k)fluoranthene	**3300**	D	130	23	10	09/12/11	09/13/11	KWG1108952	
Benz(a)anthracene	**20000**	D	130	19	10	09/12/11	09/13/11	KWG1108952	
Chrysene	**17000**	D	130	21	10	09/12/11	09/13/11	KWG1108952	
Benzo(a)pyrene	**5500**	D	130	20	10	09/12/11	09/13/11	KWG1108952	
Indeno(1,2,3-cd)pyrene	**1700**	D	130	23	10	09/12/11	09/13/11	KWG1108952	
Dibenz(a,h)anthracene	**410**	D	130	21	10	09/12/11	09/13/11	KWG1108952	
Benzo(g,h,i)perylene	**1400**	D	130	22	10	09/12/11	09/13/11	KWG1108952	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	17-104	09/13/11	Acceptable
Fluoranthene-d10	78	27-106	09/13/11	Acceptable
Terphenyl-d14	111	35-109	09/13/11	Outside Control Limits

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Extracted:**	09/12/2011
Sample Matrix:	Soil	**Date Analyzed:**	09/13/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	ug/Kg
Analysis Method:	8270D SIM	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG1108952

	Lab Control Sample KWG1108952-3 Lab Control Spike			Duplicate Lab Control Sample KWG1108952-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	368	500	74	335	500	67	43-99	9	40
2-Methylnaphthalene	384	500	77	352	500	70	44-111	9	40
Acenaphthylene	370	500	74	346	500	69	41-110	7	40
Acenaphthene	371	500	74	346	500	69	44-104	7	40
Fluorene	380	500	76	361	500	72	49-105	5	40
Dibenzofuran	362	500	72	341	500	68	43-113	6	40
Phenanthrene	360	500	72	336	500	67	47-104	7	40
Anthracene	402	500	80	390	500	78	47-112	3	40
Fluoranthene	427	500	85	418	500	84	51-111	2	40
Pyrene	398	500	80	391	500	78	48-113	2	40
Benzo(b)fluoranthene	472	500	94	463	500	93	51-113	2	40
Benzo(k)fluoranthene	470	500	94	458	500	92	56-114	3	40
Benz(a)anthracene	423	500	85	417	500	83	51-111	1	40
Chrysene	439	500	88	427	500	85	54-111	3	40
Benzo(a)pyrene	466	500	93	453	500	91	52-118	3	40
Indeno(1,2,3-cd)pyrene	475	500	95	466	500	93	42-123	2	40
Dibenz(a,h)anthracene	457	500	91	446	500	89	44-119	2	40
Benzo(g,h,i)perylene	436	500	87	428	500	86	46-114	2	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452

Surrogate Recovery Summary
Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
TP-01	K1108452-001	84	89	95
TP-02	K1108452-002	83	87	92
Method Blank	KWG1109056-3	85	87	93
Lab Control Sample	KWG1109056-1	82	86	82
Duplicate Lab Control Sample	KWG1109056-2	82	86	86

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	28-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	09/12/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1109056-3	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**32**		0.20	1	09/13/11	09/20/11	KWG1109056	
2-Methylnaphthalene	**8.5**		0.20	1	09/13/11	09/20/11	KWG1109056	
Acenaphthylene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Acenaphthene	**1.6**		0.20	1	09/13/11	09/20/11	KWG1109056	
Dibenzofuran	**2.8**		0.20	1	09/13/11	09/20/11	KWG1109056	
Fluorene	**1.5**		0.20	1	09/13/11	09/20/11	KWG1109056	
Phenanthrene	**2.7**		0.20	1	09/13/11	09/20/11	KWG1109056	
Anthracene	**0.43**		0.20	1	09/13/11	09/20/11	KWG1109056	
Fluoranthene	**0.59**		0.20	1	09/13/11	09/20/11	KWG1109056	
Pyrene	**0.31**		0.20	1	09/13/11	09/20/11	KWG1109056	
Benz(a)anthracene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Chrysene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(b)fluoranthene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(k)fluoranthene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(a)pyrene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	85	28-98	09/20/11	Acceptable
Fluoranthene-d10	87	31-105	09/20/11	Acceptable
Terphenyl-d14	93	27-112	09/20/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/01/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011
		Date Prepared:	09/12/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name:	TP-01	**Units:**	ug/L
Lab Code:	K1108452-001	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.7**	B	0.20	1	09/13/11	09/20/11	KWG1109056	
2-Methylnaphthalene	**0.49**	B	0.20	1	09/13/11	09/20/11	KWG1109056	
Acenaphthylene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Acenaphthene	**2.0**	B	0.20	1	09/13/11	09/20/11	KWG1109056	
Dibenzofuran	**0.74**	B	0.20	1	09/13/11	09/20/11	KWG1109056	
Fluorene	**0.57**	B	0.20	1	09/13/11	09/20/11	KWG1109056	
Phenanthrene	**0.30**	B	0.20	1	09/13/11	09/20/11	KWG1109056	
Anthracene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Fluoranthene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Pyrene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benz(a)anthracene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Chrysene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(b)fluoranthene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(k)fluoranthene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(a)pyrene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	84	28-98	09/20/11	Acceptable
Fluoranthene-d10	89	31-105	09/20/11	Acceptable
Terphenyl-d14	95	27-112	09/20/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Collected: 09/06/2011
Date Received: 09/09/2011
Date Prepared: 09/12/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name: TP-02
Lab Code: K1108452-002

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**12000**	D	40	200	09/13/11	09/22/11	KWG1109056	
2-Methylnaphthalene	**1100**	D	40	200	09/13/11	09/22/11	KWG1109056	
Acenaphthylene	**11**		0.20	1	09/13/11	09/20/11	KWG1109056	
Acenaphthene	**460**	D	2.0	10	09/13/11	09/21/11	KWG1109056	
Dibenzofuran	**280**	D	2.0	10	09/13/11	09/21/11	KWG1109056	
Fluorene	**250**	D	2.0	10	09/13/11	09/21/11	KWG1109056	
Phenanthrene	**240**	D	2.0	10	09/13/11	09/21/11	KWG1109056	
Anthracene	**25**		0.20	1	09/13/11	09/20/11	KWG1109056	
Fluoranthene	**22**		0.20	1	09/13/11	09/20/11	KWG1109056	
Pyrene	**11**		0.20	1	09/13/11	09/20/11	KWG1109056	
Benz(a)anthracene	**0.43**		0.20	1	09/13/11	09/20/11	KWG1109056	
Chrysene	**0.41**		0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(b)fluoranthene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(k)fluoranthene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(a)pyrene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Dibenz(a,h)anthracene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	
Benzo(g,h,i)perylene	ND	U	0.20	1	09/13/11	09/20/11	KWG1109056	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	83	28-98	09/20/11	Acceptable
Fluoranthene-d10	87	31-105	09/20/11	Acceptable
Terphenyl-d14	92	27-112	09/20/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Prepared: 09/12/2011
Date Extracted: 09/13/2011
Date Analyzed: 09/20/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Extraction Method: EPA 1311/EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1109056

	Lab Control Sample KWG1109056-1 Lab Control Spike			Duplicate Lab Control Sample KWG1109056-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	22.5	25.0	90	19.7	25.0	79	39-110	13	30
2-Methylnaphthalene	22.7	25.0	91	18.8	25.0	75	39-115	19	30
Acenaphthylene	22.5	25.0	90	21.5	25.0	86	44-115	5	30
Acenaphthene	22.4	25.0	90	20.9	25.0	84	44-113	7	30
Dibenzofuran	22.1	25.0	88	20.8	25.0	83	46-116	6	30
Fluorene	23.3	25.0	93	22.0	25.0	88	48-118	6	30
Phenanthrene	22.0	25.0	88	21.5	25.0	86	47-120	2	30
Anthracene	23.1	25.0	92	22.4	25.0	90	44-117	3	30
Fluoranthene	24.9	25.0	99	24.7	25.0	99	48-128	1	30
Pyrene	22.9	25.0	92	22.8	25.0	91	42-133	0	30
Benz(a)anthracene	22.6	25.0	90	21.8	25.0	87	48-125	3	30
Chrysene	23.8	25.0	95	23.3	25.0	93	50-128	2	30
Benzo(b)fluoranthene	25.3	25.0	101	24.4	25.0	98	49-131	4	30
Benzo(k)fluoranthene	25.7	25.0	103	25.0	25.0	100	54-131	3	30
Benzo(a)pyrene	25.2	25.0	101	24.2	25.0	97	43-124	4	30
Indeno(1,2,3-cd)pyrene	24.1	25.0	97	22.9	25.0	92	45-133	5	30
Dibenz(a,h)anthracene	24.4	25.0	98	23.4	25.0	94	49-133	4	30
Benzo(g,h,i)perylene	23.2	25.0	93	22.2	25.0	89	51-124	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
TP-01	K1108452-001	94	95
TP-02	K1108452-002	124	108
TP-02DUP	KWG1109197-1	122	105
Method Blank	KWG1109197-3	109	110
Lab Control Sample	KWG1109197-2	91	88

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	09/14/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1109197-3	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/16/11	09/19/11	KWG1109197	
Residual Range Organics (RRO)	ND	U	500	500	1	09/16/11	09/19/11	KWG1109197	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	109	50-150	09/19/11	Acceptable
n-Triacontane	110	50-150	09/19/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/01/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011
		Date Prepared:	09/14/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	TP-01	**Units:**	ug/L
Lab Code:	K1108452-001	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	280	280	1	09/16/11	09/19/11	KWG1109197	
Residual Range Organics (RRO)	ND	U	560	560	1	09/16/11	09/19/11	KWG1109197	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	94	50-150	09/19/11	Acceptable
n-Triacontane	95	50-150	09/19/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/06/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011
		Date Prepared:	09/14/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	TP-02	**Units:**	ug/L
Lab Code:	K1108452-002	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**26000**	Z	280	280	1	09/16/11	09/19/11	KWG1109197	
Residual Range Organics (RRO)	ND	U	560	560	1	09/16/11	09/19/11	KWG1109197	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	124	50-150	09/19/11	Acceptable
n-Triacontane	108	50-150	09/19/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Extracted:**	09/16/2011
Sample Matrix:	Soil	**Date Analyzed:**	09/19/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name:	TP-02	**Units:**	ug/L
Lab Code:	K1108452-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1109197

Analyte Name	MRL	MDL	Sample Result	TP-02DUP KWG1109197-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	300	300	26000	26000	26000	1	30
Residual Range Organics (RRO)	590	590	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Prepared: 09/14/2011
Date Extracted: 09/16/2011
Date Analyzed: 09/19/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 1312/EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1109197

	Lab Control Sample KWG1109197-2 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	2860	3200	89	46-140
Residual Range Organics (RRO)	1190	1600	75	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452

Surrogate Recovery Summary
Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Preparation Method: EPA 1311
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
TP-01	K1108452-001	112	109
TP-02	K1108452-002	130	97
TP-02DUP	KWG1109379-1	129	96
Method Blank	KWG1109379-3	94	86
Method Blank	KWG1109379-4	98	94
Lab Control Sample	KWG1109379-2	105	96

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Collected: NA
Date Received: NA
Date Prepared: 09/20/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1109379-3

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/22/11	09/23/11	KWG1109379	
Residual Range Organics (RRO)	ND	U	500	500	1	09/22/11	09/23/11	KWG1109379	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	94	50-150	09/23/11	Acceptable
n-Triacontane	86	50-150	09/23/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	09/20/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1109379-4	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/22/11	09/23/11	KWG1109379	
Residual Range Organics (RRO)	ND	U	500	500	1	09/22/11	09/23/11	KWG1109379	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	98	50-150	09/23/11	Acceptable
n-Triacontane	94	50-150	09/23/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Collected: 09/01/2011
Date Received: 09/09/2011
Date Prepared: 09/20/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name: TP-01
Lab Code: K1108452-001

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	09/22/11	09/23/11	KWG1109379	*
Residual Range Organics (RRO)	ND	U	500	500	1	09/22/11	09/23/11	KWG1109379	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	112	50-150	09/23/11	Acceptable
n-Triacontane	109	50-150	09/23/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/06/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011
		Date Prepared:	09/20/2011

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name:	TP-02	**Units:**	ug/L
Lab Code:	K1108452-002	**Basis:**	NA
Preparation Method:	EPA 1311	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**26000**	Z	270	270	1	09/22/11	09/24/11	KWG1109379	
Residual Range Organics (RRO)	ND	U	530	530	1	09/22/11	09/24/11	KWG1109379	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	130	50-150	09/24/11	Acceptable
n-Triacontane	97	50-150	09/24/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Extracted: 09/22/2011
Date Analyzed: 09/24/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: TP-02
Lab Code: K1108452-002

Units: ug/L
Basis: NA

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1109379

Analyte Name	MRL	MDL	Sample Result	TP-02DUP KWG1109379-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	270	270	26000	26000	26000	1	30
Residual Range Organics (RRO)	530	530	ND	ND	ND	-	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Prepared: 09/20/2011
Date Extracted: 09/22/2011
Date Analyzed: 09/23/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 1311/EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1109379

	Lab Control Sample KWG1109379-2 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	3390	3200	106	46-140
Residual Range Organics (RRO)	1430	1600	89	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Sediment

Service Request: K1108452

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
Batch QC	K1108247-004	108	111
TP-01	K1108452-001	125	126
TP-02	K1108452-002	217 D *	138 D
Batch QCDUP	KWG1109213-1	103	107
Method Blank	KWG1109213-3	89	85
Lab Control Sample	KWG1109213-2	119	112

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG1109213-3	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	25	1.2	1	09/12/11	09/14/11	KWG1109213	
Residual Range Organics (RRO)	ND	U	99	2.9	1	09/12/11	09/14/11	KWG1109213	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	89	50-150	09/14/11	Acceptable
n-Triacontane	85	50-150	09/14/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/01/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011

Diesel and Residual Range Organics

Sample Name:	TP-01	**Units:**	mg/Kg
Lab Code:	K1108452-001	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**42**		33	1.6	1	09/12/11	09/14/11	KWG1109213	
Residual Range Organics (RRO)	**120**	J	140	3.8	1	09/12/11	09/14/11	KWG1109213	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	125	50-150	09/14/11	Acceptable
n-Triacontane	126	50-150	09/14/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/06/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011

Diesel and Residual Range Organics

Sample Name:	TP-02	**Units:**	mg/Kg
Lab Code:	K1108452-002	**Basis:**	Dry
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**8500**	DZ	640	31	20	09/12/11	09/14/11	KWG1109213	
Residual Range Organics (RRO)	**1600**	JD	2600	75	20	09/12/11	09/14/11	KWG1109213	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	217	50-150	09/14/11	Outside Control Limits
n-Triacontane	138	50-150	09/14/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452
Date Extracted: 09/12/2011
Date Analyzed: 09/14/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1108247-004

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: mg/Kg
Basis: Dry

Level: Low
Extraction Lot: KWG1109213

Analyte Name	MRL	MDL	Sample Result	Batch QCDUP KWG1109213-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	25	1.2	28	13	21	71 #	40
Residual Range Organics (RRO)	100	2.9	170	95	130	58 #	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Extracted:**	09/12/2011
Sample Matrix:	Soil	**Date Analyzed:**	09/14/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	Method	**Units:**	mg/Kg
Analysis Method:	NWTPH-Dx	**Basis:**	Dry
		Level:	Low
		Extraction Lot:	KWG1109213

	Lab Control Sample KWG1109213-2 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	302	267	113	56-124
Residual Range Organics (RRO)	125	133	94	60-135

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview Treatability Study
Sample Matrix: Soil

Service Request: K1108452

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
TP-01	K1108452-001	09/01/2011	09/09/2011	09/12/2011	75.8	
TP-02	K1108452-002	09/06/2011	09/09/2011	09/12/2011	77.8	

Client:	URS Corporation	**Service Request:**	K1108452
Project:	Longview Treatability Study	**Date Collected:**	09/01/2011
Sample Matrix:	Soil	**Date Received:**	09/09/2011
		Date Analyzed:	09/12/2011

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
TP-01	K1108452-001	75.8	77.1	76.5	2	

Columbia Analytical Services™ 1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

November 10, 2011 Analytical Report for Service Request No: K1110402

Paul Kalina
URS Corporation
1501 4th Ave., Suite 1400
Seattle, WA 98101

RE: Longview

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on October 26, 2011. For your reference, these analyses have been assigned our service request number K1110402.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/ln

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1110402
Project:	IP Longview	**Date Received:**	11/2/11
Sample Matrix:	Soils		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eleven soil samples were received for analysis at Columbia Analytical Services on 11/2/11. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

SPLP Metals

No anomalies associated with the analysis of these samples were observed

Diesel Range Organics on SPLP Extract by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Residual Range Organics (RRO) in sample 0397-025 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

Method Blank Exceptions:
The Method Blank KWG1110970-5 contained low levels of Naphthalene above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated.

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of numerous analytes for sample 0397-010 were not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Sample Notes and Discussion:
MDL studies were not performed on SPLP leachates. The MDLs reported were for water samples.

Approved by Emw **Date** 11/10/11

K1110402

Columbia Analytical Services
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS

Project: Longview

Project Manager: Paul Kalina

Telephone No. 206-438-2172

Fax No. 866-495-5282

Method of Shipment: Fed Ex ~~7 day Rush~~

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	SPLP TPH-DRO	SPLP PAH	SPLP RCRA 8 Metals															Turn Around Time (working days)
0397-010		2	x					x	10/24/11	1440	x	x																7 Day Rush
0397-011		2	x					x	10/24/11	1447	x	x																
0297-013		2	x					x	10/24/11	1452	x	x																
0397-016		2	x					x	10/24/11	1458	x	x																
0397-017		2	x					x	10/24/11	1503	x	x																
0397-019		2	x					x	10/24/11	1507	x	x																
0397-021		2	x					x	10/24/11	1510	x	x	x															
0397-022		2	x					x	10/24/11	1515	x	x	x															
0397-023		2	x					x	10/24/11	1520	x	x																
0397-024		2	x					x	10/24/11	1525	x	x																
0397-025		2	x					x	10/24/11	1528	x	x																

MARKS: 8

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name): Jill Suhm	Date: 10/25/11 Time: 1547	Received by (Sign & Print Name):
Relinquished by	Date Time	Received by
Relinquished by	Date Time	Received by
Relinquished by	Date Time	Received by laboratory: Date: 10/26/11 Time: 0940

Lab Work No.

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed

Client / Project: URS Service Request *K11* 10402

Received: 10/26/11 Opened: 10/26/11 By: Sma Unloaded: 10/26/11 By: Sma

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? one, front
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.5	0.8	318		7976 5948 9830	

7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other*_____
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Notes, Discrepancies, & Resolutions:*_____

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-010	K1110402-001	76	83	82
0397-011	K1110402-002	74	79	80
0397-013	K1110402-003	76	82	80
0397-016	K1110402-004	78	86	87
0397-017	K1110402-005	76	83	82
0397-019	K1110402-006	78	83	81
0397-021	K1110402-007	76	83	84
0397-022	K1110402-008	79	85	84
0397-023	K1110402-009	80	85	86
0397-024	K1110402-010	76	83	78
0397-025	K1110402-011	73	80	76
Method Blank	KWG1110970-5	83	79	93
0397-010MS	KWG1110970-1	81 D	82 D	92 D
0397-010DMS	KWG1110970-2	79 D	82 D	91 D
Lab Control Sample	KWG1110970-3	82	77	87
Duplicate Lab Control Sample	KWG1110970-4	84	81	93

Surrogate Recovery Control Limits (%)

Sur1	= Fluorene-d10	28-98
Sur2	= Fluoranthene-d10	31-105
Sur3	= Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1110970-5	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.24**		0.20	0.030	1	10/28/11	11/01/11	KWG1110970	
2-Methylnaphthalene	**0.036**	J	0.20	0.023	1	10/28/11	11/01/11	KWG1110970	
Acenaphthylene	ND	U	0.20	0.034	1	10/28/11	11/01/11	KWG1110970	
Acenaphthene	ND	U	0.20	0.044	1	10/28/11	11/01/11	KWG1110970	
Dibenzofuran	ND	U	0.20	0.046	1	10/28/11	11/01/11	KWG1110970	
Fluorene	ND	U	0.20	0.038	1	10/28/11	11/01/11	KWG1110970	
Phenanthrene	ND	U	0.20	0.050	1	10/28/11	11/01/11	KWG1110970	
Anthracene	ND	U	0.20	0.036	1	10/28/11	11/01/11	KWG1110970	
Fluoranthene	ND	U	0.20	0.044	1	10/28/11	11/01/11	KWG1110970	
Pyrene	ND	U	0.20	0.034	1	10/28/11	11/01/11	KWG1110970	
Benz(a)anthracene	ND	U	0.20	0.026	1	10/28/11	11/01/11	KWG1110970	
Chrysene	ND	U	0.20	0.034	1	10/28/11	11/01/11	KWG1110970	
Benzo(b)fluoranthene	ND	U	0.20	0.023	1	10/28/11	11/01/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/01/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/01/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/01/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/01/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/01/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	83	28-98	11/01/11	Acceptable
Fluoranthene-d10	79	31-105	11/01/11	Acceptable
Terphenyl-d14	93	27-112	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-010
Lab Code: K1110402-001

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**7500**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**840**	D	4.0	0.46	20	10/28/11	11/05/11	KWG1110970	
Acenaphthylene	**9.5**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**420**	D	4.0	0.88	20	10/28/11	11/05/11	KWG1110970	
Dibenzofuran	**270**	D	4.0	0.92	20	10/28/11	11/05/11	KWG1110970	
Fluorene	**240**	D	4.0	0.76	20	10/28/11	11/05/11	KWG1110970	
Phenanthrene	**240**	D	4.0	1.0	20	10/28/11	11/05/11	KWG1110970	
Anthracene	**35**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**22**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**11**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.42**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.40**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	ND	U	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-98	11/04/11	Acceptable
Fluoranthene-d10	83	31-105	11/04/11	Acceptable
Terphenyl-d14	82	27-112	11/04/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	0397-011	**Units:**	ug/L
Lab Code:	K1110402-002	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**7400**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**890**	D	4.0	0.46	20	10/28/11	11/05/11	KWG1110970	
Acenaphthylene	**9.1**		0.20	0.034	1	10/28/11	11/01/11	KWG1110970	
Acenaphthene	**430**	D	4.0	0.88	20	10/28/11	11/05/11	KWG1110970	
Dibenzofuran	**270**	D	4.0	0.92	20	10/28/11	11/05/11	KWG1110970	
Fluorene	**240**	D	4.0	0.76	20	10/28/11	11/05/11	KWG1110970	
Phenanthrene	**250**	D	4.0	1.0	20	10/28/11	11/05/11	KWG1110970	
Anthracene	**33**		0.20	0.036	1	10/28/11	11/01/11	KWG1110970	
Fluoranthene	**20**		0.20	0.044	1	10/28/11	11/01/11	KWG1110970	
Pyrene	**10**		0.20	0.034	1	10/28/11	11/01/11	KWG1110970	
Benz(a)anthracene	**0.57**		0.20	0.026	1	10/28/11	11/01/11	KWG1110970	
Chrysene	**0.28**		0.20	0.034	1	10/28/11	11/01/11	KWG1110970	
Benzo(b)fluoranthene	**0.046**	J	0.20	0.023	1	10/28/11	11/01/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/01/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/01/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/01/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/01/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/01/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	28-98	11/01/11	Acceptable
Fluoranthene-d10	79	31-105	11/01/11	Acceptable
Terphenyl-d14	80	27-112	11/01/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	0397-013	**Units:**	ug/L
Lab Code:	K1110402-003	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**7700**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**820**	D	4.0	0.46	20	10/28/11	11/05/11	KWG1110970	
Acenaphthylene	**8.5**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**380**	D	4.0	0.88	20	10/28/11	11/05/11	KWG1110970	
Dibenzofuran	**240**	D	4.0	0.92	20	10/28/11	11/05/11	KWG1110970	
Fluorene	**210**	D	4.0	0.76	20	10/28/11	11/05/11	KWG1110970	
Phenanthrene	**210**	D	4.0	1.0	20	10/28/11	11/05/11	KWG1110970	
Anthracene	**29**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**19**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**9.1**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.36**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.31**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.037**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-98	11/04/11	Acceptable
Fluoranthene-d10	82	31-105	11/04/11	Acceptable
Terphenyl-d14	80	27-112	11/04/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-016
Lab Code: K1110402-004

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**6800**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**780**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**7.3**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**400**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**230**	D	4.0	0.92	20	10/28/11	11/06/11	KWG1110970	
Fluorene	**210**	D	4.0	0.76	20	10/28/11	11/06/11	KWG1110970	
Phenanthrene	**210**	D	4.0	1.0	20	10/28/11	11/06/11	KWG1110970	
Anthracene	**30**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**22**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**11**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.47**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.38**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.062**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	**0.037**	J	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	**0.031**	J	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	78	28-98	11/04/11	Acceptable
Fluoranthene-d10	86	31-105	11/04/11	Acceptable
Terphenyl-d14	87	27-112	11/04/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-017
Lab Code: K1110402-005

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**4400**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**460**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**3.6**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**260**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**98**		0.20	0.046	1	10/28/11	11/04/11	KWG1110970	
Fluorene	**100**		0.20	0.038	1	10/28/11	11/04/11	KWG1110970	
Phenanthrene	**92**		0.20	0.050	1	10/28/11	11/04/11	KWG1110970	
Anthracene	**15**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**12**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**6.6**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.30**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.23**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.026**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-98	11/04/11	Acceptable
Fluoranthene-d10	83	31-105	11/04/11	Acceptable
Terphenyl-d14	82	27-112	11/04/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-019
Lab Code: K1110402-006

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**6400**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**740**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**7.1**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**380**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**210**	D	4.0	0.92	20	10/28/11	11/06/11	KWG1110970	
Fluorene	**180**	D	4.0	0.76	20	10/28/11	11/06/11	KWG1110970	
Phenanthrene	**210**	D	4.0	1.0	20	10/28/11	11/06/11	KWG1110970	
Anthracene	**30**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**20**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**10**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.40**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.35**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.030**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	78	28-98	11/04/11	Acceptable
Fluoranthene-d10	83	31-105	11/04/11	Acceptable
Terphenyl-d14	81	27-112	11/04/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-021
Lab Code: K1110402-007

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**7000**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**860**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**8.6**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**420**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**260**	D	4.0	0.92	20	10/28/11	11/06/11	KWG1110970	
Fluorene	**230**	D	4.0	0.76	20	10/28/11	11/06/11	KWG1110970	
Phenanthrene	**240**	D	4.0	1.0	20	10/28/11	11/06/11	KWG1110970	
Anthracene	**31**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**19**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**9.2**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.32**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.32**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	ND	U	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-98	11/04/11	Acceptable
Fluoranthene-d10	83	31-105	11/04/11	Acceptable
Terphenyl-d14	84	27-112	11/04/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-022
Lab Code: K1110402-008

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**7900**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**770**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**8.7**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**380**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**240**	D	4.0	0.92	20	10/28/11	11/06/11	KWG1110970	
Fluorene	**210**	D	4.0	0.76	20	10/28/11	11/06/11	KWG1110970	
Phenanthrene	**220**	D	4.0	1.0	20	10/28/11	11/06/11	KWG1110970	
Anthracene	**30**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**20**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**9.3**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.35**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.34**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.030**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	79	28-98	11/04/11	Acceptable
Fluoranthene-d10	85	31-105	11/04/11	Acceptable
Terphenyl-d14	84	27-112	11/04/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-023
Lab Code: K1110402-009

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**7300**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**760**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**8.7**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**390**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**220**	D	4.0	0.92	20	10/28/11	11/06/11	KWG1110970	
Fluorene	**190**	D	4.0	0.76	20	10/28/11	11/06/11	KWG1110970	
Phenanthrene	**210**	D	4.0	1.0	20	10/28/11	11/06/11	KWG1110970	
Anthracene	**34**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**23**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**11**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.41**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.40**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.034**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	28-98	11/04/11	Acceptable
Fluoranthene-d10	85	31-105	11/04/11	Acceptable
Terphenyl-d14	86	27-112	11/04/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-024
Lab Code: K1110402-010

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**6500**	D	40	6.0	200	10/28/11	11/07/11	KWG1110970	
2-Methylnaphthalene	**860**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**7.2**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**400**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**250**	D	4.0	0.92	20	10/28/11	11/06/11	KWG1110970	
Fluorene	**220**	D	4.0	0.76	20	10/28/11	11/06/11	KWG1110970	
Phenanthrene	**220**	D	4.0	1.0	20	10/28/11	11/06/11	KWG1110970	
Anthracene	**28**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**22**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**11**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.41**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.40**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.044**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-98	11/04/11	Acceptable
Fluoranthene-d10	83	31-105	11/04/11	Acceptable
Terphenyl-d14	78	27-112	11/04/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name:	0397-025	**Units:**	ug/L
Lab Code:	K1110402-011	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3520C		
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**9400**	D	40	6.0	200	10/28/11	11/08/11	KWG1110970	
2-Methylnaphthalene	**800**	D	4.0	0.46	20	10/28/11	11/06/11	KWG1110970	
Acenaphthylene	**8.1**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Acenaphthene	**380**	D	4.0	0.88	20	10/28/11	11/06/11	KWG1110970	
Dibenzofuran	**240**	D	4.0	0.92	20	10/28/11	11/06/11	KWG1110970	
Fluorene	**210**	D	4.0	0.76	20	10/28/11	11/06/11	KWG1110970	
Phenanthrene	**210**	D	4.0	1.0	20	10/28/11	11/06/11	KWG1110970	
Anthracene	**31**		0.20	0.036	1	10/28/11	11/04/11	KWG1110970	
Fluoranthene	**18**		0.20	0.044	1	10/28/11	11/04/11	KWG1110970	
Pyrene	**8.2**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benz(a)anthracene	**0.29**		0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Chrysene	**0.29**		0.20	0.034	1	10/28/11	11/04/11	KWG1110970	
Benzo(b)fluoranthene	**0.024**	J	0.20	0.023	1	10/28/11	11/04/11	KWG1110970	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(a)pyrene	ND	U	0.20	0.043	1	10/28/11	11/04/11	KWG1110970	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	10/28/11	11/04/11	KWG1110970	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	10/28/11	11/04/11	KWG1110970	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	10/28/11	11/04/11	KWG1110970	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	28-98	11/04/11	Acceptable
Fluoranthene-d10	80	31-105	11/04/11	Acceptable
Terphenyl-d14	76	27-112	11/04/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Prepared: 10/27/2011
Date Extracted: 10/28/2011
Date Analyzed: 11/04/2011

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-010
Lab Code: K1110402-001

Units: ug/L
Basis: NA

Extraction Method: EPA 1312/EPA 3520C
Analysis Method: 8270D SIM

Level: Low
Extraction Lot: KWG1110970

Analyte Name	Sample Result	0397-010MS KWG1110970-1 Matrix Spike			0397-010DMS KWG1110970-2 Duplicate Matrix Spike			%Rec Limits	RPD	RPD Limit
		Result	Expected	%Rec	Result	Expected	%Rec			
Naphthalene	7500	4890E	25.0	-10253#	4850E	25.0	-10403#	37-118	1	30
2-Methylnaphthalene	840	774E	25.0	-284 #	775E	25.0	-280 #	37-117	0	30
Acenaphthylene	9.5	33.1	25.0	94	32.6	25.0	92	43-114	2	30
Acenaphthene	420	427	25.0	43 #	427	25.0	44 #	45-114	0	30
Dibenzofuran	270	273	25.0	28 #	276	25.0	38 #	44-122	1	30
Fluorene	240	257	25.0	78 #	257	25.0	81 #	45-123	0	30
Phenanthrene	240	258	25.0	67 #	253	25.0	47 #	42-127	2	30
Anthracene	35	53.0	25.0	71	54.5	25.0	77	32-125	3	30
Fluoranthene	22	45.1	25.0	93	46.0	25.0	96	48-134	2	30
Pyrene	11	34.0	25.0	93	33.0	25.0	89	44-130	3	30
Benz(a)anthracene	0.42	22.5	25.0	88	21.3	25.0	84	41-128	6	30
Chrysene	0.40	23.1	25.0	91	22.1	25.0	87	48-128	4	30
Benzo(b)fluoranthene	ND	22.4	25.0	89	21.2	25.0	85	40-139	5	30
Benzo(k)fluoranthene	ND	22.8	25.0	91	22.0	25.0	88	48-134	4	30
Benzo(a)pyrene	ND	21.1	25.0	84	20.1	25.0	80	35-132	5	30
Indeno(1,2,3-cd)pyrene	ND	20.7	25.0	83	19.9	25.0	79	40-135	4	30
Dibenz(a,h)anthracene	ND	21.3	25.0	85	20.4	25.0	82	43-135	5	30
Benzo(g,h,i)perylene	ND	21.1	25.0	84	20.0	25.0	80	44-128	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Prepared: 10/27/2011
Date Extracted: 10/28/2011
Date Analyzed: 11/01/2011

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Extraction Method: EPA 1312/EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1110970

	Lab Control Sample KWG1110970-3 Lab Control Spike			Duplicate Lab Control Sample KWG1110970-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	18.2	25.0	73	18.8	25.0	75	39-110	3	30
2-Methylnaphthalene	16.7	25.0	67	17.3	25.0	69	39-115	4	30
Acenaphthylene	21.0	25.0	84	20.7	25.0	83	44-115	2	30
Acenaphthene	20.0	25.0	80	20.0	25.0	80	44-113	0	30
Dibenzofuran	20.9	25.0	84	20.9	25.0	84	46-116	0	30
Fluorene	21.5	25.0	86	21.6	25.0	87	48-118	1	30
Phenanthrene	20.0	25.0	80	20.3	25.0	81	47-120	1	30
Anthracene	19.0	25.0	76	20.0	25.0	80	44-117	5	30
Fluoranthene	20.6	25.0	83	21.6	25.0	86	48-128	4	30
Pyrene	21.4	25.0	86	22.3	25.0	89	42-133	4	30
Benz(a)anthracene	18.7	25.0	75	19.5	25.0	78	48-125	5	30
Chrysene	20.5	25.0	82	21.5	25.0	86	50-128	5	30
Benzo(b)fluoranthene	20.0	25.0	80	21.2	25.0	85	49-131	6	30
Benzo(k)fluoranthene	21.3	25.0	85	23.0	25.0	92	54-131	7	30
Benzo(a)pyrene	18.9	25.0	76	20.1	25.0	80	43-124	6	30
Indeno(1,2,3-cd)pyrene	16.7	25.0	67	17.8	25.0	71	45-133	7	30
Dibenz(a,h)anthracene	22.5	25.0	90	21.7	25.0	87	49-133	4	30
Benzo(g,h,i)perylene	21.4	25.0	86	21.6	25.0	86	51-124	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-010	K1110402-001	113	96
0397-011	K1110402-002	115	107
0397-013	K1110402-003	114	102
0397-016	K1110402-004	139	100
0397-017	K1110402-005	98	97
0397-019	K1110402-006	119	97
0397-021	K1110402-007	139	106
0397-022	K1110402-008	135	102
0397-023	K1110402-009	130	89
0397-024	K1110402-010	118	102
0397-025	K1110402-011	124	101
0397-010DUP	KWG1111095-1	122	101
0397-025DUP	KWG1111095-2	136	100
Method Blank	KWG1111095-4	97	100
Method Blank	KWG1111095-5	93	95
Lab Control Sample	KWG1111095-3	101	97

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: NA
Date Received: NA
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1111095-4

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	ND	U	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	97	50-150	11/01/11	Acceptable
n-Triacontane	100	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: NA
Date Received: NA
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1111095-5

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	ND	U	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	93	50-150	11/01/11	Acceptable
n-Triacontane	95	50-150	11/01/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	0397-010	**Units:**	ug/L
Lab Code:	K1110402-001	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**19000**	Z	280	280	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	ND	U	550	550	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	113	50-150	11/01/11	Acceptable
n-Triacontane	96	50-150	11/01/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	0397-011	**Units:**	ug/L
Lab Code:	K1110402-002	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**20000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	**570**	Z	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	115	50-150	11/01/11	Acceptable
n-Triacontane	107	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-013
Lab Code: K1110402-003

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**20000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	**610**	Z	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	114	50-150	11/01/11	Acceptable
n-Triacontane	102	50-150	11/01/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	0397-016	**Units:**	ug/L
Lab Code:	K1110402-004	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**18000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	ND	U	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	139	50-150	11/01/11	Acceptable
n-Triacontane	100	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-017
Lab Code: K1110402-005

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**11000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	ND	U	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	98	50-150	11/01/11	Acceptable
n-Triacontane	97	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-019
Lab Code: K1110402-006

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**17000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	ND	U	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	119	50-150	11/01/11	Acceptable
n-Triacontane	97	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-021
Lab Code: K1110402-007

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**19000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	**510**	Z	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	139	50-150	11/01/11	Acceptable
n-Triacontane	106	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-022
Lab Code: K1110402-008

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**20000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	**660**	Z	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	135	50-150	11/01/11	Acceptable
n-Triacontane	102	50-150	11/01/11	Acceptable

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Prepared:	10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	0397-023	**Units:**	ug/L
Lab Code:	K1110402-009	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**18000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	**540**	Z	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	130	50-150	11/01/11	Acceptable
n-Triacontane	89	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-024
Lab Code: K1110402-010

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**18000**	Z	250	250	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	ND	U	500	500	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	118	50-150	11/01/11	Acceptable
n-Triacontane	102	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Collected: 10/24/2011
Date Received: 10/26/2011
Date Prepared: 10/27/2011

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-025
Lab Code: K1110402-011

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**23000**	Z	270	270	1	10/31/11	11/01/11	KWG1111095	
Residual Range Organics (RRO)	**580**	Z	530	530	1	10/31/11	11/01/11	KWG1111095	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	124	50-150	11/01/11	Acceptable
n-Triacontane	101	50-150	11/01/11	Acceptable

Comments:

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Extracted: 10/31/2011
Date Analyzed: 11/01/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: 0397-010
Lab Code: K1110402-001

Units: ug/L
Basis: NA

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1111095

Analyte Name	MRL	MDL	Sample Result	0397-010DUP KWG1111095-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	280	280	19000	20000	19000	3	30
Residual Range Organics (RRO)	550	550	ND	570	NC	NC	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Extracted: 10/31/2011
Date Analyzed: 11/01/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: 0397-025
Lab Code: K1110402-011

Units: ug/L
Basis: NA

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1111095

Analyte Name	MRL	MDL	Sample Result	0397-025DUP KWG1111095-2 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	270	270	23000	22000	23000	5	30
Residual Range Organics (RRO)	530	530	580	570	570	3 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402
Date Prepared: 10/27/2011
Date Extracted: 10/31/2011
Date Analyzed: 11/01/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 1312/EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1111095

	Lab Control Sample KWG1111095-3 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	3370	3200	105	46-140
Residual Range Organics (RRO)	1410	1600	88	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

SPLP METALS

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INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K1110402
Project No.:	NA	**Date Collected:**	10/24/11
Project Name:	Longview	**Date Received:**	10/26/11
Matrix:	SPLP	**Units:**	mg/L
		Basis:	NA

Sample Name: 0397-021 **Lab Code:** K1110402-007

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010B	0.010	0.007	1.0	10/28/11	10/31/11	0.007	U	
Barium	6010B	1.0	0.1	1.0	10/28/11	10/31/11	5.2		
Cadmium	6010B	0.0050	0.0003	1.0	10/28/11	10/31/11	0.0003	U	
Chromium	6010B	0.005	0.003	1.0	10/28/11	10/31/11	0.004	J	
Lead	6010B	0.050	0.004	1.0	10/28/11	10/31/11	0.004	U	
Mercury	7470A	0.0010	0.0004	1.0	10/28/11	10/31/11	0.0004	U	
Selenium	6010B	0.10	0.02	1.0	10/28/11	10/31/11	0.02	U	
Silver	6010B	0.010	0.006	1.0	10/28/11	10/31/11	0.006	U	

% Solids: 0.0

Comments:

SPLP METALS

- 5A -

SPIKE SAMPLE RECOVERY

Client:	URS Corporation	**Service Request:**	K1110402
Project No.:	NA	**Units:**	MG/L
Project Name:	Longview	**Basis:**	NA
Matrix:	SPLP	**% Solids:**	0.0

Sample Name: 0397-021S **Lab Code:** K1110402-007S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	75 - 125	4.960		0.007	U	5.00	99.2		6010B
Barium	75 - 125	15.2		5.2		10.00	100.0		6010B
Cadmium	75 - 125	0.950		0.0003	U	1.00	95.0		6010B
Chromium	75 - 125	4.760		0.004	J	5.00	95.1		6010B
Lead	75 - 125	5.020		0.004	U	5.00	100.4		6010B
Mercury	75 - 125	0.0046		0.0004	U	0.005	92.0		7470A
Selenium	75 - 125	0.89		0.02	U	1.00	89.0		6010B
Silver	75 - 125	1.000		0.006	U	1.00	100.0		6010B

An empty field in the Control Limit column indicates the control limit is not applicable

SPLP METALS

- 5B -

POST SPIKE SAMPLE RECOVERY

Client: URS Corporation
Service Request: K1110402
Project No.: NA
Units: MG/L
Project Name: Longview
Basis: NA
Matrix: WATER

Sample Name: 0397-021A
Lab Code: K1110402-007A

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Mercury	85 - 115	0.0046		0.0004	U	0.0050	92.0		7470A

SPLP METALS

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DUPLICATES

Client:	URS Corporation	**Service Request:**	K1110402
Project No.:	NA	**Units:**	MG/L
Project Name:	Longview	**Basis:**	NA
Matrix:	SPLP	**% Solids:**	0.0

Sample Name: 0397-021D **Lab Code:** K1110402-007D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Arsenic		0.007	U	0.007	U			6010B
Barium	20	5.2		5.4		3.8		6010B
Cadmium		0.0003	U	0.0003	U			6010B
Chromium		0.004	J	0.004	J	0.0		6010B
Lead		0.004	U	0.004	U			6010B
Mercury		0.0004	U	0.0004	U			7470A
Selenium		0.02	U	0.02	U			6010B
Silver		0.006	U	0.006	U			6010B

An empty field in the Control Limit column indicates the control limit is not applicable.

SPLP METALS

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INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K1110402
Project No.:	NA	**Date Collected:**	10/24/11
Project Name:	Longview	**Date Received:**	10/26/11
Matrix:	SPLP	**Units:**	mg/L
		Basis:	NA

Sample Name: 0397-022 **Lab Code:** K1110402-008

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010B	0.010	0.007	1.0	10/28/11	10/31/11	0.007	U	
Barium	6010B	1.0	0.1	1.0	10/28/11	10/31/11	0.3	J	
Cadmium	6010B	0.0050	0.0003	1.0	10/28/11	10/31/11	0.0003	U	
Chromium	6010B	0.005	0.003	1.0	10/28/11	10/31/11	0.013		
Lead	6010B	0.050	0.004	1.0	10/28/11	10/31/11	0.004	U	
Mercury	7470A	0.0010	0.0004	1.0	10/28/11	10/31/11	0.0004	U	
Selenium	6010B	0.10	0.02	1.0	10/28/11	10/31/11	0.02	U	
Silver	6010B	0.010	0.006	1.0	10/28/11	10/31/11	0.006	U	

% Solids: 0.0

Comments:

SPLP METALS

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INORGANIC ANALYSIS DATA PACKAGE

Client:	URS Corporation	**Service Request:**	K1110402
Project No.:	NA	**Date Collected:**	
Project Name:	Longview	**Date Received:**	
Matrix:	SPLP	**Units:**	mg/L
		Basis:	NA

Sample Name: Method Blank **Lab Code:** K1110402-MB

Analyte	Analysis Method	MRL	MDL	Dil. Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010B	0.010	0.007	1.0	10/28/11	10/31/11	0.007	U	
Barium	6010B	1.0	0.1	1.0	10/28/11	10/31/11	0.1	U	
Cadmium	6010B	0.0050	0.0003	1.0	10/28/11	10/31/11	0.0003	U	
Chromium	6010B	0.005	0.003	1.0	10/28/11	10/31/11	0.003	U	
Lead	6010B	0.050	0.004	1.0	10/28/11	10/31/11	0.004	U	
Mercury	7470A	0.0010	0.0004	1.0	10/28/11	10/31/11	0.0004	U	
Selenium	6010B	0.10	0.02	1.0	10/28/11	10/31/11	0.02	U	
Silver	6010B	0.010	0.006	1.0	10/28/11	10/31/11	0.006	U	

% Solids: 0.0

Comments:

SPLP METALS

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LABORATORY CONTROL SAMPLE

Client: URS Corporation **Service Request:** K1110402

Project No.: NA

Project Name: Longview

Aqueous LCS Source: CAS MIXED **Solid LCS Source:**

Analyte	Aqueous: mg/L			Solid: mg/kg				
	True	Found	%R	True	Found	C	Limits	%R
Arsenic	5	4.930	98.6					
Barium	10	9.7	97.0					
Cadmium	1	0.972	97.2					
Chromium	5	4.850	97.0					
Lead	5	5.020	100.4					
Mercury	0.005	0.0047	94.0					
Selenium	1	0.89	89.0					
Silver	1	0.985	98.5					

Analytical Results

Client: URS Corporation
Project: Longview
Sample Matrix: Soil

Service Request: K1110402

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
0397-010	K1110402-001	10/24/2011	10/26/2011	10/27/2011	81.5	
0397-011	K1110402-002	10/24/2011	10/26/2011	10/27/2011	73.1	
0397-013	K1110402-003	10/24/2011	10/26/2011	10/27/2011	77.8	
0397-016	K1110402-004	10/24/2011	10/26/2011	10/27/2011	70.9	
0397-017	K1110402-005	10/24/2011	10/26/2011	10/27/2011	70.9	
0397-019	K1110402-006	10/24/2011	10/26/2011	10/27/2011	72.6	
0397-021	K1110402-007	10/24/2011	10/26/2011	10/27/2011	81.7	
0397-022	K1110402-008	10/24/2011	10/26/2011	10/27/2011	79.3	
0397-023	K1110402-009	10/24/2011	10/26/2011	10/27/2011	72.0	
0397-024	K1110402-010	10/24/2011	10/26/2011	10/27/2011	73.6	
0397-025	K1110402-011	10/24/2011	10/26/2011	10/27/2011	73.4	

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Analyzed:	10/27/2011

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
0397-010	K1110402-001	81.5	81.5	81.5	<1	

Client:	URS Corporation	**Service Request:**	K1110402
Project:	Longview	**Date Collected:**	10/24/2011
Sample Matrix:	Soil	**Date Received:**	10/26/2011
		Date Analyzed:	10/27/2011

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
0397-025	K1110402-011	73.4	73.5	73.5	<1	

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

January 25, 2012 Analytical Report for Service Request No: K1200448

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP URS Longview Solidification

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on January 18, 2012. For your reference, these analyses have been assigned our service request number K1200448.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/jw

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition* : Analyte was not detected and is reported as less tban the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1200448
Project:	IP Longview Solidification	**Date Received:**	1/18/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including sunumary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Three samples were received for analysis at Columbia Analytical Services on 1/18/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel and Residual Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Residual Range Organics (RRO) in sample Batch QC was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by EMW **Date** 1/25/12

Columbia Analytical Services
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp.

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: FedEx

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	TPH-DRO	PAH	Turn Around Time (working days)
0397-017 (2 HR)		2		X				X	1/17/12	9:45	X	X	1 week
0397-017 (7 HR)		2		X				X	1/17/12	9:53	X	X	1 week
0397-017 (24 HR)		2		X				X	1/17/12	11:55	X	X	1 week

MARKS

Please send results to:
Tommy Jordan
tjordan@kennon.com
Paul Kalina
paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

	Date	Time		Date	Time
Relinq. by sampler (Sign & Print Name) Stephen E. McClanahan	1/17/12	12:30	Received by (Sign & Print Name)	1/18/12	945
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Lab Work No.

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed

Client / Project: URS Corp Service Request *K12* 448

Received: 1/18/12 Opened: 1/18/12 By: BT Unloaded: 1/18/12 By: BT

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number	NA	Filed
-0.3	NIA	295				X

7. Packing material: *Inserts* *Baggies* (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

RUSH

Page ____ *of* ____

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-017 (2 HR)	K1200448-001	61	75	75
0397-017 (7 HR)	K1200448-002	70	80	83
0397-017 (24 HR)	K1200448-003	62	74	75
Method Blank	KWG1200673-3	71	74	86
Lab Control Sample	KWG1200673-1	74	81	87
Duplicate Lab Control Sample	KWG1200673-2	69	77	84

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	29-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1200673-3

Units: ng/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**2.5**	J	3.4	0.71	1	01/19/12	01/21/12	KWG1200673	
2-Methylnaphthalene	**0.64**	J	3.4	0.40	1	01/19/12	01/21/12	KWG1200673	
Acenaphthylene	ND	U	3.4	0.37	1	01/19/12	01/21/12	KWG1200673	
Acenaphthene	ND	U	3.4	0.36	1	01/19/12	01/21/12	KWG1200673	
Dibenzofuran	ND	U	3.4	0.42	1	01/19/12	01/21/12	KWG1200673	
Fluorene	ND	U	3.4	0.42	1	01/19/12	01/21/12	KWG1200673	
Phenanthrene	**1.6**	J	3.4	0.72	1	01/19/12	01/21/12	KWG1200673	
Anthracene	ND	U	3.4	0.29	1	01/19/12	01/21/12	KWG1200673	
Fluoranthene	**0.48**	J	3.4	0.46	1	01/19/12	01/21/12	KWG1200673	
Pyrene	ND	U	3.4	0.78	1	01/19/12	01/21/12	KWG1200673	
Benz(a)anthracene	ND	U	3.4	0.34	1	01/19/12	01/21/12	KWG1200673	
Chrysene	ND	U	3.4	0.65	1	01/19/12	01/21/12	KWG1200673	
Benzo(b)fluoranthene	ND	U	3.4	0.25	1	01/19/12	01/21/12	KWG1200673	
Benzo(k)fluoranthene	ND	U	3.4	0.41	1	01/19/12	01/21/12	KWG1200673	
Benzo(a)pyrene	ND	U	3.4	0.41	1	01/19/12	01/21/12	KWG1200673	
Indeno(1,2,3-cd)pyrene	ND	U	3.4	0.44	1	01/19/12	01/21/12	KWG1200673	
Dibenz(a,h)anthracene	ND	U	3.4	0.45	1	01/19/12	01/21/12	KWG1200673	
Benzo(g,h,i)perylene	ND	U	3.4	0.36	1	01/19/12	01/21/12	KWG1200673	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	71	29-98	01/21/12	Acceptable
Fluoranthene-d10	74	31-105	01/21/12	Acceptable
Terphenyl-d14	86	27-112	01/21/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Collected: 01/17/2012
Date Received: 01/18/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017 (2 HR)
Lab Code: K1200448-001

Units: ng/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**7000**	D	36	7.4	10	01/19/12	01/23/12	KWG1200673	
2-Methylnaphthalene	**890**		3.6	0.42	1	01/19/12	01/21/12	KWG1200673	
Acenaphthylene	**40**		3.6	0.39	1	01/19/12	01/21/12	KWG1200673	
Acenaphthene	**1200**		3.6	0.38	1	01/19/12	01/21/12	KWG1200673	
Dibenzofuran	**840**		3.6	0.44	1	01/19/12	01/21/12	KWG1200673	
Fluorene	**670**		3.6	0.44	1	01/19/12	01/21/12	KWG1200673	
Phenanthrene	**4200**	D	36	7.5	10	01/19/12	01/23/12	KWG1200673	
Anthracene	**590**		3.6	0.30	1	01/19/12	01/21/12	KWG1200673	
Fluoranthene	**2400**	D	36	4.8	10	01/19/12	01/23/12	KWG1200673	
Pyrene	**1300**		3.6	0.81	1	01/19/12	01/21/12	KWG1200673	
Benz(a)anthracene	**390**		3.6	0.36	1	01/19/12	01/21/12	KWG1200673	
Chrysene	**360**		3.6	0.68	1	01/19/12	01/21/12	KWG1200673	
Benzo(b)fluoranthene	**200**		3.6	0.26	1	01/19/12	01/21/12	KWG1200673	
Benzo(k)fluoranthene	**78**		3.6	0.43	1	01/19/12	01/21/12	KWG1200673	
Benzo(a)pyrene	**100**		3.6	0.43	1	01/19/12	01/21/12	KWG1200673	
Indeno(1,2,3-cd)pyrene	**50**		3.6	0.46	1	01/19/12	01/21/12	KWG1200673	
Dibenz(a,h)anthracene	**21**		3.6	0.47	1	01/19/12	01/21/12	KWG1200673	
Benzo(g,h,i)perylene	**41**		3.6	0.38	1	01/19/12	01/21/12	KWG1200673	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	61	29-98	01/21/12	Acceptable
Fluoranthene-d10	75	31-105	01/21/12	Acceptable
Terphenyl-d14	75	27-112	01/21/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Collected: 01/17/2012
Date Received: 01/18/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017 (7 HR)
Lab Code: K1200448-002

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**23000**	D	68	15	20	01/19/12	01/23/12	KWG1200673	
2-Methylnaphthalene	**3100**	D	68	8.0	20	01/19/12	01/23/12	KWG1200673	
Acenaphthylene	**57**		3.4	0.37	1	01/19/12	01/21/12	KWG1200673	
Acenaphthene	**3100**	D	68	7.2	20	01/19/12	01/23/12	KWG1200673	
Dibenzofuran	**1700**		3.4	0.42	1	01/19/12	01/21/12	KWG1200673	
Fluorene	**1300**		3.4	0.42	1	01/19/12	01/21/12	KWG1200673	
Phenanthrene	**4500**	D	68	15	20	01/19/12	01/23/12	KWG1200673	
Anthracene	**540**		3.4	0.29	1	01/19/12	01/21/12	KWG1200673	
Fluoranthene	**1100**		3.4	0.46	1	01/19/12	01/21/12	KWG1200673	
Pyrene	**690**		3.4	0.78	1	01/19/12	01/21/12	KWG1200673	
Benz(a)anthracene	**120**		3.4	0.34	1	01/19/12	01/21/12	KWG1200673	
Chrysene	**120**		3.4	0.65	1	01/19/12	01/21/12	KWG1200673	
Benzo(b)fluoranthene	**55**		3.4	0.25	1	01/19/12	01/21/12	KWG1200673	
Benzo(k)fluoranthene	**19**		3.4	0.41	1	01/19/12	01/21/12	KWG1200673	
Benzo(a)pyrene	**31**		3.4	0.41	1	01/19/12	01/21/12	KWG1200673	
Indeno(1,2,3-cd)pyrene	**10**		3.4	0.44	1	01/19/12	01/21/12	KWG1200673	
Dibenz(a,h)anthracene	**3.4**		3.4	0.45	1	01/19/12	01/21/12	KWG1200673	
Benzo(g,h,i)perylene	**8.8**		3.4	0.36	1	01/19/12	01/21/12	KWG1200673	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	70	29-98	01/21/12	Acceptable
Fluoranthene-d10	80	31-105	01/21/12	Acceptable
Terphenyl-d14	83	27-112	01/21/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Collected: 01/17/2012
Date Received: 01/18/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017 (24 HR)
Lab Code: K1200448-003

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**84000**	D	180	37	50	01/19/12	01/23/12	KWG1200673	
2-Methylnaphthalene	**11000**	D	180	21	50	01/19/12	01/23/12	KWG1200673	
Acenaphthylene	**130**		3.6	0.39	1	01/19/12	01/21/12	KWG1200673	
Acenaphthene	**8900**	D	180	19	50	01/19/12	01/23/12	KWG1200673	
Dibenzofuran	**5400**	D	180	22	50	01/19/12	01/23/12	KWG1200673	
Fluorene	**3400**	D	180	22	50	01/19/12	01/23/12	KWG1200673	
Phenanthrene	**9000**	D	180	38	50	01/19/12	01/23/12	KWG1200673	
Anthracene	**1100**		3.6	0.30	1	01/19/12	01/21/12	KWG1200673	
Fluoranthene	**1700**		3.6	0.48	1	01/19/12	01/21/12	KWG1200673	
Pyrene	**1100**		3.6	0.81	1	01/19/12	01/21/12	KWG1200673	
Benz(a)anthracene	**140**		3.6	0.36	1	01/19/12	01/21/12	KWG1200673	
Chrysene	**120**		3.6	0.68	1	01/19/12	01/21/12	KWG1200673	
Benzo(b)fluoranthene	**52**		3.6	0.26	1	01/19/12	01/21/12	KWG1200673	
Benzo(k)fluoranthene	**19**		3.6	0.43	1	01/19/12	01/21/12	KWG1200673	
Benzo(a)pyrene	**29**		3.6	0.43	1	01/19/12	01/21/12	KWG1200673	
Indeno(1,2,3-cd)pyrene	**11**		3.6	0.46	1	01/19/12	01/21/12	KWG1200673	
Dibenz(a,h)anthracene	**3.2**	J	3.6	0.47	1	01/19/12	01/21/12	KWG1200673	
Benzo(g,h,i)perylene	**8.9**		3.6	0.38	1	01/19/12	01/21/12	KWG1200673	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	62	29-98	01/21/12	Acceptable
Fluoranthene-d10	74	31-105	01/21/12	Acceptable
Terphenyl-d14	75	27-112	01/21/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Extracted: 01/19/2012
Date Analyzed: 01/21/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA
Level: Low
Extraction Lot: KWG1200673

	Lab Control Sample KWG1200673-1 Lab Control Spike			Duplicate Lab Control Sample KWG1200673-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	383	500	77	360	500	72	39-110	6	30
2-Methylnaphthalene	392	500	78	362	500	72	39-115	8	30
Acenaphthylene	430	500	86	396	500	79	44-115	8	30
Acenaphthene	408	500	82	375	500	75	44-113	8	30
Dibenzofuran	420	500	84	385	500	77	46-116	9	30
Fluorene	409	500	82	377	500	75	48-118	8	30
Phenanthrene	416	500	83	383	500	77	47-120	8	30
Anthracene	428	500	86	393	500	79	44-117	9	30
Fluoranthene	425	500	85	405	500	81	48-128	5	30
Pyrene	465	500	93	440	500	88	42-133	5	30
Benz(a)anthracene	439	500	88	408	500	82	48-125	7	30
Chrysene	449	500	90	423	500	85	50-128	6	30
Benzo(b)fluoranthene	454	500	91	429	500	86	49-131	6	30
Benzo(k)fluoranthene	461	500	92	443	500	89	54-131	4	30
Benzo(a)pyrene	445	500	89	422	500	84	43-134	5	30
Indeno(1,2,3-cd)pyrene	393	500	79	380	500	76	45-133	3	30
Dibenz(a,h)anthracene	344	500	69	327	500	65	49-133	5	30
Benzo(g,h,i)perylene	420	500	84	395	500	79	51-124	6	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
Batch QC	K1200435-003	93	97
0397-017 (2 HR)	K1200448-001	103	106
0397-017 (7 HR)	K1200448-002	104	107
0397-017 (24 HR)	K1200448-003	103	109
Batch QCDUP	KWG1200768-1	97	104
Method Blank	KWG1200768-3	109	113
Lab Control Sample	KWG1200768-2	115	112

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1200768-3

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	01/20/12	01/24/12	KWG1200768	
Residual Range Organics (RRO)	ND	U	500	1	01/20/12	01/24/12	KWG1200768	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	109	50-150	01/24/12	Acceptable
n-Triacontane	113	50-150	01/24/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Collected: 01/17/2012
Date Received: 01/18/2012

Diesel and Residual Range Organics

Sample Name: 0397-017 (2 HR)
Lab Code: K1200448-001

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	260	1	01/20/12	01/24/12	KWG1200768	
Residual Range Organics (RRO)	ND	U	520	1	01/20/12	01/24/12	KWG1200768	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	103	50-150	01/24/12	Acceptable
n-Triacontane	106	50-150	01/24/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1200448
Project:	IP URS Longview Solidification	**Date Collected:**	01/17/2012
Sample Matrix:	Water	**Date Received:**	01/18/2012

Diesel and Residual Range Organics

Sample Name:	0397-017 (7 HR)	**Units:**	ug/L
Lab Code:	K1200448-002	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	300	1	01/20/12	01/24/12	KWG1200768	
Residual Range Organics (RRO)	ND	U	600	1	01/20/12	01/24/12	KWG1200768	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	104	50-150	01/24/12	Acceptable
n-Triacontane	107	50-150	01/24/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Collected: 01/17/2012
Date Received: 01/18/2012

Diesel and Residual Range Organics

Sample Name: 0397-017 (24 HR)
Lab Code: K1200448-003

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	500	Z	290	1	01/20/12	01/24/12	KWG1200768	
Residual Range Organics (RRO)	ND	U	570	1	01/20/12	01/24/12	KWG1200768	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	103	50-150	01/24/12	Acceptable
n-Triacontane	109	50-150	01/24/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200448
Date Extracted: 01/20/2012
Date Analyzed: 01/24/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1200435-003

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1200768

Analyte Name	MRL	Sample Result	Batch QCDUP KWG1200768-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	250	ND	NC	NC	30
Residual Range Organics (RRO)	520	600	600	600	0 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	URS Corporation	**Service Request:**	K1200448
Project:	IP URS Longview Solidification	**Date Extracted:**	01/20/2012
Sample Matrix:	Water	**Date Analyzed:**	01/24/2012

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	Method	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1200768

	Lab Control Sample KWG1200768-2 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	2010	1600	125	46-140
Residual Range Organics (RRO)	899	800	112	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

January 27, 2012 Analytical Report for Service Request No: K1200585

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
paul_kalina@urscorp.com
Seattle, WA 98101

RE: IP URS Longview Solidification

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on January 21, 2012. For your reference, these analyses have been assigned our service request number K1200585.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/jw

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.1 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1200585
Project:	IP Longview Solidification	**Date Received:**	1/21/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Three water samples were received for analysis at Columbia Analytical Services on 1/21/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by EMW **Date** 1/27/12

Columbia Analytical Services
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp.

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: FEDEX

Special Detection Limit/Reporting

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	TPH-DRO NWTPH-DX	PAH 8270 SIM	Turn Around Time (working days)
0397-017 (2-Day)		2		X				X	1/19/12	13:10	X	X	1 week
0397-017 (3-Day)		2		X				X	1/19/12	13:18	X	X	1 week
0397-017 (4-Day)		2		X				X	1/20/12	10:32	X	X	1 week

Please send results to:
Tommy Jordan
tjordan@kennon.com
Paul Kalina
paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)	Date	Time
Jill Suhm	1/20/12	16:30		1/21/12	930
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Lab Work No.: K1200585

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC EA

Client / Project: URS Service Request K12 00 585

Received: 1/21/12 Opened: 1/21/12 By: BT Unloaded: 1/21/12 By: BT

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number	NA	Filed
0.6		289				X

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y (N)
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
ALL					✓	HCL	2 mls	20110620231	BT	1145

Notes, Discrepancies, & Resolutions: _____

Page ____ *of* ____

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-017 (2-Day)	K1200585-001	76	81	93
0397-017 (3-Day)	K1200585-002	77	84	93
0397-017 (4-Day)	K1200585-003	78	84	93
Method Blank	KWG1200760-3	81	80	93
Lab Control Sample	KWG1200760-1	79	80	86
Duplicate Lab Control Sample	KWG1200760-2	80	83	87

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	28-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1200760-3

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.020	0.0030	1	01/23/12	01/25/12	KWG1200760	
2-Methylnaphthalene	ND	U	0.020	0.0023	1	01/23/12	01/25/12	KWG1200760	
Acenaphthylene	ND	U	0.020	0.0034	1	01/23/12	01/25/12	KWG1200760	
Acenaphthene	ND	U	0.020	0.0044	1	01/23/12	01/25/12	KWG1200760	
Dibenzofuran	ND	U	0.020	0.0046	1	01/23/12	01/25/12	KWG1200760	
Fluorene	ND	U	0.020	0.0038	1	01/23/12	01/25/12	KWG1200760	
Phenanthrene	ND	U	0.020	0.0050	1	01/23/12	01/25/12	KWG1200760	
Anthracene	ND	U	0.020	0.0036	1	01/23/12	01/25/12	KWG1200760	
Fluoranthene	ND	U	0.020	0.0044	1	01/23/12	01/25/12	KWG1200760	
Pyrene	ND	U	0.020	0.0035	1	01/23/12	01/25/12	KWG1200760	
Benz(a)anthracene	ND	U	0.020	0.0026	1	01/23/12	01/25/12	KWG1200760	
Chrysene	ND	U	0.020	0.0034	1	01/23/12	01/25/12	KWG1200760	
Benzo(b)fluoranthene	ND	U	0.020	0.0023	1	01/23/12	01/25/12	KWG1200760	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	01/23/12	01/25/12	KWG1200760	
Benzo(a)pyrene	ND	U	0.020	0.0043	1	01/23/12	01/25/12	KWG1200760	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0026	1	01/23/12	01/25/12	KWG1200760	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	01/23/12	01/25/12	KWG1200760	
Benzo(g,h,i)perylene	ND	U	0.020	0.0029	1	01/23/12	01/25/12	KWG1200760	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	81	28-98	01/25/12	Acceptable
Fluoranthene-d10	80	31-105	01/25/12	Acceptable
Terphenyl-d14	93	27-112	01/25/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1200585
Project:	IP URS Longview Solidification	**Date Collected:**	01/19/2012
Sample Matrix:	Water	**Date Received:**	01/21/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-017 (2-Day)	**Units:**	ug/L
Lab Code:	K1200585-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**110**	D	0.44	0.065	20	01/23/12	01/25/12	KWG1200760	
2-Methylnaphthalene	**13**	D	0.44	0.050	20	01/23/12	01/25/12	KWG1200760	
Acenaphthylene	**0.19**		0.022	0.0037	1	01/23/12	01/25/12	KWG1200760	
Acenaphthene	**11**	D	0.44	0.095	20	01/23/12	01/25/12	KWG1200760	
Dibenzofuran	**6.3**		0.022	0.0050	1	01/23/12	01/25/12	KWG1200760	
Fluorene	**4.6**		0.022	0.0041	1	01/23/12	01/25/12	KWG1200760	
Phenanthrene	**11**	D	0.44	0.11	20	01/23/12	01/25/12	KWG1200760	
Anthracene	**1.2**		0.022	0.0039	1	01/23/12	01/25/12	KWG1200760	
Fluoranthene	**2.0**		0.022	0.0048	1	01/23/12	01/25/12	KWG1200760	
Pyrene	**1.3**		0.022	0.0038	1	01/23/12	01/25/12	KWG1200760	
Benz(a)anthracene	**0.092**		0.022	0.0028	1	01/23/12	01/25/12	KWG1200760	
Chrysene	**0.052**		0.022	0.0037	1	01/23/12	01/25/12	KWG1200760	
Benzo(b)fluoranthene	**0.014**	J	0.022	0.0025	1	01/23/12	01/25/12	KWG1200760	
Benzo(k)fluoranthene	**0.0060**	J	0.022	0.0027	1	01/23/12	01/25/12	KWG1200760	
Benzo(a)pyrene	**0.0062**	J	0.022	0.0047	1	01/23/12	01/25/12	KWG1200760	
Indeno(1,2,3-cd)pyrene	**0.0045**	J	0.022	0.0028	1	01/23/12	01/25/12	KWG1200760	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	01/23/12	01/25/12	KWG1200760	
Benzo(g,h,i)perylene	**0.0066**	J	0.022	0.0032	1	01/23/12	01/25/12	KWG1200760	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	28-98	01/25/12	Acceptable
Fluoranthene-d10	81	31-105	01/25/12	Acceptable
Terphenyl-d14	93	27-112	01/25/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585
Date Collected: 01/19/2012
Date Received: 01/21/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017 (3-Day)
Lab Code: K1200585-002

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**150**	D	0.46	0.069	20	01/23/12	01/25/12	KWG1200760	
2-Methylnaphthalene	**19**	D	0.46	0.053	20	01/23/12	01/25/12	KWG1200760	
Acenaphthylene	**0.23**		0.023	0.0039	1	01/23/12	01/25/12	KWG1200760	
Acenaphthene	**15**	D	0.46	0.10	20	01/23/12	01/25/12	KWG1200760	
Dibenzofuran	**8.0**		0.023	0.0053	1	01/23/12	01/25/12	KWG1200760	
Fluorene	**5.5**		0.023	0.0044	1	01/23/12	01/25/12	KWG1200760	
Phenanthrene	**13**	D	0.46	0.12	20	01/23/12	01/25/12	KWG1200760	
Anthracene	**1.4**		0.023	0.0041	1	01/23/12	01/25/12	KWG1200760	
Fluoranthene	**2.2**		0.023	0.0050	1	01/23/12	01/25/12	KWG1200760	
Pyrene	**1.3**		0.023	0.0040	1	01/23/12	01/25/12	KWG1200760	
Benz(a)anthracene	**0.091**		0.023	0.0030	1	01/23/12	01/25/12	KWG1200760	
Chrysene	**0.058**		0.023	0.0039	1	01/23/12	01/25/12	KWG1200760	
Benzo(b)fluoranthene	**0.014**	J	0.023	0.0027	1	01/23/12	01/25/12	KWG1200760	
Benzo(k)fluoranthene	**0.0048**	J	0.023	0.0029	1	01/23/12	01/25/12	KWG1200760	
Benzo(a)pyrene	**0.0069**	J	0.023	0.0049	1	01/23/12	01/25/12	KWG1200760	
Indeno(1,2,3-cd)pyrene	ND	U	0.023	0.0030	1	01/23/12	01/25/12	KWG1200760	
Dibenz(a,h)anthracene	ND	U	0.023	0.0029	1	01/23/12	01/25/12	KWG1200760	
Benzo(g,h,i)perylene	ND	U	0.023	0.0033	1	01/23/12	01/25/12	KWG1200760	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	77	28-98	01/25/12	Acceptable
Fluoranthene-d10	84	31-105	01/25/12	Acceptable
Terphenyl-d14	93	27-112	01/25/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585
Date Collected: 01/20/2012
Date Received: 01/21/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017 (4-Day)
Lab Code: K1200585-003

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**140**	D	0.42	0.062	20	01/23/12	01/25/12	KWG1200760	
2-Methylnaphthalene	**19**	D	0.42	0.048	20	01/23/12	01/25/12	KWG1200760	
Acenaphthylene	**0.22**		0.021	0.0036	1	01/23/12	01/25/12	KWG1200760	
Acenaphthene	**14**	D	0.42	0.091	20	01/23/12	01/25/12	KWG1200760	
Dibenzofuran	**7.7**		0.021	0.0048	1	01/23/12	01/25/12	KWG1200760	
Fluorene	**5.0**		0.021	0.0040	1	01/23/12	01/25/12	KWG1200760	
Phenanthrene	**12**	D	0.42	0.11	20	01/23/12	01/25/12	KWG1200760	
Anthracene	**1.2**		0.021	0.0038	1	01/23/12	01/25/12	KWG1200760	
Fluoranthene	**2.0**		0.021	0.0046	1	01/23/12	01/25/12	KWG1200760	
Pyrene	**1.3**		0.021	0.0037	1	01/23/12	01/25/12	KWG1200760	
Benz(a)anthracene	**0.079**		0.021	0.0027	1	01/23/12	01/25/12	KWG1200760	
Chrysene	**0.056**		0.021	0.0036	1	01/23/12	01/25/12	KWG1200760	
Benzo(b)fluoranthene	**0.015**	J	0.021	0.0024	1	01/23/12	01/25/12	KWG1200760	
Benzo(k)fluoranthene	**0.0055**	J	0.021	0.0026	1	01/23/12	01/25/12	KWG1200760	
Benzo(a)pyrene	**0.0066**	J	0.021	0.0045	1	01/23/12	01/25/12	KWG1200760	
Indeno(1,2,3-cd)pyrene	ND	U	0.021	0.0027	1	01/23/12	01/25/12	KWG1200760	
Dibenz(a,h)anthracene	ND	U	0.021	0.0026	1	01/23/12	01/25/12	KWG1200760	
Benzo(g,h,i)perylene	ND	U	0.021	0.0030	1	01/23/12	01/25/12	KWG1200760	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	78	28-98	01/25/12	Acceptable
Fluoranthene-d10	84	31-105	01/25/12	Acceptable
Terphenyl-d14	93	27-112	01/25/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585
Date Extracted: 01/23/2012
Date Analyzed: 01/25/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1200760

	Lab Control Sample KWG1200760-1 Lab Control Spike			Duplicate Lab Control Sample KWG1200760-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	1.95	2.50	78	1.87	2.50	75	39-110	4	30
2-Methylnaphthalene	1.93	2.50	77	1.82	2.50	73	39-115	6	30
Acenaphthylene	2.20	2.50	88	2.15	2.50	86	44-115	2	30
Acenaphthene	2.05	2.50	82	2.01	2.50	80	44-113	2	30
Dibenzofuran	2.12	2.50	85	2.11	2.50	84	46-116	0	30
Fluorene	2.17	2.50	87	2.13	2.50	85	48-118	2	30
Phenanthrene	2.13	2.50	85	2.15	2.50	86	47-120	1	30
Anthracene	2.16	2.50	86	2.17	2.50	87	44-117	1	30
Fluoranthene	2.21	2.50	88	2.28	2.50	91	48-128	3	30
Pyrene	2.44	2.50	97	2.43	2.50	97	42-133	0	30
Benz(a)anthracene	2.22	2.50	89	2.20	2.50	88	48-125	1	30
Chrysene	2.33	2.50	93	2.31	2.50	92	50-128	1	30
Benzo(b)fluoranthene	2.29	2.50	91	2.33	2.50	93	49-131	2	30
Benzo(k)fluoranthene	2.41	2.50	96	2.42	2.50	97	54-131	0	30
Benzo(a)pyrene	2.35	2.50	94	2.34	2.50	94	43-134	0	30
Indeno(1,2,3-cd)pyrene	2.08	2.50	83	2.10	2.50	84	45-133	1	30
Dibenz(a,h)anthracene	1.89	2.50	76	1.97	2.50	79	49-133	4	30
Benzo(g,h,i)perylene	2.05	2.50	82	2.09	2.50	83	51-124	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-017 (2-Day)	K1200585-001	100	98
0397-017 (3-Day)	K1200585-002	103	104
0397-017 (4-Day)	K1200585-003	106	110
Method Blank	KWG1200867-3	107	107
Lab Control Sample	KWG1200867-1	108	111
Duplicate Lab Control Sample	KWG1200867-2	107	109

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1200585
Project:	IP URS Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1200867-3	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	01/24/12	01/26/12	KWG1200867	
Residual Range Organics (RRO)	ND	U	500	19	1	01/24/12	01/26/12	KWG1200867	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	107	50-150	01/26/12	Acceptable
n-Triacontane	107	50-150	01/26/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1200585
Project:	IP URS Longview Solidification	**Date Collected:**	01/19/2012
Sample Matrix:	Water	**Date Received:**	01/21/2012

Diesel and Residual Range Organics

Sample Name:	0397-017 (2-Day)	**Units:**	ug/L
Lab Code:	K1200585-001	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**550**	Z	280	12	1	01/24/12	01/26/12	KWG1200867	
Residual Range Organics (RRO)	**75**	J	550	21	1	01/24/12	01/26/12	KWG1200867	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	100	50-150	01/26/12	Acceptable
n-Triacontane	98	50-150	01/26/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1200585
Project:	IP URS Longview Solidification	**Date Collected:**	01/19/2012
Sample Matrix:	Water	**Date Received:**	01/21/2012

Diesel and Residual Range Organics

Sample Name:	0397-017 (3-Day)	**Units:**	ug/L
Lab Code:	K1200585-002	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**600**	Z	280	12	1	01/24/12	01/26/12	KWG1200867	
Residual Range Organics (RRO)	**53**	J	550	21	1	01/24/12	01/26/12	KWG1200867	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	103	50-150	01/26/12	Acceptable
n-Triacontane	104	50-150	01/26/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585
Date Collected: 01/20/2012
Date Received: 01/21/2012

Diesel and Residual Range Organics

Sample Name: 0397-017 (4-Day)
Lab Code: K1200585-003

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**660**	Z	270	12	1	01/24/12	01/26/12	KWG1200867	
Residual Range Organics (RRO)	**55**	J	530	20	1	01/24/12	01/26/12	KWG1200867	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	106	50-150	01/26/12	Acceptable
n-Triacontane	110	50-150	01/26/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200585
Date Extracted: 01/24/2012
Date Analyzed: 01/26/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1200867

	Lab Control Sample KWG1200867-1 Lab Control Spike			Duplicate Lab Control Sample KWG1200867-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1780	1600	111	1730	1600	108	46-140	3	30
Residual Range Organics (RRO)	790	800	99	775	800	97	45-159	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

February 1, 2012 Analytical Report for Service Request No: K1200691

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP URS Longview Solidification

Dear Paul:

Enclosed are the results of the rush sample submitted to our laboratory on January 25, 2012. For your reference, these analyses have been assigned our service request number K1200691.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at EWallace@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/ln

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1200691
Project:	IP Longview Solidification	**Date Received:**	1/25/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

One water sample was received for analysis at Columbia Analytical Services on 1/25/12. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel and Residual Range Organics by NWTPH-Dx

No anomalies with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

The following analytes could not be adequately resolved in sample 0397-017(5-day): Benzo(b)fluoranthene and Benzo(k)fluoranthene. The results for these compounds were integrated together and reported as Benzo(b)fluoranthene. The results for both analytes were flagged with "X" to indicate the issue.

Approved by Eww Date 2/2/12

K1200691

CHAIN of CUSTODY

Page 1 of 1

Columbia Analytical Services
800.695.7222
www.caslab.com

Client: URS Corp.

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: FED EX

Special Detection Limit/Reporting: Paul Kalina request ultra low level 8270 SIM. 11/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	TPH-DRO NW TPH-DX	PAH 8270 SIM												Turn Around Time (working days)
0397-017 (5-day)		2		X					1/23/12	1235	+	+												1 week

MARKS: Please send results to: Tommy Jordan tjordan@kenrar.com
Paul Kalina paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Stephen E. McClanahan	1/23/12		Gregg LaFon ALS 1/24/12 @ 0940
Relinquished by: Amy Hertschke	1/24/12	1800	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory — Date 1/25/12 Time 10:20

Lab Work No.

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed

Client / Project: URS Service Request K12 691

Received: 1/25/12 Opened: 1/25/12 By: BT Unloaded: 1/25/12 By: BT

1. Samples were received via? *Mail* *Fed Ex* (*UPS*) *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number NA	Filed
0.7	N/M	289		1Z17W4381348528493	

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Notes, Discrepancies, & Resolutions:*_____

RUSH

Page ____ *of* ____

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200691

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-017(5-day)	K1200691-001	75	80	82
Method Blank	KWG1200865-3	82	86	92
Lab Control Sample	KWG1200865-1	77	81	83
Duplicate Lab Control Sample	KWG1200865-2	76	80	81

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	28-98
Sur2 = Fluoranthene-d10	31-105
Sur3 = Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200691
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1200865-3

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.020	0.0030	1	01/25/12	01/30/12	KWG1200865	
2-Methylnaphthalene	**0.0038**	J	0.020	0.0023	1	01/25/12	01/30/12	KWG1200865	
Acenaphthylene	ND	U	0.020	0.0034	1	01/25/12	01/30/12	KWG1200865	
Acenaphthene	ND	U	0.020	0.0044	1	01/25/12	01/30/12	KWG1200865	
Dibenzofuran	ND	U	0.020	0.0046	1	01/25/12	01/30/12	KWG1200865	
Fluorene	ND	U	0.020	0.0038	1	01/25/12	01/30/12	KWG1200865	
Phenanthrene	ND	U	0.020	0.0050	1	01/25/12	01/30/12	KWG1200865	
Anthracene	ND	U	0.020	0.0036	1	01/25/12	01/30/12	KWG1200865	
Fluoranthene	ND	U	0.020	0.0044	1	01/25/12	01/30/12	KWG1200865	
Pyrene	ND	U	0.020	0.0035	1	01/25/12	01/30/12	KWG1200865	
Benz(a)anthracene	**0.0030**	J	0.020	0.0026	1	01/25/12	01/30/12	KWG1200865	
Chrysene	ND	U	0.020	0.0034	1	01/25/12	01/30/12	KWG1200865	
Benzo(b)fluoranthene	ND	U	0.020	0.0023	1	01/25/12	01/30/12	KWG1200865	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	01/25/12	01/30/12	KWG1200865	
Benzo(a)pyrene	ND	U	0.020	0.0043	1	01/25/12	01/30/12	KWG1200865	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0026	1	01/25/12	01/30/12	KWG1200865	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	01/25/12	01/30/12	KWG1200865	
Benzo(g,h,i)perylene	ND	U	0.020	0.0029	1	01/25/12	01/30/12	KWG1200865	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	82	28-98	01/30/12	Acceptable
Fluoranthene-d10	86	31-105	01/30/12	Acceptable
Terphenyl-d14	92	27-112	01/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200691
Date Collected: 01/23/2012
Date Received: 01/25/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017(5-day)
Lab Code: K1200691-001

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**68**	D	0.43	0.064	20	01/25/12	01/31/12	KWG1200865	
2-Methylnaphthalene	**8.9**		0.022	0.0025	1	01/25/12	01/30/12	KWG1200865	
Acenaphthylene	**0.13**		0.022	0.0037	1	01/25/12	01/30/12	KWG1200865	
Acenaphthene	**8.3**		0.022	0.0047	1	01/25/12	01/30/12	KWG1200865	
Dibenzofuran	**5.0**	D	0.43	0.098	20	01/25/12	01/31/12	KWG1200865	
Fluorene	**3.5**		0.022	0.0041	1	01/25/12	01/30/12	KWG1200865	
Phenanthrene	**10**		0.022	0.0054	1	01/25/12	01/30/12	KWG1200865	
Anthracene	**0.30**		0.022	0.0039	1	01/25/12	01/30/12	KWG1200865	
Fluoranthene	**2.1**		0.022	0.0047	1	01/25/12	01/30/12	KWG1200865	
Pyrene	**1.1**		0.022	0.0038	1	01/25/12	01/30/12	KWG1200865	
Benz(a)anthracene	**0.12**		0.022	0.0028	1	01/25/12	01/30/12	KWG1200865	
Chrysene	**0.092**		0.022	0.0037	1	01/25/12	01/30/12	KWG1200865	
Benzo(b)fluoranthene	**0.040**	X	0.022	0.0025	1	01/25/12	01/30/12	KWG1200865	
Benzo(k)fluoranthene	ND	UX	0.022	0.0027	1	01/25/12	01/30/12	KWG1200865	
Benzo(a)pyrene	**0.012**	J	0.022	0.0046	1	01/25/12	01/30/12	KWG1200865	
Indeno(1,2,3-cd)pyrene	**0.0088**	J	0.022	0.0028	1	01/25/12	01/30/12	KWG1200865	
Dibenz(a,h)anthracene	ND	U	0.022	0.0027	1	01/25/12	01/30/12	KWG1200865	
Benzo(g,h,i)perylene	**0.0065**	J	0.022	0.0031	1	01/25/12	01/30/12	KWG1200865	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	75	28-98	01/30/12	Acceptable
Fluoranthene-d10	80	31-105	01/30/12	Acceptable
Terphenyl-d14	82	27-112	01/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200691
Date Extracted: 01/25/2012
Date Analyzed: 01/30/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1200865

Analyte Name	Lab Control Sample KWG1200865-1 Lab Control Spike Result	Expected	%Rec	Duplicate Lab Control Sample KWG1200865-2 Duplicate Lab Control Spike Result	Expected	%Rec	%Rec Limits	RPD	RPD Limit
Naphthalene	2.03	2.50	81	1.94	2.50	78	39-110	5	30
2-Methylnaphthalene	2.08	2.50	83	1.99	2.50	80	39-115	4	30
Acenaphthylene	2.21	2.50	89	2.07	2.50	83	44-115	7	30
Acenaphthene	2.08	2.50	83	1.98	2.50	79	44-113	5	30
Dibenzofuran	2.16	2.50	86	2.05	2.50	82	46-116	5	30
Fluorene	2.19	2.50	88	2.07	2.50	83	48-118	6	30
Phenanthrene	2.13	2.50	85	1.99	2.50	79	47-120	7	30
Anthracene	1.78	2.50	71	1.78	2.50	71	44-117	0	30
Fluoranthene	2.27	2.50	91	2.17	2.50	87	48-128	4	30
Pyrene	2.16	2.50	86	2.09	2.50	83	42-133	3	30
Benz(a)anthracene	2.20	2.50	88	2.07	2.50	83	48-125	6	30
Chrysene	2.29	2.50	92	2.16	2.50	87	50-128	6	30
Benzo(b)fluoranthene	2.29	2.50	92	2.15	2.50	86	49-131	6	30
Benzo(k)fluoranthene	2.33	2.50	93	2.20	2.50	88	54-131	5	30
Benzo(a)pyrene	2.31	2.50	92	2.20	2.50	88	43-134	5	30
Indeno(1,2,3-cd)pyrene	2.27	2.50	91	2.20	2.50	88	45-133	3	30
Dibenz(a,h)anthracene	2.27	2.50	91	2.16	2.50	87	49-133	5	30
Benzo(g,h,i)perylene	2.10	2.50	84	2.02	2.50	81	51-124	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1200691

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-017(5-day)	K1200691-001	115	116
Method Blank	KWG1200941-3	111	109
Lab Control Sample	KWG1200941-1	125	117
Duplicate Lab Control Sample	KWG1200941-2	118	114

Surrogate Recovery Control Limits (%)

Sur1 =	o-Terphenyl	50-150
Sur2 =	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1200691
Project:	IP URS Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1200941-3	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	01/26/12	02/01/12	KWG1200941	
Residual Range Organics (RRO)	ND	U	500	1	01/26/12	02/01/12	KWG1200941	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	111	50-150	02/01/12	Acceptable
n-Triacontane	109	50-150	02/01/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1200691
Project:	IP URS Longview Solidification	**Date Collected:**	01/23/2012
Sample Matrix:	Water	**Date Received:**	01/25/2012

Diesel and Residual Range Organics

Sample Name:	0397-017(5-day)	**Units:**	ug/L
Lab Code:	K1200691-001	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**420**	Z	280	1	01/26/12	02/01/12	KWG1200941	
Residual Range Organics (RRO)	ND	U	560	1	01/26/12	02/01/12	KWG1200941	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	115	50-150	02/01/12	Acceptable
n-Triacontane	116	50-150	02/01/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1200691
Project:	IP URS Longview Solidification	**Date Extracted:**	01/26/2012
Sample Matrix:	Water	**Date Analyzed:**	02/01/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	Method	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1200941

	Lab Control Sample KWG1200941-1 Lab Control Spike			Duplicate Lab Control Sample KWG1200941-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	2120	1600	132	1890	1600	118	46-140	11	30
Residual Range Organics (RRO)	933	800	117	832	800	104	45-159	11	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services™ 1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

March 1, 2012 Analytical Report for Service Request No: K1201445

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP URS Longview Solidification

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on February 16, 2012. For your reference, these analyses have been assigned our service request number K1201445.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at Ed.Wallace@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/jw

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1201445
Project:	IP Longview Solidification	**Date Received:**	2/16/12
Sample Matrix:	Water and Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Twelve water and two soil samples were received for analysis at Columbia Analytical Services on 2/16/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Residual Range Organics (RRO) in sample Batch QC was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

SPLP

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of Dibenzofuran, Fluorene, Naphthalene, 2-Methylnaphthalene, Acenaphthene, and Phenanthrene for sample 0397-017A (28 day) were not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Water

Internal Standard Exceptions:
The internal standard recovery of Naphthalene-d8 in the neat analysis of all field samples was outside control criteria because of matrix interference. The samples were reanalyzed at a dilution. The affected internal standard was within control criteria in the diluted analyses. All affected analytes were reported from the diluted analysis.

Elevated Detection Limits:
All samples required multiple dilutions due to the presence of elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by EMW **Date** 3/23/12

Columbia Analytical Services™
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www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp.

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina requests ultra low level 8270 SIM. 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	TPH DRO NWTPH-DX	PAH 8270 SIM	Turn Around Time (working days)
0397-016 (2 hr)		2		✓				✓	2-13-12	1217	✓	✓	5
0397-016 (7 hr)		2		✓				✓	2-13-12	1725	✓	✓	5
0397-016 (24 hr)		2		✓				✓	2-14-12	1010	✓	✓	5
0397-016 (48 hr)		2		✓				✓	2-15-12	1009	✓	✓	5

HOLD ALL SAMPLES

Hold all samples

MARKS

Please send results to:
Tommy Jordan
tjordan@kemron.com
Paul Kalina
paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

	Date	Time	
Relinq. by sampler (Sign & Print Name): Jill Suhm	2-15-12	1600	Received by (Sign & Print Name):
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: CAS — Date 2/16/12 Time 0900

Lab Work No.

Columbia Analytical Services
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp.

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina requests ultra low level 8270 SIM. 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	TPH-DRO NWTPH-DX	PAH 8270 SIM	Turn Around Time (working days)
0397-017A (2 hr)		2		✓				✓	2-13-12	1227	✓	✓	5
0397-017A (7 hr)		2		✓				✓	2-13-12	1730	✓	✓	5
0397-017A (24 hr)		2		✓				✓	2-14-12	1023	✓	✓	5
0397-017A (48 hr)		2		✓				✓	2-15-12	1022	✓	✓	5

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Jill Suhm	2-15-12	1600	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: CAS — Date 2/16/12 Time 0900

MARKS

Please send results to:
Tommy Jordan
tjordan@kemron.com
Paul Kalina
paul.kalina@urscorp.com

Lab Work No.

Columbia Analytical Services™

800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp.

Project: Ir URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina request for ultra low level 8270 SIM 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	TPH-DRO NWTPH-DX	PAH 8270 SIM												Turn Around Time (working days)
0397-017 Dup (2 hr)		2		✓				✓	2-13-12	1237	✓	✓	HOLD ALL SAMPLES											5
0397-017 Dup (7 hr)		2		✓				✓	2-13-12	1740	✓	✓												5
0397-017 Dup (24 hr)		2		✓				✓	2-14-12	1035	✓	✓												5
0397-017 Dup (48 hr)		2		✓				✓	2-15-12	1028	✓	✓												5

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Jill Suhm	2-15-12	1600	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory CAS — Date 2/16/12 Time 0900

MARKS: Please send results to: Tommy Jordan tjordan@kemron.com Paul Kalina paul.kalina@ursorp.com

Lab Work No.

10

Columbia Analytical Services
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp

Project: DP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: FedEx

Special Detection Limit/Reporting: Paul Kalina request for low level 8270 SIM 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	SPLP PAH 8270 SIM	SPLP TPH-DRO NWTPH-Dx	Turn Around Time (working days)
0397-017A (28day)			✓					✓	2-15-12	1055	X	X	5
0397-017DUP (28day)			✓					✓	2-15-12	1105	X	X	5

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name): Jill Suhm — Date 2-15-12 Time 1600

Received by (Sign & Print Name):

Relinquished by — Date — Time — Received by

Relinquished by — Date — Time — Received by

Relinquished by — Date — Time — Received by laboratory: CAS — Date 2/16/12 Time 0900

MARKS:
Please send results to:
Tommy Jordan
tjordan@kemron.com
Paul Kalina
paul.kalina@urscorp.com

Lab Work No.

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed. W

Client / Project: Kinross Service Request *K12* 01445

Received: 2/16/12 Opened: 2/16/12 By: AJ Unloaded: 2/16/12 By: AJ

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 17
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
1.9	0.4	276	Cooler #1		✓
-2.9	0.4	234	Cooler #2		✓
-0.6	1.2	314	Cooler #3		✓

7. Packing material: (*Inserts*) (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? NA (Y) N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
One 1L amber per Sample	1L Amber				X	HCL	2mL	20110622031	BST	10:00

Notes, Discrepancies, & Resolutions: _____

RUSH

Page ____ *of* ____

Client: URS Corporation
Project: IP URS Longview Solidification
Service Request: K1201445

Cover Page - Organic Analysis Data Package
Polynuclear Aromatic Hydrocarbons

Sample Name	Lab Code	Date Collected	Date Received
0397-017A (2 hr)	K1201445-005	02/13/2012	02/16/2012
0397-017A (7 hr)	K1201445-006	02/13/2012	02/16/2012
0397-017A (24 hr)	K1201445-007	02/14/2012	02/16/2012
0397-017A (48 hr)	K1201445-008	02/15/2012	02/16/2012

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Carl Dayer

Date: 2/29/12 Title: Group Supervisor

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-017A (2 hr)	K1201445-005	68	77	81
0397-017A (7 hr)	K1201445-006	69	76	81
0397-017A (24 hr)	K1201445-007	53	64	81
0397-017A (48 hr)	K1201445-008	50	68	82
Method Blank	KWG1201681-3	76	75	83
Lab Control Sample	KWG1201681-1	68	72	71
Duplicate Lab Control Sample	KWG1201681-2	74	76	74

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	29-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1201445
Project:	IP URS Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ng/L
Lab Code:	KWG1201681-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.3**	J	3.3	0.71	1	02/17/12	02/21/12	KWG1201681	
2-Methylnaphthalene	**0.48**	J	3.3	0.40	1	02/17/12	02/21/12	KWG1201681	
Acenaphthylene	ND	U	3.3	0.37	1	02/17/12	02/21/12	KWG1201681	
Acenaphthene	ND	U	3.3	0.36	1	02/17/12	02/21/12	KWG1201681	
Dibenzofuran	ND	U	3.3	0.42	1	02/17/12	02/21/12	KWG1201681	
Fluorene	ND	U	3.3	0.42	1	02/17/12	02/21/12	KWG1201681	
Phenanthrene	**1.1**	J	3.3	0.72	1	02/17/12	02/21/12	KWG1201681	
Anthracene	ND	U	3.3	0.29	1	02/17/12	02/21/12	KWG1201681	
Fluoranthene	ND	U	3.3	0.46	1	02/17/12	02/21/12	KWG1201681	
Pyrene	ND	U	3.3	0.78	1	02/17/12	02/21/12	KWG1201681	
Benz(a)anthracene	ND	U	3.3	0.34	1	02/17/12	02/21/12	KWG1201681	
Chrysene	ND	U	3.3	0.65	1	02/17/12	02/21/12	KWG1201681	
Benzo(b)fluoranthene	ND	U	3.3	0.25	1	02/17/12	02/21/12	KWG1201681	
Benzo(k)fluoranthene	ND	U	3.3	0.41	1	02/17/12	02/21/12	KWG1201681	
Benzo(a)pyrene	ND	U	3.3	0.41	1	02/17/12	02/21/12	KWG1201681	
Indeno(1,2,3-cd)pyrene	ND	U	3.3	0.44	1	02/17/12	02/21/12	KWG1201681	
Dibenz(a,h)anthracene	ND	U	3.3	0.45	1	02/17/12	02/21/12	KWG1201681	
Benzo(g,h,i)perylene	ND	U	3.3	0.36	1	02/17/12	02/21/12	KWG1201681	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	29-98	02/21/12	Acceptable
Fluoranthene-d10	75	31-105	02/21/12	Acceptable
Terphenyl-d14	83	27-112	02/21/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Collected: 02/13/2012
Date Received: 02/16/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017A (2 hr)
Lab Code: K1201445-005

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**71000**	D	710	150	200	02/17/12	02/22/12	KWG1201681	
2-Methylnaphthalene	**13000**	D	36	4.2	10	02/17/12	02/21/12	KWG1201681	
Acenaphthylene	**160**		3.6	0.39	1	02/17/12	02/21/12	KWG1201681	
Acenaphthene	**12000**	D	36	3.8	10	02/17/12	02/21/12	KWG1201681	
Dibenzofuran	**6500**	D	36	4.4	10	02/17/12	02/21/12	KWG1201681	
Fluorene	**8200**	D	36	4.4	10	02/17/12	02/21/12	KWG1201681	
Phenanthrene	**13000**	D	36	7.5	10	02/17/12	02/21/12	KWG1201681	
Anthracene	**1700**		3.6	0.30	1	02/17/12	02/21/12	KWG1201681	
Fluoranthene	**2700**	D	36	4.8	10	02/17/12	02/21/12	KWG1201681	
Pyrene	**1600**		3.6	0.81	1	02/17/12	02/21/12	KWG1201681	
Benz(a)anthracene	**130**		3.6	0.36	1	02/17/12	02/21/12	KWG1201681	
Chrysene	**64**		3.6	0.68	1	02/17/12	02/21/12	KWG1201681	
Benzo(b)fluoranthene	**11**		3.6	0.26	1	02/17/12	02/21/12	KWG1201681	
Benzo(k)fluoranthene	**3.4**	J	3.6	0.43	1	02/17/12	02/21/12	KWG1201681	
Benzo(a)pyrene	**6.6**		3.6	0.43	1	02/17/12	02/21/12	KWG1201681	
Indeno(1,2,3-cd)pyrene	**0.78**	J	3.6	0.46	1	02/17/12	02/21/12	KWG1201681	
Dibenz(a,h)anthracene	ND	U	3.6	0.47	1	02/17/12	02/21/12	KWG1201681	
Benzo(g,h,i)perylene	**0.68**	J	3.6	0.38	1	02/17/12	02/21/12	KWG1201681	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	29-98	02/21/12	Acceptable
Fluoranthene-d10	77	31-105	02/21/12	Acceptable
Terphenyl-d14	81	27-112	02/21/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201445
Project:	IP URS Longview Solidification	**Date Collected:**	02/13/2012
Sample Matrix:	Water	**Date Received:**	02/16/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-017A (7 hr)	**Units:**	ng/L
Lab Code:	K1201445-006	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**130000**	D	710	150	200	02/17/12	02/22/12	KWG1201681	
2-Methylnaphthalene	**22000**	D	710	84	200	02/17/12	02/22/12	KWG1201681	
Acenaphthylene	**220**		3.6	0.39	1	02/17/12	02/21/12	KWG1201681	
Acenaphthene	**16000**	D	36	3.8	10	02/17/12	02/21/12	KWG1201681	
Dibenzofuran	**8400**	D	36	4.4	10	02/17/12	02/21/12	KWG1201681	
Fluorene	**10000**	D	36	4.4	10	02/17/12	02/21/12	KWG1201681	
Phenanthrene	**12000**	D	36	7.6	10	02/17/12	02/21/12	KWG1201681	
Anthracene	**1500**		3.6	0.31	1	02/17/12	02/21/12	KWG1201681	
Fluoranthene	**1800**		3.6	0.48	1	02/17/12	02/21/12	KWG1201681	
Pyrene	**1000**		3.6	0.82	1	02/17/12	02/21/12	KWG1201681	
Benz(a)anthracene	**100**		3.6	0.36	1	02/17/12	02/21/12	KWG1201681	
Chrysene	**55**		3.6	0.68	1	02/17/12	02/21/12	KWG1201681	
Benzo(b)fluoranthene	**19**		3.6	0.27	1	02/17/12	02/21/12	KWG1201681	
Benzo(k)fluoranthene	**7.9**		3.6	0.43	1	02/17/12	02/21/12	KWG1201681	
Benzo(a)pyrene	**13**		3.6	0.43	1	02/17/12	02/21/12	KWG1201681	
Indeno(1,2,3-cd)pyrene	**3.6**	J	3.6	0.46	1	02/17/12	02/21/12	KWG1201681	
Dibenz(a,h)anthracene	**1.1**	J	3.6	0.47	1	02/17/12	02/21/12	KWG1201681	
Benzo(g,h,i)perylene	**2.9**	J	3.6	0.38	1	02/17/12	02/21/12	KWG1201681	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	69	29-98	02/21/12	Acceptable
Fluoranthene-d10	76	31-105	02/21/12	Acceptable
Terphenyl-d14	81	27-112	02/21/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Collected: 02/14/2012
Date Received: 02/16/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017A (24 hr)
Lab Code: K1201445-007

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**340000**	D	1400	290	400	02/17/12	02/22/12	KWG1201681	
2-Methylnaphthalene	**57000**	D	1400	170	400	02/17/12	02/22/12	KWG1201681	
Acenaphthylene	**400**		3.5	0.38	1	02/17/12	02/21/12	KWG1201681	
Acenaphthene	**41000**	D	1400	150	400	02/17/12	02/22/12	KWG1201681	
Dibenzofuran	**21000**	D	70	8.6	20	02/17/12	02/21/12	KWG1201681	
Fluorene	**25000**	D	70	8.6	20	02/17/12	02/21/12	KWG1201681	
Phenanthrene	**28000**	D	70	15	20	02/17/12	02/21/12	KWG1201681	
Anthracene	**4300**	D	70	6.0	20	02/17/12	02/21/12	KWG1201681	
Fluoranthene	**4100**	D	70	9.4	20	02/17/12	02/21/12	KWG1201681	
Pyrene	**2000**	D	70	16	20	02/17/12	02/21/12	KWG1201681	
Benz(a)anthracene	**180**		3.5	0.35	1	02/17/12	02/21/12	KWG1201681	
Chrysene	**85**		3.5	0.67	1	02/17/12	02/21/12	KWG1201681	
Benzo(b)fluoranthene	**23**		3.5	0.26	1	02/17/12	02/21/12	KWG1201681	
Benzo(k)fluoranthene	**7.8**		3.5	0.42	1	02/17/12	02/21/12	KWG1201681	
Benzo(a)pyrene	**13**		3.5	0.42	1	02/17/12	02/21/12	KWG1201681	
Indeno(1,2,3-cd)pyrene	**3.0**	J	3.5	0.45	1	02/17/12	02/21/12	KWG1201681	
Dibenz(a,h)anthracene	**1.2**	J	3.5	0.46	1	02/17/12	02/21/12	KWG1201681	
Benzo(g,h,i)perylene	**2.6**	J	3.5	0.37	1	02/17/12	02/21/12	KWG1201681	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	53	29-98	02/21/12	Acceptable
Fluoranthene-d10	64	31-105	02/21/12	Acceptable
Terphenyl-d14	81	27-112	02/21/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201445
Project:	IP URS Longview Solidification	**Date Collected:**	02/15/2012
Sample Matrix:	Water	**Date Received:**	02/16/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-017A (48 hr)	**Units:**	ng/L
Lab Code:	K1201445-008	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**310000**	D	1500	300	400	02/17/12	02/22/12	KWG1201681	
2-Methylnaphthalene	**55000**	D	1500	170	400	02/17/12	02/22/12	KWG1201681	
Acenaphthylene	**370**		3.6	0.39	1	02/17/12	02/21/12	KWG1201681	
Acenaphthene	**38000**	D	72	7.6	20	02/17/12	02/21/12	KWG1201681	
Dibenzofuran	**20000**	D	72	8.9	20	02/17/12	02/21/12	KWG1201681	
Fluorene	**23000**	D	72	8.9	20	02/17/12	02/21/12	KWG1201681	
Phenanthrene	**28000**	D	72	16	20	02/17/12	02/21/12	KWG1201681	
Anthracene	**4200**	D	72	6.2	20	02/17/12	02/21/12	KWG1201681	
Fluoranthene	**4200**	D	72	9.7	20	02/17/12	02/21/12	KWG1201681	
Pyrene	**2200**	D	72	17	20	02/17/12	02/21/12	KWG1201681	
Benz(a)anthracene	**180**		3.6	0.36	1	02/17/12	02/21/12	KWG1201681	
Chrysene	**80**		3.6	0.69	1	02/17/12	02/21/12	KWG1201681	
Benzo(b)fluoranthene	**18**		3.6	0.27	1	02/17/12	02/21/12	KWG1201681	
Benzo(k)fluoranthene	**4.8**		3.6	0.44	1	02/17/12	02/21/12	KWG1201681	
Benzo(a)pyrene	**9.8**		3.6	0.44	1	02/17/12	02/21/12	KWG1201681	
Indeno(1,2,3-cd)pyrene	**1.7**	J	3.6	0.47	1	02/17/12	02/21/12	KWG1201681	
Dibenz(a,h)anthracene	**0.63**	J	3.6	0.48	1	02/17/12	02/21/12	KWG1201681	
Benzo(g,h,i)perylene	**1.4**	J	3.6	0.38	1	02/17/12	02/21/12	KWG1201681	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	50	29-98	02/21/12	Acceptable
Fluoranthene-d10	68	31-105	02/21/12	Acceptable
Terphenyl-d14	82	27-112	02/21/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Extracted: 02/17/2012
Date Analyzed: 02/21/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA
Level: Low
Extraction Lot: KWG1201681

	Lab Control Sample KWG1201681-1 Lab Control Spike			Duplicate Lab Control Sample KWG1201681-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	363	500	73	374	500	75	39-110	3	30
2-Methylnaphthalene	390	500	78	406	500	81	39-115	4	30
Acenaphthylene	369	500	74	383	500	77	44-115	4	30
Acenaphthene	354	500	71	366	500	73	44-113	3	30
Dibenzofuran	370	500	74	382	500	76	46-116	3	30
Fluorene	372	500	74	382	500	76	48-118	3	30
Phenanthrene	354	500	71	367	500	73	47-120	4	30
Anthracene	374	500	75	400	500	80	44-117	7	30
Fluoranthene	378	500	76	391	500	78	48-128	3	30
Pyrene	357	500	71	362	500	72	42-133	1	30
Benz(a)anthracene	426	500	85	423	500	85	48-125	1	30
Chrysene	415	500	83	419	500	84	50-128	1	30
Benzo(b)fluoranthene	415	500	83	416	500	83	49-131	0	30
Benzo(k)fluoranthene	433	500	87	451	500	90	54-131	4	30
Benzo(a)pyrene	444	500	89	445	500	89	43-134	0	30
Indeno(1,2,3-cd)pyrene	355	500	71	345	500	69	45-133	3	30
Dibenz(a,h)anthracene	381	500	76	367	500	73	49-133	4	30
Benzo(g,h,i)perylene	361	500	72	341	500	68	51-124	6	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Service Request: K1201445

Cover Page - Organic Analysis Data Package
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name	Lab Code	Date Collected	Date Received
0397-017A (28 day)	K1201445-013	02/15/2012	02/16/2012
0397-017DUP (28 day)	K1201445-014	02/15/2012	02/16/2012
0397-017A (28 day)MS	KWG1201958-1	02/15/2012	02/16/2012
0397-017A (28 day)DMS	KWG1201958-2	02/15/2012	02/16/2012

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Cal Degner

Date: 3/1/12 Title: SVM Supervisor

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-017A (28 day)	K1201445-013	77	81	89
0397-017DUP (28 day)	K1201445-014	77	83	91
Method Blank	KWG1201958-5	78	77	92
0397-017A (28 day)MS	KWG1201958-1	75	80	88
0397-017A (28 day)DMS	KWG1201958-2	76	81	89
Lab Control Sample	KWG1201958-3	76	83	84
Duplicate Lab Control Sample	KWG1201958-4	79	85	86

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	28-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Collected: NA
Date Received: NA
Date Prepared: 02/20/2012

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: Method Blank
Lab Code: KWG1201958-5

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	0.095	J	0.20	0.030	1	02/21/12	02/27/12	KWG1201958	
2-Methylnaphthalene	0.054	J	0.20	0.023	1	02/21/12	02/27/12	KWG1201958	
Acenaphthylene	ND	U	0.20	0.034	1	02/21/12	02/27/12	KWG1201958	
Acenaphthene	ND	U	0.20	0.044	1	02/21/12	02/27/12	KWG1201958	
Dibenzofuran	ND	U	0.20	0.046	1	02/21/12	02/27/12	KWG1201958	
Fluorene	ND	U	0.20	0.038	1	02/21/12	02/27/12	KWG1201958	
Phenanthrene	ND	U	0.20	0.050	1	02/21/12	02/27/12	KWG1201958	
Anthracene	ND	U	0.20	0.036	1	02/21/12	02/27/12	KWG1201958	
Fluoranthene	ND	U	0.20	0.044	1	02/21/12	02/27/12	KWG1201958	
Pyrene	ND	U	0.20	0.034	1	02/21/12	02/27/12	KWG1201958	
Benz(a)anthracene	ND	U	0.20	0.026	1	02/21/12	02/27/12	KWG1201958	
Chrysene	ND	U	0.20	0.034	1	02/21/12	02/27/12	KWG1201958	
Benzo(b)fluoranthene	ND	U	0.20	0.023	1	02/21/12	02/27/12	KWG1201958	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	02/21/12	02/27/12	KWG1201958	
Benzo(a)pyrene	ND	U	0.20	0.043	1	02/21/12	02/27/12	KWG1201958	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	02/21/12	02/27/12	KWG1201958	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	02/21/12	02/27/12	KWG1201958	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	02/21/12	02/27/12	KWG1201958	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	78	28-98	02/27/12	Acceptable
Fluoranthene-d10	77	31-105	02/27/12	Acceptable
Terphenyl-d14	92	27-112	02/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Collected: 02/15/2012
Date Received: 02/16/2012
Date Prepared: 02/20/2012

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-017A (28 day)
Lab Code: K1201445-013

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1800**	D	4.0	0.60	20	02/21/12	02/28/12	KWG1201958	
2-Methylnaphthalene	**380**	D	4.0	0.46	20	02/21/12	02/28/12	KWG1201958	
Acenaphthylene	**3.4**		0.20	0.034	1	02/21/12	02/27/12	KWG1201958	
Acenaphthene	**280**	D	4.0	0.88	20	02/21/12	02/28/12	KWG1201958	
Dibenzofuran	**97**		0.20	0.046	1	02/21/12	02/27/12	KWG1201958	
Fluorene	**99**		0.20	0.038	1	02/21/12	02/27/12	KWG1201958	
Phenanthrene	**140**	D	4.0	1.0	20	02/21/12	02/28/12	KWG1201958	
Anthracene	**17**		0.20	0.036	1	02/21/12	02/27/12	KWG1201958	
Fluoranthene	**16**		0.20	0.044	1	02/21/12	02/27/12	KWG1201958	
Pyrene	**9.3**		0.20	0.034	1	02/21/12	02/27/12	KWG1201958	
Benz(a)anthracene	**0.43**		0.20	0.026	1	02/21/12	02/27/12	KWG1201958	
Chrysene	**0.35**		0.20	0.034	1	02/21/12	02/27/12	KWG1201958	
Benzo(b)fluoranthene	**0.046**	J	0.20	0.023	1	02/21/12	02/27/12	KWG1201958	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	02/21/12	02/27/12	KWG1201958	
Benzo(a)pyrene	ND	U	0.20	0.043	1	02/21/12	02/27/12	KWG1201958	
Indeno(1,2,3-cd)pyrene	**0.031**	J	0.20	0.026	1	02/21/12	02/27/12	KWG1201958	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	02/21/12	02/27/12	KWG1201958	
Benzo(g,h,i)perylene	**0.040**	J	0.20	0.029	1	02/21/12	02/27/12	KWG1201958	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	77	28-98	02/27/12	Acceptable
Fluoranthene-d10	81	31-105	02/27/12	Acceptable
Terphenyl-d14	89	27-112	02/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Collected: 02/15/2012
Date Received: 02/16/2012
Date Prepared: 02/20/2012

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-017DUP (28 day)
Lab Code: K1201445-014

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1700**	D	4.0	0.60	20	02/21/12	02/28/12	KWG1201958	
2-Methylnaphthalene	**340**	D	4.0	0.46	20	02/21/12	02/28/12	KWG1201958	
Acenaphthylene	**3.6**		0.20	0.034	1	02/21/12	02/28/12	KWG1201958	
Acenaphthene	**250**	D	4.0	0.88	20	02/21/12	02/28/12	KWG1201958	
Dibenzofuran	**95**		0.20	0.046	1	02/21/12	02/28/12	KWG1201958	
Fluorene	**94**		0.20	0.038	1	02/21/12	02/28/12	KWG1201958	
Phenanthrene	**140**	D	4.0	1.0	20	02/21/12	02/28/12	KWG1201958	
Anthracene	**18**		0.20	0.036	1	02/21/12	02/28/12	KWG1201958	
Fluoranthene	**16**		0.20	0.044	1	02/21/12	02/28/12	KWG1201958	
Pyrene	**9.4**		0.20	0.034	1	02/21/12	02/28/12	KWG1201958	
Benz(a)anthracene	**0.43**		0.20	0.026	1	02/21/12	02/28/12	KWG1201958	
Chrysene	**0.38**		0.20	0.034	1	02/21/12	02/28/12	KWG1201958	
Benzo(b)fluoranthene	**0.045**	J	0.20	0.023	1	02/21/12	02/28/12	KWG1201958	
Benzo(k)fluoranthene	ND	U	0.20	0.025	1	02/21/12	02/28/12	KWG1201958	
Benzo(a)pyrene	ND	U	0.20	0.043	1	02/21/12	02/28/12	KWG1201958	
Indeno(1,2,3-cd)pyrene	ND	U	0.20	0.026	1	02/21/12	02/28/12	KWG1201958	
Dibenz(a,h)anthracene	ND	U	0.20	0.025	1	02/21/12	02/28/12	KWG1201958	
Benzo(g,h,i)perylene	ND	U	0.20	0.029	1	02/21/12	02/28/12	KWG1201958	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	77	28-98	02/28/12	Acceptable
Fluoranthene-d10	83	31-105	02/28/12	Acceptable
Terphenyl-d14	91	27-112	02/28/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Prepared: 02/20/2012
Date Extracted: 02/21/2012
Date Analyzed: 02/27/2012

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-017A (28 day)
Lab Code: K1201445-013

Units: ug/L
Basis: NA

Extraction Method: EPA 1312/EPA 3520C
Analysis Method: 8270D SIM

Level: Low
Extraction Lot: KWG1201958

Analyte Name	Sample Result	0397-017A (28 day)MS KWG1201958-1 Matrix Spike Result	Expected	%Rec	0397-017A (28 day)DMS KWG1201958-2 Duplicate Matrix Spike Result	Expected	%Rec	%Rec Limits	RPD	RPD Limit
Naphthalene	1800	718E	25.0	-4398#	753E	25.0	-4255#	37-118	5	30
2-Methylnaphthalene	380	284E	25.0	-394 #	291E	25.0	-364 #	37-117	3	30
Acenaphthylene	3.4	23.4	25.0	80	22.6	25.0	77	43-114	3	30
Acenaphthene	280	202E	25.0	-296 #	202E	25.0	-298 #	45-114	0	30
Dibenzofuran	97	108E	25.0	45	109E	25.0	50	44-122	1	30
Fluorene	99	113E	25.0	55	114E	25.0	60	45-123	1	30
Phenanthrene	140	117E	25.0	-80 #	119E	25.0	-69 #	42-127	2	30
Anthracene	17	35.1	25.0	73	34.4	25.0	70	32-125	2	30
Fluoranthene	16	36.9	25.0	84	36.4	25.0	82	48-134	1	30
Pyrene	9.3	30.2	25.0	83	29.8	25.0	82	44-130	1	30
Benz(a)anthracene	0.43	22.5	25.0	88	22.1	25.0	87	41-128	2	30
Chrysene	0.35	22.7	25.0	90	22.0	25.0	87	48-128	3	30
Benzo(b)fluoranthene	0.046	24.0	25.0	96	23.2	25.0	93	40-139	4	30
Benzo(k)fluoranthene	ND	24.2	25.0	97	23.3	25.0	93	48-134	4	30
Benzo(a)pyrene	ND	25.3	25.0	101	24.1	25.0	96	35-132	5	30
Indeno(1,2,3-cd)pyrene	0.031	21.8	25.0	87	21.0	25.0	84	40-135	4	30
Dibenz(a,h)anthracene	ND	21.7	25.0	87	20.9	25.0	84	43-135	4	30
Benzo(g,h,i)perylene	0.040	20.5	25.0	82	19.7	25.0	79	44-128	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Prepared: 02/20/2012
Date Extracted: 02/21/2012
Date Analyzed: 02/27/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Extraction Method: EPA 1312/EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1201958

	Lab Control Sample KWG1201958-3 Lab Control Spike			Duplicate Lab Control Sample KWG1201958-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	1.86	2.50	74	1.92	2.50	77	39-110	3	30
2-Methylnaphthalene	1.80	2.50	72	1.87	2.50	75	39-115	4	30
Acenaphthylene	2.03	2.50	81	2.11	2.50	84	44-115	4	30
Acenaphthene	1.90	2.50	76	1.99	2.50	80	44-113	5	30
Dibenzofuran	1.93	2.50	77	2.03	2.50	81	46-116	5	30
Fluorene	1.98	2.50	79	2.05	2.50	82	48-118	4	30
Phenanthrene	1.97	2.50	79	2.03	2.50	81	47-120	3	30
Anthracene	2.05	2.50	82	2.12	2.50	85	44-117	3	30
Fluoranthene	2.16	2.50	87	2.19	2.50	88	48-128	1	30
Pyrene	1.97	2.50	79	2.06	2.50	82	42-133	4	30
Benz(a)anthracene	2.05	2.50	82	2.12	2.50	85	48-125	3	30
Chrysene	2.09	2.50	84	2.14	2.50	86	50-128	2	30
Benzo(b)fluoranthene	2.23	2.50	89	2.26	2.50	90	49-131	1	30
Benzo(k)fluoranthene	2.24	2.50	90	2.30	2.50	92	54-131	2	30
Benzo(a)pyrene	2.35	2.50	94	2.37	2.50	95	43-124	1	30
Indeno(1,2,3-cd)pyrene	2.09	2.50	84	2.09	2.50	83	45-133	0	30
Dibenz(a,h)anthracene	2.06	2.50	83	2.07	2.50	83	49-133	0	30
Benzo(g,h,i)perylene	1.97	2.50	79	1.96	2.50	78	51-124	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Service Request: K1201445

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
0397-017A (2 hr)	K1201445-005	02/13/2012	02/16/2012
0397-017A (7 hr)	K1201445-006	02/13/2012	02/16/2012
0397-017A (24 hr)	K1201445-007	02/14/2012	02/16/2012
0397-017A (48 hr)	K1201445-008	02/15/2012	02/16/2012
0397-017A (28 day)	K1201445-013	02/15/2012	02/16/2012
0397-017DUP (28 day)	K1201445-014	02/15/2012	02/16/2012

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Jeffrey M. Smith

Date: 02/23/2012 Title: GC Analyst

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-017A (2 hr)	K1201445-005	127	128
0397-017A (7 hr)	K1201445-006	117	117
0397-017A (24 hr)	K1201445-007	121	119
0397-017A (48 hr)	K1201445-008	117	117
0397-017A (28 day)	K1201445-013	106	108
0397-017DUP (28 day)	K1201445-014	116	124
Batch QC	K1201477-001	138	119
Batch QCDUP	KWG1201833-1	133	117
Method Blank	KWG1201833-3	106	95
Method Blank	KWG1201878-3	104	104
Method Blank	KWG1201878-4	109	109
Lab Control Sample	KWG1201833-2	109	100
Duplicate Lab Control Sample	KWG1201833-5	109	101
Lab Control Sample	KWG1201878-1	123	119
Duplicate Lab Control Sample	KWG1201878-2	118	116

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1201445
Project:	IP URS Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1201833-3	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	ND	U	500	19	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	106	50-150	02/22/12	Acceptable
n-Triacontane	95	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Collected: NA
Date Received: NA
Date Prepared: 02/20/2012

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1201878-3

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	250	1	02/22/12	02/23/12	KWG1201878	
Residual Range Organics (RRO)	ND	U	500	500	1	02/22/12	02/23/12	KWG1201878	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	104	50-150	02/23/12	Acceptable
n-Triacontane	104	50-150	02/23/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Collected: NA
Date Received: NA
Date Prepared: 02/20/2012

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1201878-4

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	260	260	1	02/22/12	02/23/12	KWG1201878	
Residual Range Organics (RRO)	ND	U	520	520	1	02/22/12	02/23/12	KWG1201878	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	109	50-150	02/23/12	Acceptable
n-Triacontane	109	50-150	02/23/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Collected: 02/13/2012
Date Received: 02/16/2012

Diesel and Residual Range Organics

Sample Name: 0397-017A (2 hr)
Lab Code: K1201445-005

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	390	Z	280	12	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	35	J	550	21	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	127	50-150	02/22/12	Acceptable
n-Triacontane	128	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Collected: 02/13/2012
Date Received: 02/16/2012

Diesel and Residual Range Organics

Sample Name: 0397-017A (7 hr)
Lab Code: K1201445-006

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	710	Z	270	12	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	33	J	530	20	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	117	50-150	02/22/12	Acceptable
n-Triacontane	117	50-150	02/22/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201445
Project:	IP URS Longview Solidification	**Date Collected:**	02/14/2012
Sample Matrix:	Water	**Date Received:**	02/16/2012

Diesel and Residual Range Organics

Sample Name:	0397-017A (24 hr)	**Units:**	ug/L
Lab Code:	K1201445-007	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	1600	Z	270	12	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	53	J	540	21	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	121	50-150	02/22/12	Acceptable
n-Triacontane	119	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Collected: 02/15/2012
Date Received: 02/16/2012

Diesel and Residual Range Organics

Sample Name: 0397-017A (48 hr)
Lab Code: K1201445-008

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	1600	Z	260	12	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	56	J	510	20	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	117	50-150	02/22/12	Acceptable
n-Triacontane	117	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Collected: 02/15/2012
Date Received: 02/16/2012
Date Prepared: 02/20/2012

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-017A (28 day)
Lab Code: K1201445-013

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	6700	Z	260	260	1	02/22/12	02/23/12	KWG1201878	
Residual Range Organics (RRO)	ND	U	520	520	1	02/22/12	02/23/12	KWG1201878	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	106	50-150	02/23/12	Acceptable
n-Triacontane	108	50-150	02/23/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Collected: 02/15/2012
Date Received: 02/16/2012
Date Prepared: 02/20/2012

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-017DUP (28 day)
Lab Code: K1201445-014

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	6900	Z	260	260	1	02/22/12	02/23/12	KWG1201878	
Residual Range Organics (RRO)	ND	U	510	510	1	02/22/12	02/23/12	KWG1201878	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	116	50-150	02/23/12	Acceptable
n-Triacontane	124	50-150	02/23/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Extracted: 02/21/2012
Date Analyzed: 02/22/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1201477-001

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low
Extraction Lot: KWG1201833

Analyte Name	MRL	MDL	Sample Result	Batch QCDUP KWG1201833-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	280	13	19000	19000	19000	2	30
Residual Range Organics (RRO)	560	22	890	830	860	7 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201445
Date Extracted: 02/21/2012
Date Analyzed: 02/22/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1201833

	Lab Control Sample KWG1201833-2 Lab Control Spike			Duplicate Lab Control Sample KWG1201833-5 Duplicate Lab Control Spike			%Rec		RPD
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**Limits**	**RPD**	**Limit**
Diesel Range Organics (DRO)	1610	1600	101	1550	1600	97	46-140	4	30
Residual Range Organics (RRO)	711	800	89	673	800	84	45-159	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Soil

Service Request: K1201445
Date Prepared: 02/20/2012
Date Extracted: 02/22/2012
Date Analyzed: 02/23/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 1312/EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1201878

	Lab Control Sample KWG1201878-1 Lab Control Spike			Duplicate Lab Control Sample KWG1201878-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	3370	3200	105	3620	3200	113	46-140	7	30
Residual Range Organics (RRO)	1510	1600	94	1630	1600	102	45-159	7	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

March 5, 2012 Analytical Report for Service Request No: K1201477

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP Longview

Dear Paul:

Enclosed are the results of the sample submitted to our laboratory on February 16, 2012. For your reference, these analyses have been assigned our service request number K1201477.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at Ed.Wallace@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/jw

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Agency	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
DOD ELAP	L11-119
Florida DOH	E87412
Georgia DNR	881
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
ISO 17025	L11-118
Louisiana DEQ	3016
Louisiana DHH	LA080001
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon – DEQ (NELAP)	WA100010
South Carolina DHEC	61002
Texas CEQ	04704427-08-TX
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1201477
Project:	IP Longview	**Date Received:**	2/16/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

One water sample was received for analysis at Columbia Analytical Services on 2/16/12. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Residual Range Organics (RRO) in sample BV-13 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Surrogate Exceptions:
The control criteria were exceeded for Fluorene-d10 in sample BV-13 due to matrix interference. The presence of non-target background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.

The control criteria for Terphenyl-d14 in sample BV-13 were not applicable. The analysis of the sample required a dilution, which resulted in a surrogate concentration below the reporting limit. No further corrective action was appropriate.

Elevated Detection Limits:
Sample BV-13 required dilution due to the presence of elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the MS/MSD for these samples.

Approved by EWW **Date** 3/5/12

Columbia Analytical Services INC.
An Employee - Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K1201477

PAGE 1 OF 1 COC #

PROJECT NAME: LP LONGVIEW
PROJECT NUMBER:
PROJECT MANAGER: PAUL KALINA
COMPANY/ADDRESS: 1501 4TH AVE STE 1400
CITY/STATE/ZIP: SEATTLE WA 98229
E-MAIL ADDRESS: PAUL.KALINA@URS.COM
PHONE #: 206 438 2700 FAX#:
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Diesel☐ Oil☐ Gas☐ Fuel Fingerprint (FIQ)☐ NW-HCID Screen☐	Oil & Grease/TRPH 1664 SGT☐ 1664 HEM☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐	Hex-Chrom☐	pH, Cond., Cl, SO_4, P, F, NO_2, NO_3, BOD, TSS, TDS (circle)	NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	PAH 8270C SIM				REMARKS
BV-13	2/16/12	1000		WATER	3		X													X				

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. #
Bill To:

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

LIST A PAHS, REGULAR LOW LEVEL

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: 2/16/12	Signature: 2/16/12 12:50	Signature	Signature
Printed Name: IAN VERGA	Printed Name: BRAD TRAIN	Printed Name	Printed Name
Date/Time: URS	Date/Time: CAS	Date/Time	Date/Time
Firm	Firm	Firm	Firm

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed. W

Client / Project: URS Service Request *K12* 01477

Received: 2/16/12 Opened: 2/16/12 By: BT Unloaded: 2/16/12 By: BT

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* ~~*Hand Delivered*~~
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number (NA)	Filed
4.1	5.6	259			

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* ~~NA~~ Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* ~~NA~~ (Y) N
15. Was C12/Res negative? ~~NA~~ (Y) N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

Page ____ *of* ____

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K1201477

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
BV-13	K1201477-001	107 D *	89 D	99 D #
Method Blank	KWG1201892-3	74	77	91
Lab Control Sample	KWG1201892-1	79	80	86
Duplicate Lab Control Sample	KWG1201892-2	76	78	84

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	28-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K1201477
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1201892-3

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	0.0032	J	0.020	0.0030	1	02/23/12	02/29/12	KWG1201892	
2-Methylnaphthalene	ND	U	0.020	0.0023	1	02/23/12	02/29/12	KWG1201892	
Acenaphthylene	ND	U	0.020	0.0034	1	02/23/12	02/29/12	KWG1201892	
Acenaphthene	ND	U	0.020	0.0044	1	02/23/12	02/29/12	KWG1201892	
Dibenzofuran	ND	U	0.020	0.0046	1	02/23/12	02/29/12	KWG1201892	
Fluorene	ND	U	0.020	0.0038	1	02/23/12	02/29/12	KWG1201892	
Phenanthrene	ND	U	0.020	0.0050	1	02/23/12	02/29/12	KWG1201892	
Anthracene	ND	U	0.020	0.0036	1	02/23/12	02/29/12	KWG1201892	
Fluoranthene	ND	U	0.020	0.0044	1	02/23/12	02/29/12	KWG1201892	
Pyrene	ND	U	0.020	0.0035	1	02/23/12	02/29/12	KWG1201892	
Benz(a)anthracene	ND	U	0.020	0.0026	1	02/23/12	02/29/12	KWG1201892	
Chrysene	ND	U	0.020	0.0034	1	02/23/12	02/29/12	KWG1201892	
Benzo(b)fluoranthene	ND	U	0.020	0.0023	1	02/23/12	02/29/12	KWG1201892	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	02/23/12	02/29/12	KWG1201892	
Benzo(a)pyrene	ND	U	0.020	0.0043	1	02/23/12	02/29/12	KWG1201892	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0026	1	02/23/12	02/29/12	KWG1201892	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	02/23/12	02/29/12	KWG1201892	
Benzo(g,h,i)perylene	ND	U	0.020	0.0029	1	02/23/12	02/29/12	KWG1201892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	28-98	02/29/12	Acceptable
Fluoranthene-d10	77	31-105	02/29/12	Acceptable
Terphenyl-d14	91	27-112	02/29/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201477
Project:	IP Longview	**Date Collected:**	02/16/2012
Sample Matrix:	Water	**Date Received:**	02/16/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	BV-13	**Units:**	ug/L
Lab Code:	K1201477-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5300**	D	40	6.0	2000	02/23/12	02/29/12	KWG1201892	
2-Methylnaphthalene	**580**	D	4.0	0.46	200	02/23/12	02/29/12	KWG1201892	
Acenaphthylene	**8.2**	D	4.0	0.68	200	02/23/12	02/29/12	KWG1201892	
Acenaphthene	**400**	D	4.0	0.88	200	02/23/12	02/29/12	KWG1201892	
Dibenzofuran	**270**	D	4.0	0.92	200	02/23/12	02/29/12	KWG1201892	
Fluorene	**270**	D	4.0	0.76	200	02/23/12	02/29/12	KWG1201892	
Phenanthrene	**300**	D	4.0	1.0	200	02/23/12	02/29/12	KWG1201892	
Anthracene	**42**	D	4.0	0.72	200	02/23/12	02/29/12	KWG1201892	
Fluoranthene	**99**	D	4.0	0.88	200	02/23/12	02/29/12	KWG1201892	
Pyrene	**62**	D	4.0	0.70	200	02/23/12	02/29/12	KWG1201892	
Benz(a)anthracene	**15**	D	4.0	0.52	200	02/23/12	02/29/12	KWG1201892	
Chrysene	**13**	D	4.0	0.68	200	02/23/12	02/29/12	KWG1201892	
Benzo(b)fluoranthene	**7.0**	D	4.0	0.46	200	02/23/12	02/29/12	KWG1201892	
Benzo(k)fluoranthene	**3.8**	JD	4.0	0.50	200	02/23/12	02/29/12	KWG1201892	
Benzo(a)pyrene	**3.6**	JD	4.0	0.86	200	02/23/12	02/29/12	KWG1201892	
Indeno(1,2,3-cd)pyrene	**1.5**	JD	4.0	0.52	200	02/23/12	02/29/12	KWG1201892	
Dibenz(a,h)anthracene	**0.72**	JD	4.0	0.50	200	02/23/12	02/29/12	KWG1201892	
Benzo(g,h,i)perylene	**1.5**	JD	4.0	0.58	200	02/23/12	02/29/12	KWG1201892	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	107	28-98	02/29/12	Outside Control Limits
Fluoranthene-d10	89	31-105	02/29/12	Acceptable
Terphenyl-d14	99	27-112	02/29/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K1201477
Date Extracted: 02/23/2012
Date Analyzed: 02/29/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1201892

	Lab Control Sample KWG1201892-1 Lab Control Spike			Duplicate Lab Control Sample KWG1201892-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	2.12	2.50	85	1.98	2.50	79	39-110	7	30
2-Methylnaphthalene	2.13	2.50	85	1.98	2.50	79	39-115	7	30
Acenaphthylene	2.24	2.50	90	2.08	2.50	83	44-115	8	30
Acenaphthene	2.15	2.50	86	1.99	2.50	80	44-113	8	30
Dibenzofuran	2.19	2.50	87	2.03	2.50	81	46-116	8	30
Fluorene	2.20	2.50	88	2.04	2.50	82	48-118	7	30
Phenanthrene	2.13	2.50	85	2.05	2.50	82	47-120	4	30
Anthracene	2.22	2.50	89	2.07	2.50	83	44-117	7	30
Fluoranthene	2.30	2.50	92	2.17	2.50	87	48-128	6	30
Pyrene	2.23	2.50	89	2.08	2.50	83	42-133	7	30
Benz(a)anthracene	2.25	2.50	90	2.08	2.50	83	48-125	8	30
Chrysene	2.36	2.50	94	2.17	2.50	87	50-128	9	30
Benzo(b)fluoranthene	2.46	2.50	99	2.30	2.50	92	49-131	7	30
Benzo(k)fluoranthene	2.63	2.50	105	2.44	2.50	98	54-131	7	30
Benzo(a)pyrene	2.64	2.50	105	2.46	2.50	98	43-134	7	30
Indeno(1,2,3-cd)pyrene	2.29	2.50	91	2.10	2.50	84	45-133	8	30
Dibenz(a,h)anthracene	2.38	2.50	95	2.20	2.50	88	49-133	8	30
Benzo(g,h,i)perylene	2.23	2.50	89	2.06	2.50	82	51-124	8	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K1201477

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
BV-13	K1201477-001	138	119
BV-13DUP	KWG1201833-1	133	117
Method Blank	KWG1201833-3	106	95
Lab Control Sample	KWG1201833-2	109	100
Duplicate Lab Control Sample	KWG1201833-5	109	101

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1201477
Project:	IP Longview	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1201833-3	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	ND	U	500	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	106	50-150	02/22/12	Acceptable
n-Triacontane	95	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K1201477
Date Collected: 02/16/2012
Date Received: 02/16/2012

Diesel and Residual Range Organics

Sample Name: BV-13
Lab Code: K1201477-001

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**19000**	Z	280	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	**890**	Z	560	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	138	50-150	02/22/12	Acceptable
n-Triacontane	119	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K1201477
Date Extracted: 02/21/2012
Date Analyzed: 02/22/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: BV-13
Lab Code: K1201477-001

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low
Extraction Lot: KWG1201833

Analyte Name	MRL	Sample Result	BV-13DUP KWG1201833-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	280	19000	19000	19000	2	30
Residual Range Organics (RRO)	560	890	830	860	7 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview
Sample Matrix: Water

Service Request: K1201477
Date Extracted: 02/21/2012
Date Analyzed: 02/22/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1201833

	Lab Control Sample KWG1201833-2 Lab Control Spike			Duplicate Lab Control Sample KWG1201833-5 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1610	1600	101	1550	1600	97	46-140	4	30
Residual Range Organics (RRO)	711	800	89	673	800	84	45-159	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 360.577.7222 360.636.1068 (fax) www.caslab.com

March 5, 2012 Analytical Report for Service Request No: K1201540

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP URS Longview Solidification

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on February 18, 2012. For your reference, these analyses have been assigned our service request number K1201540.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at Ed.Wallace@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/afs

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1201540
Project:	IP Longview Solidification	**Date Received:**	2/18/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six water samples were received for analysis at Columbia Analytical Services on 2/18/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Residual Range Organics (RRO) in sample Batch QC was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Elevated Detection Limits:
Samples 0397-017A (3 Day) and 0397-017A (4 Day) required dilution due to the presence of elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). An MS and Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) were analyzed and reported in lieu of the MS/MSD for these samples.

Approved by _____ **Date** 3/5/12

K1201540

Columbia Analytical Services
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CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 866-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina request for low level 8270 SIM. 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	PAH 8270 SIM	TPH-DRO NWTPH-DX	Turn Around Time (working days)
0397-017A (3 Day)		2		✓				✓	2-16-12	10:55	X	X	5
0397-017A (4 day)		2		✓				✓	2-17-12	10:16	X	X	5

REMARKS: Please send results to Tommy Jordan tjordan@kemron.com. Paul Kalina paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)	Date	Time
Jill Sahm	2-17-12	1600	Brad Tobin CAS	2/18/12	540
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Lab Work No.

K1201540

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Page 1 of 1

Client: URS Corp

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina request for low level 8270 SIM 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	PAH 8270 SIM	TPH-DRO NWTPH-Dx											Turn Around Time (working days)
0397-017 Dup (3 Day)		2		✓				✓	2/16/12	1100	X	X	(Hold All Samples)										5
0397-017 Dup (4 Day)		2		✓				✓	2/17/12	1021	X	X											5

Hold All Samples

Please send results to

MARKS: Tommy Jordan tjordan@kemron.com
Paul Kalina paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Jill Suhm	2-17-12	1600	Brad Robin (AS 2/18/12 840
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory / Date / Time

Lab Work No.

K1201540

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CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina request for low level 8270 SIM. 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	PAH 8270 SIM	TPH-DRO NWTPH-DX											Turn Around Time (working days)
0397-016 (3 Day)		2		✓				✓	2/16/12	10:50	X	X											5
0397-016 (4 Day)		2		✓				✓	2/17/12	10:08	X	X											5
~~0397-016 (5 Day)~~		~~2~~		✓				✓			X	X											~~5~~

Hold All Samples

Hold All Samples

Please send results to Tommy Jordan tjordan@kemron.com

Paul Kalina paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)	Date	Time
J. Jill Suhm Jill Suhm	2-17-12	1600	Brad Tobin (ARS	2/18/12	840
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by		
Relinquished by	Date	Time	Received by laboratory	Date	Time

Lab Work No.

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC Ed.W

Client / Project: URS Corp Service Request K12 01540

Received: 2/18/12 Opened: 2/18/12 By: BT Unloaded: 2/18/12 By: BT

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (N) N If yes, how many and where? 1 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number	NA	Filed
0.3	0.9	307				
-0.4	0.2	311				

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y (N)
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

ALL Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
1 of 2 of the 1L Ambers	1x1L Amber				x	HCL	2mL	20110202031	BT	9:55

Notes, Discrepancies, & Resolutions: _____

RUSH

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-017A (3 Day)	K1201540-001	47 D	47 D	53 D
0397-017A (4 Day)	K1201540-002	82 D	85 D	97 D
Batch QC	K1201568-001	77	85	87
Method Blank	KWG1201791-3	76	80	91
Batch QCMS	KWG1201791-4	72	85	87
Lab Control Sample	KWG1201791-1	73	84	83
Duplicate Lab Control Sample	KWG1201791-2	77	86	86

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	29-98
Sur2 = Fluoranthene-d10	31-105
Sur3 = Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1201791-3

Units: ng/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.3**	J	3.3	0.71	1	02/21/12	02/27/12	KWG1201791	
2-Methylnaphthalene	**0.82**	J	3.3	0.40	1	02/21/12	02/27/12	KWG1201791	
Acenaphthylene	ND	U	3.3	0.37	1	02/21/12	02/27/12	KWG1201791	
Acenaphthene	ND	U	3.3	0.36	1	02/21/12	02/27/12	KWG1201791	
Dibenzofuran	ND	U	3.3	0.42	1	02/21/12	02/27/12	KWG1201791	
Fluorene	ND	U	3.3	0.42	1	02/21/12	02/27/12	KWG1201791	
Phenanthrene	**1.3**	J	3.3	0.72	1	02/21/12	02/27/12	KWG1201791	
Anthracene	ND	U	3.3	0.29	1	02/21/12	02/27/12	KWG1201791	
Fluoranthene	**1.3**	J	3.3	0.46	1	02/21/12	02/27/12	KWG1201791	
Pyrene	ND	U	3.3	0.78	1	02/21/12	02/27/12	KWG1201791	
Benz(a)anthracene	ND	U	3.3	0.34	1	02/21/12	02/27/12	KWG1201791	
Chrysene	ND	U	3.3	0.65	1	02/21/12	02/27/12	KWG1201791	
Benzo(b)fluoranthene	ND	U	3.3	0.25	1	02/21/12	02/27/12	KWG1201791	
Benzo(k)fluoranthene	ND	U	3.3	0.41	1	02/21/12	02/27/12	KWG1201791	
Benzo(a)pyrene	ND	U	3.3	0.41	1	02/21/12	02/27/12	KWG1201791	
Indeno(1,2,3-cd)pyrene	ND	U	3.3	0.44	1	02/21/12	02/27/12	KWG1201791	
Dibenz(a,h)anthracene	ND	U	3.3	0.45	1	02/21/12	02/27/12	KWG1201791	
Benzo(g,h,i)perylene	ND	U	3.3	0.36	1	02/21/12	02/27/12	KWG1201791	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	76	29-98	02/27/12	Acceptable
Fluoranthene-d10	80	31-105	02/27/12	Acceptable
Terphenyl-d14	91	27-112	02/27/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201540
Project:	IP URS Longview Solidification	**Date Collected:**	02/16/2012
Sample Matrix:	Water	**Date Received:**	02/18/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-017A (3 Day)	**Units:**	ng/L
Lab Code:	K1201540-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**270000**	D	800	170	200	02/21/12	02/28/12	KWG1201791	
2-Methylnaphthalene	**48000**	D	800	95	200	02/21/12	02/28/12	KWG1201791	
Acenaphthylene	**570**	D	40	4.4	10	02/21/12	02/27/12	KWG1201791	
Acenaphthene	**36000**	D	800	85	200	02/21/12	02/28/12	KWG1201791	
Dibenzofuran	**17000**	D	40	5.0	10	02/21/12	02/27/12	KWG1201791	
Fluorene	**20000**	D	40	5.0	10	02/21/12	02/27/12	KWG1201791	
Phenanthrene	**29000**	D	800	170	200	02/21/12	02/28/12	KWG1201791	
Anthracene	**3800**	D	40	3.5	10	02/21/12	02/27/12	KWG1201791	
Fluoranthene	**4500**	D	40	5.5	10	02/21/12	02/27/12	KWG1201791	
Pyrene	**2600**	D	40	9.2	10	02/21/12	02/27/12	KWG1201791	
Benz(a)anthracene	**150**	D	40	4.0	10	02/21/12	02/27/12	KWG1201791	
Chrysene	**87**	D	40	7.7	10	02/21/12	02/27/12	KWG1201791	
Benzo(b)fluoranthene	**18**	JD	40	3.0	10	02/21/12	02/27/12	KWG1201791	
Benzo(k)fluoranthene	**6.5**	JD	40	4.9	10	02/21/12	02/27/12	KWG1201791	
Benzo(a)pyrene	**8.1**	JD	40	4.9	10	02/21/12	02/27/12	KWG1201791	
Indeno(1,2,3-cd)pyrene	ND	U	40	5.2	10	02/21/12	02/27/12	KWG1201791	
Dibenz(a,h)anthracene	ND	U	40	5.3	10	02/21/12	02/27/12	KWG1201791	
Benzo(g,h,i)perylene	ND	U	40	4.3	10	02/21/12	02/27/12	KWG1201791	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	47	29-98	02/27/12	Acceptable
Fluoranthene-d10	47	31-105	02/27/12	Acceptable
Terphenyl-d14	53	27-112	02/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Collected: 02/17/2012
Date Received: 02/18/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017A (4 Day)
Lab Code: K1201540-002

Units: ng/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**310000**	D	770	160	200	02/21/12	02/28/12	KWG1201791	
2-Methylnaphthalene	**56000**	D	770	90	200	02/21/12	02/28/12	KWG1201791	
Acenaphthylene	**630**	D	39	4.2	10	02/21/12	02/27/12	KWG1201791	
Acenaphthene	**42000**	D	770	81	200	02/21/12	02/28/12	KWG1201791	
Dibenzofuran	**19000**	D	39	4.8	10	02/21/12	02/27/12	KWG1201791	
Fluorene	**22000**	D	39	4.8	10	02/21/12	02/27/12	KWG1201791	
Phenanthrene	**31000**	D	770	170	200	02/21/12	02/28/12	KWG1201791	
Anthracene	**4100**	D	39	3.3	10	02/21/12	02/27/12	KWG1201791	
Fluoranthene	**4700**	D	39	5.2	10	02/21/12	02/27/12	KWG1201791	
Pyrene	**2800**	D	39	8.8	10	02/21/12	02/27/12	KWG1201791	
Benz(a)anthracene	**170**	D	39	3.9	10	02/21/12	02/27/12	KWG1201791	
Chrysene	**100**	D	39	7.4	10	02/21/12	02/27/12	KWG1201791	
Benzo(b)fluoranthene	**26**	JD	39	2.9	10	02/21/12	02/27/12	KWG1201791	
Benzo(k)fluoranthene	**8.3**	JD	39	4.7	10	02/21/12	02/27/12	KWG1201791	
Benzo(a)pyrene	**12**	JD	39	4.7	10	02/21/12	02/27/12	KWG1201791	
Indeno(1,2,3-cd)pyrene	ND	U	39	5.0	10	02/21/12	02/27/12	KWG1201791	
Dibenz(a,h)anthracene	ND	U	39	5.1	10	02/21/12	02/27/12	KWG1201791	
Benzo(g,h,i)perylene	ND	U	39	4.1	10	02/21/12	02/27/12	KWG1201791	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	82	29-98	02/27/12	Acceptable
Fluoranthene-d10	85	31-105	02/27/12	Acceptable
Terphenyl-d14	97	27-112	02/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Extracted: 02/21/2012
Date Analyzed: 02/27/2012

Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name: Batch QC
Lab Code: K1201568-001

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low
Extraction Lot: KWG1201791

Batch QCMS
KWG1201791-4

Analyte Name	Sample Result	Matrix Spike Result	Matrix Spike Expected	Matrix Spike %Rec	%Rec Limits
Naphthalene	5.4	355	476	73	37-118
2-Methylnaphthalene	1.3	337	476	71	37-117
Acenaphthylene	0.65	357	476	75	43-114
Acenaphthene	2.0	343	476	72	45-114
Dibenzofuran	1.2	351	476	73	44-122
Fluorene	1.7	358	476	75	45-123
Phenanthrene	4.6	366	476	76	42-127
Anthracene	1.5	377	476	79	32-125
Fluoranthene	2.0	423	476	88	48-134
Pyrene	1.9	401	476	84	44-130
Benz(a)anthracene	1.3	425	476	89	41-128
Chrysene	1.1	396	476	83	48-128
Benzo(b)fluoranthene	1.6	434	476	91	40-139
Benzo(k)fluoranthene	0.60	393	476	82	48-134
Benzo(a)pyrene	0.88	412	476	86	35-132
Indeno(1,2,3-cd)pyrene	1.0	391	476	82	40-135
Dibenz(a,h)anthracene	ND	376	476	79	43-135
Benzo(g,h,i)perylene	1.0	356	476	75	44-128

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Extracted: 02/21/2012
Date Analyzed: 02/27/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA
Level: Low
Extraction Lot: KWG1201791

	Lab Control Sample KWG1201791-1 Lab Control Spike			Duplicate Lab Control Sample KWG1201791-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	377	500	75	390	500	78	39-110	3	30
2-Methylnaphthalene	373	500	75	382	500	76	39-115	2	30
Acenaphthylene	408	500	82	420	500	84	44-115	3	30
Acenaphthene	385	500	77	398	500	80	44-113	3	30
Dibenzofuran	378	500	76	398	500	80	46-116	5	30
Fluorene	372	500	74	403	500	81	48-118	8	30
Phenanthrene	402	500	80	416	500	83	47-120	3	30
Anthracene	410	500	82	434	500	87	44-117	6	30
Fluoranthene	445	500	89	453	500	91	48-128	2	30
Pyrene	380	500	76	407	500	81	42-133	7	30
Benz(a)anthracene	415	500	83	423	500	85	48-125	2	30
Chrysene	419	500	84	430	500	86	50-128	3	30
Benzo(b)fluoranthene	456	500	91	462	500	92	49-131	1	30
Benzo(k)fluoranthene	460	500	92	465	500	93	54-131	1	30
Benzo(a)pyrene	469	500	94	478	500	96	43-134	2	30
Indeno(1,2,3-cd)pyrene	437	500	87	434	500	87	45-133	1	30
Dibenz(a,h)anthracene	432	500	86	432	500	86	49-133	0	30
Benzo(g,h,i)perylene	417	500	83	410	500	82	51-124	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
Batch QC	K1201477-001	138	119
0397-017A (3 Day)	K1201540-001	110	105
0397-017A (4 Day)	K1201540-002	109	108
Batch QCDUP	KWG1201833-1	133	117
Method Blank	KWG1201833-3	106	95
Lab Control Sample	KWG1201833-2	109	100
Duplicate Lab Control Sample	KWG1201833-5	109	101

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1201833-3

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	ND	U	500	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	106	50-150	02/22/12	Acceptable
n-Triacontane	95	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Collected: 02/16/2012
Date Received: 02/18/2012

Diesel and Residual Range Organics

Sample Name: 0397-017A (3 Day)
Lab Code: K1201540-001

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1100**	Z	270	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	ND	U	540	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	110	50-150	02/22/12	Acceptable
n-Triacontane	105	50-150	02/22/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201540
Project:	IP URS Longview Solidification	**Date Collected:**	02/17/2012
Sample Matrix:	Water	**Date Received:**	02/18/2012

Diesel and Residual Range Organics

Sample Name:	0397-017A (4 Day)	**Units:**	ug/L
Lab Code:	K1201540-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1100**	Z	270	1	02/21/12	02/22/12	KWG1201833	
Residual Range Organics (RRO)	ND	U	540	1	02/21/12	02/22/12	KWG1201833	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	109	50-150	02/22/12	Acceptable
n-Triacontane	108	50-150	02/22/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Extracted: 02/21/2012
Date Analyzed: 02/22/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1201477-001

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low
Extraction Lot: KWG1201833

Analyte Name	MRL	Sample Result	Batch QCDUP KWG1201833-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	280	19000	19000	19000	2	30
Residual Range Organics (RRO)	560	890	830	860	7 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201540
Date Extracted: 02/21/2012
Date Analyzed: 02/22/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1201833

	Lab Control Sample KWG1201833-2 Lab Control Spike			Duplicate Lab Control Sample KWG1201833-5 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1610	1600	101	1550	1600	97	46-140	4	30
Residual Range Organics (RRO)	711	800	89	673	800	84	45-159	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services, Inc.
1317 S. 13th Avenue, Kelso, WA 98626 | 360.577.7222 | 360.636.1068 (fax) | www.caslab.com

March 5, 2012 Analytical Report for Service Request No: K1201617

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP URS Longview Solidification

Dear Paul:

Enclosed are the results of the rush samples submitted to our laboratory on February 22, 2012. For your reference, these analyses have been assigned our service request number K1201617.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at Ed.Wallace@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace

Ed Wallace
Project Chemist

EW/afs

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1201617
Project:	IP Longview Solidification	**Date Received:**	2/22/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six water samples were received for analysis at Columbia Analytical Services on 2/22/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

No anomalies with the analysis of these samples were observed.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Elevated Detection Limits:
All samples required dilution due to the presence of elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a Matrix Spike/Matrix Spike Duplicate (MS/MSD). An MS and Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) were analyzed and reported in lieu of the MS/MSD for these samples.

Approved by EMW **Date** 3/5/12

Columbia Analytical Services
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina request for low level 8270 SIM 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	PAH 8270 SIM	TPH-DRO NWTPH-DX	Turn Around Time (working days)
0397-016 (5day)		2		✓				✓	2/20/12	1225	X	X	5
													X

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Jill Suhm Jill Suhm	2-20-12	1600	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory GHS Date 2/22/12 Time 1130

REMARKS: Please send results to Tommy Jordan tjordan@kemron.com Paul Kalina paul.kalina@urscorp.com

Lab Work No.

Columbia Analytical Services™

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CHAIN of CUSTODY

Page 1 of 1

Client: URS

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: FedEx

Special Detection Limit/Reporting: Paul Kalina request for low level 8270 SIM 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	MH 8270 SIM	TPH-DRO NWTPH-DX	Turn Around Time (working days)
0397-017A (5 day)		2		✓				✓	2/20/12	1228	X	X	5
													~~5~~

MARKS: Please send results to Tommy Jordan tjordan@kemron.com Paul Kalina paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Jill Suhm Jill Suhm	2-20-12	1600	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory CMS Date 2/22/12 Time 0930

Lab Work No.

Columbia Analytical Services

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CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: Fed Ex

Special Detection Limit/Reporting: Paul Kalina request for low level 8270 SIM 1/20/12

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	PAH 8270 SIM	TPH-DRO NWTPH-DX	Turn Around Time (working days)
0397-017 DUP (5day)		2		✓				✓	2-20-12	1232	X	X	5

MARKS: Please send results to Tommy Jordan tjordan@kemron.com Paul Kalina paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Jill Suhm	2-20-12	1600	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory CTS Date 2/22/12 Time 0930

Lab Work No.

PC Ed. W

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

Client / Project: URS Corp Service Request *K12* 01617

Received: 2/22/12 Opened: 2/22/12 By: AJ Unloaded: 2/22/12 By: AJ

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
0.6	1.6	304			✓

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
0397-16 (5day)	1LA				X	HCL	2mL	20110602231	AJ	1015
0397-017A (5day)	1LA				X	HCL	2mL	20110602031	AJ	1015
0397-017 Dup (5day)	1LA				X	HCL	2mL	20110602031	AJ	1015

Notes, Discrepancies, & Resolutions: _____

RUSH

Page ____ *of* ____

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-016 (5 day)	K1201617-001	68	79	85
0397-017A (5 day)	K1201617-002	65	75	83
0397-017 DUP (5 day)	K1201617-003	67	75	88
Method Blank	KWG1201890-3	73	79	85
Lab Control Sample	KWG1201890-1	70	76	81
Duplicate Lab Control Sample	KWG1201890-2	70	77	80

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	29-98
Sur2 =	Fluoranthene-d10	31-105
Sur3 =	Terphenyl-d14	27-112

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1201890-3

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.5**	J	3.4	0.71	1	02/23/12	02/27/12	KWG1201890	
2-Methylnaphthalene	**0.81**	J	3.4	0.40	1	02/23/12	02/27/12	KWG1201890	
Acenaphthylene	ND	U	3.4	0.37	1	02/23/12	02/27/12	KWG1201890	
Acenaphthene	ND	U	3.4	0.36	1	02/23/12	02/27/12	KWG1201890	
Dibenzofuran	**0.45**	J	3.4	0.42	1	02/23/12	02/27/12	KWG1201890	
Fluorene	ND	U	3.4	0.42	1	02/23/12	02/27/12	KWG1201890	
Phenanthrene	**1.5**	J	3.4	0.72	1	02/23/12	02/27/12	KWG1201890	
Anthracene	ND	U	3.4	0.29	1	02/23/12	02/27/12	KWG1201890	
Fluoranthene	**0.73**	J	3.4	0.46	1	02/23/12	02/27/12	KWG1201890	
Pyrene	ND	U	3.4	0.78	1	02/23/12	02/27/12	KWG1201890	
Benz(a)anthracene	ND	U	3.4	0.34	1	02/23/12	02/27/12	KWG1201890	
Chrysene	ND	U	3.4	0.65	1	02/23/12	02/27/12	KWG1201890	
Benzo(b)fluoranthene	**0.28**	J	3.4	0.25	1	02/23/12	02/27/12	KWG1201890	
Benzo(k)fluoranthene	ND	U	3.4	0.41	1	02/23/12	02/27/12	KWG1201890	
Benzo(a)pyrene	ND	U	3.4	0.41	1	02/23/12	02/27/12	KWG1201890	
Indeno(1,2,3-cd)pyrene	ND	U	3.4	0.44	1	02/23/12	02/27/12	KWG1201890	
Dibenz(a,h)anthracene	ND	U	3.4	0.45	1	02/23/12	02/27/12	KWG1201890	
Benzo(g,h,i)perylene	ND	U	3.4	0.36	1	02/23/12	02/27/12	KWG1201890	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	29-98	02/27/12	Acceptable
Fluoranthene-d10	79	31-105	02/27/12	Acceptable
Terphenyl-d14	85	27-112	02/27/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201617
Project:	IP URS Longview Solidification	**Date Collected:**	02/20/2012
Sample Matrix:	Water	**Date Received:**	02/22/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-016 (5 day)	**Units:**	ng/L
Lab Code:	K1201617-001	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**100000**	D	1800	370	400	02/23/12	02/29/12	KWG1201890	
2-Methylnaphthalene	**13000**	D	89	11	20	02/23/12	02/28/12	KWG1201890	
Acenaphthylene	**130**		4.5	0.49	1	02/23/12	02/27/12	KWG1201890	
Acenaphthene	**10000**	D	89	9.4	20	02/23/12	02/28/12	KWG1201890	
Dibenzofuran	**6700**	D	89	11	20	02/23/12	02/28/12	KWG1201890	
Fluorene	**6800**	D	89	11	20	02/23/12	02/28/12	KWG1201890	
Phenanthrene	**17000**	D	89	19	20	02/23/12	02/28/12	KWG1201890	
Anthracene	**1700**		4.5	0.38	1	02/23/12	02/27/12	KWG1201890	
Fluoranthene	**4000**	D	89	12	20	02/23/12	02/28/12	KWG1201890	
Pyrene	**1700**		4.5	1.1	1	02/23/12	02/27/12	KWG1201890	
Benz(a)anthracene	**100**		4.5	0.45	1	02/23/12	02/27/12	KWG1201890	
Chrysene	**100**		4.5	0.85	1	02/23/12	02/27/12	KWG1201890	
Benzo(b)fluoranthene	**13**		4.5	0.33	1	02/23/12	02/27/12	KWG1201890	
Benzo(k)fluoranthene	**4.0**	J	4.5	0.54	1	02/23/12	02/27/12	KWG1201890	
Benzo(a)pyrene	**6.2**		4.5	0.54	1	02/23/12	02/27/12	KWG1201890	
Indeno(1,2,3-cd)pyrene	**1.5**	J	4.5	0.58	1	02/23/12	02/27/12	KWG1201890	
Dibenz(a,h)anthracene	**0.86**	J	4.5	0.59	1	02/23/12	02/27/12	KWG1201890	
Benzo(g,h,i)perylene	**1.9**	J	4.5	0.47	1	02/23/12	02/27/12	KWG1201890	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	29-98	02/27/12	Acceptable
Fluoranthene-d10	79	31-105	02/27/12	Acceptable
Terphenyl-d14	85	27-112	02/27/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201617
Project:	IP URS Longview Solidification	**Date Collected:**	02/20/2012
Sample Matrix:	Water	**Date Received:**	02/22/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-017A (5 day)	**Units:**	ng/L
Lab Code:	K1201617-002	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**100000**	D	1500	310	400	02/23/12	02/29/12	KWG1201890	
2-Methylnaphthalene	**17000**	D	74	8.7	20	02/23/12	02/28/12	KWG1201890	
Acenaphthylene	**230**		3.7	0.40	1	02/23/12	02/27/12	KWG1201890	
Acenaphthene	**16000**	D	74	7.8	20	02/23/12	02/28/12	KWG1201890	
Dibenzofuran	**9200**	D	74	9.1	20	02/23/12	02/28/12	KWG1201890	
Fluorene	**11000**	D	74	9.1	20	02/23/12	02/28/12	KWG1201890	
Phenanthrene	**18000**	D	74	16	20	02/23/12	02/28/12	KWG1201890	
Anthracene	**2000**		3.7	0.32	1	02/23/12	02/27/12	KWG1201890	
Fluoranthene	**3500**	D	74	9.9	20	02/23/12	02/28/12	KWG1201890	
Pyrene	**1700**		3.7	0.84	1	02/23/12	02/27/12	KWG1201890	
Benz(a)anthracene	**110**		3.7	0.37	1	02/23/12	02/27/12	KWG1201890	
Chrysene	**88**		3.7	0.70	1	02/23/12	02/27/12	KWG1201890	
Benzo(b)fluoranthene	**15**		3.7	0.27	1	02/23/12	02/27/12	KWG1201890	
Benzo(k)fluoranthene	**4.7**		3.7	0.45	1	02/23/12	02/27/12	KWG1201890	
Benzo(a)pyrene	**7.5**		3.7	0.45	1	02/23/12	02/27/12	KWG1201890	
Indeno(1,2,3-cd)pyrene	**1.3**	J	3.7	0.48	1	02/23/12	02/27/12	KWG1201890	
Dibenz(a,h)anthracene	**0.53**	J	3.7	0.49	1	02/23/12	02/27/12	KWG1201890	
Benzo(g,h,i)perylene	**1.0**	J	3.7	0.39	1	02/23/12	02/27/12	KWG1201890	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	65	29-98	02/27/12	Acceptable
Fluoranthene-d10	75	31-105	02/27/12	Acceptable
Terphenyl-d14	83	27-112	02/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617
Date Collected: 02/20/2012
Date Received: 02/22/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-017 DUP (5 day)
Lab Code: K1201617-003

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**81000**	D	1500	310	400	02/23/12	02/29/12	KWG1201890	
2-Methylnaphthalene	**15000**	D	74	8.7	20	02/23/12	02/28/12	KWG1201890	
Acenaphthylene	**200**		3.7	0.41	1	02/23/12	02/27/12	KWG1201890	
Acenaphthene	**15000**	D	74	7.9	20	02/23/12	02/28/12	KWG1201890	
Dibenzofuran	**8200**	D	74	9.2	20	02/23/12	02/28/12	KWG1201890	
Fluorene	**9300**	D	74	9.2	20	02/23/12	02/28/12	KWG1201890	
Phenanthrene	**15000**	D	74	16	20	02/23/12	02/28/12	KWG1201890	
Anthracene	**1600**		3.7	0.32	1	02/23/12	02/27/12	KWG1201890	
Fluoranthene	**2100**		3.7	0.50	1	02/23/12	02/27/12	KWG1201890	
Pyrene	**1300**		3.7	0.85	1	02/23/12	02/27/12	KWG1201890	
Benz(a)anthracene	**83**		3.7	0.37	1	02/23/12	02/27/12	KWG1201890	
Chrysene	**70**		3.7	0.71	1	02/23/12	02/27/12	KWG1201890	
Benzo(b)fluoranthene	**12**		3.7	0.28	1	02/23/12	02/27/12	KWG1201890	
Benzo(k)fluoranthene	**3.6**	J	3.7	0.45	1	02/23/12	02/27/12	KWG1201890	
Benzo(a)pyrene	**5.5**		3.7	0.45	1	02/23/12	02/27/12	KWG1201890	
Indeno(1,2,3-cd)pyrene	**0.86**	J	3.7	0.48	1	02/23/12	02/27/12	KWG1201890	
Dibenz(a,h)anthracene	ND	U	3.7	0.49	1	02/23/12	02/27/12	KWG1201890	
Benzo(g,h,i)perylene	**0.76**	J	3.7	0.40	1	02/23/12	02/27/12	KWG1201890	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	29-98	02/27/12	Acceptable
Fluoranthene-d10	75	31-105	02/27/12	Acceptable
Terphenyl-d14	88	27-112	02/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617
Date Extracted: 02/23/2012
Date Analyzed: 02/27/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA
Level: Low
Extraction Lot: KWG1201890

Analyte Name	Lab Control Sample KWG1201890-1 Lab Control Spike Result	Expected	%Rec	Duplicate Lab Control Sample KWG1201890-2 Duplicate Lab Control Spike Result	Expected	%Rec	%Rec Limits	RPD	RPD Limit
Naphthalene	356	500	71	355	500	71	39-110	1	30
2-Methylnaphthalene	357	500	71	356	500	71	39-115	0	30
Acenaphthylene	379	500	76	386	500	77	44-115	2	30
Acenaphthene	362	500	72	369	500	74	44-113	2	30
Dibenzofuran	371	500	74	371	500	74	46-116	0	30
Fluorene	375	500	75	375	500	75	48-118	0	30
Phenanthrene	376	500	75	379	500	76	47-120	1	30
Anthracene	399	500	80	392	500	78	44-117	2	30
Fluoranthene	405	500	81	404	500	81	48-128	0	30
Pyrene	386	500	77	390	500	78	42-133	1	30
Benz(a)anthracene	399	500	80	406	500	81	48-125	2	30
Chrysene	405	500	81	408	500	82	50-128	1	30
Benzo(b)fluoranthene	435	500	87	438	500	88	49-131	1	30
Benzo(k)fluoranthene	440	500	88	436	500	87	54-131	1	30
Benzo(a)pyrene	456	500	91	460	500	92	43-134	1	30
Indeno(1,2,3-cd)pyrene	425	500	85	429	500	86	45-133	1	30
Dibenz(a,h)anthracene	418	500	84	418	500	84	49-133	0	30
Benzo(g,h,i)perylene	397	500	79	400	500	80	51-124	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-016 (5 day)	K1201617-001	112	109
0397-017A (5 day)	K1201617-002	110	110
0397-017 DUP (5 day)	K1201617-003	105	105
Method Blank	KWG1201930-3	100	92
Lab Control Sample	KWG1201930-1	109	102
Duplicate Lab Control Sample	KWG1201930-2	104	98

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1201930-3

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	02/23/12	02/24/12	KWG1201930	
Residual Range Organics (RRO)	ND	U	500	1	02/23/12	02/24/12	KWG1201930	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	100	50-150	02/24/12	Acceptable
n-Triacontane	92	50-150	02/24/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617
Date Collected: 02/20/2012
Date Received: 02/22/2012

Diesel and Residual Range Organics

Sample Name: 0397-016 (5 day)
Lab Code: K1201617-001

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**500**	Z	260	1	02/23/12	02/24/12	KWG1201930	
Residual Range Organics (RRO)	ND	U	520	1	02/23/12	02/24/12	KWG1201930	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	112	50-150	02/24/12	Acceptable
n-Triacontane	109	50-150	02/24/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617
Date Collected: 02/20/2012
Date Received: 02/22/2012

Diesel and Residual Range Organics

Sample Name: 0397-017A (5 day)
Lab Code: K1201617-002

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	570	Z	290	1	02/23/12	02/24/12	KWG1201930	
Residual Range Organics (RRO)	ND	U	570	1	02/23/12	02/24/12	KWG1201930	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	110	50-150	02/24/12	Acceptable
n-Triacontane	110	50-150	02/24/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1201617
Date Collected: 02/20/2012
Date Received: 02/22/2012

Diesel and Residual Range Organics

Sample Name: 0397-017 DUP (5 day)
Lab Code: K1201617-003

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	500	Z	280	1	02/23/12	02/24/12	KWG1201930	
Residual Range Organics (RRO)	ND	U	550	1	02/23/12	02/24/12	KWG1201930	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	105	50-150	02/24/12	Acceptable
n-Triacontane	105	50-150	02/24/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1201617
Project:	IP URS Longview Solidification	**Date Extracted:**	02/23/2012
Sample Matrix:	Water	**Date Analyzed:**	02/24/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method:	Method	**Units:**	ug/L
Analysis Method:	NWTPH-Dx	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1201930

	Lab Control Sample KWG1201930-1 Lab Control Spike			Duplicate Lab Control Sample KWG1201930-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1580	1600	99	1660	1600	104	46-140	5	30
Residual Range Organics (RRO)	694	800	87	742	800	93	45-159	7	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

July 05, 2012 Analytical Report for Service Request No: K1206162

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP URS Longview Solidification

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on June 27, 2012. For your reference, these analyses have been assigned our service request number K1206162.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at Ed.Wallace@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Chemist

EW/jw

Columbia Analytical Services
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PHONE +1 360 577 7222 | FAX +1 360 636 1068
Columbia Analytical Services, Inc.
Part of the ALS Group A Campbell Brothers Limited Company

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc. - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2286
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L12-28
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Georgia DNR	http://www.gaepd.org/Documents/techguide_pcb.html#cel	881
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
Indiana DOH	http://www.in.gov/isdh/24859.htm	C-WA-01
ISO 17025	http://www.pjlabs.com/	L12-27
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	3016
Louisiana DHH	Not available	LA110003
Maine DHS	Not available	WA0035
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-368
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA35
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
New Mexico ED	http://www.nmenv.state.nm.us/dwb/Index.htm	-
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA200001
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T704427-08-TX
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C1203
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.caslab.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.caslab.com or at the accreditation bodies web site

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1206162
Project:	IP Longview Solidification	**Date Received:**	6/27/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Seven water samples were received for analysis at Columbia Analytical Services on 6/27/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory. Six of the samples were placed on hold.

Diesel Range Organics by NWTPH-Dx

Sample Notes and Discussion:
Insufficient sample volume was received to perform a duplicate client sample analysis. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the duplicate analysis for these samples.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM

Elevated Detection Limits:
Sample 0397-026 (5day) required dilution due to the presence of elevated levels of target analyte. The reporting limits were adjusted to reflect the dilution.

Approved by Emw **Date** 7/5/12

Columbia Analytical Services™

800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp.

Project: IP URS Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 886-495-5282

Method of Shipment: FED EX

Special Detection Limit/Reporting: Paul Kalina request ultra low level 8270 Sim

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Water	Air	Other	Prsv.: Yes	No	Sampling Date	Sampling Time	TPH-ORO NWTPH-DX	PAH 8270 SIM	Turn Around Time (working days)
0397-026 (2hr)		2		X				X	6/18/12	1249	X	X	Hold
0397-026 (7hr)		2		X				X	6/18/12	1715	X	X	Hold
0397-026 (24hr)		2		X				X	6/19/12	0912	X	X	Hold
0397-026 (48hr)		2		X				X	6/20/12	0915	X	X	Hold
0397-026 (72hr)		2		X				X	6/21/12	0915	X	X	Hold
0397-026 (4 day)		2		X				X	6/22/12	0919	X	X	Hold
0397-026 (5 day)		2		X				X	6/23/12	1010	X	X	3 Day

MARKS: Please send results to: stjordan@kennedy.com Paul Kalina paul.kalina@urscorp.com

Sample Received Intact: Yes No

Temperature received: (Ice) No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Mason M Reedy	6/25/12	1617	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: Date 6/27/12 Time 0945

Lab Work No.

PC ED

Cooler Receipt and Preservation Form

Client / Project: URS Service Request K12 606462

Received: 6/27/12 Opened: 6/27/12 By: SAW Unloaded: 6/27/12 By: SAW

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____

If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
0.3	—	315		7485 4874 0449	

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

RUSH

Notes, Discrepancies, & Resolutions: 5 bda RUSH confirmed only -007 to be analyzed per P. Kalina 6/27/12 CL

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1206162

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3	Sur4
0397-026 (5 day)	K1206162-007	69 D	94 D	80 D	99 D
Method Blank	KWG1207088-3	67	83	74	96
Duplicate Lab Control Sample	KWG1207088-2	67	85	55	95
Lab Control Sample	KWG1207088-4	72	82	42	97

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	46-114
Sur2 =	Fluoranthene-d10	51-121
Sur3 =	2,4,6-Tribromophenol	10-136
Sur4 =	Terphenyl-d14	58-140

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1206162
Project:	IP URS Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1207088-3	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
2-Methylnaphthalene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Acenaphthylene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Acenaphthene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Dibenzofuran	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Fluorene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Phenanthrene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Anthracene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Fluoranthene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Pyrene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Benz(a)anthracene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Chrysene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Benzo(b)fluoranthene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Benzo(k)fluoranthene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Benzo(a)pyrene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Indeno(1,2,3-cd)pyrene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Dibenz(a,h)anthracene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Benzo(g,h,i)perylene	ND	U	0.0034	1	06/27/12	07/02/12	KWG1207088	
Pentachlorophenol	ND	U	1.0	1	06/27/12	07/02/12	KWG1207088	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	46-114	07/02/12	Acceptable
Fluoranthene-d10	83	51-121	07/02/12	Acceptable
2,4,6-Tribromophenol	74	10-136	07/02/12	Acceptable
Terphenyl-d14	96	58-140	07/02/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1206162
Date Collected: 06/23/2012
Date Received: 06/27/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-026 (5 day)
Lab Code: K1206162-007

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**170**	D	0.39	100	06/27/12	07/02/12	KWG1207088	
2-Methylnaphthalene	**30**	D	0.39	100	06/27/12	07/02/12	KWG1207088	
Acenaphthylene	**0.54**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Acenaphthene	**21**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Dibenzofuran	**15**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Fluorene	**16**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Phenanthrene	**44**	D	0.39	100	06/27/12	07/02/12	KWG1207088	
Anthracene	**5.7**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Fluoranthene	**11**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Pyrene	**5.9**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Benz(a)anthracene	**0.56**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Chrysene	**0.47**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Benzo(b)fluoranthene	**0.085**	D	0.039	10	06/27/12	07/02/12	KWG1207088	
Benzo(k)fluoranthene	ND	U	0.039	10	06/27/12	07/02/12	KWG1207088	
Benzo(a)pyrene	ND	U	0.039	10	06/27/12	07/02/12	KWG1207088	
Indeno(1,2,3-cd)pyrene	ND	U	0.039	10	06/27/12	07/02/12	KWG1207088	
Dibenz(a,h)anthracene	ND	U	0.039	10	06/27/12	07/02/12	KWG1207088	
Benzo(g,h,i)perylene	ND	U	0.039	10	06/27/12	07/02/12	KWG1207088	
Pentachlorophenol	ND	U	12	10	06/27/12	07/02/12	KWG1207088	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	69	46-114	07/02/12	Acceptable
Fluoranthene-d10	94	51-121	07/02/12	Acceptable
2,4,6-Tribromophenol	80	10-136	07/02/12	Acceptable
Terphenyl-d14	99	58-140	07/02/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206162
Project:	IP URS Longview Solidification	**Date Extracted:**	06/28/2012
Sample Matrix:	Water	**Date Analyzed:**	07/02/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	ug/L
Analysis Method:	8270D SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1207088

	Lab Control Sample KWG1207088-4 Lab Control Spike			Duplicate Lab Control Sample KWG1207088-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.386	0.500	77	0.348	0.500	70	39-110	11	30
2-Methylnaphthalene	0.373	0.500	75	0.337	0.500	67	39-115	10	30
Acenaphthylene	0.397	0.500	79	0.372	0.500	74	44-115	6	30
Acenaphthene	0.391	0.500	78	0.366	0.500	73	44-113	7	30
Dibenzofuran	0.374	0.500	75	0.356	0.500	71	46-116	5	30
Fluorene	0.377	0.500	75	0.364	0.500	73	48-118	4	30
Phenanthrene	0.373	0.500	75	0.363	0.500	73	47-120	3	30
Anthracene	0.386	0.500	77	0.367	0.500	73	44-117	5	30
Fluoranthene	0.397	0.500	79	0.417	0.500	83	48-128	5	30
Pyrene	0.440	0.500	88	0.430	0.500	86	42-133	2	30
Benz(a)anthracene	0.420	0.500	84	0.446	0.500	89	48-125	6	30
Chrysene	0.442	0.500	88	0.440	0.500	88	50-128	1	30
Benzo(b)fluoranthene	0.421	0.500	84	0.456	0.500	91	49-131	8	30
Benzo(k)fluoranthene	0.460	0.500	92	0.453	0.500	91	54-131	1	30
Benzo(a)pyrene	0.439	0.500	88	0.432	0.500	86	43-134	2	30
Indeno(1,2,3-cd)pyrene	0.493	0.500	99	0.555	0.500	111	45-133	12	30
Dibenz(a,h)anthracene	0.511	0.500	102	0.543	0.500	109	49-133	6	30
Benzo(g,h,i)perylene	0.445	0.500	89	0.471	0.500	94	51-124	6	30
Pentachlorophenol	1.17	2.00	59	1.34	2.00	67	10-123	13	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1206162

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-026 (5 day)	K1206162-007	112	111
Method Blank	KWG1207149-3	97	97
Lab Control Sample	KWG1207149-1	108	107
Duplicate Lab Control Sample	KWG1207149-2	110	113

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1206162
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1207149-3

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	06/28/12	07/04/12	KWG1207149	
Residual Range Organics (RRO)	ND	U	500	1	06/28/12	07/04/12	KWG1207149	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	97	50-150	07/04/12	Acceptable
n-Triacontane	97	50-150	07/04/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206162
Project:	IP URS Longview Solidification	**Date Collected:**	06/23/2012
Sample Matrix:	Water	**Date Received:**	06/27/2012

Diesel and Residual Range Organics

Sample Name:	0397-026 (5 day)	**Units:**	ug/L
Lab Code:	K1206162-007	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1300**	Z	280	1	06/28/12	07/04/12	KWG1207149	
Residual Range Organics (RRO)	ND	U	560	1	06/28/12	07/04/12	KWG1207149	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	112	50-150	07/04/12	Acceptable
n-Triacontane	111	50-150	07/04/12	Acceptable

Comments:

Client: URS Corporation
Project: IP URS Longview Solidification
Sample Matrix: Water

Service Request: K1206162
Date Extracted: 06/28/2012
Date Analyzed: 07/04/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1207149

	Lab Control Sample KWG1207149-1 Lab Control Spike			Duplicate Lab Control Sample KWG1207149-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1740	1600	108	1590	1600	99	46-140	9	30
Residual Range Organics (RRO)	810	800	101	755	800	94	45-159	7	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

August 7, 2012 Analytical Report for Service Request No: K1206824

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP Longview Solidification

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on July 13, 2012. For your reference, these analyses have been assigned our service request number K1206824.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at Ed.Wallace@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Manager

EW/ln

Columbia Analytical Services
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Environmental www.caslab.com ▪ www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc. - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2286
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L12-28
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Georgia DNR	http://www.gaepd.org/Documents/techguide_pcb.html#cel	881
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
Indiana DOH	http://www.in.gov/isdh/24859.htm	C-WA-01
ISO 17025	http://www.pjlabs.com/	L12-27
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	3016
Louisiana DHH	Not available	LA110003
Maine DHS	Not available	WA0035
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-368
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA35
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
New Mexico ED	http://www.nmenv.state.nm.us/dwb/Index.htm	-
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA200001
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T704427-08-TX
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C1203
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.caslab.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.caslab.com or at the accreditation bodies web site

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1206824
Project:	IP Longview Solidification	**Date Received:**	7/13/12
Sample Matrix:	Water and Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six samples were received for analysis at Columbia Analytical Services on 7/13/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx Waters

Holding Time Exceptions:
The analysis of samples 0397-028 (2hr), 0397-028 (7hr), and 0397-028 (24hr) was initially performed past the recommended holding time. The bottles received for these samples were not preserved; therefore, a 7 day holding time from sample collection applies. Due to a laboratory error, the samples were initially logged in to the Laboratory Information Management System (LIMS) with a 14 day holding time applied. Efforts were made to analyze the samples as soon as the error was identified. The data was flagged to indicate the holding time violation.

Sample Notes and Discussion:
Insufficient sample volume was received to perform a duplicate client sample analysis for extraction lots KWG1207973 and KWG1208040. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the duplicate analysis for these samples.

Diesel Range Organics by NWTPH-Dx Soil

No anomalies associated with the analysis of these samples were observed

Diesel Range Organics by NWTPH-Dx Following TCLP and SPLP

Holding Time Exceptions:
The TCLP and SPLP extraction of sample 0397-028 was initially performed within the recommended holding time. Due to a laboratory error, the TCLP leachate was misidentified as an additional bottle of SPLP leachate. Consequently, the TCLP leachate was improperly extracted in the same preparation batch as the SPLP leachate. The SPLP leachate was mistakenly spiked with the analytes of concern for analysis as a Matrix Spike. Both the TCLP and SPLP extraction were repeated past the recommended holding time after the error was identified. The leachates generated by these procedures were then properly extracted separately and analyzed. Results from both determinations were comparable. The results from the reanalysis were reported. The data was flagged to indicate the holding time violation. No further corrective action was feasible.

Approved by Emw **Date** 8/27/12

Sample Notes and Discussion:
Insufficient leachate volume was available to perform a duplicate client sample analysis. A Laboratory Control Sample and Duplicate Laboratory Control Sample (LCS/DLCS) were analyzed and reported in lieu of the duplicate analysis for these samples.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM Soil

Surrogate Exceptions:
The control criteria were exceeded for Fluorene-d10, Fluoranthene-d10 and Terphenyl-d14 in sample 0397-028, 0397-028MS and 0397-028DMS due to matrix interference. The presence of non-target background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of all analytes for sample 0397-028 were 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 Water

No anomalies associated with the analysis of these samples were observed

Sample Notes and Discussion:
It was not possible to maintain satisfactory chromatography and still reach an MDL of 0.012 ug/L. To maintain adequate recovery of internal standards, the extracts needed to be diluted.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM TCLP

Blank Exceptions:
The Method Blank KWG12-8008-5 (TCLP) contained low levels of Naphthalene, 2-Methylnaphthalene, Acenaphthene, Dibenzofuran, Fluorene and Phenanthrene above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM SPLP

Blank Exceptions:
The Method Blank KWG1208008-5 (SPLP) contained low levels of several analytes above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated.

Surrogate Exceptions:
The control criteria were exceeded for Fluoranthene-d10 in sample 0397-028 Leachate due to matrix interference. The presence of non-target background components prevented adequate resolution of the surrogate. Accurate quantitation was not possible. No further corrective action was appropriate.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C SIM Wipe

Blank Exceptions:
The Method Blank KWG1208078-3 contained low levels of Naphthalene, 2-Methylnaphthalene, Acenaphthene, Dibenzofuran, Fluorene and Phenanthrene above the Method Reporting Limit (MRL). In accordance with CAS QA/QC policy, all sample results less than twenty times the level found in the Method Blank were flagged as estimated.

Approved by E.M.W **Date** 5/21/12

Lab Control Sample Exceptions:
The control criterion was exceeded for Naphthalene, 2-Methylnaphthalene, Acenaphthene, Acenapthylene, Dibenzofuran and Fluorene, in Laboratory Control Sample (LCS) KWG128078-1. The problem indicated a potential low bias for results reported from this analytical batch. Samples 0397-028 (wipe) tested positive for the analytes in question. Reanalysis was not performed because insufficient sample remained for additional testing. The data was flagged to indicate the problem

Surrogate Exceptions:
The control criteria were exceeded for Fluorene-d10 in 0397-028 (wipe) and Method Blank KWG1208078-3. The problem indicated a potential low bias for results reported from this analytical batch. A re-analysis was not performed because insufficient sample was available. No further corrective action was possible.

Sample Notes and Discussion:
The result reported for Benzo(a)pyrene in sample 0397-028 (wipe) may contain a slight bias. The chromatogram indicated the presence of non-target background components. The matrix interference may have resulted in a slight high bias in the affected samples. The results were flagged with "X" to indicate the issue.

Approved by EMW **Date** 8/21/12

Columbia Analytical Services™

800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page ___ of ___

Client: URS Corp

Project: IP Longview Solidification

Method of Shipment: FedEx

Project Manager: Paul Kalina

Telephone No. 206-438-2172

Fax No. 886-495-5282

Special Detection Limit/Reporting: Paul Kalina requests ultra low level 8270 SIM

K1206824

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	SPLP PAH 8270 SIM	SPLP DRO NWJPH-DX	TCLP PAH 8270 SIM	TCLP DRO NWJPH-DX	Total PAH 8270 SIM	Total DRO NWJPH-DX						Hold	Turn Around Time (working days)
0397-028		1	x					x	7/6/2012	1527	x	x	x	x									STD
0397-028 (2hr)		2		x				x	7/9/2012	1113					x	x							STD
0397-028 (7 hr)		2		x				x	7/9/2012	1612					x	x							STD
0397-028 (24 hr)		2		x				x	7/10/2012	0914					x	x							STD
0397-028 (48 hr)		2		x				x	7/11/2012	0915					x	x							STD
0397-028 (wipe)		2				x	X		7/11/2012	1404					x	x							STD

1 of 9

Please sennd results to Tommy Jordan at tjordan@kemron.com, Paul Kalina at paul.kalina.urscorp.com

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name) Mason M Reedy Mason M Reedy	Date 7/11/12	Time 1410	Received by (Sign & Print Name)
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory Cathryn Wise

Date 7/13/12 Time 8:15

Lab Work No.

PC Ed

Cooler Receipt and Preservation Form

Client / Project: URS Corp. Service Request K12 06824

Received: 7/13/12 Opened: 7/13/12 By: GW Unloaded: 7/13/12 By: GW

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1 front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number	NA	Filed
1.8	—	289		7935 7718 6781		

7. Packing material: *Inserts* (*Baggies*) (*Bubble Wrap*) *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? NA (Y) N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

Analytical Results

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
0397-028	K1206824-001	07/06/2012	07/13/2012	07/16/2012	76.2	

QA/QC Report

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	07/06/2012
Sample Matrix:	Soil	**Date Received:**	07/13/2012
		Date Analyzed:	07/16/2012

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
0397-028	K1206824-001	76.2	76.6	76.4	<1	

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-028	K1206824-001	112 D *	117 D *	215 D *
Method Blank	KWG1208077-5	35	47	69
0397-028MS	KWG1208077-1	311 D *	84 D	218 D *
0397-028DMS	KWG1208077-2	308 D *	119 D *	227 D *
Lab Control Sample	KWG1208077-3	56	59	78
Duplicate Lab Control Sample	KWG1208077-4	45	54	71

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	17-104
Sur2 = Fluoranthene-d10	27-106
Sur3 = Terphenyl-d14	35-109

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1208077-5

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.26**	J	0.76	0.089	1	07/20/12	07/31/12	KWG1208077	
2-Methylnaphthalene	**0.24**	J	0.76	0.047	1	07/20/12	07/31/12	KWG1208077	
Acenaphthylene	ND	U	0.38	0.029	1	07/20/12	07/31/12	KWG1208077	
Acenaphthene	**0.28**	J	0.38	0.032	1	07/20/12	07/31/12	KWG1208077	
Dibenzofuran	**0.19**	J	0.38	0.022	1	07/20/12	07/31/12	KWG1208077	
Fluorene	**0.20**	J	0.38	0.039	1	07/20/12	07/31/12	KWG1208077	
Phenanthrene	**0.51**		0.38	0.033	1	07/20/12	07/31/12	KWG1208077	
Anthracene	**0.097**	J	0.38	0.026	1	07/20/12	07/31/12	KWG1208077	
Fluoranthene	**0.23**	J	0.38	0.032	1	07/20/12	07/31/12	KWG1208077	
Pyrene	**0.15**	J	0.38	0.032	1	07/20/12	07/31/12	KWG1208077	
Benz(a)anthracene	**0.057**	J	0.38	0.033	1	07/20/12	07/31/12	KWG1208077	
Chrysene	**0.034**	J	0.38	0.027	1	07/20/12	07/31/12	KWG1208077	
Benzo(b)fluoranthene	ND	U	0.38	0.057	1	07/20/12	07/31/12	KWG1208077	
Benzo(k)fluoranthene	ND	U	0.38	0.045	1	07/20/12	07/31/12	KWG1208077	
Benzo(a)pyrene	ND	U	0.38	0.036	1	07/20/12	07/31/12	KWG1208077	
Indeno(1,2,3-cd)pyrene	ND	U	0.38	0.064	1	07/20/12	07/31/12	KWG1208077	
Dibenz(a,h)anthracene	ND	U	0.38	0.058	1	07/20/12	07/31/12	KWG1208077	
Benzo(g,h,i)perylene	ND	U	0.38	0.059	1	07/20/12	07/31/12	KWG1208077	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	35	17-104	07/31/12	Acceptable
Fluoranthene-d10	47	27-106	07/31/12	Acceptable
Terphenyl-d14	69	35-109	07/31/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824
Date Collected: 07/06/2012
Date Received: 07/13/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-028
Lab Code: K1206824-001

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**150000**	D	2000	180	2000	07/20/12	08/02/12	KWG1208077	
2-Methylnaphthalene	**84000**	D	2000	94	2000	07/20/12	08/02/12	KWG1208077	
Acenaphthylene	**1300**	D	50	2.9	100	07/20/12	08/01/12	KWG1208077	
Acenaphthene	**91000**	D	1000	64	2000	07/20/12	08/02/12	KWG1208077	
Dibenzofuran	**67000**	D	1000	44	2000	07/20/12	08/02/12	KWG1208077	
Fluorene	**86000**	D	1000	78	2000	07/20/12	08/02/12	KWG1208077	
Phenanthrene	**250000**	D	1000	66	2000	07/20/12	08/02/12	KWG1208077	
Anthracene	**48000**	D	1000	52	2000	07/20/12	08/02/12	KWG1208077	
Fluoranthene	**110000**	D	1000	64	2000	07/20/12	08/02/12	KWG1208077	
Pyrene	**74000**	D	1000	64	2000	07/20/12	08/02/12	KWG1208077	
Benz(a)anthracene	**17000**	D	1000	66	2000	07/20/12	08/02/12	KWG1208077	
Chrysene	**19000**	D	50	2.7	100	07/20/12	08/01/12	KWG1208077	
Benzo(b)fluoranthene	**9600**	D	50	5.7	100	07/20/12	08/01/12	KWG1208077	
Benzo(k)fluoranthene	**3600**	D	50	4.5	100	07/20/12	08/01/12	KWG1208077	
Benzo(a)pyrene	**6100**	D	50	3.6	100	07/20/12	08/01/12	KWG1208077	
Indeno(1,2,3-cd)pyrene	**2000**	D	50	6.4	100	07/20/12	08/01/12	KWG1208077	
Dibenz(a,h)anthracene	**510**	D	50	5.8	100	07/20/12	08/01/12	KWG1208077	
Benzo(g,h,i)perylene	**1600**	D	50	5.9	100	07/20/12	08/01/12	KWG1208077	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	112	17-104	08/01/12	Outside Control Limits
Fluoranthene-d10	117	27-106	08/01/12	Outside Control Limits
Terphenyl-d14	215	35-109	08/01/12	Outside Control Limits

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Extracted:**	07/20/2012
Sample Matrix:	Soil	**Date Analyzed:**	08/01/2012

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-028	**Units:**	ug/Kg
Lab Code:	K1206824-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270D SIM	**Extraction Lot:**	KWG1208077

Analyte Name	Sample Result	0397-028MS KWG1208077-1 Matrix Spike			0397-028DMS KWG1208077-2 Duplicate Matrix Spike			%Rec Limits	RPD	RPD Limit
		Result	Expected	%Rec	Result	Expected	%Rec			
Naphthalene	150000	113000E	99.5	-36143#	124000E	99.5	-25402#	23-114	9	40
2-Methylnaphthalene	84000	75600E	99.5	-8530 #	81000E	99.5	-3168 #	24-115	7	40
Acenaphthylene	1300	1540	99.5	281 #	1500	99.5	237 #	32-117	3	40
Acenaphthene	91000	70800E	99.5	-20032#	72400E	99.5	-18453#	33-118	2	40
Dibenzofuran	67000	52000E	99.5	-15368#	52700E	99.5	-14680#	34-131	1	40
Fluorene	86000	69500E	99.5	-16417#	68100E	99.5	-17815#	33-125	2	40
Phenanthrene	250000	177000E	99.5	-70840#	178000E	99.5	-69285#	29-125	1	40
Anthracene	48000	43100E	99.5	-5429 #	45600E	99.5	-2848 #	30-127	6	40
Fluoranthene	110000	106000E	99.5	-7634 #	105000E	99.5	-9370 #	35-139	2	40
Pyrene	74000	82200E	99.5	8107 #	78900E	99.5	4700 #	27-134	4	40
Benz(a)anthracene	17000	23200E	99.5	6426 #	22400E	99.5	5598 #	35-122	4	40
Chrysene	19000	20400E	99.5	1662 #	20200E	99.5	1475 #	36-126	1	40
Benzo(b)fluoranthene	9600	10600	99.5	1011 #	10100	99.5	514 #	35-124	5	40
Benzo(k)fluoranthene	3600	3850	99.5	248 #	3690	99.5	85 #	38-124	4	40
Benzo(a)pyrene	6100	6750	99.5	649 #	6580	99.5	475 #	37-123	3	40
Indeno(1,2,3-cd)pyrene	2000	2230	99.5	279 #	2170	99.5	212 #	28-133	3	40
Dibenz(a,h)anthracene	510	639	99.5	132 #	603	99.5	96 #	32-125	6	40
Benzo(g,h,i)perylene	1600	1790	99.5	220 #	1740	99.5	168 #	33-128	3	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824
Date Extracted: 07/20/2012
Date Analyzed: 08/01/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG1208077

	Lab Control Sample KWG1208077-3 Lab Control Spike			Duplicate Lab Control Sample KWG1208077-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	57.7	100	58	56.6	100	57	32-124	2	40
2-Methylnaphthalene	64.7	100	65	60.4	100	60	27-126	7	40
Acenaphthylene	66.4	100	66	60.0	100	60	38-126	10	40
Acenaphthene	65.4	100	65	59.2	100	59	39-124	10	40
Dibenzofuran	65.5	100	66	58.9	100	59	41-130	11	40
Fluorene	67.5	100	68	61.2	100	61	39-129	10	40
Phenanthrene	68.2	100	68	61.1	100	61	39-123	11	40
Anthracene	68.9	100	69	62.9	100	63	38-130	9	40
Fluoranthene	69.5	100	69	64.8	100	65	39-135	7	40
Pyrene	79.6	100	80	71.4	100	71	39-134	11	40
Benz(a)anthracene	84.8	100	85	76.4	100	76	46-120	10	40
Chrysene	83.5	100	83	75.9	100	76	49-120	10	40
Benzo(b)fluoranthene	80.8	100	81	75.6	100	76	51-121	7	40
Benzo(k)fluoranthene	83.1	100	83	77.5	100	78	55-120	7	40
Benzo(a)pyrene	88.2	100	88	81.9	100	82	49-122	7	40
Indeno(1,2,3-cd)pyrene	87.2	100	87	79.1	100	79	40-128	10	40
Dibenz(a,h)anthracene	81.0	100	81	73.4	100	73	43-125	10	40
Benzo(g,h,i)perylene	80.1	100	80	72.2	100	72	49-122	10	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-028 (2hr)	K1206824-002	73	80	96
0397-028 (7hr)	K1206824-003	69	75	91
0397-028 (24hr)	K1206824-004	63	95	97
0397-028 (48hr)	K1206824-005	64	85	93
Method Blank	KWG1207834-3	72	84	106
Lab Control Sample	KWG1207834-1	74	80	98
Duplicate Lab Control Sample	KWG1207834-2	68	74	93

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	46-114
Sur2 =	Fluoranthene-d10	51-121
Sur3 =	Terphenyl-d14	58-140

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1207834-3

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.7**	J	3.4	0.71	1	07/16/12	07/30/12	KWG1207834	
2-Methylnaphthalene	**0.63**	J	3.4	0.40	1	07/16/12	07/30/12	KWG1207834	
Acenaphthylene	ND	U	3.4	0.37	1	07/16/12	07/30/12	KWG1207834	
Acenaphthene	ND	U	3.4	0.36	1	07/16/12	07/30/12	KWG1207834	
Dibenzofuran	**0.52**	J	3.4	0.42	1	07/16/12	07/30/12	KWG1207834	
Fluorene	ND	U	3.4	0.42	1	07/16/12	07/30/12	KWG1207834	
Phenanthrene	**2.7**	J	3.4	0.72	1	07/16/12	07/30/12	KWG1207834	
Anthracene	ND	U	3.4	0.29	1	07/16/12	07/30/12	KWG1207834	
Fluoranthene	**0.88**	J	3.4	0.46	1	07/16/12	07/30/12	KWG1207834	
Pyrene	**1.1**	J	3.4	0.78	1	07/16/12	07/30/12	KWG1207834	
Benz(a)anthracene	**0.76**	J	3.4	0.34	1	07/16/12	07/30/12	KWG1207834	
Chrysene	ND	U	3.4	0.65	1	07/16/12	07/30/12	KWG1207834	
Benzo(b)fluoranthene	**0.50**	J	3.4	0.25	1	07/16/12	07/30/12	KWG1207834	
Benzo(k)fluoranthene	**0.42**	J	3.4	0.41	1	07/16/12	07/30/12	KWG1207834	
Benzo(a)pyrene	**1.4**	J	3.4	0.41	1	07/16/12	07/30/12	KWG1207834	
Indeno(1,2,3-cd)pyrene	**0.94**	J	3.4	0.44	1	07/16/12	07/30/12	KWG1207834	
Dibenz(a,h)anthracene	**0.59**	J	3.4	0.45	1	07/16/12	07/30/12	KWG1207834	
Benzo(g,h,i)perylene	**1.3**	J	3.4	0.36	1	07/16/12	07/30/12	KWG1207834	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	72	46-114	07/30/12	Acceptable
Fluoranthene-d10	84	51-121	07/30/12	Acceptable
Terphenyl-d14	106	58-140	07/30/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	07/09/2012
Sample Matrix:	Water	**Date Received:**	07/13/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-028 (2hr)	**Units:**	ng/L
Lab Code:	K1206824-002	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**30000**	D	68	15	20	07/16/12	07/30/12	KWG1207834	
2-Methylnaphthalene	**6100**	D	68	8.0	20	07/16/12	07/30/12	KWG1207834	
Acenaphthylene	**120**		3.4	0.37	1	07/16/12	07/29/12	KWG1207834	
Acenaphthene	**6000**	D	68	7.2	20	07/16/12	07/30/12	KWG1207834	
Dibenzofuran	**4100**	D	68	8.4	20	07/16/12	07/30/12	KWG1207834	
Fluorene	**4600**	D	68	8.4	20	07/16/12	07/30/12	KWG1207834	
Phenanthrene	**7200**	D	68	15	20	07/16/12	07/30/12	KWG1207834	
Anthracene	**980**		3.4	0.29	1	07/16/12	07/29/12	KWG1207834	
Fluoranthene	**1000**		3.4	0.46	1	07/16/12	07/29/12	KWG1207834	
Pyrene	**660**		3.4	0.78	1	07/16/12	07/29/12	KWG1207834	
Benz(a)anthracene	**94**		3.4	0.34	1	07/16/12	07/29/12	KWG1207834	
Chrysene	**71**		3.4	0.65	1	07/16/12	07/29/12	KWG1207834	
Benzo(b)fluoranthene	**27**		3.4	0.25	1	07/16/12	07/29/12	KWG1207834	
Benzo(k)fluoranthene	**12**		3.4	0.41	1	07/16/12	07/29/12	KWG1207834	
Benzo(a)pyrene	**19**		3.4	0.41	1	07/16/12	07/29/12	KWG1207834	
Indeno(1,2,3-cd)pyrene	**5.7**		3.4	0.44	1	07/16/12	07/29/12	KWG1207834	
Dibenz(a,h)anthracene	**1.5**	J	3.4	0.45	1	07/16/12	07/29/12	KWG1207834	
Benzo(g,h,i)perylene	**5.2**		3.4	0.36	1	07/16/12	07/29/12	KWG1207834	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	73	46-114	07/29/12	Acceptable
Fluoranthene-d10	80	51-121	07/29/12	Acceptable
Terphenyl-d14	96	58-140	07/29/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	07/09/2012
Sample Matrix:	Water	**Date Received:**	07/13/2012

Polynuclear Aromatic Hydrocarbons

Sample Name:	0397-028 (7hr)	**Units:**	ng/L
Lab Code:	K1206824-003	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270D SIM		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**64000**	D	340	71	100	07/16/12	08/02/12	KWG1207834	
2-Methylnaphthalene	**12000**	D	340	40	100	07/16/12	08/02/12	KWG1207834	
Acenaphthylene	**190**		3.4	0.37	1	07/16/12	07/29/12	KWG1207834	
Acenaphthene	**11000**	D	340	36	100	07/16/12	08/02/12	KWG1207834	
Dibenzofuran	**6600**	D	340	42	100	07/16/12	08/02/12	KWG1207834	
Fluorene	**8300**	D	340	42	100	07/16/12	08/02/12	KWG1207834	
Phenanthrene	**13000**	D	340	72	100	07/16/12	08/02/12	KWG1207834	
Anthracene	**1400**		3.4	0.29	1	07/16/12	07/29/12	KWG1207834	
Fluoranthene	**1700**		3.4	0.46	1	07/16/12	07/29/12	KWG1207834	
Pyrene	**1100**		3.4	0.78	1	07/16/12	07/29/12	KWG1207834	
Benz(a)anthracene	**120**		3.4	0.34	1	07/16/12	07/29/12	KWG1207834	
Chrysene	**100**		3.4	0.65	1	07/16/12	07/29/12	KWG1207834	
Benzo(b)fluoranthene	**30**		3.4	0.25	1	07/16/12	07/29/12	KWG1207834	
Benzo(k)fluoranthene	**11**		3.4	0.41	1	07/16/12	07/29/12	KWG1207834	
Benzo(a)pyrene	**17**		3.4	0.41	1	07/16/12	07/29/12	KWG1207834	
Indeno(1,2,3-cd)pyrene	**4.5**		3.4	0.44	1	07/16/12	07/29/12	KWG1207834	
Dibenz(a,h)anthracene	**1.3**	J	3.4	0.45	1	07/16/12	07/29/12	KWG1207834	
Benzo(g,h,i)perylene	**4.1**		3.4	0.36	1	07/16/12	07/29/12	KWG1207834	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	69	46-114	07/29/12	Acceptable
Fluoranthene-d10	75	51-121	07/29/12	Acceptable
Terphenyl-d14	91	58-140	07/29/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824
Date Collected: 07/10/2012
Date Received: 07/13/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-028 (24hr)
Lab Code: K1206824-004

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**170000**	D	380	79	100	07/16/12	08/02/12	KWG1207834	
2-Methylnaphthalene	**34000**	D	380	44	100	07/16/12	08/02/12	KWG1207834	
Acenaphthylene	**410**		3.8	0.41	1	07/16/12	07/30/12	KWG1207834	
Acenaphthene	**29000**	D	380	40	100	07/16/12	08/02/12	KWG1207834	
Dibenzofuran	**19000**	D	380	47	100	07/16/12	08/02/12	KWG1207834	
Fluorene	**22000**	D	380	47	100	07/16/12	08/02/12	KWG1207834	
Phenanthrene	**42000**	D	380	80	100	07/16/12	08/02/12	KWG1207834	
Anthracene	**5600**	D	380	32	100	07/16/12	08/02/12	KWG1207834	
Fluoranthene	**6900**	D	380	51	100	07/16/12	08/02/12	KWG1207834	
Pyrene	**4300**	D	380	86	100	07/16/12	08/02/12	KWG1207834	
Benz(a)anthracene	**330**		3.8	0.38	1	07/16/12	07/30/12	KWG1207834	
Chrysene	**270**		3.8	0.72	1	07/16/12	07/30/12	KWG1207834	
Benzo(b)fluoranthene	**68**		3.8	0.28	1	07/16/12	07/30/12	KWG1207834	
Benzo(k)fluoranthene	**23**		3.8	0.46	1	07/16/12	07/30/12	KWG1207834	
Benzo(a)pyrene	**34**		3.8	0.46	1	07/16/12	07/30/12	KWG1207834	
Indeno(1,2,3-cd)pyrene	**9.5**		3.8	0.49	1	07/16/12	07/30/12	KWG1207834	
Dibenz(a,h)anthracene	**2.5**	J	3.8	0.50	1	07/16/12	07/30/12	KWG1207834	
Benzo(g,h,i)perylene	**7.4**		3.8	0.40	1	07/16/12	07/30/12	KWG1207834	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	63	46-114	07/30/12	Acceptable
Fluoranthene-d10	95	51-121	07/30/12	Acceptable
Terphenyl-d14	97	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824
Date Collected: 07/11/2012
Date Received: 07/13/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-028 (48hr)
Lab Code: K1206824-005

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**120000**	D	340	71	100	07/16/12	08/02/12	KWG1207834	
2-Methylnaphthalene	**23000**	D	340	40	100	07/16/12	08/02/12	KWG1207834	
Acenaphthylene	**300**		3.4	0.37	1	07/16/12	07/30/12	KWG1207834	
Acenaphthene	**20000**	D	340	36	100	07/16/12	08/02/12	KWG1207834	
Dibenzofuran	**14000**	D	340	42	100	07/16/12	08/02/12	KWG1207834	
Fluorene	**16000**	D	340	42	100	07/16/12	08/02/12	KWG1207834	
Phenanthrene	**35000**	D	340	72	100	07/16/12	08/02/12	KWG1207834	
Anthracene	**5400**	D	340	29	100	07/16/12	08/02/12	KWG1207834	
Fluoranthene	**7000**	D	340	46	100	07/16/12	08/02/12	KWG1207834	
Pyrene	**4300**	D	340	78	100	07/16/12	08/02/12	KWG1207834	
Benz(a)anthracene	**350**		3.4	0.34	1	07/16/12	07/30/12	KWG1207834	
Chrysene	**270**		3.4	0.65	1	07/16/12	07/30/12	KWG1207834	
Benzo(b)fluoranthene	**52**		3.4	0.25	1	07/16/12	07/30/12	KWG1207834	
Benzo(k)fluoranthene	**16**		3.4	0.41	1	07/16/12	07/30/12	KWG1207834	
Benzo(a)pyrene	**24**		3.4	0.41	1	07/16/12	07/30/12	KWG1207834	
Indeno(1,2,3-cd)pyrene	**4.7**		3.4	0.44	1	07/16/12	07/30/12	KWG1207834	
Dibenz(a,h)anthracene	**1.2**	J	3.4	0.45	1	07/16/12	07/30/12	KWG1207834	
Benzo(g,h,i)perylene	**3.2**	J	3.4	0.36	1	07/16/12	07/30/12	KWG1207834	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	64	46-114	07/30/12	Acceptable
Fluoranthene-d10	85	51-121	07/30/12	Acceptable
Terphenyl-d14	93	58-140	07/30/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Extracted:**	07/16/2012
Sample Matrix:	Water	**Date Analyzed:**	07/30/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3520C	**Units:**	ng/L
Analysis Method:	8270D SIM	**Basis:**	NA
		Level:	Low
		Extraction Lot:	KWG1207834

	Lab Control Sample KWG1207834-1 Lab Control Spike			Duplicate Lab Control Sample KWG1207834-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	382	500	76	362	500	72	39-110	5	30
2-Methylnaphthalene	396	500	79	374	500	75	39-115	6	30
Acenaphthylene	397	500	79	381	500	76	44-115	4	30
Acenaphthene	395	500	79	378	500	76	44-113	5	30
Dibenzofuran	404	500	81	385	500	77	46-116	5	30
Fluorene	404	500	81	395	500	79	48-118	2	30
Phenanthrene	402	500	80	386	500	77	47-120	4	30
Anthracene	409	500	82	390	500	78	44-117	5	30
Fluoranthene	400	500	80	384	500	77	48-128	4	30
Pyrene	456	500	91	451	500	90	42-133	1	30
Benz(a)anthracene	444	500	89	435	500	87	48-125	2	30
Chrysene	450	500	90	433	500	87	50-128	4	30
Benzo(b)fluoranthene	439	500	88	421	500	84	49-131	4	30
Benzo(k)fluoranthene	455	500	91	433	500	87	54-131	5	30
Benzo(a)pyrene	482	500	96	453	500	91	43-134	6	30
Indeno(1,2,3-cd)pyrene	452	500	90	442	500	88	45-133	2	30
Dibenz(a,h)anthracene	414	500	83	400	500	80	49-133	3	30
Benzo(g,h,i)perylene	425	500	85	405	500	81	51-124	5	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824

Surrogate Recovery Summary
Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-028 Leachate	K1206824-007	99 D	96 D	111 D
Method Blank	KWG1208008-5	90	86	115
Lab Control Sample	KWG1208008-1	69	73	90
Duplicate Lab Control Sample	KWG1208008-2	67	70	89

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	46-114
Sur2 = Fluoranthene-d10	51-121
Sur3 = Terphenyl-d14	58-140

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824
Date Collected: NA
Date Received: NA
Date Prepared: 07/17/2012

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name: Method Blank
Lab Code: KWG1208008-5

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.2**		0.022	0.0033	1	07/19/12	07/30/12	KWG1208008	
2-Methylnaphthalene	**0.38**		0.022	0.0026	1	07/19/12	07/30/12	KWG1208008	
Acenaphthylene	ND	U	0.022	0.0038	1	07/19/12	07/30/12	KWG1208008	
Acenaphthene	**0.056**		0.022	0.0049	1	07/19/12	07/30/12	KWG1208008	
Dibenzofuran	**0.34**		0.022	0.0051	1	07/19/12	07/30/12	KWG1208008	
Fluorene	**0.14**		0.022	0.0042	1	07/19/12	07/30/12	KWG1208008	
Phenanthrene	**0.23**		0.022	0.0055	1	07/19/12	07/30/12	KWG1208008	
Anthracene	**0.0066**	J	0.022	0.0040	1	07/19/12	07/30/12	KWG1208008	
Fluoranthene	**0.0096**	J	0.022	0.0049	1	07/19/12	07/30/12	KWG1208008	
Pyrene	**0.0045**	J	0.022	0.00038	1	07/19/12	07/30/12	KWG1208008	
Benz(a)anthracene	**0.0038**	J	0.022	0.0029	1	07/19/12	07/30/12	KWG1208008	
Chrysene	ND	U	0.022	0.0038	1	07/19/12	07/30/12	KWG1208008	
Benzo(b)fluoranthene	ND	U	0.022	0.0026	1	07/19/12	07/30/12	KWG1208008	
Benzo(k)fluoranthene	ND	U	0.022	0.0028	1	07/19/12	07/30/12	KWG1208008	
Benzo(a)pyrene	ND	U	0.022	0.0048	1	07/19/12	07/30/12	KWG1208008	
Indeno(1,2,3-cd)pyrene	**0.0037**	J	0.022	0.0029	1	07/19/12	07/30/12	KWG1208008	
Dibenz(a,h)anthracene	ND	U	0.022	0.0028	1	07/19/12	07/30/12	KWG1208008	
Benzo(g,h,i)perylene	**0.0037**	J	0.022	0.0032	1	07/19/12	07/30/12	KWG1208008	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	90	46-114	07/30/12	Acceptable
Fluoranthene-d10	86	51-121	07/30/12	Acceptable
Terphenyl-d14	115	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824
Date Collected: 07/11/2012
Date Received: 07/13/2012
Date Prepared: 07/17/2012

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Sample Name: 0397-028 Leachate
Lab Code: K1206824-007

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5100**	D	22	3.3	1000	07/19/12	08/02/12	KWG1208008	
2-Methylnaphthalene	**750**	D	2.2	0.26	100	07/19/12	08/02/12	KWG1208008	
Acenaphthylene	**8.4**	D	0.22	0.038	10	07/19/12	07/30/12	KWG1208008	
Acenaphthene	**420**	D	2.2	0.49	100	07/19/12	08/02/12	KWG1208008	
Dibenzofuran	**260**	D	2.2	0.51	100	07/19/12	08/02/12	KWG1208008	
Fluorene	**230**	D	2.2	0.42	100	07/19/12	08/02/12	KWG1208008	
Phenanthrene	**260**	D	2.2	0.55	100	07/19/12	08/02/12	KWG1208008	
Anthracene	**31**	D	0.22	0.040	10	07/19/12	07/30/12	KWG1208008	
Fluoranthene	**22**	D	0.22	0.049	10	07/19/12	07/30/12	KWG1208008	
Pyrene	**13**	D	0.22	0.0038	10	07/19/12	07/30/12	KWG1208008	
Benz(a)anthracene	**0.58**	D	0.22	0.029	10	07/19/12	07/30/12	KWG1208008	
Chrysene	**0.48**	D	0.22	0.038	10	07/19/12	07/30/12	KWG1208008	
Benzo(b)fluoranthene	**0.063**	JD	0.22	0.026	10	07/19/12	07/30/12	KWG1208008	
Benzo(k)fluoranthene	**0.034**	JD	0.22	0.028	10	07/19/12	07/30/12	KWG1208008	
Benzo(a)pyrene	ND	U	0.22	0.048	10	07/19/12	07/30/12	KWG1208008	
Indeno(1,2,3-cd)pyrene	ND	U	0.22	0.029	10	07/19/12	07/30/12	KWG1208008	
Dibenz(a,h)anthracene	ND	U	0.22	0.028	10	07/19/12	07/30/12	KWG1208008	
Benzo(g,h,i)perylene	ND	U	0.22	0.032	10	07/19/12	07/30/12	KWG1208008	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	99	46-114	07/30/12	Acceptable
Fluoranthene-d10	96	51-121	07/30/12	Acceptable
Terphenyl-d14	111	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824
Date Prepared: 07/17/2012
Date Extracted: 07/19/2012
Date Analyzed: 07/30/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on TCLP Leachate

Extraction Method: EPA 1311/EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1208008

	Lab Control Sample KWG1208008-1 Lab Control Spike			Duplicate Lab Control Sample KWG1208008-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.379	0.500	76	0.365	0.500	73	39-110	4	30
2-Methylnaphthalene	0.390	0.500	78	0.382	0.500	76	39-115	2	30
Acenaphthylene	0.403	0.500	81	0.393	0.500	79	44-115	2	30
Acenaphthene	0.390	0.500	78	0.382	0.500	76	44-113	2	30
Dibenzofuran	0.398	0.500	80	0.392	0.500	78	46-116	2	30
Fluorene	0.399	0.500	80	0.392	0.500	78	48-118	2	30
Phenanthrene	0.405	0.500	81	0.378	0.500	76	47-120	7	30
Anthracene	0.410	0.500	82	0.392	0.500	78	44-117	5	30
Fluoranthene	0.394	0.500	79	0.372	0.500	74	48-128	6	30
Pyrene	0.461	0.500	92	0.458	0.500	92	42-133	1	30
Benz(a)anthracene	0.447	0.500	89	0.435	0.500	87	48-125	3	30
Chrysene	0.440	0.500	88	0.433	0.500	87	50-128	2	30
Benzo(b)fluoranthene	0.426	0.500	85	0.424	0.500	85	49-131	0	30
Benzo(k)fluoranthene	0.453	0.500	91	0.437	0.500	87	54-131	4	30
Benzo(a)pyrene	0.463	0.500	93	0.455	0.500	91	43-124	2	30
Indeno(1,2,3-cd)pyrene	0.438	0.500	88	0.425	0.500	85	45-133	3	30
Dibenz(a,h)anthracene	0.405	0.500	81	0.397	0.500	79	49-133	2	30
Benzo(g,h,i)perylene	0.412	0.500	82	0.403	0.500	81	51-124	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-028 Leachate	K1206824-007	104 D	237 D *	89 D
Method Blank	KWG1208008-4	67	72	89
Lab Control Sample	KWG1208008-1	69	73	90
Duplicate Lab Control Sample	KWG1208008-2	67	70	89

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	46-114
Sur2 =	Fluoranthene-d10	51-121
Sur3 =	Terphenyl-d14	58-140

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824
Date Collected: NA
Date Received: NA
Date Prepared: 07/17/2012

Toxicity Characteristic Leaching Procedure (TCLP)
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: Method Blank
Lab Code: KWG1208008-4

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**29**	D	0.20	0.030	10	07/19/12	08/01/12	KWG1208008	
2-Methylnaphthalene	**6.8**		0.020	0.0023	1	07/19/12	07/30/12	KWG1208008	
Acenaphthylene	**0.094**		0.020	0.0034	1	07/19/12	07/30/12	KWG1208008	
Acenaphthene	**4.4**		0.020	0.0044	1	07/19/12	07/30/12	KWG1208008	
Dibenzofuran	**3.1**		0.020	0.0046	1	07/19/12	07/30/12	KWG1208008	
Fluorene	**2.9**		0.020	0.0038	1	07/19/12	07/30/12	KWG1208008	
Phenanthrene	**3.2**		0.020	0.0050	1	07/19/12	07/30/12	KWG1208008	
Anthracene	**0.31**		0.020	0.0036	1	07/19/12	07/30/12	KWG1208008	
Fluoranthene	**0.32**		0.020	0.0044	1	07/19/12	07/30/12	KWG1208008	
Pyrene	**0.17**		0.020	0.00034	1	07/19/12	07/30/12	KWG1208008	
Benz(a)anthracene	**0.0089**	J	0.020	0.0026	1	07/19/12	07/30/12	KWG1208008	
Chrysene	**0.0074**	J	0.020	0.0034	1	07/19/12	07/30/12	KWG1208008	
Benzo(b)fluoranthene	ND	U	0.020	0.0023	1	07/19/12	07/30/12	KWG1208008	
Benzo(k)fluoranthene	ND	U	0.020	0.0025	1	07/19/12	07/30/12	KWG1208008	
Benzo(a)pyrene	ND	U	0.020	0.0043	1	07/19/12	07/30/12	KWG1208008	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	0.0026	1	07/19/12	07/30/12	KWG1208008	
Dibenz(a,h)anthracene	ND	U	0.020	0.0025	1	07/19/12	07/30/12	KWG1208008	
Benzo(g,h,i)perylene	ND	U	0.020	0.0029	1	07/19/12	07/30/12	KWG1208008	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	67	46-114	07/30/12	Acceptable
Fluoranthene-d10	72	51-121	07/30/12	Acceptable
Terphenyl-d14	89	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824
Date Collected: 07/11/2012
Date Received: 07/13/2012
Date Prepared: 07/17/2012

Synthetic Precipitation Leaching Procedure
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Sample Name: 0397-028 Leachate
Lab Code: K1206824-007

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**5400**	D	21	3.2	1000	07/19/12	08/02/12	KWG1208008	
2-Methylnaphthalene	**790**	D	2.1	0.24	100	07/19/12	08/02/12	KWG1208008	
Acenaphthylene	**9.0**	D	0.21	0.036	10	07/19/12	07/30/12	KWG1208008	
Acenaphthene	**440**	D	2.1	0.46	100	07/19/12	08/02/12	KWG1208008	
Dibenzofuran	**290**	D	2.1	0.48	100	07/19/12	08/02/12	KWG1208008	
Fluorene	**250**	D	2.1	0.40	100	07/19/12	08/02/12	KWG1208008	
Phenanthrene	**270**	D	2.1	0.53	100	07/19/12	08/02/12	KWG1208008	
Anthracene	**36**	D	0.21	0.038	10	07/19/12	07/30/12	KWG1208008	
Fluoranthene	**24**	D	0.21	0.046	10	07/19/12	07/30/12	KWG1208008	
Pyrene	**13**	D	0.21	0.0036	10	07/19/12	07/30/12	KWG1208008	
Benz(a)anthracene	**0.71**	D	0.21	0.028	10	07/19/12	07/30/12	KWG1208008	
Chrysene	**0.46**	D	0.21	0.036	10	07/19/12	07/30/12	KWG1208008	
Benzo(b)fluoranthene	**0.049**	JD	0.21	0.024	10	07/19/12	07/30/12	KWG1208008	
Benzo(k)fluoranthene	**0.028**	JD	0.21	0.027	10	07/19/12	07/30/12	KWG1208008	
Benzo(a)pyrene	ND	U	0.21	0.045	10	07/19/12	07/30/12	KWG1208008	
Indeno(1,2,3-cd)pyrene	ND	U	0.21	0.028	10	07/19/12	07/30/12	KWG1208008	
Dibenz(a,h)anthracene	ND	U	0.21	0.027	10	07/19/12	07/30/12	KWG1208008	
Benzo(g,h,i)perylene	ND	U	0.21	0.031	10	07/19/12	07/30/12	KWG1208008	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	104	46-114	07/30/12	Acceptable
Fluoranthene-d10	237	51-121	07/30/12	Outside Control Limits
Terphenyl-d14	89	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824
Date Prepared: 07/17/2012
Date Extracted: 07/19/2012
Date Analyzed: 07/30/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons on SPLP Leachate

Extraction Method: EPA 1311/EPA 3520C
Analysis Method: 8270D SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1208008

	Lab Control Sample KWG1208008-1 Lab Control Spike			Duplicate Lab Control Sample KWG1208008-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.379	0.500	76	0.365	0.500	73	39-110	4	30
2-Methylnaphthalene	0.390	0.500	78	0.382	0.500	76	39-115	2	30
Acenaphthylene	0.403	0.500	81	0.393	0.500	79	44-115	2	30
Acenaphthene	0.390	0.500	78	0.382	0.500	76	44-113	2	30
Dibenzofuran	0.398	0.500	80	0.392	0.500	78	46-116	2	30
Fluorene	0.399	0.500	80	0.392	0.500	78	48-118	2	30
Phenanthrene	0.405	0.500	81	0.378	0.500	76	47-120	7	30
Anthracene	0.410	0.500	82	0.392	0.500	78	44-117	5	30
Fluoranthene	0.394	0.500	79	0.372	0.500	74	48-128	6	30
Pyrene	0.461	0.500	92	0.458	0.500	92	42-133	1	30
Benz(a)anthracene	0.447	0.500	89	0.435	0.500	87	48-125	3	30
Chrysene	0.440	0.500	88	0.433	0.500	87	50-128	2	30
Benzo(b)fluoranthene	0.426	0.500	85	0.424	0.500	85	49-131	0	30
Benzo(k)fluoranthene	0.453	0.500	91	0.437	0.500	87	54-131	4	30
Benzo(a)pyrene	0.463	0.500	93	0.455	0.500	91	43-124	2	30
Indeno(1,2,3-cd)pyrene	0.438	0.500	88	0.425	0.500	85	45-133	3	30
Dibenz(a,h)anthracene	0.405	0.500	81	0.397	0.500	79	49-133	2	30
Benzo(g,h,i)perylene	0.412	0.500	82	0.403	0.500	81	51-124	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Wipe

Service Request: K1206824

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1		Sur2	Sur3
0397-028 (wipe)	K1206824-006	7	*	54	80
Method Blank	KWG1208078-3	5	*	55	82
Lab Control Sample	KWG1208078-1	25		61	81
Duplicate Lab Control Sample	KWG1208078-2	20		50	67

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	17-104
Sur2 = Fluoranthene-d10	27-106
Sur3 = Terphenyl-d14	35-109

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Wipe

Service Request: K1206824
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1208078-3

Units: ug/WIPE
Basis: Wet

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.068**		0.0050	0.00060	1	07/20/12	07/31/12	KWG1208078	*
2-Methylnaphthalene	**0.032**		0.0050	0.00046	1	07/20/12	07/31/12	KWG1208078	*
Acenaphthylene	ND	U	0.0050	0.00056	1	07/20/12	07/31/12	KWG1208078	*
Acenaphthene	**0.017**		0.0050	0.00050	1	07/20/12	07/31/12	KWG1208078	*
Dibenzofuran	**0.0094**		0.0050	0.00063	1	07/20/12	07/31/12	KWG1208078	*
Fluorene	**0.0079**		0.0050	0.00061	1	07/20/12	07/31/12	KWG1208078	*
Phenanthrene	**0.0076**		0.0050	0.0014	1	07/20/12	07/31/12	KWG1208078	
Anthracene	**0.0019**	J	0.0050	0.00055	1	07/20/12	07/31/12	KWG1208078	
Fluoranthene	**0.0013**	J	0.0050	0.00098	1	07/20/12	07/31/12	KWG1208078	
Pyrene	ND	U	0.0050	0.00076	1	07/20/12	07/31/12	KWG1208078	
Benz(a)anthracene	ND	U	0.0050	0.00072	1	07/20/12	07/31/12	KWG1208078	
Chrysene	ND	U	0.0050	0.00080	1	07/20/12	07/31/12	KWG1208078	
Benzo(b)fluoranthene	ND	U	0.0050	0.00092	1	07/20/12	07/31/12	KWG1208078	
Benzo(k)fluoranthene	ND	U	0.0050	0.00087	1	07/20/12	07/31/12	KWG1208078	
Benzo(a)pyrene	ND	U	0.0050	0.00076	1	07/20/12	07/31/12	KWG1208078	
Indeno(1,2,3-cd)pyrene	ND	U	0.0050	0.00087	1	07/20/12	07/31/12	KWG1208078	
Dibenz(a,h)anthracene	ND	U	0.0050	0.00080	1	07/20/12	07/31/12	KWG1208078	
Benzo(g,h,i)perylene	ND	U	0.0050	0.00085	1	07/20/12	07/31/12	KWG1208078	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	5	17-104	07/31/12	Outside Control Limits
Fluoranthene-d10	55	27-106	07/31/12	Acceptable
Terphenyl-d14	82	35-109	07/31/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Wipe

Service Request: K1206824
Date Collected: 07/11/2012
Date Received: 07/13/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-028 (wipe)
Lab Code: K1206824-006

Units: ug/WIPE
Basis: Wet

Extraction Method: EPA 3541
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.48**	B	0.0050	0.00060	1	07/20/12	08/01/12	KWG1208078	*
2-Methylnaphthalene	**0.18**	B	0.0050	0.00046	1	07/20/12	08/01/12	KWG1208078	*
Acenaphthylene	**0.010**		0.0050	0.00056	1	07/20/12	08/01/12	KWG1208078	*
Acenaphthene	**0.26**	B	0.0050	0.00050	1	07/20/12	08/01/12	KWG1208078	*
Dibenzofuran	**0.20**		0.0050	0.00063	1	07/20/12	08/01/12	KWG1208078	*
Fluorene	**0.28**		0.0050	0.00061	1	07/20/12	08/01/12	KWG1208078	*
Phenanthrene	**1.1**		0.0050	0.0014	1	07/20/12	08/01/12	KWG1208078	
Anthracene	**0.21**		0.0050	0.00055	1	07/20/12	08/01/12	KWG1208078	
Fluoranthene	**0.62**		0.0050	0.00098	1	07/20/12	08/01/12	KWG1208078	
Pyrene	**0.44**		0.0050	0.00076	1	07/20/12	08/01/12	KWG1208078	
Benz(a)anthracene	**0.13**		0.0050	0.00072	1	07/20/12	08/01/12	KWG1208078	
Chrysene	**0.12**		0.0050	0.00080	1	07/20/12	08/01/12	KWG1208078	
Benzo(b)fluoranthene	**0.085**		0.0050	0.00092	1	07/20/12	08/01/12	KWG1208078	
Benzo(k)fluoranthene	**0.033**		0.0050	0.00087	1	07/20/12	08/01/12	KWG1208078	
Benzo(a)pyrene	**0.090**	X	0.0050	0.00076	1	07/20/12	08/01/12	KWG1208078	
Indeno(1,2,3-cd)pyrene	**0.024**		0.0050	0.00087	1	07/20/12	08/01/12	KWG1208078	
Dibenz(a,h)anthracene	**0.0065**		0.0050	0.00080	1	07/20/12	08/01/12	KWG1208078	
Benzo(g,h,i)perylene	**0.022**		0.0050	0.00085	1	07/20/12	08/01/12	KWG1208078	

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	7	17-104	08/01/12	Outside Control Limits
Fluoranthene-d10	54	27-106	08/01/12	Acceptable
Terphenyl-d14	80	35-109	08/01/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Extracted:**	07/20/2012
Sample Matrix:	Wipe	**Date Analyzed:**	08/01/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method:	EPA 3541	**Units:**	ug/WIPE
Analysis Method:	8270D SIM	**Basis:**	Wet
		Level:	Low
		Extraction Lot:	KWG1208078

	Lab Control Sample KWG1208078-1 Lab Control Spike			Duplicate Lab Control Sample KWG1208078-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	0.108	0.500	22 *	0.0155	0.500	3 *	32-124	150 *	40
2-Methylnaphthalene	0.103	0.500	21 *	0.0262	0.500	5 *	27-126	119 *	40
Acenaphthylene	0.0955	0.500	19 *	0.0343	0.500	7 *	38-126	94 *	40
Acenaphthene	0.119	0.500	24 *	0.0397	0.500	8 *	39-124	100 *	40
Dibenzofuran	0.131	0.500	26 *	0.0739	0.500	15 *	41-130	56 *	40
Fluorene	0.184	0.500	37 *	0.154	0.500	31 *	39-129	18	40
Phenanthrene	0.250	0.500	50	0.227	0.500	45	39-123	10	40
Anthracene	0.296	0.500	59	0.282	0.500	56	38-130	5	40
Fluoranthene	0.328	0.500	66	0.300	0.500	60	39-135	9	40
Pyrene	0.374	0.500	75	0.332	0.500	66	39-134	12	40
Benz(a)anthracene	0.402	0.500	80	0.352	0.500	70	46-120	13	40
Chrysene	0.410	0.500	82	0.365	0.500	73	49-120	12	40
Benzo(b)fluoranthene	0.388	0.500	78	0.346	0.500	69	51-121	11	40
Benzo(k)fluoranthene	0.418	0.500	84	0.382	0.500	76	56-114	9	40
Benzo(a)pyrene	0.434	0.500	87	0.387	0.500	77	49-122	11	40
Indeno(1,2,3-cd)pyrene	0.422	0.500	84	0.367	0.500	73	40-128	14	40
Dibenz(a,h)anthracene	0.389	0.500	78	0.350	0.500	70	43-125	10	40
Benzo(g,h,i)perylene	0.391	0.500	78	0.351	0.500	70	49-122	11	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-028 (2hr)	K1206824-002	105	105
0397-028 (7hr)	K1206824-003	107	112
0397-028 (24hr)	K1206824-004	94	98
0397-028 (48hr)	K1206824-005	102	103
Method Blank	KWG1207973-3	92	98
Lab Control Sample	KWG1207973-1	101	100
Duplicate Lab Control Sample	KWG1207973-2	104	100

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1207973-3	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	07/18/12	07/27/12	KWG1207973	
Residual Range Organics (RRO)	ND	U	500	1	07/18/12	07/27/12	KWG1207973	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	92	50-150	07/27/12	Acceptable
n-Triacontane	98	50-150	07/27/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	07/09/2012
Sample Matrix:	Water	**Date Received:**	07/13/2012

Diesel and Residual Range Organics

Sample Name:	0397-028 (2hr)	**Units:**	ug/L
Lab Code:	K1206824-002	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**520**	Z	270	1	07/18/12	07/27/12	KWG1207973	*
Residual Range Organics (RRO)	ND	U	540	1	07/18/12	07/27/12	KWG1207973	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	105	50-150	07/27/12	Acceptable
n-Triacontane	105	50-150	07/27/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	07/09/2012
Sample Matrix:	Water	**Date Received:**	07/13/2012

Diesel and Residual Range Organics

Sample Name:	0397-028 (7hr)	**Units:**	ug/L
Lab Code:	K1206824-003	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**570**	Z	280	1	07/18/12	07/27/12	KWG1207973	*
Residual Range Organics (RRO)	ND	U	550	1	07/18/12	07/27/12	KWG1207973	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	107	50-150	07/27/12	Acceptable
n-Triacontane	112	50-150	07/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824
Date Collected: 07/10/2012
Date Received: 07/13/2012

Diesel and Residual Range Organics

Sample Name: 0397-028 (24hr)
Lab Code: K1206824-004

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**930**	Z	250	1	07/18/12	07/27/12	KWG1207973	*
Residual Range Organics (RRO)	ND	U	500	1	07/18/12	07/27/12	KWG1207973	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	94	50-150	07/27/12	Acceptable
n-Triacontane	98	50-150	07/27/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	07/11/2012
Sample Matrix:	Water	**Date Received:**	07/13/2012

Diesel and Residual Range Organics

Sample Name:	0397-028 (48hr)	**Units:**	ug/L
Lab Code:	K1206824-005	**Basis:**	NA
Extraction Method:	EPA 3510C	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**910**	Z	280	1	07/18/12	07/27/12	KWG1207973	
Residual Range Organics (RRO)	ND	U	550	1	07/18/12	07/27/12	KWG1207973	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	102	50-150	07/27/12	Acceptable
n-Triacontane	103	50-150	07/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206824
Date Extracted: 07/18/2012
Date Analyzed: 07/27/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1207973

	Lab Control Sample KWG1207973-1 Lab Control Spike			Duplicate Lab Control Sample KWG1207973-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1700	1600	106	1680	1600	105	46-140	1	30
Residual Range Organics (RRO)	816	800	102	784	800	98	45-159	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
Batch QC	K1206808-006	81	87
0397-028	K1206824-001	102	96
0397-028 (wipe)	K1206824-006	88	98
Batch QCDUP	KWG1208038-1	94	105
Method Blank	KWG1208038-3	87	86
Method Blank	KWG1208040-3	89	92
Lab Control Sample	KWG1208038-2	95	90
Lab Control Sample	KWG1208040-2	100	97
Duplicate Lab Control Sample	KWG1208040-4	96	97

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	mg/Kg
Lab Code:	KWG1208038-3	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	25	1	07/19/12	07/20/12	KWG1208038	
Residual Range Organics (RRO)	ND	U	99	1	07/19/12	07/20/12	KWG1208038	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	87	50-150	07/20/12	Acceptable
n-Triacontane	86	50-150	07/20/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Wipe	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/WIPE
Lab Code:	KWG1208040-3	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	500	1	07/19/12	07/20/12	KWG1208040	
Residual Range Organics (RRO)	ND	U	500	1	07/19/12	07/20/12	KWG1208040	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	89	50-150	07/20/12	Acceptable
n-Triacontane	92	50-150	07/20/12	Acceptable

Comments:

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	07/06/2012
Sample Matrix:	Soil	**Date Received:**	07/13/2012

Diesel and Residual Range Organics

Sample Name:	0397-028	**Units:**	mg/Kg
Lab Code:	K1206824-001	**Basis:**	Dry
Extraction Method:	EPA 3550B	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**4300**	Z	33	1	07/19/12	07/20/12	KWG1208038	
Residual Range Organics (RRO)	**1000**	Z	140	1	07/19/12	07/20/12	KWG1208038	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	102	50-150	07/20/12	Acceptable
n-Triacontane	96	50-150	07/20/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Wipe

Service Request: K1206824
Date Collected: 07/11/2012
Date Received: 07/13/2012

Diesel and Residual Range Organics

Sample Name: 0397-028 (wipe)
Lab Code: K1206824-006

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: ug/WIPE
Basis: As received

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	500	1	07/19/12	07/20/12	KWG1208040	
Residual Range Organics (RRO)	**560**	Z	500	1	07/19/12	07/20/12	KWG1208040	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	88	50-150	07/20/12	Acceptable
n-Triacontane	98	50-150	07/20/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824
Date Extracted: 07/19/2012
Date Analyzed: 07/20/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1206808-006

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: mg/Kg
Basis: Dry

Level: Low
Extraction Lot: KWG1208038

Analyte Name	MRL	Sample Result	Batch QCDUP KWG1208038-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	30	290	350	320	17	40
Residual Range Organics (RRO)	120	480	600	540	21	40

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824
Date Extracted: 07/19/2012
Date Analyzed: 07/20/2012

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: mg/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG1208038

	Lab Control Sample KWG1208038-2 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Diesel Range Organics (DRO)	283	267	106	56-124
Residual Range Organics (RRO)	122	133	92	60-135

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Wipe

Service Request: K1206824
Date Extracted: 07/19/2012
Date Analyzed: 07/20/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3550B
Analysis Method: NWTPH-Dx

Units: ug/WIPE
Basis: Dry
Level: Low
Extraction Lot: KWG1208040

	Lab Control Sample KWG1208040-2 Lab Control Spike			Duplicate Lab Control Sample KWG1208040-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	9120	8000	114	8470	8000	106	70-130	7	40
Residual Range Organics (RRO)	4260	4000	107	3970	4000	99	70-130	7	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824

Surrogate Recovery Summary
Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-028	K1206824-001	146	137
0397-028 Leachate	K1206824-007	116	107
Method Blank	KWG1208523-4	99	106
Method Blank	KWG1208561-3	97	102
Lab Control Sample	KWG1208523-2	109	115
Duplicate Lab Control Sample	KWG1208523-3	116	115
Lab Control Sample	KWG1208561-1	90	88
Duplicate Lab Control Sample	KWG1208561-2	106	106

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client:	URS Corporation	**Service Request:**	K1206824
Project:	IP Longview Solidification	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA
		Date Prepared:	07/25/2012

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1208523-4	**Basis:**	NA
Preparation Method:	EPA 1312	**Level:**	Low
Extraction Method:	EPA 3510C		
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	270	1	07/31/12	08/01/12	KWG1208523	
Residual Range Organics (RRO)	ND	U	540	1	07/31/12	08/01/12	KWG1208523	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	99	50-150	08/01/12	Acceptable
n-Triacontane	106	50-150	08/01/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824
Date Collected: NA
Date Received: NA
Date Prepared: 07/25/2012

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1208561-3

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	07/31/12	08/01/12	KWG1208561	
Residual Range Organics (RRO)	ND	U	500	1	07/31/12	08/01/12	KWG1208561	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	97	50-150	08/01/12	Acceptable
n-Triacontane	102	50-150	08/01/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824
Date Collected: 07/06/2012
Date Received: 07/13/2012
Date Prepared: 07/25/2012

Synthetic Precipitation Leaching Procedure
Diesel and Residual Range Organics

Sample Name: 0397-028
Lab Code: K1206824-001

Units: ug/L
Basis: NA

Preparation Method: EPA 1312
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**17000**	Z	250	1	07/31/12	08/01/12	KWG1208523	*
Residual Range Organics (RRO)	**920**	Z	500	1	07/31/12	08/01/12	KWG1208523	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	146	50-150	08/01/12	Acceptable
n-Triacontane	137	50-150	08/01/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824
Date Collected: 07/06/2012
Date Received: 07/13/2012
Date Prepared: 07/25/2012

Toxicity Characteristic Leaching Procedure (TCLP)
Diesel and Residual Range Organics

Sample Name: 0397-028 Leachate
Lab Code: K1206824-007

Units: ug/L
Basis: NA

Preparation Method: EPA 1311
Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**15000**	Z	270	1	07/31/12	08/01/12	KWG1208561	*
Residual Range Organics (RRO)	ND	U	540	1	07/31/12	08/01/12	KWG1208561	*

* See Case Narrative

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	116	50-150	08/01/12	Acceptable
n-Triacontane	107	50-150	08/01/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Soil

Service Request: K1206824
Date Prepared: 07/25/2012
Date Extracted: 07/31/2012
Date Analyzed: 08/01/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 1312/EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1208523

	Lab Control Sample KWG1208523-2 Lab Control Spike			Duplicate Lab Control Sample KWG1208523-3 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1540	1600	96	1650	1600	103	46-140	7	30
Residual Range Organics (RRO)	783	800	98	776	800	97	45-159	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Aqueous extract

Service Request: K1206824
Date Prepared: 07/25/2012
Date Extracted: 07/31/2012
Date Analyzed: 08/01/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 1311/EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1208561

	Lab Control Sample KWG1208561-1 Lab Control Spike			Duplicate Lab Control Sample KWG1208561-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1390	1600	87	1590	1600	100	46-140	13	30
Residual Range Organics (RRO)	643	800	80	759	800	95	45-159	16	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

August 6, 2012 Analytical Report for Service Request No: K1206890

Paul Kalina
URS Corporation
1501 4th Ave.,Suite 1400
Seattle, WA 98101

RE: IP Longview Solidification

Dear Paul:

Enclosed are the results of the samples submitted to our laboratory on July 17, 2012. For your reference, these analyses have been assigned our service request number K1206890.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3291. You may also contact me via Email at Ed.Wallace@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Ed Wallace
Project Manager

EW/tj

Columbia Analytical Services
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Columbia Analytical Services, Inc.
Part of the ALS Group A Campbell Brothers Limited Company

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
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition*: Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2286
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L12-28
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Georgia DNR	http://www.gaepd.org/Documents/techguide_pcb.html#cel	881
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
Indiana DOH	http://www.in.gov/isdh/24859.htm	C-WA-01
ISO 17025	http://www.pjlabs.com/	L12-27
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	3016
Louisiana DHH	Not available	LA110003
Maine DHS	Not available	WA0035
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-368
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA35
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
New Mexico ED	http://www.nmenv.state.nm.us/dwb/Index.htm	-
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA200001
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T704427-08-TX
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C1203
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.caslab.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.caslab.com or at the accreditation bodies web site

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	URS Corporation	**Service Request No.:**	K1206890
Project:	IP Longview Solidification	**Date Received:**	7/17/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Three samples were received for analysis at Columbia Analytical Services on 7/17/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx Waters

Sample Notes and Discussion:
Insufficient sample volume was received to perform a duplicate client sample. A Laboratory Control Sample/Duplicate Laboratory Control Sample (LCS/DLCS) was analyzed and reported in lieu of the duplicate analysis for these samples.

Approved by EMW **Date** 8/7/12

Columbia Analytical Services
800.695.7222
www.caslab.com

CHAIN of CUSTODY

Page 1 of 1

Client: URS Corp

Project: IP Longview Solidification

Project Manager: Paul Kalina

Telephone No.: 206-438-2172

Fax No.: 866-495-5282

Method of Shipment: FedEx

Special Detection Limit/Reporting: Paul Kalina requests ultra low level 8270 SIM

Sample I.D.	Lab Sample No.	No. of Containers	Matrix: Soil	Matrix: Water	Matrix: Air	Matrix: Other	Prsv.: Yes	Prsv.: No	Sampling Date	Sampling Time	SVOC PAH 8270 SIM	SPLP DRO NWTPH-Dx	TCLP PAH 8270 SIM	TCLP DRO NWTPH-Dx	Total PAH 8270 SIM	Total DRO NWTPH-Dx	Turn Around Time (working days)
0397-28(3 day)	~~928~~	2		X				X	7/12/12	928					X	X	STD
0397-28(4 day)		2		X				X	7/13/12	917					X	X	STD
0397-28(5 day)		2		X				X	7/14/12	915					X	X	STD

Please send results to Tommy Jordan tjordan@kemron.com and Paul Kalina at paul.kalina.usc@rf.com

REMARKS

Sample Received Intact: Yes No

Temperature received: Ice No ice

Relinq. by sampler (Sign & Print Name)	Date	Time	Received by (Sign & Print Name)
Ashley Clayborn	7/16/12	15:10	
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: [signature] Date 7/17/12 Time 0900

Lab Work No. K1206890

PC Ed

Cooler Receipt and Preservation Form

Client / Project: Kennon Service Request K12 6890

Received: 7/17/12 Opened: 7/17/12 By: 40 Unloaded: 7/17/12 By: 40

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where?_____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number	NA	Filed
2.5		276		7986 2470 0593		

7. Packing material: (*Inserts*) *Baggies* *Bubble Wrap* *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y (N)
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? NA (Y) N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time
0397-28(3day)	1LA				✓	HCL	2ml	20110620J1	EW	1135
0397-28(4day)	1LA				✓	HCL	2ml	20110620J1	EW	1135
0397-28(5day)	1LA				✓	HCL	2ml	20110620J1	EW	1135

*Notes, Discrepancies, & Resolutions:*_____

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
0397-28 (3 day)	K1206890-001	81 D	94 D	108 D
0397-28 (4 day)	K1206890-002	80 D	93 D	104 D
0397-28 (5 day)	K1206890-003	77 D	85 D	100 D
Method Blank	KWG1208513-3	74	78	100
Lab Control Sample	KWG1208513-1	69	73	90
Duplicate Lab Control Sample	KWG1208513-2	67	70	89

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	46-114
Sur2 = Fluoranthene-d10	51-121
Sur3 = Terphenyl-d14	58-140

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG1208513-3

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**1.2**	J	3.3	0.71	1	07/19/12	07/30/12	KWG1208513	
2-Methylnaphthalene	**0.42**	J	3.3	0.40	1	07/19/12	07/30/12	KWG1208513	
Acenaphthylene	ND	U	3.3	0.37	1	07/19/12	07/30/12	KWG1208513	
Acenaphthene	ND	U	3.3	0.36	1	07/19/12	07/30/12	KWG1208513	
Dibenzofuran	ND	U	3.3	0.42	1	07/19/12	07/30/12	KWG1208513	
Fluorene	ND	U	3.3	0.42	1	07/19/12	07/30/12	KWG1208513	
Phenanthrene	**1.3**	J	3.3	0.72	1	07/19/12	07/30/12	KWG1208513	
Anthracene	ND	U	3.3	0.29	1	07/19/12	07/30/12	KWG1208513	
Fluoranthene	**0.54**	J	3.3	0.46	1	07/19/12	07/30/12	KWG1208513	
Pyrene	ND	U	3.3	0.78	1	07/19/12	07/30/12	KWG1208513	
Benz(a)anthracene	**0.58**	J	3.3	0.34	1	07/19/12	07/30/12	KWG1208513	
Chrysene	ND	U	3.3	0.65	1	07/19/12	07/30/12	KWG1208513	
Benzo(b)fluoranthene	**0.35**	J	3.3	0.25	1	07/19/12	07/30/12	KWG1208513	
Benzo(k)fluoranthene	ND	U	3.3	0.41	1	07/19/12	07/30/12	KWG1208513	
Benzo(a)pyrene	**0.42**	J	3.3	0.41	1	07/19/12	07/30/12	KWG1208513	
Indeno(1,2,3-cd)pyrene	**1.0**	J	3.3	0.44	1	07/19/12	07/30/12	KWG1208513	
Dibenz(a,h)anthracene	**0.60**	J	3.3	0.45	1	07/19/12	07/30/12	KWG1208513	
Benzo(g,h,i)perylene	**1.3**	J	3.3	0.36	1	07/19/12	07/30/12	KWG1208513	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	74	46-114	07/30/12	Acceptable
Fluoranthene-d10	78	51-121	07/30/12	Acceptable
Terphenyl-d14	100	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: 07/12/2012
Date Received: 07/17/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-28 (3 day)
Lab Code: K1206890-001

Units: ng/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**140000**	D	330	71	100	07/19/12	08/02/12	KWG1208513	
2-Methylnaphthalene	**29000**	D	330	40	100	07/19/12	08/02/12	KWG1208513	
Acenaphthylene	**440**	D	33	3.7	10	07/19/12	07/30/12	KWG1208513	
Acenaphthene	**24000**	D	330	36	100	07/19/12	08/02/12	KWG1208513	
Dibenzofuran	**14000**	D	33	4.2	10	07/19/12	07/30/12	KWG1208513	
Fluorene	**16000**	D	33	4.2	10	07/19/12	07/30/12	KWG1208513	
Phenanthrene	**41000**	D	330	72	100	07/19/12	08/02/12	KWG1208513	
Anthracene	**5300**	D	33	2.9	10	07/19/12	07/30/12	KWG1208513	
Fluoranthene	**8200**	D	33	4.6	10	07/19/12	07/30/12	KWG1208513	
Pyrene	**4800**	D	33	7.8	10	07/19/12	07/30/12	KWG1208513	
Benz(a)anthracene	**390**	D	33	3.4	10	07/19/12	07/30/12	KWG1208513	
Chrysene	**390**	D	33	6.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(b)fluoranthene	**65**	D	33	2.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(k)fluoranthene	**26**	JD	33	4.1	10	07/19/12	07/30/12	KWG1208513	
Benzo(a)pyrene	**34**	D	33	4.1	10	07/19/12	07/30/12	KWG1208513	
Indeno(1,2,3-cd)pyrene	**20**	JD	33	4.4	10	07/19/12	07/30/12	KWG1208513	
Dibenz(a,h)anthracene	**11**	JD	33	4.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(g,h,i)perylene	**23**	JD	33	3.6	10	07/19/12	07/30/12	KWG1208513	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	81	46-114	07/30/12	Acceptable
Fluoranthene-d10	94	51-121	07/30/12	Acceptable
Terphenyl-d14	108	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: 07/13/2012
Date Received: 07/17/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-28 (4 day)
Lab Code: K1206890-002

Units: ng/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**120000**	D	330	71	100	07/19/12	08/02/12	KWG1208513	
2-Methylnaphthalene	**26000**	D	330	40	100	07/19/12	08/02/12	KWG1208513	
Acenaphthylene	**390**	D	33	3.7	10	07/19/12	07/30/12	KWG1208513	
Acenaphthene	**19000**	D	33	3.6	10	07/19/12	07/30/12	KWG1208513	
Dibenzofuran	**12000**	D	33	4.2	10	07/19/12	07/30/12	KWG1208513	
Fluorene	**14000**	D	33	4.2	10	07/19/12	07/30/12	KWG1208513	
Phenanthrene	**35000**	D	330	72	100	07/19/12	08/02/12	KWG1208513	
Anthracene	**4700**	D	33	2.9	10	07/19/12	07/30/12	KWG1208513	
Fluoranthene	**7300**	D	33	4.6	10	07/19/12	07/30/12	KWG1208513	
Pyrene	**4200**	D	33	7.8	10	07/19/12	07/30/12	KWG1208513	
Benz(a)anthracene	**330**	D	33	3.4	10	07/19/12	07/30/12	KWG1208513	
Chrysene	**320**	D	33	6.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(b)fluoranthene	**48**	D	33	2.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(k)fluoranthene	**22**	JD	33	4.1	10	07/19/12	07/30/12	KWG1208513	
Benzo(a)pyrene	**23**	JD	33	4.1	10	07/19/12	07/30/12	KWG1208513	
Indeno(1,2,3-cd)pyrene	**9.6**	JD	33	4.4	10	07/19/12	07/30/12	KWG1208513	
Dibenz(a,h)anthracene	**5.9**	JD	33	4.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(g,h,i)perylene	**9.7**	JD	33	3.6	10	07/19/12	07/30/12	KWG1208513	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	46-114	07/30/12	Acceptable
Fluoranthene-d10	93	51-121	07/30/12	Acceptable
Terphenyl-d14	104	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: 07/14/2012
Date Received: 07/17/2012

Polynuclear Aromatic Hydrocarbons

Sample Name: 0397-28 (5 day)
Lab Code: K1206890-003

Units: ng/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**100000**	D	330	71	100	07/19/12	08/02/12	KWG1208513	
2-Methylnaphthalene	**22000**	D	330	40	100	07/19/12	08/02/12	KWG1208513	
Acenaphthylene	**340**	D	33	3.7	10	07/19/12	07/30/12	KWG1208513	
Acenaphthene	**17000**	D	33	3.6	10	07/19/12	07/30/12	KWG1208513	
Dibenzofuran	**11000**	D	33	4.2	10	07/19/12	07/30/12	KWG1208513	
Fluorene	**13000**	D	33	4.2	10	07/19/12	07/30/12	KWG1208513	
Phenanthrene	**31000**	D	330	72	100	07/19/12	08/02/12	KWG1208513	
Anthracene	**4400**	D	33	2.9	10	07/19/12	07/30/12	KWG1208513	
Fluoranthene	**7700**	D	33	4.6	10	07/19/12	07/30/12	KWG1208513	
Pyrene	**4500**	D	33	7.8	10	07/19/12	07/30/12	KWG1208513	
Benz(a)anthracene	**380**	D	33	3.4	10	07/19/12	07/30/12	KWG1208513	
Chrysene	**380**	D	33	6.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(b)fluoranthene	**58**	D	33	2.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(k)fluoranthene	**25**	JD	33	4.1	10	07/19/12	07/30/12	KWG1208513	
Benzo(a)pyrene	**29**	JD	33	4.1	10	07/19/12	07/30/12	KWG1208513	
Indeno(1,2,3-cd)pyrene	**8.1**	JD	33	4.4	10	07/19/12	07/30/12	KWG1208513	
Dibenz(a,h)anthracene	ND	U	33	4.5	10	07/19/12	07/30/12	KWG1208513	
Benzo(g,h,i)perylene	**8.8**	JD	33	3.6	10	07/19/12	07/30/12	KWG1208513	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	77	46-114	07/30/12	Acceptable
Fluoranthene-d10	85	51-121	07/30/12	Acceptable
Terphenyl-d14	100	58-140	07/30/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Extracted: 07/19/2012
Date Analyzed: 07/30/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270D SIM

Units: ng/L
Basis: NA
Level: Low
Extraction Lot: KWG1208513

	Lab Control Sample KWG1208513-1 Lab Control Spike			Duplicate Lab Control Sample KWG1208513-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	379	500	76	365	500	73	39-110	4	30
2-Methylnaphthalene	390	500	78	382	500	76	39-115	2	30
Acenaphthylene	403	500	81	393	500	79	44-115	2	30
Acenaphthene	390	500	78	382	500	76	44-113	2	30
Dibenzofuran	397	500	79	392	500	78	46-116	1	30
Fluorene	399	500	80	392	500	78	48-118	2	30
Phenanthrene	405	500	81	378	500	76	47-120	7	30
Anthracene	410	500	82	392	500	78	44-117	5	30
Fluoranthene	394	500	79	372	500	74	48-128	6	30
Pyrene	461	500	92	458	500	92	42-133	1	30
Benz(a)anthracene	447	500	89	435	500	87	48-125	3	30
Chrysene	440	500	88	433	500	87	50-128	2	30
Benzo(b)fluoranthene	426	500	85	424	500	85	49-131	0	30
Benzo(k)fluoranthene	453	500	91	437	500	87	54-131	4	30
Benzo(a)pyrene	463	500	93	455	500	91	43-134	2	30
Indeno(1,2,3-cd)pyrene	438	500	88	425	500	85	45-133	3	30
Dibenz(a,h)anthracene	405	500	81	397	500	79	49-133	2	30
Benzo(g,h,i)perylene	412	500	82	403	500	81	51-124	2	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
0397-28 (3 day)	K1206890-001	109	110
0397-28 (4 day)	K1206890-002	94	108
0397-28 (5 day)	K1206890-003	92	104
Method Blank	KWG1207973-3	92	98
Lab Control Sample	KWG1207973-1	101	100
Duplicate Lab Control Sample	KWG1207973-2	104	100

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1207973-3

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	1	07/18/12	07/27/12	KWG1207973	
Residual Range Organics (RRO)	ND	U	500	1	07/18/12	07/27/12	KWG1207973	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	92	50-150	07/27/12	Acceptable
n-Triacontane	98	50-150	07/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: 07/12/2012
Date Received: 07/17/2012

Diesel and Residual Range Organics

Sample Name: 0397-28 (3 day)
Lab Code: K1206890-001

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**920**	Z	310	1	07/18/12	07/27/12	KWG1207973	
Residual Range Organics (RRO)	ND	U	610	1	07/18/12	07/27/12	KWG1207973	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	109	50-150	07/27/12	Acceptable
n-Triacontane	110	50-150	07/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: 07/13/2012
Date Received: 07/17/2012

Diesel and Residual Range Organics

Sample Name: 0397-28 (4 day)
Lab Code: K1206890-002

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**1000**	Z	310	1	07/18/12	07/27/12	KWG1207973	
Residual Range Organics (RRO)	ND	U	610	1	07/18/12	07/27/12	KWG1207973	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	94	50-150	07/27/12	Acceptable
n-Triacontane	108	50-150	07/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Collected: 07/14/2012
Date Received: 07/17/2012

Diesel and Residual Range Organics

Sample Name: 0397-28 (5 day)
Lab Code: K1206890-003

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**860**	Z	290	1	07/18/12	07/27/12	KWG1207973	
Residual Range Organics (RRO)	ND	U	580	1	07/18/12	07/27/12	KWG1207973	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	92	50-150	07/27/12	Acceptable
n-Triacontane	104	50-150	07/27/12	Acceptable

Comments:

Client: URS Corporation
Project: IP Longview Solidification
Sample Matrix: Water

Service Request: K1206890
Date Extracted: 07/18/2012
Date Analyzed: 07/27/2012

Lab Control Spike/Duplicate Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: EPA 3510C
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1207973

	Lab Control Sample KWG1207973-1 Lab Control Spike			Duplicate Lab Control Sample KWG1207973-2 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Diesel Range Organics (DRO)	1700	1600	106	1680	1600	105	46-140	1	30
Residual Range Organics (RRO)	816	800	102	784	800	98	45-159	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Appendix F

Laboratory Quality Assurance Reviews

Memo

1501 4th Avenue, Suite 1400
Seattle, WA 98101-1616
206-438-2700 Telephone
406-438-2699 Fax

To:	Paul Kalina, Project Manager	**Info:**	**FINAL**
From:	Alison M. Rohde, Chemist Jennifer Garner, Chemist	**Date:**	November 16, 2011
RE:	**Quality Assurance Review** **IP Longview – Treatibility Study** **Roll-Off Box Samples – August and September 2011** **CAS SDGs K1107780 and K1108452**		

The summary data quality review of 6 soil samples collected between August 22 and September 6, 2011 has been completed. The samples were submitted to Columbia Analytical Services (CAS), a Washington State Department of Ecology (Ecology) accredited laboratory, located in Kelso, Washington. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) by Environmental Protection Agency (EPA) Method 8270C ultra low-level modified by select ion monitoring (SIM), total petroleum hydrocarbons (TPH- diesel range and oil range) by Ecology Method NWTPH-Dx, and total solids by EPA Method 160.3 as identified by the cross reference below. The analyses were performed in general accordance with methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846) Update IIIB*, June 2005 and *Methods for Chemical Analysis of Water and Wastes*, March 1983, and Ecology's Analytical *Methods for Petroleum Hydrocarbons*, June 1997. The following samples are associated with CAS sample delivery groups (SDGs) K1107780 and K1108452:

Sample ID	CAS ID	Parameters
TP01-S-2.0-7.5-082211	K1107780-001	SPLP PAHs, Total PAHs, TCLP PAHs, SPLP TPHs, TCLP TPHs, Total TPHs, Total Solids
TP01-S-7.5-082211	K1107780-002	Total PAHs, Total TPH, Total solids
TP01-S-2.0-6.5-082211	K1107780-003	SPLP PAHs, Total PAHs, TCLP PAHs, SPLP TPHs, TCLP TPHs, Total TPHs, Total Solids
TP01-S-6.5-082211	K1107780-004	Total PAHs, Total TPH, Total solids
TP-01	K1108452-001	SPLP PAHs, Total PAHs, TCLP PAHs, SPLP TPHs, TCLP TPHs, Total TPHs, Total Solids
TP-02	K1108452-002	SPLP PAHs, Total PAHs, TCLP PAHs, SPLP TPHs, TCLP TPHs, Total TPHs, Total Solids

Upon receipt by CAS, the sample jar information was compared to the associated chain-of-custody (COC). No discrepancies relating to sample identification were noted by the laboratory. The temperature blank and cooler temperatures were recorded as part of the check-in procedure. Cooler (-0.4°C) and cooler blank temperatures (0.8°C) assocated with SDG K1108452 were outside the EPA-recommended limits of 4ºC±2ºC. As the samples were submitted within 3 hours of collection, data were not qualified based on the cooler and cooler blank temperatures.

Data validation is based on method performance criteria and QC criteria as documented in the *Agency Draft Quality Assurance Project Plan (QAPP), Appendix A of the Performance and Compliance Monitoring Plan, Former Treated Wood Products Area, International Paper Facility / Longview, Washington* (Woodward Clyde, 1997). The laboratory provided EPA Contract Laboratory Program-equivalent validatable data packages. The data review conducted on these SDGs included a review of summarized results and QA/QC data, per the requirements set forth in Section A.10 of the QAPP. Hold times, initial and continuing calibrations, method blanks, surrogate

recoveries, laboratory control sample (LCS) results, matrix duplicate results, matrix spike/matrix spike duplicate (MS/MSD) results, field duplicates, and reporting limits were reviewed to assess compliance with applicable methods. Calculation checks and review of the raw data were not included in the data review. If data qualification was required, data were qualified in accordance with *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review*, June 2008 and *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review*, January 2010, as appropriate.

Organic Analyses

Samples were analyzed for PAHs and TPHs by the methods identified in the introduction to this report.

1. Holding Times – Acceptable except as noted below:

   SPLP PAHs by Method 8270D-SIM – Due to laboratory error, sample TP01-S-2.0-7.5-082211 was re-extracted 2 days past holding time. The results for SPLP PAHs in this sample are qualified as estimated and flagged with a 'J' or 'UJ' based on the holding time exceedance.

   TCLP TPHs by NWTPH-Dx – Due to laboratory error, sample TP01 was re-extracted 5 days past holding time. The results for TCLP PAHs in this sample are qualified as estimated and flagged with a 'UJ' based on the holding time exceedance.

2. Instrument Performance (Tunes – applicable to PAHs only) – Acceptable

3. Initial Calibrations – Acceptable

4. Continuing Calibrations – Acceptable except as noted below:

   SPLP and TCLP PAHs by Method 8270D-SIM – The percent differences (%Ds) for indeno(1,2,3-cd)pyrene (21%, high) and dibenz(a,h)anthracene (22%, high) were outside the method limits of 20% in the continuing calibration analyzed on September 9, 2011. Indeno(1,2,3-c,d)pyrene and dibenzo(a,h)anthracene were reported as not detected in the samples associated with this continuing calibration; therefore, data were not qualified based on the elevated %Ds.

5. Blanks – Acceptable except as noted below:

   TCLP PAHs by Method 8270D-SIM – Several analytes were detected in method blanks extracted on September 3 and September 13, 2011 as shown below:

Method Blank Extracted On:	Analyte	Method Blank Concentration (ug/L)
9/3/2011	Naphthalene	63
	2-Methylnaphthalene	9.4
	Acenaphthene	4.5
	Dibenzofuran	3.0
	Fluorene	3.0
	Phenanthrene	3.8
	Anthracene	0.48
	Fluoranthene	0.61
	Pyrene	0.31

Method Blank Extracted On:	Analyte	Method Blank Concentration (ug/L)
9/13/2011	Naphthalene	32
	2-Methylnaphthalene	8.5
	Acenaphthene	1.6
	Dibenzofuran	2.8
	Fluorene	1.5
	Phenanthrene	2.7
	Anthracene	0.43
	Fluoranthene	0.59
	Pyrene	0.31

Per CLP guidelines, results reported at concentrations less than the method blank concentration are qualified as not detected and flagged with a 'U' at the reported result. When the associated sample results are reported between the method detection limit (MDL) and the reporting limit, the results are qualified as not detected at the reporting limit. Results reported at concentrations between one and two times (2x) the method blank concentrations may be qualified as not detected using professional judgment. Results reported at concentrations greater than 2x the concentration found in the method blank do not require qualification. The concentrations for the above noted analytes in the samples associated with the method blank extracted on September 3, 2011 were more than 2x the method blank concentration; therefore, data were not qualified based on these method blank results.

The results for naphthalene, 2-methyl naphthalene, acenapthene, dibenzofuran, fluorine, and phenanthrene in TP01 are less than 2x the method blank concentrations. The results for these analytes in TP01 are qualified as not detected and flagged 'U' at the reported results.

SPLP PAHs by Method 8270D-SIM – Several analytes were detected in method blanks extracted on September 3, September 7 and September 19, 2011 as shown below:

Method Blank Extracted On:	Analyte	Method Blank Concentration (ug/L)
9/3/2011	Naphthalene	6.1
	2-Methylnaphthalene	1.1
	Acenaphthene	0.77
	Dibenzofuran	0.64
	Fluorene	0.74
	Phenanthrene	1.3
	Fluoranthene	0.21
9/7/2011	Acenaphthene	0.21
	Dibenzofuran	0.68
	Fluorene	0.76
	Phenanthrene	4.0
	Anthracene	0.46
	Fluoranthene	2.4
	Pyrene	1.3
9/19/2011	Naphthalene	8.5
	2-Methylnaphthalene	0.64

The concentrations for the analytes noted above in the samples associated with the method blank extracted on September 3, 2011 were more than 2x the method blank concentration; therefore, data were not qualified based on these method blank results.

As the results for phenanthrene, anthracene, fluoranthene, and pyrene in samples associated with the method blank extracted on September 7, 2011 were reported as not detected; data were not qualified based on these method blank results. The results for acenapthene, dibenzofuran, and fluorene in TP01-S-2.0-7.5-082211 are less than 2x the method blank concentrations. The results for acenapthene, dibenzofuran, and fluorene in this sample are qualified as not detected and flagged 'U' at the reported results.

Results associated with the method blank extracted on September 19, 2011 were not reported; therefore, data were not qualified based on these method blank results.

TPH by NWTPH-Dx – Diesel-range hydrocarbons (3.4 mg/kg) and oil-range hydrocarbons (10 mg/kg) were detected at concentrations between the method detection limits (MDLs) and the laboratory reporting limits in the method blank extracted on August 24, 2011. As all associated sample results were reported at concentrations above the reporting limit and more than ten times (10x) the method blank concentrations, data were not qualified based on the method blank results.

TCLP TPH by NWTPH-Dx – Diesel-range hydrocarbons (260 ug/L) was detected in the method blank extracted on September 1, 2011. As all associated sample results were either reported as not detected or reported at concentrations above the reporting limit and more than ten times (10x) the method blank concentrations, data were not qualified based on the method blank result.

6. Surrogates – Acceptable except as noted below:

TCLP and SPLP PAHs by Method 8270D-SIM – The percent recoveries for one or more surrogates did not meet the control limits in several samples as shown below:

Sample ID *Control Limits*	**Analysis Type**	**Fluorene-d10** *28-98%*	**Fluoranthene-d10** *31-105%*	**Terphenyl-d14** *27-112%*
TP01-S-2.0-7.5-082211	TCLP	105%	128%	124%
LCS (9/7/2011)	TCLP	105%	124%	114%
TP01-S-2.0-7.5-082211	SPLP	102%	128%	120%
LCS (9/7/2011)	SPLP	105%	124%	114%

LCS – laboratory control sample

Per the CLP guidelines, one surrogate per fraction (acid or base/neutral) is allowed to be outside the specified control limits with no qualification. Data were not qualified based on surrogate recoveries in quality control samples (LCS). All detected TCLP PAHs in TP01-S-2.0-7.5-082211are qualified as estimated and flagged with a 'J' based on the surrogate recoveries. The results for SPLP PAHs in TP01-S-2.0-7.5-082211were previously qualified based on method blank detections; no further qualification is necessary.

PAHs by Method 8270D-SIM – The percent recovery for the surrogate terphenyl-d14 in TP-02 (111%) was outside the control limits of 35-109%. As one surrogate per fraction was outside of control limits for TP-02, data were not qualified based on the elevated surrogate recovery.

TPHs by NWTPH-Dx – The percent recoveries for the surrogate o-terphenyl in TP01-S-2.0-6.5-082211 (172%), TP01-S-6.5-082211 (185%), and TP-02 (217%) were outside the laboratory control limits of 50-150%. As the percent recoveries for the alternate surrogate, n-triacontane, were acceptable in these samples, data were not qualified based on the elevated o-terphenyl percent recoveries.

7. Internal Standards (applicable to GC/MS only) – Acceptable except as noted below:

   TCLP and SPLP PAHs by Method 8270D-SIM – The internal standard naphthene-d8 area counts exceeded the method limits of -50% to 200% in TP01-S-2.0-6.5-082211 and TP-02. The naphthene-d8 internal standard area counts were acceptable in the dilutions performed on these samples. As data were reported from the dilutions of these samples, qualification is not necessary.

8. Laboratory Control/ Laboratory Control Duplicate Samples (LCS/LCSD) – Acceptable where applicable

9. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted below:

   PAHs by Method 8270D-SIM – A MS/MSD was performed on TP01-S-2.0-7.5-082211. The percent recovery for the MSD (25%) for dibenzofuran performed on TP01-S-2.0-7.5-082211 was below the control limits of 31-105%. As the percent recovery for the MS and the relative percent difference (RPD) for the MS/MSD pair for dibenzofuran were acceptable, data were not qualified for this analyte based on the MSD result.

   A MS/MSD was not performed in association with the PAH analyses (TCLP and SPLP). Accuracy and precision were assessed using the LCS/LCSD results.

   TPH by NWTPH-Dx – A MS/MSD was not performed in association with the TPH analyses (total, TCLP, and SPLP). Accuracy was assessed using the LCS. Precision was assessed using the laboratory duplicate results.

10. Laboratory Duplicate – Acceptable except as noted below:

    PAHs by Method 8270D-SIM – A laboratory duplicate was not performed in association with these analyses (total, TCLP, and SPLP). Precision was assessed using the LCS/LCSD and/or MS/MSD results.

    TPH by NWTPH-Dx – Laboratory duplicates were performed on TP01-S-2.0-7.5-082211 and TP-02. Results were acceptable for TCLP and SPLP TPH analyses.

    A laboratory duplicate was performed on TP01-S-7.5-082211. The RPD for oil-range TPH (55%) exceeded the laboratory control limit of 40%. The result for oil-range TPH in TP01-S-7.5-082211is qualified as estimated and flagged 'J' based on the laboratory duplicate RPD.

    A laboratory duplicate was performed on a soil sample from an unrelated project. The RPDs for diesel-range (71%) and oil-range TPH (58%) exceeded the laboratory control limit of 40%. Data were not qualified based on unrelated QC.

11. Reporting Limits – Acceptable except as noted below:

    General – The reporting limits for one or more analytes were elevated in several samples due to the percent moisture content of the samples. The elevated reporting limits may affect the use of the data for project objectives.

    The results for one or more analytes in several samples were assigned a 'D' qualifier by the laboratory to indicate the results were reported from a dilution of the samples. No additional qualifiers were necessary based on the 'D' qualifiers assigned by the laboratory.

The results for one or more analytes in several samples were assigned a 'J' or'JD' qualifier by the laboratory to indicate that the reported concentration is above the MDL, but below the laboratory reporting limit. All J-flagged results are considered estimated.

TPH by NWTPH-Dx – The results for diesel-range and/or residual-range hydrocarbons in several samples were assigned a 'Z' qualifier by the laboratory to indicate that the chromatographic fingerprint does not match the laboratory standard chromatographic fingerprint. No additional qualifiers were necessary based on the qualifiers assigned by the laboratory.

General Chemistry Parameter

Samples were analyzed for total solids by the method identified in the introduction to this report.

1. Holding Times – Acceptable

2. Laboratory Duplicates – Acceptable

   Laboratory duplicates were performed on TP01-S-2.0-7.5-082211 and TP-01. Results were acceptable.

3. Reporting Limits – Acceptable

Overall Assessment

The data reported in these SDGs, as qualified, are considered to be usable for meeting project objectives. The completeness for SDGs K1107780 and K1108452 is greater than 99%.

Data Qualifier Definitions:

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

DNR Do Not Report. Another result is available that is more reliable or appropriate.

Table 1. Summary of Qualified Data

Sample ID	Laboratory ID	Analyte	Analysis Type	Lab Result	Unit	Final Result
TP01-S-2.0-7.5-082211	K1107780-001	Benzo(k)fluoranthene	Total PAH	1.1 J	ug/Kg	1.1 J
		Naphthalene	TCLP PAH	1.5	ug/L	1.5 J
		2-Methylnaphthalene	TCLP PAH	0.33	ug/L	0.33 J
		Acenaphthene	TCLP PAH	1.6	ug/L	1.6 J
		Dibenzofuran	TCLP PAH	0.38	ug/L	0.38 J
		Fluorene	TCLP PAH	0.35	ug/L	0.35 J
		Naphthalene	SPLP PAH	1.2	ug/L	1.2 J
		2-Methylnaphthalene	SPLP PAH	0.23	ug/L	0.23 J
		Acenaphthylene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Acenaphthene	SPLP PAH	1.3	ug/L	1.3 UJ
		Dibenzofuran	SPLP PAH	0.29	ug/L	0.29 UJ
		Fluorene	SPLP PAH	0.28	ug/L	0.28 UJ
		Phenanthrene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Anthracene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Fluoranthene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Pyrene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Benz(a)anthracene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Chrysene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Benzo(b)fluoranthene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Benzo(k)fluoranthene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Benzo(a)pyrene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Indeno(1,2,3-cd)pyrene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Dibenz(a,h)anthracene	SPLP PAH	0.20 U	ug/L	0.20 UJ
		Benzo(g,h,i)perylene	SPLP PAH	0.20 U	ug/L	0.20 UJ
TP01-S-7.5-082211	K1107780-002	Residual Range Organics (RRO)	Total TPH	160 Z	mg/Kg	160 J
TP02-S-2.0-6.5-082211	K1107780-003	Residual Range Organics (RRO)	Total TPH	1,800 JDZ	mg/Kg	1,800 J
TP02-S-6.5-082211	K1107780-004	Residual Range Organics (RRO)	Total TPH	2,000 JDZ	mg/Kg	2,000 J
TP-01	K1108452-001	Naphthalene	TCLP PAH	1.7	ug/L	1.7 U
		2-Methylnaphthalene	TCLP PAH	0.49	ug/L	0.49 U
		Acenaphthene	TCLP PAH	2.0	ug/L	2.0 U
		Dibenzofuran	TCLP PAH	0.74	ug/L	0.74 U
		Fluorene	TCLP PAH	0.57	ug/L	0.57 U
		Phenanthrene	TCLP PAH	0.30	ug/L	0.30 U
		Diesel Range Organics (DRO)	TCLP TPH	250 U	ug/L	250 UJ
		Residual Range Organics (RRO)	TCLP TPH	500 U	ug/L	500 UJ
		Residual Range Organics (RRO)	Total TPH	120 J	mg/Kg	120 J
TP-02	K1108452-002	Residual Range Organics (RRO)	Total TPH	1,600 JD	mg/Kg	1,600 J

Memo

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To: Paul Kalina, Project Manager

Info: **FINAL**

From: Alison M. Rohde, Chemist
Christine T. Gebel, Chemist
Jennifer B. Garner, Chemist

Date: April 20, 2012

RE: **Quality Assurance Review**
IP Longview – Treatability Study
Soil Samples – Initial Mixes
CAS SDGs K1110402, K1200448, K1200585, K1200691, K1201445, K1201477, K1201540, and K1201617

The summary data quality review of 11 soil samples, 18 leachates, and one groundwater collected between October 24, 2011 and February 20, 2012 has been completed. The samples were submitted to Columbia Analytical Services (CAS), a Washington State Department of Ecology (Ecology) accredited laboratory, located in Kelso, Washington. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) by Environmental Protection Agency (EPA) Method 8270C by select ion monitoring (SIM), total petroleum hydrocarbons (TPH- diesel range and oil range) by Ecology Method NWTPH-Dx, metals by EPA Methods 6010B (arsenic, barium, cadmium, chromium, lead, selenium, and silver) and 7470A (mercury), and/or total solids by EPA Method 160.3 as identified by the cross reference below. Select samples were leached using the Synthetic Precipitation Leaching Procedure (SPLP) by EPA Method 1312. The soil samples were also submitted to Kemron Environmental Services, located in Atlanta, Georgia, for leaching tests. The sample ID includes the length of time leached. These leachates were sent to CAS for analysis. The analyses were performed in general accordance with methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846) Update IIIB*, June 2005 and *Methods for Chemical Analysis of Water and Wastes*, March 1983, and Ecology's Analytical *Methods for Petroleum Hydrocarbons*, June 1997. The following samples are associated with CAS sample delivery groups (SDGs) K1110402, K1200448, K1200585, K1200691, K1201445, K1201477, K1201540, and K1201617:

Sample ID	CAS ID	Matrix	Parameters
0397-010	K1110402-001	Soil	TPH-Dx, PAHs, Total Solids
0397-011	K1110402-002	Soil	TPH-Dx, PAHs, Total Solids
0397-013	K1110402-003	Soil	TPH-Dx, PAHs, Total Solids
0397-016	K1110402-004	Soil	TPH-Dx, PAHs, Total Solids
0397-017	K1110402-005	Soil	TPH-Dx, PAHs, Total Solids
0397-019	K1110402-006	Soil	TPH-Dx, PAHs, Total Solids
0397-021	K1110402-007	Soil	TPH-Dx, PAHs, Metals, Total Solids
0397-022	K1110402-008	Soil	TPH-Dx, PAHs, Metals, Total Solids
0397-023	K1110402-009	Soil	TPH-Dx, PAHs, Total Solids
0397-024	K1110402-010	Soil	TPH-Dx, PAHs, Total Solids
0397-025	K1110402-011	Soil	TPH-Dx, PAHs, Total Solids
0397-017 (2 hour)	K1200448-001	Leachate	TPH-Dx, PAHs
0397-017 (7 hour)	K1200448-002	Leachate	TPH-Dx, PAHs
0397-017 (24 hour)	K1200448-003	Leachate	TPH-Dx, PAHs

Sample ID	CAS ID	Matrix	Parameters
0397-017 (2 day)	K1200585-001	Leachate	TPH-Dx, PAHs
0397-017 (3 day)	K1200585-002	Leachate	TPH-Dx, PAHs
0397-017 (4 day)	K1200585-003	Leachate	TPH-Dx, PAHs
0397-017 (5 day)	K1200691-001	Leachate	TPH-Dx, PAHs
0397-017A (2hr)	K1201445-005	Leachate	TPH-Dx, PAHs
0397-017A (7hr)	K1201445-006	Leachate	TPH-Dx, PAHs
0397-017A (24hr)	K1201445-007	Leachate	TPH-Dx, PAHs
0397-017A (48hr)	K1201445-008	Leachate	TPH-Dx, PAHs
0397-017A (28day)	K1201445-013	SPLP Leachate	TPH-Dx, SPLP TPH-Dx, PAHs, SPLP PAHs
0397-017DUP (28day) Duplicate of 0397-017A (28day)	K1201445-014	SPLP Leachate	TPH-Dx, SPLP TPH-Dx, PAHs, SPLP PAHs
BV-13	K1201477-001	Water	TPH-Dx, PAHs
0397-017A (3day)	K1201540-001	Leachate	TPH-Dx, PAHs
0397-017A (4day)	K1201540-002	Leachate	TPH-Dx, PAHs
0397-016 (5day)	K1201617-001	Leachate	TPH-Dx, PAHs
0397-017A (5day)	K1201617-002	Leachate	TPH-Dx, PAHs
0397-017DUP (5day)	K1201617-003	Leachate	TPH-Dx, PAHs

Upon receipt by CAS, the sample jar information was compared to the associated chain-of-custody (COC). No discrepancies relating to sample identification were noted by the laboratory. The temperature blank and cooler temperatures were recorded as part of the check-in procedure. Cooler temperatures ranged from -0.9°C to 1.0°C and cooler blank temperatures ranged from 0.2°C to 1.6°C which were outside the EPA-recommended limits of 4ºC±2ºC. Data were not qualified based on the cooler and cooler blank temperatures.

Data validation is based on method performance criteria and QC criteria as documented in the *Agency Draft Quality Assurance Project Plan (QAPP), Appendix A of the Performance and Compliance Monitoring Plan, Former Treated Wood Products Area, International Paper Facility / Longview, Washington* (Woodward Clyde, 1997). The laboratory provided EPA Contract Laboratory Program-equivalent validatable data packages. The data review conducted on these SDGs included a review of summarized results and QA/QC data, per the requirements set forth in Section A.10 of the QAPP. Hold times, initial and continuing calibrations, method blanks, surrogate recoveries, laboratory control sample (LCS) results, matrix duplicate results, matrix spike/matrix spike duplicate (MS/MSD) results, field duplicates, and reporting limits were reviewed to assess compliance with applicable methods. Calculation checks and review of the raw data were not included in the data review. If data qualification was required, data were qualified in accordance with *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review*, June 2008 and *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Data Review*, January 2010, as appropriate.

Organic Analyses

Samples were analyzed for PAHs and TPHs by the methods identified in the introduction to this report.

1. Holding Times – Acceptable

2. Instrument Performance (Tunes – applicable to PAHs only) – Acceptable

3. Initial Calibrations – Acceptable

4. Continuing Calibrations – Acceptable

5. Blanks – Acceptable except as noted below:

PAHs by Method 8270D-SIM – Several PAHs were detected in several method blanks as noted below.

Method blank extracted date:	Analyte	Concentration (ug/L)
January 19, 2012	Naphthalene	0.0025 J
	2-Methylnaphthalene	0.00064 J
	Phenanthrene	0.0016 J
	Fluoranthene	0.00048 J
January 25, 2012	2-Methylnaphthalene	0.0038 J
	Benzo(a)anthracene	0.003 J
February 17, 2012	Naphthalene	0.0013 J
	2-Methylnaphthalene	0.00048 J
	Phenanthrene	0.0011 J
February 21, 2012	Naphthalene	0.0013 J
	2-Methylnaphthalene	0.00082 J
	Phenanthrene	0.0013 J
	Fluoranthene	0.0013 J
February 23, 2012 (KWG1201890-3)	Naphthalene	0.0015 J
	2-Methylnaphthalene	0.00081 J
	Dibenzofuran	0.00045 J
	Phenanthrene	0.0015 J
	Fluoranthene	0.00073 J
	Benzo(b)fluoranthene	0.00028 J
February 23, 2012 (KWG1201892-3)	Naphthalene	0.0032 J

The concentrations for the above noted analytes in the samples associated with the method blanks were more than the method blank concentration; therefore, data were not qualified based on these method blank results.

SPLP PAHs by Method 8270D-SIM – Napthalene (0.24 ug/L) and 2-methylnaphthalene (0.036 J ug/L) were detected in method blank extracted on October 28, 2011. Per CLP guidelines, results reported at concentrations less than the method blank concentration are qualified as not detected and flagged with a 'U' at the reported result. When the associated sample results are reported between the method detection limit (MDL) and the reporting limit, the results are qualified as not detected at the reporting limit. Results reported at concentrations between one and two times (2x) the method blank concentrations may be qualified as not detected using professional judgment. Results reported at concentrations greater than 2x the concentration found in the method blank do not require qualification. The concentrations for the above noted analytes in the samples associated with the method blank were more than 2x the method blank concentration; therefore, data were not qualified based on these method blank results.

Napthalene (0.095 ug/L) and 2-methylnaphthalene (0.054 ug/L) were detected in method blank extracted on February 21, 2012 at concentrations greater than the MDL and less than the reporting limit. The concentrations for the above noted analytes in the samples associated with the method blank were more than 2x the method blank concentration; therefore, data were not qualified based on these method blank results.

6. Surrogates – Acceptable except as noted below:

   PAHs by Method 8270D-SIM – The percent recovery for fluorene-d10 (107%) was above the control limits of 28-98% in BV-13 due to matrix interference. As the percent recoveries for fluoranthene- d10 and terphenyl- d14 were acceptable, the results for PAHs in this sample were not qualified based on the fluorene-d10 recovery.

7. Internal Standards (applicable to GC/MS only) – Acceptable except as noted below:

   PAHs by Method 8270D-SIM – The internal standard, naphthalene-d8, was not recovered from the initial analysis of 0397-17A (2hr), 0397-17A (7hr), 0397-17A (24hr), and 0397-17A (48hr). These samples were reanalyzed at dilution and the internal standard area counts for naphthalene-d8 were acceptable. Data were not qualified based on these internal standard results.

8. Laboratory Control/ Laboratory Control Duplicate Samples (LCS/LCSD) – Acceptable where applicable

9. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted below:

   TPH by NWTPH-Dx – A MS/MSD was not performed in association with the TPH analysis. Accuracy was assessed using the LCS. Precision was assessed using the laboratory duplicate results.

   SPLP TPH by NWTPH-Dx – A MS/MSD was not performed in association with the SPLP TPH analysis. Accuracy was assessed using the LCS. Precision was assessed using the laboratory duplicate results.

   PAHs by Method 8270D-SIM – A MS was performed on a sample from an unrelated project. Results were acceptable.

   SPLP PAHs by Method 8270D-SIM – A MS/MSD was performed on 0397-010. The percent recoveries for the MS and MSD in several analytes were outside the laboratory control limits as shown below:

Analyte	MS % Recovery	MSD % Recovery	Control Limit
Naphthalene	-10253%	-10403%	37-118%
2-Methylnaphthalene	-284%	-280%	37-117%
Acenaphthene	43%	44%	45-114%
Dibenzofuran	28%	38%	44-122%

   The sample concentrations for the above noted analytes in 0397-010 were more than four times (4x) the spike concentrations; therefore, data was not qualified for these analytes based on these MS/MSD results.

   A MS/MSD was performed on 0397-17A (28day). The percent recoveries for several analytes in the MS and MSD were outside the laboratory control limits as shown below:

Analyte	MS % Recovery	MSD % Recovery	Control Limit
Naphthalene	-4398%	-4255%	37-118%
2-Methylnaphthalene	-394%	-364%	37-117%
Acenaphthene	-296%	-298%	45-114%
Dibenzofuran	45%	50%	44-122%
Phenanthrene	-80%	-69%	42-127%
Fluorene	55%	60%	45-123%

The sample concentrations for naphthalene, 2-methylnaphthalene, acenaphthene, and phenanthrene in 0397-017A (28 day) were more than 4x the spike concentrations; therefore, data was not qualified for these analytes based on these MS/MSD results. The MS/MSD concentrations for dibenzofuran and fluorene exceeded the calibration range of the instrument and were flagged 'E' by the laboratory. Although the laboratory calculated acceptable recoveries for the MS and MSD for dibenzofuran and fluorene, these recoveries are not calculable as the results exceeded the calibration range. The results for dibenzofuran and fluorene in 0397-017A (28 day) are qualified as estimated and flagged 'J' based on the MS/MSD results.

10. Laboratory Duplicate – Acceptable

TPH by NWTPH-Dx – A laboratory duplicate was performed on BV-13. Results were acceptable.

SPLP TPH by NWTPH-Dx – Laboratory duplicates were performed on 0397-010 and 0397-025. Results were acceptable.

SPLP PAHs by Method 8270D-SIM – A laboratory duplicate was not performed in association with this analysis. Precision was assessed using the LCS/LCSD and/or MS/MSD results.

11. Field Duplicate – Acceptable

TPH by NWTPH-Dx – A field duplicate was submitted for sample 0397-017A (5day) and identified as 0397-017DUP (5day). Results were comparable.

PAHs by Method 8270D-SIM – A field duplicate was submitted for sample 0397-017A (5day) and identified as 0397-017DUP (5day). The relative percent difference (RPD) for fluoranthene (50%) was more than the control limit of 30%; therefore, the results for 0397-017DUP (5day) in 0397-017A (5day) and 0397-017DUP (5day) are qualified as estimated and flagged 'J'.

12. Reporting Limits – Acceptable except as noted below:

General – The results for one or more analytes in several samples were assigned a 'D' qualifier by the laboratory to indicate the results were reported from a dilution of the samples. No additional qualifiers were necessary based on the 'D' qualifiers assigned by the laboratory.

The results for one or more analytes in several samples were flagged with a 'J' or 'JD' by the laboratory to indicate that the reported concentration is above the method detection limit (MDL), but below the reporting limit. All J-flagged results are considered estimated unless otherwise qualified as described in this report.

TPH by NWTPH-Dx – The results for diesel-range and/or residual-range hydrocarbons in several samples were assigned a 'Z' qualifier by the laboratory to indicate that the chromatographic fingerprint does not resemble a petroleum product. No additional qualifier was necessary based on this qualifier assigned by the laboratory.

The reporting limits for residual-range hydrocarbons in the samples associated with SDG K12011617 were elevated due to the lower sample volumes used.

SPLP TPH by NWTPH-Dx – The results for diesel-range and/or residual-range hydrocarbons in several samples were assigned a 'Z' qualifier by the laboratory to indicate that the chromatographic fingerprint does not resemble a petroleum product. No additional qualifiers were necessary based on the qualifiers assigned by the laboratory.

PAHs by Method 8270D-SIM – The reporting limits for one or more PAHs were elevated in the samples associated with SDG K1201540 and BV-13 due to the dilutions necessary to quantitate high concentrations of target analytes present in the samples.

SPLP PAHs/PAHs by Method 8270D-SIM – The reporting limits for one or more analytes were elevated in several samples due to the percent moisture content of the samples. The elevated reporting limits may affect the use of the data for project objectives.

The results for benzo(b)fluroathene and benzo(k)fluoranthene for sample 0397-017 (5 day) were reported as benzo(b)fluroanthene due to the laboratory inability to differentiate the two analytes. The result for benzo(b)fluroanthene is qualified as estimated and flagged with a 'J'.

Metals Analysis

Samples were analyzed for metals as identified in the introduction of this report.

1. Holding Times – Acceptable

2. Initial Calibrations – Acceptable

3. Continuing Calibrations – Acceptable

4. Blanks – Acceptable

5. Laboratory Control Samples – Acceptable

6. Matrix Spike Samples – Acceptable

   A matrix spike and post-spike were performed on 0397-021. Results were acceptable.

7. Laboratory Duplicates – Acceptable

   A laboratory duplicate was performed on 0397-021. Results were acceptable.

8. Reporting Limits – Acceptable except as noted below:

   The results for barium and/or chromium in 0397-021 and 0397-022 were assigned a 'J' qualifier by the laboratory to indicate that the reported concentrations are above the MDL, but below the laboratory reporting limit. All J-flagged results are considered estimated.

General Chemistry Parameter

Samples were analyzed for total solids by the method identified in the introduction to this report.

1. Holding Times – Acceptable

2. Laboratory Duplicates – Acceptable

   Laboratory duplicates were performed on 0397-010 and 0397-025. Results were acceptable.

3. Reporting Limits – Acceptable

Overall Assessment

The data reported in this SDG, as qualified, are considered to be usable for meeting project objectives. The completeness for SDG K1110402 is greater than 99%.

Data Qualifier Definitions:

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

DNR Do Not Report. Another result is available that is more reliable or appropriate.

Table 1. Summary of Qualified Data

Sample ID	Laboratory ID	Analyte	Lab Result	Unit	Final Result
0397-011	K1110402-002	Benzo(b)fluoranthene	0.046 J	ug/L	0.046 J
0397-013	K1110402-003	Benzo(b)fluoranthene	0.037 J	ug/L	0.037 J
0397-016	K1110402-004	Benzo(b)fluoranthene	0.062 J	ug/L	0.062 J
		Benzo(k)fluoranthene	0.037 J	ug/L	0.037 J
		Indeno(1,2,3-cd)pyrene	0.031 J	ug/L	0.031 J
0397-017	K1110402-005	Benzo(b)fluoranthene	0.026 J	ug/L	0.026 J
0397-019	K1110402-006	Benzo(b)fluoranthene	0.030 J	ug/L	0.030 J
0397-021	K1110402-007	Chromium	0.004 J	mg/L	0.004 J
0397-022	K1110402-008	Benzo(b)fluoranthene	0.030 J	ug/L	0.030 J
		Barium	0.3 J	mg/L	0.3 J
0397-023	K1110402-009	Benzo(b)fluoranthene	0.034 J	ug/L	0.034 J
0397-024	K1110402-010	Benzo(b)fluoranthene	0.044 J	ug/L	0.044 J
0397-025	K1110402-011	Benzo(b)fluoranthene	0.024 J	ug/L	0.024 J
0397-017 (24 hour)	K1200448-003	Dibenz(a,h)anthracene	0.00032 J	ug/L	0.00032 J
0397-017 (2 Day)	K1200585-001	Benzo(b)fluoranthene	0.014 J	ug/L	0.014 J
		Benzo(k)fluoranthene	0.0060 J	ug/L	0.0060 J
		Benzo(a)pyrene	0.0062 J	ug/L	0.0062 J
		Indeno(1,2,3-cd)pyrene	0.0045 J	ug/L	0.0045 J
		Benzo(g,h,i)perylene	0.0066 J	ug/L	0.0066 J
		Residual Range Organics (RRO)	75 J	ug/L	75 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Lab Result	Unit	Final Result
0397-017 (3 Day)	K1200585-002	Benzo(b)fluoranthene	0.014 J	ug/L	0.014 J
		Benzo(k)fluoranthene	0.0048 J	ug/L	0.0048 J
		Benzo(a)pyrene	0.0069 J	ug/L	0.0069 J
		Residual Range Organics (RRO)	53 J	ug/L	53 J
0397-017 (4 Day)	K1200585-003	Benzo(b)fluoranthene	0.015 J	ug/L	0.015 J
		Benzo(k)fluoranthene	0.0055 J	ug/L	0.0055 J
		Benzo(a)pyrene	0.0066 J	ug/L	0.0066 J
		Residual Range Organics (RRO)	55 J	ug/L	55 J
0397-017 (5 Day)	K1200691-001	Benzo(b)fluoranthene	0.040 J	ug/L	0.040 J
		Benzo(a)pyrene	0.012 J	ug/L	0.012 J
		Indeno(1,2,3-cd)pyrene	0.0088 J	ug/L	0.0088 J
		Benzo(g,h,i)perylene	0.0065 J	ug/L	0.0065 J
0397-017A (2hr)	K1201445-001	Residual Range Organics (RRO)	35 J	ug/L	35 J
		Benzo(k)fluoranthene	0.0034 J	ug/L	0.0034 J
		Indeno(1,2,3-cd)pyrene	0.00078 J	ug/L	0.00078 J
		Benzo(g,h,i)perylene	0.00068 J	ug/L	0.00068 J
0397-017A (7 hr)	K1201445-002	Residual Range Organics (RRO)	33 J	ug/L	33 J
		Indeno(1,2,3-cd)pyrene	0.0036 J	ug/L	0.0036 J
		Dibenz(a,h)anthracene	0.0011 J	ug/L	0.0011 J
		Benzo(g,h,i)perylene	0.0029 J	ug/L	0.0029 J
0397-017A (24 hr)	K1201445-003	Residual Range Organics (RRO)	53 J	ug/L	53 J
		Indeno(1,2,3-cd)pyrene	0.0030 J	ug/L	0.0030 J
		Dibenz(a,h)anthracene	0.0012 J	ug/L	0.0012 J
		Benzo(g,h,i)perylene	0.0026 J	ug/L	0.0026 J
0397-017A (48 hr)	K1201445-004	Residual Range Organics (RRO)	56 J	ug/L	56 J
		Indeno(1,2,3-cd)pyrene	0.0017 J	ug/L	0.0017 J
		Dibenz(a,h)anthracene	0.00063 J	ug/L	0.00063 J
		Benzo(g,h,i)perylene	0.0014 J	ug/L	0.0014 J
0397-017A (28 day)	K1201445-005	SPLP Dibenzofuran	97	ug/L	97 J
		SPLP Fluorene	99	ug/L	99 J
		SPLP Benzo(b)fluoranthene	0.046 J	ug/L	0.046 J
		SPLP Indeno(1,2,3-cd)pyrene	0.031 J	ug/L	0.031 J
		SPLP Benzo(g,h,i)perylene	0.040 J	ug/L	0.040 J
0397-017DUP (28 day)	K1201445-006	SPLP Benzo(b)fluoranthene	0.045 J	ug/L	0.045 J
BV-13	K1201477-0001	Benzo(k)fluoranthene	3.8 J	ug/L	3.8 J
		Benzo(a)pyrene	3.6 J	ug/L	3.6 J
		Indeno(1,2,3-cd)pyrene	1.5 J	ug/L	1.5 J
		Dibenz(a,h)anthracene	0.72 J	ug/L	0.72 J
		Benzo(g,h,i)perylene	1.5 J	ug/L	1.5 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Lab Result	Unit	Final Result
0397-017A (3 day)	K1201540-001	Benzo(b)fluoranthene	0.018 J	ug/L	0.018 J
		Benzo(k)fluoranthene	0.0065 J	ug/L	0.0065 J
		Benzo(a)pyrene	0.0081 J	ug/L	0.0081 J
0397-017A (4 day)	K1201540-002	Benzo(b)fluoranthene	0.026 J	ug/L	0.026 J
		Benzo(k)fluoranthene	0.0083 J	ug/L	0.0083 J
		Benzo(a)pyrene	0.012 J	ug/L	0.012 J
0397-016 (5 day)	K1201617-001	Benzo(k)fluoranthene	0.0040 J	ug/L	0.0040 J
		Indeno(1,2,3-cd)pyrene	0.0015 J	ug/L	0.0015 J
		Dibenz(a,h)anthracene	0.00086 J	ug/L	0.00086 J
		Benzo(g,h,i)perylene	0.0019 J	ug/L	0.0019 J
0397-017A (5 day)	K1201617-002	Fluoranthene	3.5	ug/L	3.5 J
		Indeno(1,2,3-cd)pyrene	0.0013 J	ug/L	0.0013 J
		Dibenz(a,h)anthracene	0.00053 J	ug/L	0.00053 J
		Benzo(g,h,i)perylene	0.0010 J	ug/L	0.0010 J
0397-017DUP (5 day)	K1201617-003	Fluoranthene	2.1	ug/L	2.1 J
		Benzo(k)fluoranthene	0.0036 J	ug/L	0.0036 J
		Indeno(1,2,3-cd)pyrene	0.00086 J	ug/L	0.00086 J
		Benzo(g,h,i)perylene	0.00076 J	ug/L	0.00076 J

Memo

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To: Paul Kalina, Project Manager **Info:** **FINAL**

From: Christine T. Gebel, Chemist
Jennifer B. Garner, Chemist **Date:** August 27, 2012

RE: **Quality Assurance Review**
IP Longview – Treatibility Study
Soil Samples – Mixes 26 & 28
CAS SDGs K1206162, K1206824, K1206890

The summary data quality review of 8 leachates, 1 soil, and 1 wipe collected between June 23, 2012 and July 14, 2012 has been completed. The samples were submitted to Columbia Analytical Services (CAS), a Washington State Department of Ecology (Ecology) accredited laboratory, located in Kelso, Washington. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) by Environmental Protection Agency (EPA) Method 8270C modified by select ion monitoring (SIM) and total petroleum hydrocarbons (TPH-diesel range and oil range) by Ecology Method NWTPH-Dx. PAHs and TPHs in one sample were also extracted and analyzed using Toxicity Characteristic Leaching Procedure (TCLP) prepared by EPA Method 1311 and Synthetic Precipitation Leaching Procedure (SPLP) prepared by EPA Method 1312. The soil samples were submitted to Kemron Environmental Services, located in Atlanta, Georgia, for leaching tests. The sample ID includes the length of time leached. These leachates were sent to CAS for analysis. The analyses were performed in general accordance with methods specified in EPA's *Test Methods for Evaluating Solid Waste (SW-846) Update IIIB*, June 2005 and Ecology's Analytical *Methods for Petroleum Hydrocarbons*, June 1997. The following samples are associated with CAS sample delivery groups (SDGs) K1206162, K1206824, and K1206890.

Sample ID	CAS ID	Matrix	Parameters
0397-026 (5 day)	K1206162-001	Leachate	TPH-Dx, PAHs, TCLP TPH-Dx, TCLP PAHs, SPLP TPH-Dx, SPLP PAHs
0397-028	K1206824-001	Soil	TPH-Dx, PAHs
0397-028 (2 hr)	K1206824-002	Leachate	TPH-Dx, PAHs
0397-028 (7 hr)	K1206824-003	Leachate	TPH-Dx, PAHs
0397-028 (24 hr)	K1206824-004	Leachate	TPH-Dx, PAHs
0397-028 (48 hr)	K1206824-005	Leachate	TPH-Dx, PAHs
0397-028 (wipe)	K1206824-006	Wipe	TPH-Dx, PAHs
0397-028 (3 day)	K1206890-001	Leachate	TPH-Dx, PAHs
0397-028 (4 day)	K1206890-002	Leachate	TPH-Dx, PAHs
0397-028 (5 day)	K1206890-003	Leachate	TPH-Dx, PAHs

Upon receipt by CAS, the sample jar information was compared to the associated chain-of-custody (COC). No discrepancies relating to sample identification were noted by the laboratory. Two coolers were received below the EPA-recommended temperature limits of 4ºC±2ºC at -0.3 ºC and 1.8 ºC. Data were not qualified based on the cooler temperatures.

The samples in SDG K1206890 were received by the laboratory without preservation. The laboratory preserved these samples with hydrochloric acid upon receipt.

Data validation is based on method performance criteria and QC criteria as documented in the *Agency Draft Quality Assurance Project Plan (QAPP), Appendix A of the Performance and Compliance Monitoring Plan, Former Treated Wood Products Area, International Paper Facility / Longview, Washington* (Woodward Clyde, 1997). The laboratory provided EPA Contract Laboratory Program-equivalent validatable data packages. The data review conducted on these SDGs included a review of summarized results and QA/QC data, per the requirements set forth in Section A.10 of the QAPP. Hold times, initial and continuing calibrations, method blanks, surrogate recoveries, laboratory control sample (LCS) results, matrix duplicate results, matrix spike/matrix spike duplicate (MS/MSD) results, field duplicates, and reporting limits were reviewed to assess compliance with applicable methods. Calculation checks and review of the raw data were not included in the data review. If data qualification was required, data were qualified in accordance with *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review,* June 2008.

Organic Analyses

Samples were analyzed for PAHs and TPHs by the methods identified in the introduction to this report.

1. Holding Times – Acceptable except as noted below:

   TPH by NWTPH-Dx – The SPLP and TCLP leachates of 0397-028 were not initially extracted for TPH analysis correctly. SPLP and TCLP analyses for this sample were performed again and these SPLP and TCLP leachates were extracted 5 days past the method-recommended holding time. The results for SPLP and TCLP TPH in this sample are qualified as estimated and flagged 'J' or 'UJ' based on the holding time exceedance.

2. Instrument Performance (Tunes – applicable to PAHs only) – Acceptable

3. Initial Calibrations – Acceptable

4. Continuing Calibrations – Acceptable

5. Blanks – Acceptable except as noted below:

   PAHs by Method 8270D-SIM – Several PAHs were detected in several method blanks as noted below.

Method Blank ID	Analyte	Concentration (ug/kg)
MB (soil)	Naphthalene	0.26 J
	2-Methylnaphthalene	0.24 J
	Acenaphthene	0.28 J
	Dibenzofuran	0.19 J
	Fluorene	0.2 J
	Phenanthrene	0.51
	Anthracene	0.097 J
	Fluoranthene	0.23 J
	Pyrene	0.15 J
	Benz(a)anthracene	0.057 J
	Chrysene	0.034 J

J – result reported between the method detection limit (MDL) and the reporting limit

Method Blank ID	Analyte	Concentration (ug/L)
MB (water, SDG K1206824)	Naphthalene	0.0017 J
	2-Methylnaphthalene	0.0003 J
	Dibenzofuran	0.00052 J
	Phenanthrene	0.0027 J
	Fluoranthene	0.00088 J
	Pyrene	0.0011 J
	Benz(a)anthracene	0.00076 J
	Benzo(b)fluoranthene	0.0005 J
	Benzo(k)fluoranthene	0.00042 J
	Benzo(a)pyrene	0.0014 J
	Indeno(1,2,3-cd)pyrene	0.00094 J
	Dibenz(a,h)anthracene	0.00059 J
	Benzo(g,h,i)perylene	0.0013 J
MB (water, SDG K1206890)	Naphthalene	0.0012 J
	2-Methylnaphthalene	0.00042 J
	Phenanthrene	0.0013 J
	Fluoranthene	0.00054 J
	Benz(a)anthracene	0.00058 J
	Benzo(b)fluoranthene	0.00035 J
	Benzo(a)pyrene	0.00042 J
	Indeno(1,2,3-cd)pyrene	0.0010 J
	Dibenz(a,h)anthracene	0.00060 J
	Benzo(g,h,i)perylene	0.0013 J

J – result reported between the MDL and the reporting limit

Method Blank ID	Analyte	Concentration (ug/wipe)
MB (wipe)	Naphthalene	0.068
	2-Methylnaphthalene	0.032
	Acenaphthene	0.017
	Dibenzofuran	0.0094
	Fluorene	0.0079
	Phenanthrene	0.0076
	Anthracene	0.0019 J
	Fluoranthene	0.0013 J

J – result reported between the MDL and the reporting limit

The concentrations for the above-noted analytes in the samples associated with the method blanks for the soil sample and the wipe sample were more than the method blanks concentrations or were not detected; therefore, data were not qualified based on these method blank results.

Dibenz(a,h)anthracene and benzo(g,h,i)perylene were detected in the method blank for water associated with SDG K1206824 at concentrations greater than the method detection limits (MDLs) and less than the reporting limits. Dibenz(a,h)anthracene was detected in 0397-028(2 hr), 0397-028(7 hr), 0397-028(24 hr), and 0397-028(48 hr) at concentrations less than the reporting limits but above the MDLs; therefore, the results for dibenz(a,h)anthracene in these samples are qualified as not detected and flagged 'U' at the reporting limits based on the method blank result. Benzo(g,h,i)perylene was detected in 0397-028(48 hr) at a concentration less than the reporting limit but above the MDL; therefore, the result for benzo(g,h,i)perylene in this sample is qualified as not detected and flagged 'U' at the reporting limit based on the method blank result.

TCLP PAHs by Method 8270D-SIM – Several PAHs were detected in the TCLP method blank as noted below.

Analyte	Concentration (ug/L)
Naphthalene	0.0012
2-Methylnaphthalene	0.00038
Acenaphthene	0.000056
Dibenzofuran	0.00034
Fluorene	0.00014
Phenanthrene	0.00023
Anthracene	0.0000066 J
Fluoranthene	0.0000096 J
Pyrene	0.0000045 J
Benz(a)anthracene	0.0000038 J
Indeno(1,2,3-cd)pyrene	0.0000037 J
Benzo(g,h,i)perylene	0.0000037 J

J – result reported between the MDL and the reporting limit

The concentrations for the above-noted analytes in the sample associated with this method blank were more than the method blank concentration; therefore, data were not qualified based on these method blank results.

SPLP PAHs by Method 8270D-SIM – Several PAHs were detected in the SPLP method blank as noted below.

Analyte	Concentration (ug/L)
Naphthalene	0.029
2-Methylnaphthalene	0.0068
Acenaphthalene	0.000094
Acenaphthene	0.0044
Dibenzofuran	0.0031
Fluorene	0.0029
Phenanthrene	0.0032
Anthracene	0.00031
Fluoranthene	0.00032
Pyrene	0.00017
Benz(a)anthracene	0.0000089 J
Chrysene	0.0000074 J

J – result reported between the MDL and the reporting limit

The concentrations for the above-noted analytes in the sample associated with this method blank were more than the method blank concentration; therefore, data were not qualified based on these method blank results.

6. Surrogates – Acceptable except as noted below:

PAHs by Method 8270D-SIM – The percent recoveries for d10-fluorene, d10-fluoranthene, and/or d14-terphenyl were outside the control limits in several samples as noted below.

Sample ID	d10-Fluorene		d10-Fluoranthene		d14-Terphenyl	
	%R	CLs	%R	CLs	%R	CLs
0397-028	112%	17-104%	117%	27-106%	215%	35-109%
0397-028 MS	311%	17-104%	ok	27-106%	218%	35-109%
0397-028 MSD	308%	17-104%	119%	27-106%	227%	35-109%
0397-028 SPLP	ok	17-104%	237%	27-106%	ok	35-109%
0397-028 (wipe)	7%	17-104%	ok	27-106%	ok	35-109%
Method Blank (wipe)	5%	17-104%	ok	27-106%	ok	35-109%

%R – percent recovery CL – control limit ok – result acceptable

The results for PAHs reported as detected in 0397-028 are qualified as estimated and flagged with a 'J' based on the elevated surrogate recoveries.

As only one surrogate is out of control for 0397-028 SPLP and 0397-028 (wipe), data are not qualified in these samples based on the surrogate recoveries.

The matrix spike and matrix spike duplicate for 0397-028 and the method blank for 0397-028 (wipe) are QC samples; therefore data were not qualified based on the surrogate recoveries. The laboratory noted that a re-extraction of the wipe was not performed due to insufficient sample volume.

7. Internal Standards (applicable to GC/MS only) – Acceptable

8. Laboratory Control/ Laboratory Control Duplicate Samples (LCS/LCSD) – Acceptable except as noted below:

PAHs by Method 8270D-SIM – The percent recoveries for the following compounds in LCS/LCSD extracted on July 20, 2012 and associated with the wipe sample were below the control limits as described below.

Analyte	LCS	LCSD	CLs	RPD (CL 40%)
Naphthalene	22%	3%	32-124%	150%
2-Methylnaphthalene	21%	5%	27-126%	119%
Acenaphthylene	19%	7%	38-126%	94%
Acenaphthene	24%	8%	39-124%	100%
Dibenzofuran	26%	15%	41-130%	56%
Fluorene	37%	31%	39-129%	ok

CL – control limit RPD – relative percent difference ok – result acceptable

The results for naphthalene, 2-methylnaphthalene, acenaphthylene, acenaphthene, dibenzofuran, and fluorene in 0397-028 (wipe) are qualified as estimated and flagged 'J' based on the LCS/LCSD results.

9. Matrix Spike/Matrix Spike Duplicate (MS/MSD) – Acceptable except as noted below:

TPH by NWTPH-Dx – A MS/MSD was not performed in association with the TPH analyses. Accuracy and precision were assessed using the LCS/LCSD.

PAHs by Method 8270D-SIM – A MS/MSD was performed on 0397-028. The percent recoveries for several compounds were outside the control limits as noted below:

Analyte	MS	MSD	CLs
Naphthalene	-36,143%	-25,402%	23-114%
2-Methylnaphthalene	-8,530%	-3,168%	24-115%
Acenaphthalene	281%	237%	32-117%
Acenaphthene	-20,032%	-18,453%	33-118%
Dibenzofuran	-15,368%	-14,680%	34-131%
Fluorene	-16,417%	-17,815%	33-125%
Phenanthrene	-70,840%	-69,285%	29-125%
Anthracene	-5,429%	-2,848%	30-127%
Fluoranthene	-7,634%	-9,370%	35-139%
Pyrene	8,107%	4,700%	27-134%
Benz(a)anthracene	6,426%	5,598%	35-122%
Chrysene	1,662%	1,475%	36-126%
Benzo(b)fluoranthene	1,011%	514%	35-124%
Benzo(k)fluoranthene	248%	ok	38-124%
Benzo(a)pyrene	649%	475%	37-123%
Indeno(1,2,3-cd)pyrene	279%	212%	28-133%
Dibenz(a,h)anthracene	132%	ok	32-125%
Benzo(g,h,i)perylene	220%	168%	33-128%

CL – control limit ok – result acceptable

The results for PAHs in 0397-028 were previously qualified as described in Section 6 and no further qualification based on the MS/MSD is required.

10. Laboratory Duplicates – Acceptable

TPH by NWTPH-Dx – A laboratory duplicate was performed for soil on an unrelated project. Results were acceptable.

PAHs by Method 8270D-SIM – Laboratory duplicates were not performed in association with the PAH analyses. Accuracy and precision were assessed using the LCS/LCSD.

11. Reporting Limits – Acceptable except as noted below:

TPH by NWTPH-Dx – The results for diesel-range and/or residual-range hydrocarbons in several samples were assigned a 'Z' qualifier by the laboratory to indicate that the chromatographic fingerprint does not resemble a petroleum product. No additional qualifier was necessary based on this qualifier assigned by the laboratory.

The reporting limits for residual-range hydrocarbons in 0397-026(5day), 0397-028(2 hr), 0397-028(7 hr), 0397-028 48 hr), 0397-028 TCLP, 0397-028(3 day), 0397-028(4 day), and 0397-028(5 day) were elevated due to the lower sample volume used.

PAHs by Method 8270D-SIM – The results for one or more analytes in several samples were assigned a 'D' qualifier by the laboratory to indicate the results were reported from a dilution of the samples. No additional qualifiers were necessary based on the 'D' qualifiers assigned by the laboratory.

The reporting limits for one or more PAHs were elevated in 0397-026(5day), 0397-028 TCLP, 0397-028 SPLP, and 0397-028(5day) due to the dilutions necessary to quantitate high concentrations of target analytes present in these samples.

The result for benzo(a)pyrene in 0397-028 (wipe) was flagged 'X' by the laboratory to indicate matrix interference. The result for benzo(a)pyrene in this sample is qualified as estimated and flagged with a 'J' based on the matrix interference.

One or more PAHs were flagged 'J' by the laboratory to indicate the result was greater than the MDL and less than the reporting limit. Laboratory 'J'-flagged results are considered estimated results. As the result is between the method detection limit and the reporting limit, there is a greater level of uncertainty associated with the numerical result.

Overall Assessment

The data reported in these SDGs, as qualified, are considered to be usable for meeting project objectives. The completeness for SDGs K1206162, K1206824, and K1206890 is 100%.

Data Qualifier Definitions:

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

DNR Do Not Report. Another result is available that is more reliable or appropriate.

Table 1. Summary of Qualified Data

Sample ID	Laboratory ID	Analyte	Lab Result	Unit	Final Result
0397-028	K1206824-001	Naphthalene	150,000	ug/kg	150,000 J
		2-Methylnaphthalene	84,000	ug/kg	84,000 J
		Acenaphthalene	1,300	ug/kg	1,300 J
		Acenaphthene	91,000	ug/kg	91,000 J
		Dibenzofuran	67,000	ug/kg	67,000 J
		Fluorene	86,000	ug/kg	86,000 J
		Phenanthrene	250,000	ug/kg	250,000 J
		Anthracene	48,000	ug/kg	48,000 J
		Fluoranthene	110,000	ug/kg	110,000 J
		Pyrene	74,000	ug/kg	74,000 J
		Benz(a)anthracene	17,000	ug/kg	17,000 J
		Chrysene	19,000	ug/kg	19,000 J
		Benzo(b)fluoranthene	9,600	ug/kg	9,600 J
		Benzo(k)fluoranthene	3,600	ug/kg	3,600 J
		Benzo(a)pyrene	6,100	ug/kg	6,100 J
		Indeno(1,2,3-cd)pyrene	2,000	ug/kg	2,000 J
		Dibenz(a,h)anthracene	510	ug/kg	510 J
		Benzo(g,h,i)perylene	1,600	ug/kg	1,600 J
0397-028 (2 hr)	K1206824-002	Dibenz(a,h)anthracene	0.0015 J	ug/L	0.0034 U
0397-028 (7 hr)	K1206824-003	Dibenz(a,h)anthracene	0.0013 J	ug/L	0.0034 U
0397-028 (24 hr)	K1206824-004	Dibenz(a,h)anthracene	0.0025 J	ug/L	0.0038 U
0397-028 (48 hr)	K1206824-005	Dibenz(a,h)anthracene	0.0012 J	ug/L	0.0034 U
		Benzo(g,h,i)perylene	0.0032 J	ug/L	0.0034 U
0397-028 TCLP	K1206824-007	Diesel Range Organics (RRO)	15,000	ug/L	15,000 J
		Residual Range Organics (RRO)	540 U	ug/L	540 UJ
		Benzo(b)fluoranthene	0.063 J	ug/L	0.063 J
		Benzo(k)fluoranthene	0.034 J	ug/L	0.034 J
0397-028 SPLP	K1206824-001	Diesel Range Organics (RRO)	17,000	ug/L	17,000 J
		Residual Range Organics (RRO)	920	ug/L	920 J
		Benzo(b)fluoranthene	0.049 J	ug/L	0.049 J
		Benzo(k)fluoranthene	0.028 J	ug/L	0.028 J
0397-028 (wipe)	K1206824-006	Naphthalene	0.48	ug/wipe	0.48 J
		2-Methylnaphthalene	0.18	ug/wipe	0.18 J
		Acenaphthylene	0.010	ug/wipe	0.010 J
		Acenaphthene	0.26	ug/wipe	0.26 J
		Dibenzofuran	0.20	ug/wipe	0.20 J
		Fluorene	0.28	ug/wipe	0.28 J
		Benzo(a)pyrene	0.090 X	ug/wipe	0.090 J

Table 1. Summary of Qualified Data (continued)

Sample ID	Laboratory ID	Analyte	Lab Result	Unit	Final Result
0397-028 (3 day)	K1206890-001	Benzo(k)fluoranthene	26 J	ng/L	26 J
		Indeno(1,2,3-cd)pyrene	20 J	ng/L	20 J
		Dibenz(a,h)anthracene	11 J	ng/L	11 J
		Benzo(g,h,i)perylene	23 J	ng/L	23 J
0397-028 (4 day)	K1206890-002	Benzo(k)fluoranthene	22 J	ng/L	22 J
		Benzo(a)pyrene	23 J	ng/L	23 J
		Indeno(1,2,3-cd)pyrene	9.6 J	ng/L	9.6 J
		Dibenz(a,h)anthracene	5.9 J	ng/L	5.9 J
		Benzo(g,h,i)perylene	9.7 J	ng/L	9.7 J
0397-028 (4 day)	K1206890-002	Benzo(k)fluoranthene	25 J	ng/L	25 J
		Benzo(a)pyrene	29 J	ng/L	29 J
		Indeno(1,2,3-cd)pyrene	8.1 J	ng/L	8.1 J
		Benzo(g,h,i)perylene	8.8 J	ng/L	8.8 J

Appendix G

ISS Treatability Study Laboratory Report – Kemron Environmental Services

LONGVIEW SITE TREATABILITY STUDY
REVISED FINAL REPORT

KEMRON Project Number: SE0397

April 12, 2013

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Acronyms

ASTM	American Society of Testing and Materials
˚C	Degrees Celsius
cm/sec	Centimeters per second
COC	Contaminants of Concern
DI	De-ionized
EPA	U.S. Environmental Protection Agency
KEMRON	Kemron Environmental Services
PAH	Polycyclic Aromatic Hydrocarbon
psi	Pounds per square inch
ANS	American Nuclear Society
SVOCs	Semi-volatile organic compounds
SPLP	Synthetic Precipitation Leaching Procedure
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbon
µg/L	Micrograms per liter
UCS	Unconfined Compressive Strength

1.0 INTRODUCTION

KEMRON Environmental Services, Inc. (KEMRON) has developed the Longview Site Bench-Scale Treatability Study Final Report to summarize the results of testing performed on materials from the site, and to present the protocols used in testing of the site materials. All testing performed during the study were conducted in accordance with the Study Work Plan, and subsequent telephone conferences and communications between KEMRON and URS.

All treatability testing was conducted at KEMRON's facilities located in Atlanta, Georgia. Throughout the study, analytical testing was performed by Columbia Analytical Services located in Kelso, Washington. Columbia was contracted directly by URS for this study.

Solidification is the process of encapsulating contaminants and reducing the mobility of contaminant constituents in a treated material. Stabilization is the process of chemically changing a hazardous waste material into a less soluble or less toxic form. For the purposes of this report the terms Solidification and Stabilization (S/S) may be used interchangeably.

The bench-scale testing was performed in a phased approach and included untreated material characterization, and stabilization evaluations. Throughout the study, KEMRON and URS were in frequent communication, and the progression of the study was relatively fluid. That is changes were made to the original work plan, and testing was altered or added at different stages of the study which were not necessarily originally planned. As such, this report may not be in the order that events took place, but rather has been organized in a way to show the effectiveness of treatments evaluated and results of testing performed on those treated materials.

The untreated material testing was performed to provide information on the physical and chemical properties of the site materials. Untreated material characterization is important to the success of the study by providing a baseline of contaminant concentration to evaluate the effectiveness of treatment as well as ensuring that the materials provided for the study were similar to those anticipated at the site.

The primary objective of the bench-scale study was to evaluate the reduction of leachable COCs from the site soils, and the improvement of physical properties including UCS and permeability of the treated materials. The following discussions summarize the various treatment alternatives and methods.

2.0 MATERIAL RECIEPT, HOMOGENIZATION, AND CHARACTERIZATION

On August 24, 2011, KEMRON received two distinct materials from the site labeled "TP-01", and "TP-02". Immediately following the receipt of the site materials, KEMRON logged the materials into a sample tracking database and placed them in a 4-degree-Celsius (°C) walk-in cooler for storage.

KEMRON individually homogenized TP-01 and TP-02 by placing the contents from the shipping containers into a pre-cleaned plastic mixing pan and gently blending by hand using a stainless steel spoon until visually homogenous. At this time aliquots of both site materials were removed for particle size analysis testing in accordance with the American Society of Testing and Materials (ASTM) Method 422. The remaining soil was further homogenized, and any particles measuring greater than 0.5 inches in diameter were removed in order to facilitate bench-scale treatment and adhere to particle-size limits outlined in certain ASTM and EPA test methods. KEMRON performed homogenization activities on the chilled samples to minimize volatilization of organic contaminants of concern.

To characterize each the physical properties of each site material, KEMRON performed the following testing on aliquots of each untreated material:

PARAMETER	**METHOD**
Moisture Content	ASTM D2216
Loss on Ignition (Organic Content)	ASTM D2974
Soil Classification	USCS D2487
Particle Size Analysis with Hydrometer	ASTM D422

A summary of the results of the physical properties testing are provided on Table 1, and physical properties data sheets for the untreated materials are included in Appendix A. The following is a summary of the data presented in Table 1:

Table 1 – Untreated Material Physical Properties Testing

TESTING PARAMETER	TEST METHOD	UNIT	TP-01 (2-7.5) RESULTS	TP-02 RESULTS
Moisture Content	ASTM D2216			
ASTM Moisture Content		%	31.85	24.72
Percent Solids		%	75.85	80.18
Loss on Ignition	ASTM D2974	%	1.93	1.16
Particle Size Distribution	ASTM D422/D854			
Gravel		%	1.0	0.0
Sand		%	76.5	91.0
Silt		%	21.3	8.3
Clay		%	1.2	0.3
Sample Description	USCS (D2487)		Dark grey silty sand	V. Dk Grey poorly graded sand with silt
Sample Classification	USCS (D2487)		SM	SP-SM

Notes

% = Percent
Sample descriptions based on the Unified Classification System. Where atterberg limits were not tested, the description is based on an assumed PI < 4.
Sample color determined by the Munsell Soil Color Charts.

The results presented in Table 1 indicate that the TP-01 material was slightly more moist, and exhibited a higher percentage of fines than the TP-02 material.

In addition to physical properties testing, aliquots of each untreated site material were subjected to the following analytical tests in accordance with the outlined testing methods;

PARAMETER	METHOD
Total PAHs	EPA Method 8270
SPLP PAHs	EPA Methods 1312/8270
Total TPH (DRO, RRO)	EPA Method
SPLP TPH (DRO, RRO)	EPA Methods

		TP-01	TP-02
TESTING PARAMETER	**UNIT**	**RESULTS**	
Total PAH's			
Naphthalene	ug/kg dry	140	420,000
2-Methylnaphthalene	ug/kg dry	92	140,000
Acenaphthylene	ug/kg dry	11	1,800
Acenaphthene	ug/kg dry	220	110,000
Fluorene	ug/kg dry	84	97,000
Dibenzofuran	ug/kg dry	110	73,000
Phenanthrene	ug/kg dry	100	260,000
Anthracene	ug/kg dry	39	49,000
Fluoranthene	ug/kg dry	100	130,000
Pyrene	ug/kg dry	80	74,000
Benzo(b)fluoranthene	ug/kg dry	290	9,300
Benzo(k)fluoranthene	ug/kg dry	49	3,300
Benz(a)anthracene	ug/kg dry	29	20,000
Chrysene	ug/kg dry	59	17,000
Benzo(a)pyrene	ug/kg dry	300	5,500
Indeno(1,2,3-cd)pyrene	ug/kg dry	300	1,700
Dibenz(a,h)anthracene	ug/kg dry	40	410
Benzo(g,h,i)perylene	ug/kg dry	260	1,400
SPLP PAH's			
Naphthalene	ug/L	0.49	12,000
2-Methylnaphthalene	ug/L	< 0.20	1,200
Acenaphthylene	ug/L	< 0.20	12
Acenaphthene	ug/L	1.3	540

		TP-01	TP-02
TESTING PARAMETER	**UNIT**	**RESULTS**	
Total PAH's			
Fluorene	ug/L	0.50	320
Dibenzofuran	ug/L	0.39	300
Phenanthrene	ug/L	0.21	360
Anthracene	ug/L	< 0.20	51
Fluoranthene	ug/L	< 0.20	73
Pyrene	ug/L	< 0.20	42
Benzo(b)fluoranthene	ug/L	< 0.20	7.9
Benzo(k)fluoranthene	ug/L	< 0.20	7.1
Benz(a)anthracene	ug/L	< 0.20	3.3
Chrysene	ug/L	< 0.20	1.0
Benzo(a)pyrene	ug/L	< 0.20	1.8
Indeno(1,2,3-cd)pyrene	ug/L	< 0.20	0.38
Dibenz(a,h)anthracene	ug/L	< 0.20	< 0.20
Benzo(g,h,i)perylene	ug/L	< 0.20	0.36
TOTAL TPH			
Diesel Range Organics (DRO)	mg/kg dry	42	8,500 Z
Residual Range Organics (RRO)	mg/kg dry	120 J	1,600 J
SPLP TPH			
Diesel Range Organics (DRO)	ug/L	< 280	26,000 Z
Residual Range Organics (RRO)	ug/L	< 560	< 560

Notes:
ug/kg = micrograms per kilogram
ug/L = micrograms per liter
mg/kg = milligrams per kilogram
QUAL = Qualifier
J = The result is an estimated value.
Z = The chromatographic fingerprint does not resemble a petroleum product.

Analytical results indicate that the untreated TP-02 site material is significantly more impacted than the TP-01 sample.

3.0 STABILIZATION EVALUATIONS

KEMRON prepared a total of nine mixture designs using the TP-01 site material. These mixtures were prepared between October 5 and October 7, 2011. Below is a summary of the mixtures prepared using the TP-01 untreated site material.

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.
0397-001	TP-01	Portland Cement	7.5	50
0397-002	TP-01	Portland Cement	12.5	50
0397-003	TP-01	Portland Cement / Bentonite	12.5 / 2	150
0397-004	TP-01	Portland Cement / Hydrated Lime	7.5 / 7.5	77
0397-005	TP-01	Portland Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 0.5	150
0397-006	TP-01	Portland Cement / Class "C" Flyash	7.5 / 7.5	50
0397-007	TP-01	NewCem Slag Cement / Bentonite	15 / 2	132
0397-008	TP-01	50:50 TerraCem	12.5	50
0397-009	TP-01	50:50 TerraCem / Bentonite	15 / 2	135

Note that the reagents or reagent blends were added to the untreated material as a pumpable slurry using potable tap water. In mixtures where bentonite was included, the bentonite was hydrated with water overnight before blending with the other reagent materials and subsequent mixing with the untreated material.

The reagent additions were calculated on a by-weight basis according to the quantity of untreated material utilized. The water used in each mixture was based on the total weight of the reagents utilized in the mixture. For example in a mixture with 7.5 percent (%) Portland cement, and 7.5% hydrated lime with a 77% water addition, for every 100g of untreated material, 7.5 grams (g) of Portland cement was blended with 7.5g of hydrated lime and then slurried with 11.6g of water.

All mixtures were prepared using a Hobart-type kitchen mixer with a paddle-type mixing arm. Mixtures were prepared by placing an aliquot of the untreated material into the mixing chamber. The appropriate reagents were then added dry to the untreated material while mixing. Each mixture was blended for a period of approximately 60 to 90 seconds at a rate of approximately 60 revolutions per minute (rpm).Treatment utilizing this mixer is intended to simulate potential full-scale remediation options, to the extent possible on the bench-scale. This approach is routinely utilized to simulate a wide range of potential full-scale remediation approaches, including both in-situ and ex-situ applications.

KEMRON originally prepared 16 mixtures (0397-010 through 0397-025) between the dates of October 5 through October 7, 2011 using the untreated TP-02 site material. The following is a summary of these mixture designs. Note that all mixtures were prepared using the previously outlined protocol.

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.
0397-010	TP-02	Portland Cement	12.5	50
0397-011	TP-02	Portland Cement / Bentonite	12.5 / 2	150
0397-012	TP-02	Portland Cement / Bentonite	17.5 / 2	125
0397-013	TP-02	Portland Cement / Hydrated Lime	7.5 / 7.5	75
0397-014	TP-02	Portland Cement / Hydrated Lime	7.5 / 12.5	75
0397-015	TP-02	Portland Cement / Hydrated Lime	10 / 12.5	75
0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 0.5	150
0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150
0397-018	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	17.5 / 2 / 0.5	150
0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	10 / 2 / 0.5	150
0397-020	TP-02	Portland Cement / Bentonite / Organoclay SS 199	15 / 2 / 0.5	150
0397-021	TP-02	Portland Cement / Class "C" Flyash	10 / 10	50
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	10 / 10	50
0397-023	TP-02	NewCem Slag Cement / Bentonite	15 / 2	132
0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	15 / 2 / 0.5	135
0397-025	TP-02	50:50 TerraCem / Bentonite	15 / 2	135

Reagent Selection

Throughout the treatability study, KEMRON utilized additives which are commonly utilized in solidification treatment of organic containing soils. These additives are readily accessible and have proven effective at treating similar materials to those from the site. The following discussions are generalizations regarding the selection of these materials for evaluation in this study.

Type I Portland cement (PC) – Used in solidification / stabilization to provide strength and bind contaminants through macro and micro encapsulation. Portland cement typically provides relatively quick curing strengths. Ultimate final strength as well as setting properties can be affected by certain contaminants, and other additives.

NewCem Slag cement – Slag cements are often used in conjunction with or as an alternative to Portland cement. Slag cements can often achieve similar strengths as PC but may provide a more cost effective alternative. Typically, slag cements cure more slowly than Portland cements but may continue to provide increasing strengths long after PC has reached its ultimate final strength.

Hydrated Lime – KEMRON typically uses hydrated lime as a conditioning agent to absorb excess moisture or to bind organic contaminants through adsorption. The use of hydrated lime can often reduce the leachability of organic contaminants.

50:50 TerraCem – This product is a blend of Cement Kiln Dust and Portland Cement combined at a 1:1 ratio. This material was considered as an alternative to straight Type I Portland cement, and was requested by URS.

Class "C" Fly Ash – Fly ashes are often used in combination with a cement additive to reduce the amount of cement necessary in a treatment mixture. Fly ashes can be used as a bulking agent to reduce excessive moisture and help to bind organic contaminants. Class "C" fly ash can contain higher amounts of calcium oxide and calcium hydroxide which can also provide an increase in treated material strength.

Bentonite – Bentonite is typically utilized to reduce the permeability of a soil during remediation. Bentonite may also be used to adsorb organic contaminants providing further leachability reduction. Bentonite used in combination with cementitious additives can reduce the ultimate final strength of the treated material over cement alone.

Organoclay – Organoclays can often be used to reduce the leachability of organic constituents by binding contaminants. Organoclay such as that utilized in this study (CETCO SS199) can be manufactured to actually attract organic molecules.

Caustic Soda – Caustic soda is not typically utilized by KEMRON during solidification treatability studies, however KEMRON was requested to evaluate the ability of caustic soda to alter the setting properties of selected mixture designs.

As outlined above the additives were typically used in different combinations to take advantage of different benefits provided by the different additives. Following the preparation of each mixture design, the treated materials were placed into cylindrical plastic molds for curing. Throughout the curing process KEMRON evaluated the potential setting properties of each mixture through pocket penetrometer testing. The results of penetrometer testing are presented in Table 3. The following is a summary of the data presented in Table 3:

TABLE 3 – Preliminary Mixture Designs Pocket Penetrometer Testing Results

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	Penetrometer Testing (tons/ft^2)				
		1 Day	3 Day	5 Day	7 Day	14 Day
0397-001	TP-01	>4.5	>4.5	>4.5	>4.5	>4.5
0397-002	TP-01	>4.5	>4.5	>4.5	>4.5	>4.5
0397-003	TP-01	3.5	4.5	>4.5	>4.5	>4.5
0397-004	TP-01	1.5	3.25	3.75	3.75	3.75
0397-005	TP-01	>4.5	>4.5	>4.5	>4.5	>4.5
0397-006	TP-01	3.75	>4.5	>4.5	>4.5	>4.5
0397-007	TP-01	0.0	0.0	0.0	0.0	0.25
0397-008	TP-01	4.25	>4.5	>4.5	>4.5	>4.5
0397-009	TP-01	1.25	3.50	4.25	>4.5	>4.5
0397-010	TP-02	>4.5	>4.5	>4.5	>4.5	>4.5
0397-011	TP-02	3.25	>4.5	>4.5	>4.5	>4.5
0397-012	TP-02	>4.5	>4.5	>4.5	>4.5	>4.5
0397-013	TP-02	3.25	>4.5	>4.5	>4.5	>4.5
0397-014	TP-02	1.25	2.5	3.0	3.75	4.25
0397-015	TP-02	2.5	3.75	>4.5	>4.5	>4.5
0397-016	TP-02	0.0	0.0	2.5	4.25	>4.5
0397-017	TP-02	0.0	0.0	1.25	3.0	>4.5
0397-018	TP-02	0.5	3.75	>4.5	>4.5	>4.5
0397-019	TP-02	3.25	4.5	>4.5	>4.5	>4.5
0397-020	TP-02	3.25	>4.5	>4.5	>4.5	>4.5
0397-021	TP-02	>4.5	>4.5	>4.5	>4.5	>4.5
0397-022	TP-02	1.0	1.75	3.25	3.75	3.75
0397-023	TP-02	0.0	3.25	4.5	>4.5	>4.5
0397-024	TP-02	2.75	3.25	4.25	>4.5	>4.5
0397-025	TP-02	1.25	2.5	4.0	4.5	>4.5

Review of the test data presented in Table 3 indicates that the majority of treated materials achieved a penetrometer strength in excess of 4.5 tons per square foot within 14 days of curing.

In addition to penetrometer testing KEMRON performed Unconfined Compressive Strength (UCS) testing to evaluate the strengths of each treated material at different curing periods. The results of UCS testing are presented in Table 4. The following is a summary of the data presented in Table 4:

TABLE 4 – Preliminary Mixture Designs Unconfined Compressive Strength Results

KEMRON SAMPLE No.	Untreated Material Type	REAGENT TYPE	Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.	Cure Days	UCS (lb/in²)
0397-001	TP-01	Portland Cement	7.5	50	9	69.2
0397-002	TP-01	Portland Cement	12.5	50	9	169.3
0397-003	TP-01	Portland Cement / Bentonite	12.5 / 2	150	8	44.9
0397-004	TP-01	Portland Cement / Hydrated Lime	7.5 / 7.5	77	9	27.1
0397-005	TP-01	Portland Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 0.5	150	8	70.3
0397-006	TP-01	Portland Cement / Class "C" Flyash	7.5 / 7.5	50	8	64.5
0397-007	TP-01	NewCem Slag Cement / Bentonite	15 / 2	132	NT	NT
0397-008	TP-01	50:50 TerraCem	12.5	50	9	58.7
0397-009	TP-01	50:50 TerraCem / Bentonite	15 / 2	135	8	29.4
0397-010	TP-02	Portland Cement	12.5	50	9	285.0
					69	306.2
0397-011	TP-02	Portland Cement / Bentonite	12.5 / 2	150	8	47.6
0397-012	TP-02	Portland Cement / Bentonite	17.5 / 2	125	8	78.1
0397-013	TP-02	Portland Cement / Hydrated Lime	7.5 / 7.5	75	9	32.4
0397-014	TP-02	Portland Cement / Hydrated Lime	7.5 / 12.5	75	NT	NT
0397-015	TP-02	Portland Cement / Hydrated Lime	10 / 12.5	75	9	31.9
0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 0.5	150	8	36.4
					67	321.5
0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150	8	31.7
					67	326.0
					101	443.7
0397-018	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	17.5 / 2 / 0.5	150	8	76.6
0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	10 / 2 / 0.5	150.0	8	35.2
					67	57.9
0397-020	TP-02	Portland Cement / Bentonite / Organoclay SS 199	15 / 2 / 0.5	150.0	8	60.8
0397-021	TP-02	Portland Cement / Class "C" Flyash	10 / 10	50.0	8	143.6
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	10 / 10	50.0	8	15.2
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	10 / 10	50.0	17	14.1
0397-023	TP-02	NewCem Slag Cement / Bentonite	15 / 2	132	8	61.3
0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	15 / 2 / 0.5	135	8	37.7
					67	87.7
0397-025	TP-02	50:50 TerraCem / Bentonite	15 / 2	135	8	32.4

Table 4 shows that of the 9 mixtures prepared using the TP-01 material, 8 of the materials achieved a UCS strength in excess of 25 psi within 9 days of mixture

preparation. Of the original 16 mixtures prepared using the TP-02 material, 15 of these mixtures evaluated achieved UCS strengths in excess of 30 psi within ten days of material preparation, with a number of the mixtures exhibiting UCS strengths greater than 100 psi.

Additional UCS testing was performed on candidate mixtures at later curing intervals to evaluate continued strength gain. Table 4 also shows that many of the mixtures continued to gain significant strength with extended curing. At approximately 67 days into the curing process KEMRON and URS selected five of the treated TP-02 materials for additional UCS and permeability testing. Permeability testing was conducted in accordance with ASTM Method D5084. The results of the 67 day UCS tests are presented in Table 4, and permeability testing results are presented in Table 5.

TABLE 5 – Preliminary Mixture Design Permeability Results

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.	Cure Days	Perm (cm/sec)
0397-010	TP-02	Portland Cement	12.5	50	69	**7.1E-07**
0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 0.5	150	67	**3.2E-08**
0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150	67	**3.0E-08**
0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	10 / 2 / 0.5	150	67	**7.4E-07**
0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	15 / 2 / 0.5	135	67	**3.0E-07**

Review of the data presented in Table 5 indicates that the lowest permeability values were achieved in mixtures 016 and 017 which were developed using the NewCem slag cement in combination with bentonite and organoclay. Because only selected mixture designs were chosen for permeability testing it is difficult to determine the exact effect that the individual additives has on permeability reduction. However, it is apparent that;

- A higher addition rate of organoclay, as shown in mixtures 016 and 017, does not have a beneficial result on the permeability.
- A lower addition of cement when combined with bentonite and organoclay resulted in relatively similar permeability results as using a higher addition rate of Portland cement alone as indicated in mixtures 010 and 019

Comparing the effectiveness between mixes using slag cement to Portland cement is also difficult because of the use of a higher addition of slag compared to cement. It is unclear if the more favorable permeability results exhibited in mixtures 016 and 017 are due to the use of slag cement or if it is a result of a higher addition of the cementitious reagent compared to mixture 019 which was developed with Portland cement.

In addition to physical testing of the preliminary mixture designs, URS requested that candidate mixtures be forwarded to Columbia Analytical Services (CAS) for analytical testing. These candidate mixtures were selected based on their physical performance.

The results of leachable PAHs and TPHs as determined by the Synthetic Precipitation Leaching Procedure are included in Table 6.

TABLE 6 – Preliminary Mixture Evaluations SPLP PAHs and TPHs

Testing Parameter	0397-010	0397-011	0397-013	0397-016	0397-017	0397-019	0397-021	0397-022	0397-023	0397-024	0397-025
SPLP PAHs (ug/L)											
Naphthalene	7,500	7,400	7,700	6,800	4,400	6,400	7,000	7,900	7,300	6,500	9,400
Acenaphthylene	9.5	9.1	8.5	7.3	3.6	7.1	8.6	8.7	8.7	7.2	8.1
Acenaphthene	420	430	380	400	260	380	420	380	390	400	380
Fluorene	240	240	210	210	92	180	230	210	190	220	210
Phenanthrene	240	250	210	210	15	210	240	220	210	220	210
Anthracene	35	33	29	30	12	30	31	30	34	28	31
Fluoranthene	22	20	19	22	6.6	20	19	20	23	22	18
Pyrene	11	10	9.1	11	0.30	10	9.2	9.3	11	11	8.2
Benz(a) anthracene	0.42	0.57	0.36	0.47	0.23	0.40	0.32	0.35	0.41	0.41	0.29
Chrysene	0.40	0.28	0.31	0.38	0.026 J	0.35	0.32	0.34	0.40	0.40	0.29
Benzo(b) fluoranthene	< 0.20	0.046 J	0.037 J	0.062 J	< 0.20	0.03 J	< 0.20	0.03 J	0.034 J	0.044 J	0.024 J
Benzo(k) fluoranthene	< 0.20	< 0.20	< 0.20	0.037 J	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Indeno(1,2,3-cd) pyrene	< 0.20	< 0.20	< 0.20	0.031 J	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2 –Methyl naphthalene	840	890	820	780	460	740	860	770	760	860	800
Dibenzofuran	270	270	240	230	98	210	260	240	220	250	240
SPLP TPH (ug/L)											
DRO	19,000	20,000	20,000	18,000	11,000	17,000	19,000	20,000	18,000	18,000	23,000
RRO	< 550	570	610	< 500	< 500	< 500	510	660	540	< 500	580

Note that in this summary table the values represented as "<" (less than) indicate that the compound was not detected at a concentration above the listed detection limit. The "J" qualifier indicates that the compound was detected at the estimated concentration which was between the analytical reporting limit and the method detection limit.

Review of the data presented in Table 6 shows that naphthalene was detected in the SPLP leachate of all mixtures tested at higher concentrations than any other PAH tested. Several other compounds were detected at lower concentrations including acenaphthene, 2-methylnaphthalene, fluorene, phenanthrene, and dibenzofuran. TPHs in the diesel range were detected at relatively high concentrations in the SPLP fluid while oil range organics were detected in some of the mixtures above the analytical detection limit. A comparison between reagent types and addition rates with the SPLP results indicate that the use of Portland cement may be slightly more effective than the slag cement. Additionally, an increase in the addition of organoclay showed lower concentrations of PAHs in the SPLP leachate.

In addition to SPLP analyses, the preliminary mixtures 016 and 017 were subjected to the American Nuclear Society (ANS) 5-day modified 16.1 leaching procedure. This leaching procedure is often utilized to evaluate the leaching of contaminants over time from a solidified monolithic sample. Specifically, a sample of the treated test material is suspended in a bath of de-ionized (DI) water. At different time intervals, the test

specimen is removed from the leaching bath. The resulting leach water is then analyzed for the contaminants of concern and the solidified test specimen is placed into a new bath of clean DI water. The 5-day modified ANS 16.1 typically utilizes 7 leaching intervals including cumulative times of 2, 7, and 24 hours, 2, 3, 4, and 5 days. In order to evaluate and compare the ANS results with the SPLP analytical results, only the 5- day leaching interval for mixture 016 was analyzed. For mixture 017, URS requested that all 7 of the leachates be analyzed. The results of testing performed on the ANS leachates for mixtures 016 and 017 are presented in Tables 7 and 8. The table below summarizes the data presented in Tables 7 and 8;

	Sample 0397-016	**SAMPLE 0397-017**						
	5-DAY	**2-Hour**	**7- Hour**	**24- Hour**	**2-DAY**	**3-DAY**	**4-DAY**	**5-DAY**
Testing Parameter	**Results (ug/L)**	**Results (ug/L)**	**Results (ug/L)**	**Results (ug/L)**	**Results (ug/L)**	**Results (ug/L)**	**Results (ug/L)**	**Results (ug/L)**
TPH								
DRO	500	< 260	< 300	500 Z	550 Z	600 Z	660 Z	420 Z
RRO	< 520	< 520	< 600	< 570	75 J	53 J	55 J	< 560
PAH's								
Naphthalene	100	7 D	23 D	84 D	110 D	150 D	140 D	68 D
2-Methylnaphthalene	780	0.890	3.1 D	11 D	13 D	19 D	19 D	8.9
Acenaphthylene	0.13	0.040	0.057	0.130	0.19	0.23	0.22	0.13
Acenaphthene	10	1.200	3.1 D	8.9 D	11 D	15 D	14 D	8.3
Dibenzofuran	6.7	0.840	1.7	5.4 D	6.3	8.0	7.7	5 D
Fluorene	6.8	0.670	1.3	3.4 D	4.6	5.5	5.0	3.5
Phenanthrene	17	4.20 D	4.5 D	9.0 D	11 D	13 D	12 D	10
Anthracene	1.7	0.590	0.540	1.1	1.2	1.4	1.2	0.30
Fluoranthene	4.0	2.40 D	1.1	1.7	2.0	2.2	2.0	2.1
Pyrene	1.7	1.300	0.690	1.1	1.3	1.3	1.3	1.1
Benz(a)anthracene	0.1	0.390	0.120	0.140	0.092	0.091	0.079	0.12
Chrysene	0.1	0.360	0.120	0.120	0.052	0.058	0.056	0.092
Benzo(b)fluoranthene	0.013	0.200	0.055	0.052	0.014 J	0.014 J	0.015 J	0.04
Benzo(k)fluoranthene	0.004 J	0.078	0.019	0.02	0.006 J	0.0048 J	0.0055 J	< 0.0027
Benzo(a)pyrene	0.0062	0.100	0.031	0.03	0.0062 J	0.0069 J	0.0066 J	0.012 J
Indeno(1,2,3-cd)pyrene	0.0015 J	0.050	0.010	0.01	0.0045 J	< 0.0030	< 0.0027	0.0088 J
Dibenz(a,h)anthracene	0.00086 J	0.021	0.0034	0.0032 J	< 0.0027	< 0.0029	< 0.0026	< 0.0027
Benzo(g,h,i)perylene	0.0019 J	0.041	0.0088	0.009	0.0066 J	< 0.0033	< 0.0030	0.0065 J

Note that in this summary table the values represented as "<" (less than) indicate that the compound was not detected at a concentration above the listed detection limit. The "J" qualifier indicates that the compound was detected at the estimated concentration which was between the analytical reporting limit and the method detection limit. The "Z" qualifier indicates that the chromatographic fingerprint does not represent a petroleum product, and the "D" qualifier shows that the value was a result of a dilution.

The results of ANS leachability testing indicates that mixture 017 provided much less contaminant in the 5-day ANS leachate than the 016 material. The contaminant leaching trend seen with mixture 017 where the contaminant concentrations increase during the middle of the test and then begin to reduce at the later leaching intervals is often seen using this leaching method. Furthermore, in many cases the contaminant concentrations continue to reduce with extended leaching intervals.

OPTIMIZATION MIXTURE EVALUATIONS

Based on the results of testing on the initial 25 mixture designs, KEMRON and URS selected to perform additional testing on mixture 017, and 6 additional optimized mixture designs for treatment of the SP-02 site material. The 6 additional optimized mixture designs were primarily developed to reduce the potential ultimate strengths of the treated site material. KEMRON also prepared two additional versions of mixture 017 which include 017A, and 017 Duplicate (DUP). Mixture 017A was prepared based on discussions with CETCO which manufactures the Organoclay SS199. Specifically mixture 017A was developed using a water addition which was solely based on the quantity of slag cement utilized, while mixture 017 DUP was prepared where the water addition was based on the total weight of all of the reagents combined, an exact duplicate of the original mixture 017. To further clarify, for mixture 017A the 150% water addition rate was calculated based on a 12.5% slag addition rate, which is equivalent to a 113.6% water addition rate based on the total 16.5% reagent addition. Mixtures 017 and 017DUP contained a water addition rate of 150% based on the total 16.5% reagent addition rate. The optimization mixture designs are outlined below;

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent Addition % By wet soil wt.	Water Addition % by Reagent wt.
0397-017A	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150* (113.6**)
0397-017 DUP	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150
0397-026	TP-02	Portland Cement / Bentonite	8 / 2	150
0397-027	TP-02	NewCem Slag Cement / Portland Cement / Bentonite	6 / 2 / 2	150
0397-028	TP-02	NewCem Slag Cement / Bentonite / Caustic Soda	8 / 2 / 0.5	175
0397-029	TP-02	NewCem Slag Cement/Bentonite / Organoclay SS 199 / Caustic Soda	8 / 2 / 0.5 / 0.5	175
0397-030	TP-02	NewCem Slag Cement/Bentonite / Caustic Soda	10 / 2 / 0.5	175
0397-031	TP-02	NewCem Slag Cement / Bentonite / OrganoClay SS199 / Caustic Soda	10 / 2 / 0.5 / 0.5	175

*The water addition rate was calculated based only on the quantity of slag cement utilized.
**The water addition rate was calculated on the total weight of the reagents utilized.

The optimized mixtures were developed in accordance with the previously discussed mixture preparation protocol. Once prepared each treated material was

placed into plastic molds for curing. Penetrometer testing performed on mixtures 026 through 031 are presented in Table 3. Review of these results show that all of the additional test mixtures achieved UCS strengths in excess of 4.5 TSF by day 5.

TABLE 3 – Pocket Penetrometer Testing Results

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	Penetrometer Testing (tons/ft^2)				
		1 Day	3 Day	5 Day	7 Day	14 Day
0397-026	TP-02	4.50	-	>4.5	-	-
0397-027	TP-02	4.25	-	>4.5	-	-
0397-028	TP-02	0.75	-	>4.5	-	-
0397-029	TP-02	0.75	-	>4.5	-	-
0397-030	TP-02	1.25	-	>4.5	-	-
0397-031	TP-02	2.00	-	>4.5	-	-

- Not Tested

To evaluate the potential increase in soil volume produced from each treatment option, KEMRON performed volumetric expansion testing at various cure intervals to evaluate the potential for volume change with increased curing. Volumetric expansion was performed by placing a 100g aliquot of the untreated soil material into a cylindrical curing mold measuring 2 inches in diameter and 4 inches in height. The untreated material was then lightly compacted to remove any air voids and simulate potential field conditions, and the height of the soil within the mold was recorded. The 100g soil aliquot was then removed from the mold and subjected to the appropriate mixture design application. The treated material was then returned to the curing mold and any air voids present were removed by tapping the mold on a hard surface. At the outlined cure date KEMRON measured the height of the treated material inside the mold and the volumetric expansion was calculated using the following formula;

(Final Ht. – Initial Ht. / Initial Ht.) x 100%

In addition to volumetric expansion testing, KEMRON performed UCS testing at various curing intervals. The results of volumetric expansion testing as well as UCS testing are presented in Table 9. The following is a summary of the volumetric expansion and UCS results presented in Table 9.

TABLE 9 – Optimization Mixtures Volumetric Expansion and UCS Results

KEMRON SAMPLE NO.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Cure Days	Volumetric Expansion (%)	UCS (lb/in²)
0397-017A	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150* (113.6**)	7	NT	23.7
					28	30.36	184.5
0397-017DUP	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150	3	48.21	NT
					7	42.86	NT
					28	42.86	180.2
0397-026	TP-02	Portland Cement #842/Bentonite	8 / 2	150	7	28.57	31.9
					14	NT	44.9
					28	31.25	243.3***
					56	27.55	77.7
0397-027	TP-02	NewCem Slag Cement/ Portland Cement/Bentonite	6 / 2 / 2	150	7	25.80	68.8
					14	NT	127.7
					28	29.64	239.8
					56	31.21	333.1
0397-028	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	8 / 2 / 0.5	175	7	36.61	91.7
					14	NT	119.1
					28	34.82	245.5
					56	36.07	383.5
					86	25.51	355.3
0397-029	TP-02	NewCem Slag Cement/Bentonite/Organo clay SS 199/Caustic Soda	8 / 2 / 0.5 / 0.5	175	7	35.71	44.8
					14	NT	117.7
					28	37.86	NT
					56	38.21	358.3
0397-030	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	10 / 2 / 0.5	175	7	40.18	120.8
					14	NT	192.0
					28	40.80	NT
					56	40.09	341.1
0397-031	TP-02	NewCem Slag Cement/Bentonite/Organo Clay SS199 /Caustic Soda	10 / 2 / 0.5 / 0.5	175	7	40.18	127.1
					14	NT	221.5
					28	40.45	NT
					56	42.59	433.9

*The water addition rate was calculated based only on the quantity of slag cement utilized.
**The water addition rate was calculated on the total weight of the reagents utilized.
*** This result was determined to be inaccurate.

Table 9 indicates that the two versions of mixture 017, mixtures 017A and 017 DUP, had very similar UCS strengths at the 28 day cure interval. The volumetric expansion values for these two mixtures are significantly different and representative of the increased water content in the 017 DUP material. To reiterate, the preparation of the 017A material was performed using information provided by CETCO and included a 150% water addition rate which was based solely on the amount of slag cement utilized in the mixture. The water addition in

this mixture was equivalent to a 113.6% addition rate if based on the total reagent combination utilized. Mixture 017 DUP was prepared using KEMRON's standard protocol where the water addition rate is based on the total weight of the reagents used. A review of the 017 UCS strengths and that determined for the 017A and 017 DUP materials at the 28 day cure interval indicates that all three materials are very comparable.

In general Table 9 also indicates that mixtures containing the slag cement show significant strength increases with extended curing. Mixture 026, containing Type I Portland cement and bentonite only, exhibited a more modest strength gain with increased curing time. Note that the 28 day curing interval result for mixture 026 indicated a strength value in excess of 200 psi. This value was determined to be caused by an error in the UCS Load cell equipment, as the treated material was relatively easily broken apart by hand, and not consistent with a high UCS value. The volumetric expansion results range from approximately 28% to 42% and as would be expected are dependent on the reagent addition rates and the quantity of water utilized in the mixtures.

Following 28 days of curing KEMRON and URS selected 4 of the optimized mixtures for permeability testing. These candidate mixtures were selected based on review of the UCS testing results and information collected throughout the study. The results of permeability testing are also presented in Table 9 and are summarized below.

TABLE 9 -
Continued

KEMRON Sample No.	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Cure Days	Perm (cm/sec)
0397-017A	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	12.5 / 2 / 2	150* (113.6**)	28	5.5E-07
0397-026	TP-02	Portland Cement / Bentonite	8 / 2	150	28	2.6E -07
0397-027	TP-02	NewCem Slag Cement / Portland Cement / Bentonite	6 / 2 / 2	150	28	3.3E-07
0397-028	TP-02	NewCem Slag Cement / Bentonite / Caustic Soda	8 / 2 / 0.5	175	28	1.9E-07

*The water addition rate was calculated based only on the quantity of slag cement utilized.
**The water addition rate was calculated on the total weight of the reagents utilized.

Review of the permeability data presented in Table 9 shows relatively similar results for the treated materials tested.

After review of the physical data collected from testing performed on the Optimized

mixture designs, KEMRON submitted aliquots of mixtures 017A, and 017 DUP for SPLP PAHs and TPHs analyses, at the request of URS. The results of these tests are presented in Table 10. The following is a summary of this data.

TABLE 10 – Optimization Mixture Evaluations Summary of SPLP TPH, PAH Analyses

		0397-017A		0397-017 DUP	
TESTING PARAMETER	**UNIT**	**Results**	**Qual**	**Results**	**Qual**
SPLP PAH's					
Naphthalene	ug/L	1,800		1,700	
Acenaphthylene	ug/L	3.4		3.6	
Acenaphthene	ug/L	280		250	
Fluorene	ug/L	99	J	94	
Phenanthrene	ug/L	140		140	
Anthracene	ug/L	17		18	
Fluoranthene	ug/L	16		16	
Pyrene	ug/L	9.3		9.4	
Benz(a)anthracene	ug/L	0.43		0.43	
Chrysene	ug/L	0.35		0.38	
Benzo(b)fluoranthene	ug/L	0.046	J	0.045	J
Benzo(k)fluoranthene	ug/L	< 0.20		< 0.20	
Benzo(a)pyrene	ug/L	< 0.20		< 0.20	
Indeno(1,2,3-cd)pyrene	ug/L	0.031	J	< 0.20	
Dibenz(a,h)anthracene	ug/L	< 0.20		< 0.20	
Benzo(g,h,i)perylene	ug/L	0.040	J	< 0.20	
2-Methylnaphthalene	ug/L	380		340	
Dibenzofuran	ug/L	97	J	95	
SPLP TPH					
DRO	ug/L	6,700		6,900	
RRO	ug/L	< 520		< 510	

As seen in the preliminary mixture designs subjected to SPLP analyses, these optimized mixtures exhibited naphthalene at the highest concentrations of the PAHs analyzed. Similarly TPHs in the diesel range were also detected at relatively high concentrations. A comparison of Mixtures 017A and 017 DUP shows almost identical results were reported.

In addition to SPLP leach analyses, candidate mixtures were selected for ANS 16.1 modified leach testing. Specifically, mixtures 017 Dup, and 026 were subjected to the 5-day ANS 16.1 test with only the 5-Day leachate being analyzed. Mixtures 017A, and 028 were also subjected to the 5-Day ANS 16.1 test with all leaching intervals being analyzed.

The following is a presentation of Table 11 which summarizes the results of analyses performed on the 5-day ANS leachates from testing of the optimized candidate mixtures 017 DUP and 026;

TABLE 11 – Optimization Mixture Evaluations Day 5 ANS 16.1 Leach Results

TESTING PARAMETER	SAMPLE 0397-017 DUP	SAMPLE 0397-026
	5-DAY	5-DAY
	RESULTS (ug/L)	RESULTS (ug/L)
TPH		
Diesel Range Organics (DRO)	500	1,300
Residual Range Organics (RRO)	< 550	< 560
PAH's		
Naphthalene	81 D	170
2-Methylnaphthalene	15 D	0.54
Acenaphthylene	0.20	21
Acenaphthene	15 D	16
Dibenzofuran	8.2 D	44
Fluorene	9.3 D	5.7
Phenanthrene	15 D	11
Anthracene	1.6	5.9
Fluoranthene	2.1	0.56
Pyrene	1.3	0.47
Benz(a)anthracene	0.830	0.085
Chrysene	0.0700	< 0.039
Benzo(b)fluoranthene	0.0120	< 0.039
Benzo(k)fluoranthene	0.0036 J	< 0.039
Benzo(a)pyrene	0.0055	< 0.039
Indeno(1,2,3-cd)pyrene	0.0086 J	< 0.039
Dibenz(a,h)anthracene	< 0.0037	30
Benzo(g,h,i)perylene	0.0076 J	15

Review of the results show that mixture 017 DUP generally exhibited lower contaminant concentrations in the Day 5 ANS 16.1 leachate than mixture 026. This is most prevalent in the DRO TPH analyses.

Mixture 017A was also subjected to a 5-day ANS 16.1 leach test, however each of the ANS leachates were analyzed for the constituents of concern. The results of analyses are presented in Table 12 which is summarized below;

Table 12 – Optimization Mixture 017A Complete 5-Day ANS 16.1 Leach Results

Testing Parameter	SAMPLE 0397-017A						
	2-Hour	7-Hour	24-Hour	2-DAY	3-DAY	4-DAY	5-DAY
	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
TPH							
DRO	390 Z	710 Z	1,600 Z	1,600 Z	1,100 Z	1,100 Z	570 Z
RRO	35 J	33 J	53 J	56 J	< 540	< 540	< 570
PAH's							
Naphthalene	71 D	130 D	340 D	310 D	270 D	310 D	100 D
2-Methylnaphthalene	13 D	22 D	57 D	55 D	48 D	56 D	17 D
Acenaphthylene	0.16	0.22	0.40	0.37	0.57 D	0.63 D	0.23
Acenaphthene	12 D	16 D	41 D	38 D	36 D	42 D	16 D
Dibenzofuran	6.5 D	8.4 D	21 D	20 D	17 D	19 D	9.2 D
Fluorene	8.2 D	10 D	25 D	23 D	20 D	22 D	11 D
Phenanthrene	13 D	12 D	28 D	28 D	29 D	31 D	18 D
Anthracene	1.7	1.5	4.3 D	4.2 D	3.8 D	4.1 D	2.00
Fluoranthene	2.7 D	1.8	4.1 D	4.2 D	4.5 D	4.7 D	3.5 D
Pyrene	1.6	1.0	2 D	2.2 D	2.6 D	2.8 D	1.7
Benz(a)anthracene	0.13	0.10	0.18	0.180	0.15 D	0.17 D	0.11
Chrysene	0.064	0.055	0.085	0.080	0.087 D	0.1 D	0.088
Benzo(b)fluoranthene	0.011	0.019	0.023	0.018	0.018 J,D	0.026 J,D	0.015
Benzo(k)fluoranthene	0.0034 J	0.0079	0.0078	0.0048	0.0065 J,D	0.0083 J,D	0.0047
Benzo(a)pyrene	0.0066	0.013	0.013	0.0098	0.0081 J,D	0.012 J,D	0.008
Indeno(1,2,3-cd)pyrene	0.00078 J	0.0036 J	0.003 J	0.0017 J	< 0.040	< 0.039	0.0013 J
Dibenz(a,h)anthracene	< 0.00047	0.0011 J	0.0012 J	0.00063 J	< 0.040	< 0.039	0.00053 J
Benzo(g,h,i)perylene	0.00068 J	0.0029 J	0.0026 J	0.0014 J	< 0.040	< 0.039	0.001 J

The results of ANS 16.1 leach testing performed on the 017A material show that TPH DRO concentrations remained relatively high at the 5-day leaching period. However, the general trend of the results indicated a reduction in DRO concentrations from earlier leaching intervals. Additionally, Naphthalene was the compound detected at the highest concentration in the PAH analyses. Naphthalene also showed a decrease in concentration at the 5-day interval compared to earlier samples.

The results of ANS 16.1 testing performed on the 028 sample are presented in Table 13 and are summarized below. Review of this data indicates relatively similar results to the 017A material. At the 5-day leaching interval the concentration of DROs was slightly higher than that seen in the 017A sample, as were certain PAH compounds.

Table 13 – Optimization Mixture Evaluations 028 Complete 5-Day ANS 16.1 Leach Results

Testing Parameter	SAMPLE 0397-028						
	2-Hour	7-Hour	24-Hour	2-DAY	3-DAY	4-DAY	5-DAY
	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)	Results (ug/L)
TPH							
DRO	520 Z	570 Z	930 Z	910 Z	920 Z	1,000 Z	860 Z
RRO	< 540	< 550	< 500	< 550	< 610	< 610	< 580
PAH's							
Naphthalene	30 D	64 D	170 D	120 D	140 D	120 D	100 D
2-Methylnaphthalene	61 D	12 D	34 D	23 D	29 D	26 D	22 D
Acenaphthylene	0.12	0.19	0.41	0.30	0.44 D	0.390 D	0.34 D
Acenaphthene	6.0 D	11 D	29 D	20 D	24 D	19 D	17 D
Dibenzofuran	4.1 D	6.6 D	19 D	14 D	14 D	12 D	11 D
Fluorene	4.6 D	8.3 D	22 D	16 D	16 D	14 D	13 D
Phenanthrene	7.2 D	13 D	42 D	35 D	41 D	35 D	31 D
Anthracene	0.980 D	1.4	5.6 D	5.4 D	5.3 D	4.7 D	4.4 D
Fluoranthene	1.0	1.7	6.9 D	7.0 D	8.2 D	7.3 D	7.7 D
Pyrene	0.660	1.1	4.3 D	4.3 D	4.8 D	4.2 D	4.5 D
Benz(a)anthracene	0.094	0.12	0.33	0.350	0.390 D	0.330 D	0.380 D
Chrysene	0.071	0.100	0.270	0.270	0.390 D	0.320 D	0.380 D
Benzo(b)fluoranthene	0.027	0.030	0.068	0.052	0.0065 D	0.048 D	0.058 D
Benzo(k)fluoranthene	0.012	0.0110	0.0230	0.0160	0.0026 JD	0.022 JD	0.025 JD
Benzo(a)pyrene	0.019	0.017	0.034	0.0240	0.0034 D	0.023 JD	0.029 JD
Indeno(1,2,3-cd)pyrene	0.0057	0.0045	0.0095	0.0047	0.0020 JD	0.0096 JD	0.0081 JD
Dibenz(a,h)anthracene	0.0015 J	0.0013 J	0.0025 J	0.0012 J	0.0011 JD	0.0059 JD	< 0.0045
Benzo(g,h,i)perylene	0.0052	0.0041	0.0074	0.0032 J	0.0023 JD	0.0097JD	0.0088 JD

Notes:
MDL = Method Detection Limit
MRL = Method Reporting Limit
PAH's = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
ug/L = micrograms per liter
ND = Not Detected
D = The reported result is from a dilution.
J = The result is an estimated value.
Z = The chromatographic fingerprint does not resemble a petroleum product.

Following the review of all test data, URS requested that additional testing be performed on the 028 treated materials. Specifically, KEMRON performed wipe sampling as well

as leachability testing in accordance with the SPLP and Toxicity Characteristic Leaching Procedure (TCLP) for PAHs and THPs Diesel and Oil Range Organics.

Wipe sampling was performed on a 100 cubic centimeter area of the solidified sample 0397-028. KEMRON used one single wipe across the sample using the subcontract analytical laboratory (CAS) wipe.

The results of the wipe, TCLP and SPLP analyses performed on the treated 028 material are presented in Table 14. The following is a summary of the data found in Table 14

Table 14 – Optimization Mixture 028 Summary of Additional Analyses

TESTING PARAMETER	0397-028							
	WIPE Results (ug/Wipe)	Qual	Total Results (mg/kg)	Qual	TCLP Results (ug/L)	Qual	SPLP Results (ug/L)	Qual
PAHs								
Naphthalene	0.48	J	150,000	J	5,100	J	5,400	J
Acenaphthylene	0.010		1,300	J	8.4	J	9.0	J
Acenaphthene	0.26	J	91,000	J	420	J	440	J
Fluorene	0.28		86,000	J	230	J	250	J
Phenanthrene	1.1		250,000	J	260	J	270	J
Anthracene	0.21		48,000	J	31	J	36	J
Fluoranthene	0.62		110,000	J	22	J	24	J
Pyrene	0.44		74,000	J	13	J	13	J
Benz(a)anthracene	0.13		17,000	J	0.58	J	0.71	J
Chrysene	0.12		19,000	J	0.48	J	0.46	J
Benzo(b)fluoranthene	0.085		9,600	J	0.063	J	0.049	J
Benzo(k)fluoranthene	0.033		3,600	J	0.034	J	0.028	J
Benzo(a)pyrene	0.090	J	6,100	J	0.22	U	0.21	U
Indeno(1,2,3-cd)pyrene	0.024		2,000	J	0.22	U	0.21	U
Dibenz(a,h)anthracene	0.0065		510	J	0.22	U	0.21	U
Benzo(g,h,i)perylene	0.022		1,600	J	0.22	U	0.21	U
2-Methylnaphthalene	0.18	J	84,000	J	750	J	790	J
Dibenzofuran	0.20		67,000	J	260	J	290	J
TPHs								
Diesel Range Organics (DRO)	500	U	4,300	J	15,000	J	17,000	J
Residual Range Organics (RRO)	560	J	1,000	J	540	U	920	J

4.0 CONCLUSIONS

A tremendous amount of data was generated throughout the course of the Longview Woodtreater Site Study. Review of the results of testing indicated that for the TP-01 material, meeting the project objectives of a material exhibiting a treated strength ranging from 50 to 200 psi, a permeability slower than 1x10-6 cm/sec, and having leachable concentrations of contaminants below the Model Toxics Control Act (MTCA) Cleanup Regulations may be easily achieved with the use of Type I Portland cement alone. Results of physical testing performed on the TP-01 material show that the application of PC at an addition rate of 7.5% yielded a treated material with a UCS strength of approximately 70 psi in only 9 days of curing. Note that no analytical testing were performed on the treated TP-01 materials, however review of the untreated characterization testing indicate that very little contaminant leaching was observed in the TP-01 sample.

The evaluation of the TP-02 material was the primary focus of the treatability study. Mixture designs were developed to produce a treated material with a limited strength gain in order to maintain a material that would be easily workable in post-treatment activities in the field, while reducing moderately high concentrations of leachable contaminants to below groundwater treatment standards. Detailed testing was performed on three mixture designs including mixture 016 which was developed using NewCem Slag Cement at a 12.5% addition rate, sodium bentonite at a 2% addition, and CETCO Organoclay SS199 at a 0.5% addition, versions of mixture 017 containing NewCem Slag Cement at a 12.5% addition, sodium bentonite at a 2% addition, and CETCO Organoclay SS199 at a 2% addition, and mixture 028 which contained an 8% addition of NewCem Slag cement, 2% sodium bentonite, and 0.5% caustic soda. In all three mixtures the bentonite was first hydrated with water for approximately 16 hours prior to mixing with the other additives. Mixture 016 had a 150% water addition, mixture 017 utilized between 113 and 150% water addition based on the total weight of the reagents utilized, and mixture 028 had a water addition rate of 175%.

A review of testing performed on mixture 016 showed that the treated sample exhibited a maximum UCS value of 321 psi after 67 days of testing and a permeability of 3.2 x 10-8 cm/sec.

Mixture 017 or versions of mixture 017 were evaluated in both the preliminary and optimization phase of testing. Review of the results of testing performed on the 017 based materials indicate that this treated material achieved significant strength gain at the 28 day cure interval, approximately 180 psi. Testing conducted on the 017 mixture developed during the preliminary phase of testing indicated that continued strength gain should be expected with longer cure times. Specifically, this material achieved a UCS value of approximately 443 psi at the 101 day cure interval. Permeability testing was performed on the initial 017 mixture which resulted in a value of 3.0×10^{-8} cm/sec at the 67 day cure interval. Permeability testing on mixture 017A, which was developed using the design preparation suggested by CETCO was modified from the original procedure in that the water addition rate of 150% was based only on the slag addition

rate. This converts to a water addition rate of 113.6% based on the total weight of the complete reagent combination. At a 28 day cure period mixture 017A achieved a permeability value of 5.5 $x10^{-7}$ cm/sec. The differences in the permeability results shown in mixtures 017 and 017A is likely due to the extended curing interval prior to testing of the 017 test material. Analytical testing performed on mixtures, 017, 017A, and 017 DUP appear relatively similar indicating a reproducible treatment application.

Mixture 028 also underwent significant testing during the study. Mixture 028 achieved a UCS result of approximately 383 psi with extended curing and a permeability in the 10-7 cm/sec range. Mixtures 016, 017 and 028 indicated relatively low concentrations of PAHs in the ANS 16.1 leachate, however, mixture 017 exhibited the lowest ANS 16.1 leachable contaminant concentrations at the 5-day leaching interval.

Of the three mixtures which underwent extensive testing during this study, all three of the treated materials exhibited relative high UCS values, and permeability values of 1.9 x 10^{-7} cm/sec or slower. The UCS values indicate continued curing over time when slag cement was utilized.

The volume increase due to the treatment processes indicate that of the three candidate mixtures, sample 028 exhibited the lowest volume expansion. This is due to the fact that this material contained the lowest reagent addition rate. While no volumetric expansion testing was performed on mixture 016, it is anticipated that this material would exhibit a slightly lower increase than mixture 017 due to the slightly lower amount of organoclay utilized in mixture 016. Of the three mixtures prepared based on sample 017, the 017A sample exhibited a lower volume increase than the 017DUP material. This is due to the difference in actual water addition utilized in mixture 017A.

Review of the TCLP and SPLP test results performed on mixture 028 show significantly higher leachable contaminant concentrations than were seen in the ANS 16.1 testing. This is likely due to the fact that the TCLP and SPLP methods require crushing of the treated material in order to reduce the size of the test specimen to less than 0.5 inches in diameter. Additionally, during the TCLP and SPLP testing the treated materials are actively tumbled in the presence of the appropriate acidic leaching fluid.

KEMRON understands the TP-02 material represented a highly impacted site material which comprises a minority of the material anticipated in the field. While no single mixture achieved all of the site goals for the study, KEMRON believes that the application of mixture 016, 017 or 028 may likely be sufficient at segregating the contaminated area from uncontaminated soils at the site, and limiting the release of contaminated groundwater from the treated site. At this time KEMRON would recommend a small pilot scale test application with corresponding sample confirmation testing to evaluate the reduction of leachable contaminant migration from the impacted area.

TABLES

URS CORPORATION
LONGVIEW TREATABILITY STUDY
KEMRON PROJECT No: SE-0397

TABLE 1

UNTREATED PHYSICAL PROPERTIES TESTING

TESTING PARAMETER	TEST METHOD	UNIT	TP-01 (2-7.5) RESULTS	TP-02 RESULTS
Moisture Content	ASTM D2216			
ASTM Moisture Content		%	31.85	24.72
Percent Solids		%	75.85	80.18
Loss on Ignition	ASTM D2974	%	1.93	1.16
Particle Size Distribution	ASTM D422/D854			
Gravel		%	1.0	0.0
Sand		%	76.5	91.0
Silt		%	21.3	8.3
Clay		%	1.2	0.3
Sample Description	USCS (D2487)		Dark grey silty sand	V. Dk Grey poorly graded sand with silt
Sample Classification	USCS (D2487)		SM	SP-SM

Notes
% = Percent
Sample descriptions based on the Unified Classification System. Where atterberg limits were not tested, the description is based on an assumed PI < 4.
Sample color determined by the Munsell Soil Color Charts.

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LONGVIEW SOLIDIFICATION
KEMRON PROJECT No: SE0397
TABLE # 2
UNTREATED MATERIAL ANALYTICAL RESULTS

		TP-01				TP-02			
TESTING PARAMETER	**UNIT**	**RESULTS**	**QUAL**	**MRL**	**MDL**	**RESULTS**	**QUAL**	**MRL**	**MDL**
Total PAH's									
Naphthalene	ug/kg dry	140		3.3	0.60	420,000	D	2,600	310
2-Methylnaphthalene	ug/kg dry	92		3.3	0.46	140,000	D	2,600	240
Acenaphthylene	ug/kg dry	11		3.3	0.59	1,800	D	130	16
Acenaphthene	ug/kg dry	220		3.3	0.76	110,000	D	2,600	400
Fluorene	ug/kg dry	84		3.3	0.61	97,000	D	2,600	320
Dibenzofuran	ug/kg dry	110		3.3	0.63	73,000	D	2,600	330
Phenanthrene	ug/kg dry	100		3.3	1.4	260,000	D	2,600	720
Anthracene	ug/kg dry	39		3.3	0.58	49,000	D	2,600	300
Fluoranthene	ug/kg dry	100		3.3	0.98	130,000	D	2,600	510
Pyrene	ug/kg dry	80		3.3	0.76	74,000	D	2,600	400
Benzo(b)fluoranthene	ug/kg dry	290		3.3	0.92	9,300	D	130	24
Benzo(k)fluoranthene	ug/kg dry	49		3.3	0.87	3,300	D	130	23
Benz(a)anthracene	ug/kg dry	29		3.3	0.72	20,000	D	130	19
Chrysene	ug/kg dry	59		3.3	0.80	17,000	D	130	21
Benzo(a)pyrene	ug/kg dry	300		3.3	0.76	5,500	D	130	20
Indeno(1,2,3-cd)pyrene	ug/kg dry	300		3.3	0.87	1,700	D	130	23
Dibenz(a,h)anthracene	ug/kg dry	40		3.3	0.80	410	D	130	21
Benzo(g,h,i)perylene	ug/kg dry	260		3.3	0.85	1,400	D	130	22
SPLP PAH's									
Naphthalene	ug/L	0.49		0.20		12,000	D	40	
2-Methylnaphthalene	ug/L	ND	U	0.20		1,200	D	40	
Acenaphthylene	ug/L	ND	U	0.20		12		0.20	
Acenaphthene	ug/L	1.3		0.20		540	D	2.0	
Fluorene	ug/L	0.50		0.20		320	D	2.0	
Dibenzofuran	ug/L	0.39		0.20		300	D	2.0	
Phenanthrene	ug/L	0.21		0.20		360	D	2.0	
Anthracene	ug/L	ND	U	0.20		51		0.20	
Fluoranthene	ug/L	ND	U	0.20		73		0.20	
Pyrene	ug/L	ND	U	0.20		42		0.20	
Benzo(b)fluoranthene	ug/L	ND	U	0.20		7.9		0.20	
Benzo(k)fluoranthene	ug/L	ND	U	0.20		7.1		0.20	
Benz(a)anthracene	ug/L	ND	U	0.20		3.3		0.20	
Chrysene	ug/L	ND	U	0.20		1.0		0.20	
Benzo(a)pyrene	ug/L	ND	U	0.20		1.8		0.20	
Indeno(1,2,3-cd)pyrene	ug/L	ND	U	0.20		0.38		0.20	
Dibenz(a,h)anthracene	ug/L	ND	U	0.20		ND	U	0.20	
Benzo(g,h,i)perylene	ug/L	ND	U	0.20		0.36		0.20	
TOTAL TPH									
Diesel Range Organics (DRO)	mg/kg dry	42		33	1.6	8,500	DZ	640	31
Residual Range Organics (RRO)	mg/kg dry	120	J	140	3.8	1,600	JD	2,600	75
SPLP TPH									
Diesel Range Organics (DRO)	ug/L	ND	U	280	280	26,000	Z	280	280
Residual Range Organics (RRO)	ug/L	ND	U	560	560	ND	U	560	560

Notes:
MRL = Method Reporting Limit
MDL = Method Detection Limit
PAH's = Polynuclear Aromatic Hydrocarbons
SPLP = Synthetic Precipitation Leaching Procedure
TPH = Total Petroleum Hydrocarbons
ug/kg = micrograms per kilogram
ug/L = micrograms per liter
mg/kg = milligrams per kilogram
ND = Not detected
QUAL = Qualifier
D = The reported result is from a dilution
J = The result is an estimated value.
U = The analyte was analyzed for, but was not detected at or above the MRL/MDL.
Z = The chromatographic fingerprint does not resemble a petroleum product.

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LONGVIEW WOOD TREATING SITE
KEMRON PROJECT # SE-0397

TABLE 3

PRELIMINARY STABILIZATION EVALUATIONS
Mixture Designs and Penetrometer Testing

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent ID			Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.	Penetrometer Testing (tons/ft^2) 1 Day	3 Day	5 Day	7 Day	14 Day
0397-001	TP-01	Portland Cement	842	-	-	7.5	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-002	TP-01	Portland Cement	842	-	-	12.5	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-003	TP-01	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	3.5	4.5	>4.5	>4.5	>4.5
0397-004	TP-01	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	77	1.5	3.25	3.75	3.75	3.75
0397-005	TP-01	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	12.5 / 2 / 0.5	150	>4.5	>4.5	>4.5	>4.5	>4.5
0397-006	TP-01	Portland Cement / Class "C" Flyash	842	921	-	7.5 / 7.5	50	3.75	>4.5	>4.5	>4.5	>4.5
0397-007	TP-01	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	0.0	0.0	0.0	0.0	0.25
0397-008	TP-01	50:50 TerraCem	916	-	-	12.5	50	4.25	>4.5	>4.5	>4.5	>4.5
0397-009	TP-01	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	1.25	3.50	4.25	>4.5	>4.5
0397-010	TP-02	Portland Cement	842	-	-	12.5	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-011	TP-02	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	3.25	>4.5	>4.5	>4.5	>4.5
0397-012	TP-02	Portland Cement / Bentonite	842	807	-	17.5 / 2	125	>4.5	>4.5	>4.5	>4.5	>4.5
0397-013	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	75	3.25	>4.5	>4.5	>4.5	>4.5
0397-014	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 12.5	75	1.25	2.5	3.0	3.75	4.25
0397-015	TP-02	Portland Cement / Hydrated Lime	842	917	-	10 / 12.5	75	2.5	3.75	>4.5	>4.5	>4.5
0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 0.5	150	0.0	0.0	2.5	4.25	>4.5
0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	0.0	0.0	1.25	3.0	>4.5
0397-018	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	17.5 / 2 / 0.5	150	0.5	3.75	>4.5	>4.5	>4.5
0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	10 / 2 / 0.5	150	3.25	4.5	>4.5	>4.5	>4.5
0397-020	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	15 / 2 / 0.5	150	3.25	>4.5	>4.5	>4.5	>4.5
0397-021	TP-02	Portland Cement / Class "C" Flyash	842	921	-	10 / 10	50	>4.5	>4.5	>4.5	>4.5	>4.5
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	920	921	-	10 / 10	50	1.0	1.75	3.25	3.75	3.75
0397-023	TP-02	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	0.0	3.25	4.5	>4.5	>4.5
0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	916	807	922	15 / 2 / 0.5	135	2.75	3.25	4.25	>4.5	>4.5
0397-025	TP-02	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	1.25	2.5	4.0	4.5	>4.5

Notes:
* Mixes 003, 005, 007, 009, 011, 012, 016, 017, 018, 019, 020, 023, 024, and 025 were subjected to an initial bentonite slurry where water was added to bentonite and allowed to hydrate under continuous stirring overnight. The additional reagents were added the next day to the hydrated bentonite with the water additions to make a pumpable slurry.

KEMRON ENVIRONMENTAL SERVICES

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LONGVIEW WOOD TREATING SITE
KEMRON PROJECT # SE-0397

TABLE 4

PRELIMINARY STABILIZATION EVALUATIONS
Mixture Designs and UCS Testing

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent ID			Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.	Cure Days	Unconfined Compressive Strength (tons/ft^2) Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)
0397-001	TP-01	Portland Cement	842	-	-	7.5	50	9	32.7	111.6	84.1	69.2
0397-002	TP-01	Portland Cement	842	-	-	12.5	50	9	31.7	114.4	86.9	169.3
0397-003	TP-01	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	8	47.4	107.9	73.2	44.9
0397-004	TP-01	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	77	9	39.3	111.5	80.0	27.1
0397-005	TP-01	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	12.5 / 2 / 0.5	150	8	44.4	108.6	75.2	70.3
0397-006	TP-01	Portland Cement / Class "C" Flyash	842	921	-	7.5 / 7.5	50	8	32.3	117.3	88.7	64.5
0397-007	TP-01	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	NT	NT	NT	NT	NT
0397-008	TP-01	50:50 TerraCem	916	-	-	12.5	50	9	34.2	113.8	84.8	58.7
0397-009	TP-01	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	8	48.8	105.6	71.0	29.4
0397-010	TP-02	Portland Cement	842	-	-	12.5	50	9	24.1	127.1	102.4	285.0
								69	23.2	122.8	99.7	306.2
0397-011	TP-02	Portland Cement / Bentonite	842	807	-	12.5 / 2	150	8	39.1	110.7	79.6	47.6
0397-012	TP-02	Portland Cement / Bentonite	842	807	-	17.5 / 2	125	8	41.4	108.8	77.0	78.1
0397-013	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 7.5	75	9	30.8	115.1	88.0	32.4
0397-014	TP-02	Portland Cement / Hydrated Lime	842	917	-	7.5 / 12.5	75	9	34.2	110.6	82.4	14.9
0397-015	TP-02	Portland Cement / Hydrated Lime	842	917	-	10 / 12.5	75	9	34.3	110.8	82.5	31.9
0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 0.5	150	8	44.5	108.7	75.2	36.4
								67	38.7	91.7	66.1	321.5
0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	8	42.5	107.7	75.6	31.7
								67	41.3	106.6	75.5	326.0
								101	38.3	106.1	76.7	443.7
0397-018	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	17.5 / 2 / 0.5	150	8	42.7	109.0	76.4	76.6
0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	10 / 2 / 0.5	150.0	8	40.3	109.1	77.8	35.2
								67	38.5	100.9	72.8	57.9
0397-020	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	15 / 2 / 0.5	150.0	8	43.1	106.1	74.2	60.8
0397-021	TP-02	Portland Cement / Class "C" Flyash	842	921	-	10 / 10	50.0	8	24.9	121.0	96.9	143.6
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	920	921	-	10 / 10	50.0	8	29.6	118.4	91.3	15.2
0397-022	TP-02	NewCem Slag Cement / Class "C" Flyash	920	921	-	10 / 10	50.0	17	30.0	122.0	93.8	14.1
0397-023	TP-02	NewCem Slag Cement / Bentonite	920	807	-	15 / 2	132	8	41.1	107.9	76.5	61.3
0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	916	807	922	15 / 2 / 0.5	135	8	38.4	108.6	78.5	37.7
								67	36.6	105.4	77.2	87.7
0397-025	TP-02	50:50 TerraCem / Bentonite	916	807	-	15 / 2	135	8	39.4	110.7	79.4	32.4

Notes:
NT = Not Tested
* Mixes 008, 009, 017, and 018 were subjected to an initial bentonite slurry where water was added to bentonite and allowed to hydrate under continuous stirring overnight. The additional reagents were added the next day to the hydrated bentonite with the water additions to make a pumpable slurry.

URS

LONGVIEW WOOD TREATING SITE
KEMRON PROJECT # SE-0397

TABLE 5

PRELIMINARY STABILIZATION EVALUATIONS
MIXTURE DESIGNS AND PERMEABILITY RESULTS

KEMRON SAMPLE No.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent ID			Reagent Addition % by wet soil wt.	Water Addition % by Reagent wt.	Cure Days	Permeability (k) (cm/sec) Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	Perm (cm/sec)
0397-010	TP-02	Portland Cement	842	-	-	12.5	50	69	25.2	123.9	98.9	**7.1E-07**
*0397-016	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 0.5	150	67	39.3	110.2	79.1	**3.2E-08**
*0397-017	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	67	42.6	105.4	73.9	**3.0E-08**
*0397-019	TP-02	Portland Cement / Bentonite / Organoclay SS 199	842	807	922	10 / 2 / 0.5	150	67	40.2	108.9	77.7	**7.4E-07**
*0397-024	TP-02	50:50 TerraCem / Bentonite / Organoclay SS 199	916	807	922	15 / 2 / 0.5	135	67	38.7	106.6	76.9	**3.0E-07**

Notes:

* Mixes 016, 017, 019, and 024 were subjected to an initial bentonite slurry where water was added to bentonite and allowed to hydrate under continuous stirring overnight. The additional reagents were added the next day to the hydrated bentonite with the water additions to make a pumpable slurry.

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TABLE 6

PRELIMINARY MIXTURE DESIGNS
Summary of SPLP PAH and TPH Results

		0397-010		0397-011		0397-013		0397-016		0397-017		0397-019		0397-021		0397-022		0397-023		0397-024		0397-025	
TESTING PARAMETER	**UNIT**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**
SPLP PAH's																							
Naphthalene	ug/L	7,500		7,400		7,700		6,800		4,400		6,400		7,000		7,900		7,300		6,500		9,400	
Acenaphthylene	ug/L	9.5		9.1		8.5		7.3		3.6		7.1		8.6		8.7		8.7		7.2		8.1	
Acenaphthene	ug/L	420		430		380		400		260		380		420		380		390		400		380	
Fluorene	ug/L	240		240		210		210		92		180		230		210		190		220		210	
Phenanthrene	ug/L	240		250		210		210		15		210		240		220		210		220		210	
Anthracene	ug/L	35		33		29		30		12		30		31		30		34		28		31	
Fluoranthene	ug/L	22		20		19		22		6.6		20		19		20		23		22		18	
Pyrene	ug/L	11		10		9.1		11		0.30		10		9.2		9.3		11		11		8.2	
Benz(a)anthracene	ug/L	0.42		0.57		0.36		0.47		0.23		0.40		0.32		0.35		0.41		0.41		0.29	
Chrysene	ug/L	0.40		0.28		0.31		0.38		0.026	J	0.35		0.32		0.34		0.40		0.40		0.29	
Benzo(b)fluoranthene	ug/L	0.20	U	0.046	J	0.037	J	0.062	J	0.20	U	0.030	J	0.20	U	0.030	J	0.034	J	0.044	J	0.024	J
Benzo(k)fluoranthene	ug/L	0.20	U	0.20	U	0.20	U	0.037	J	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Benzo(a)pyrene	ug/L	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Indeno(1,2,3-cd)pyrene	ug/L	0.20	U	0.20	U	0.20	U	0.031	J	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Dibenz(a,h)anthracene	ug/L	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Benzo(g,h,i)perylene	ug/L	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
2-Methylnaphthalene	ug/L	840		890		820		780		460		740		860		770		760		860		800	
Dibenzofuran	ug/L	270		270		240		230		98		210		260		240		220		250		240	
SPLP TPH																							
Diesel Range Organics (DRO)	ug/L	19,000		20,000		20,000		18,000		11,000		17,000		19,000		20,000		18,000		18,000		23,000	
Residual Range Organics (RRO)	ug/L	550	U	570		610		500	U	500	U	500	U	510		660		540		500	U	580	

Notes:
PAH's = Polynuclear Aromatic Hydrocarbons
SPLP = Synthetic Precipitation Leaching Procedure
TPH = Total Petroleum Hydrocarbons

ug/L = micrograms per liter

QUAL = Qualifier
J = The result is an estimated value.
U = The analyte was analyzed for, but was not detected at or above the outlined value.

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TABLE 7

SUMMARY OF ANS 16.1 LEACHABILITY RESULTS

TESTING PARAMETER	SAMPLE 0397-016		
	5-DAY		
	RESULTS (ug/L)	MRL	MDL
TPH			
Diesel Range Organics (DRO)	**500 Z**	260	-
Residual Range Organics (RRO)	< 520	520	-
PAH's			
Naphthalene	100 D	1800	370
2-Methylnaphthalene	780 D	89.0	11.0
Acenaphthylene	0.13	4.50	0.490
Acenaphthene	10 D	89.0	9.40
Dibenzofuran	6.7 D	89.0	11.0
Fluorene	6.8 D	89.0	11.0
Phenanthrene	17 D	89.0	19.0
Anthracene	1.7	4.50	0.380
Fluoranthene	4 D	89.0	12.0
Pyrene	1.7	4.50	1.10
Benz(a)anthracene	0.1	4.50	0.450
Chrysene	0.1	4.50	0.850
Benzo(b)fluoranthene	0.013	4.50	0.330
Benzo(k)fluoranthene	0.004 J	4.50	0.540
Benzo(a)pyrene	0.0062	4.50	0.540
Indeno(1,2,3-cd)pyrene	0.0015 J	4.50	0.580
Dibenz(a,h)anthracene	0.00086 J	4.50	0.590
Benzo(g,h,i)perylene	0.0019 J	4.50	0.470

Notes:
MRL = Method Reporting Limit
MDL = Method Detection Limit
PAH's = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
ug/L = micrograms per liter
D = The reported result is from a dilution.
J = The result is an estimated value.
Z = The chromatographic fingerprint does not resemble a petroleum product.

URS CORPORATION
LONGVIEW SOLIDIFICATION
KEMRON PROJECT No: SE0397
TABLE # 8
SUMMARY OF ANS 16.1 LEACHABILITY RESULTS

	SAMPLE 0397-017																				
	2-HOUR			7-HOUR			24-HOUR			2-DAY			3-DAY			4-DAY			5-DAY		
TESTING PARAMETER	RESULTS (ug/L)	MRL	MDL	RESULTS (ug/L)	MRL	MDL	RESULTS (ug/L)	MRL	MDL	RESULTS (ug/L)	MRL	MDL	RESULTS (ug/L)	MRL	MDL	RESULTS (ug/L)	MRL	MDL	RESULTS (ug/L)	MRL	MDL
TPH																					
Diesel Range Organics (DRO)	ND	260		ND	300		500 Z	290		550 Z	280	12	600 Z	280	12	660 Z	270	12.00	420 Z	280	
Residual Range Organics (RRO)	ND	520		ND	600		ND	570		75 J	550	21	53 J	550	21	55 J	530	20.00	ND	560	
PAH's																					
Naphthalene	7 D	0.036	0.0074	23 D	0.068	0.015	84 D	0.180	0.037	110 D	0.44	0.065	150 D	0.46	0.069	140 D	0.42	0.062	68 D	0.43	0.064
2-Methylnaphthalene	0.890	0.0036	0.00042	3.1 D	0.068	0.008	11 D	0.180	0.021	13 D	0.44	0.050	19 D	0.46	0.053	19 D	0.42	0.048	8.9	0.022	0.0025
Acenaphthylene	0.040	0.0036	0.00039	0.057	0.0034	0.00037	0.130	0.004	0.00039	0.19	0.022	0.0037	0.23	0.023	0.0039	0.22	0.021	0.0036	0.13	0.022	0.0037
Acenaphthene	1.200	0.0036	0.00038	3.1 D	0.068	0.0072	8.9 D	0.180	0.019	11 D	0.44	0.095	15 D	0.46	0.10	14 D	0.42	0.091	8.3	0.022	0.0047
Dibenzofuran	0.840	0.0036	0.00044	1.7	0.0034	0.00042	5.4 D	0.180	0.022	6.3	0.022	0.0050	8.0	0.023	0.0053	7.7	0.021	0.0048	5 D	0.43	0.098
Fluorene	0.670	0.0036	0.00044	1.3	0.0034	0.00042	3.4 D	0.180	0.022	4.6	0.022	0.0041	5.5	0.023	0.0044	5.0	0.021	0.0040	3.5	0.022	0.0041
Phenanthrene	4.20 D	0.036	0.0075	4.5 D	0.068	0.015	9.0 D	0.180	0.038	11 D	0.44	0.11	13 D	0.46	0.12	12 D	0.420	0.11	10	0.022	0.0054
Anthracene	0.590	0.0036	0.0003	0.540	0.0034	0.00029	1.1	0.0036	0.0003	1.2	0.022	0.0039	1.4	0.023	0.0041	1.2	0.021	0.0038	0.30	0.022	0.0039
Fluoranthene	2.40 D	0.036	0.0048	1.1	0.0034	0.00046	1.7	0.0036	0.00048	2.0	0.022	0.0048	2.2	0.023	0.0050	2.0	0.021	0.0046	2.1	0.022	0.0047
Pyrene	1.300	0.0036	0.00081	0.690	0.0034	0.00078	1.1	0.0036	0.00081	1.3	0.022	0.0038	1.3	0.023	0.0040	1.3	0.021	0.0037	1.1	0.022	0.0038
Benz(a)anthracene	0.390	0.0036	0.00036	0.120	0.0034	0.00034	0.140	0.0036	0.00036	0.092	0.022	0.0028	0.091	0.023	0.0030	0.079	0.021	0.0027	0.12	0.022	0.0028
Chrysene	0.360	0.0036	0.00068	0.120	0.0034	0.00065	0.120	0.0036	0.00068	0.052	0.022	0.0037	0.058	0.023	0.0039	0.056	0.021	0.0036	0.092	0.022	0.0037
Benzo(b)fluoranthene	0.200	0.0036	0.00026	0.055	0.0034	0.00025	0.052	0.0036	0.00026	0.014 J	0.022	0.0025	0.014 J	0.023	0.0027	0.015 J	0.021	0.0024	0.04 X	0.022	0.0025
Benzo(k)fluoranthene	0.078	0.0036	0.00043	0.019	0.0034	0.00041	0	0.0036	0.00043	0.006 J	0.022	0.0027	0.0048 J	0.023	0.0029	0.0055 J	0.021	0.0026	ND X	0.022	0.0027
Benzo(a)pyrene	0.100	0.0036	0.00043	0.031	0.0034	0.00041	0	0.0036	0.00043	0.0062 J	0.022	0.0047	0.0069 J	0.023	0.0049	0.0066 J	0.021	0.0045	0.012 J	0.022	0.0046
Indeno(1,2,3-cd)pyrene	0.050	0.0036	0.00046	0.010	0.0034	0.00044	0	0.0036	0.00046	0.0045 J	0.022	0.0028	ND	0.023	0.0030	ND	0.021	0.0027	0.0088 J	0.022	0.0028
Dibenz(a,h)anthracene	0.021	0.0036	0.00047	0.0034	0.0034	0.00045	0.0032 J	0.0036	0.00047	ND	0.022	0.0027	ND	0.023	0.0029	ND	0.021	0.0026	ND	0.022	0.0027
Benzo(g,h,i)perylene	0.041	0.0036	0.00038	0.0088	0.0034	0.00036	0.009	0.0036	0.00038	0.0066 J	0.022	0.0032	ND	0.023	0.0033	ND	0.021	0.0030	0.0065 J	0.022	0.0031

Notes:
MRL = Method Reporting Limit
MDL = Method Detection Limit
PAH's = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
ug/L = micrograms per liter
ND = Not Detected
D = The reported result is from a dilution.
J = The result is an estimated value.
U = The analyte was analyzed for, but was not detected at or above the MRL/MDL.
X = See case narrative.
Z = The chromatographic fingerprint does not resemble a petroleum product.

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TABLE 8A
28-DAY TREATED MATERIAL ANALYTICAL RESULTS

		0397-017A			0397-017 DUP		
TESTING PARAMETER	**UNIT**	**RESULTS**	**QUAL**	**MDL**	**RESULTS**	**QUAL**	**MDL**
SPLP PAH's							
Naphthalene	ug/L	1800	D	0.6	1,700	D	0.6
2-Methylnaphthalene	ug/L	380	D	0.46	340	D	0.46
Acenaphthylene	ug/L	3.4		0.034	4		0.034
Acenaphthene	ug/L	280	D	0.88	250	D	0.88
Dibenzofuran	ug/L	97.00		0.046	95		0.046
Fluorene	ug/L	99		0.038	94		0.038
Phenanthrene	ug/L	140	D	1	140	D	1
Anthracene	ug/L	17		0.036	18		0.036
Fluoranthene	ug/L	16		0.044	16		0.044
Pyrene	ug/L	9.3		0.034	9		0.034
Benz(a)anthracene	ug/L	0.43		0.026	0.4		0.026
Chrysene	ug/L	0.35		0.034	0.4		0.034
Benzo(b)fluoranthene	ug/L	0.046	J	0.023	0.0	J	0.023
Benzo(k)fluoranthene	ug/L	ND	U	0.025	ND	U	0.025
Benzo(a)pyrene	ug/L	ND	U	0.043	ND	U	0.043
Indeno(1,2,3-cd)pyrene	ug/L	0.031	J	0.026	ND	U	0.026
Dibenz(a,h)anthracene	ug/L	ND	U	0.025	ND	U	0.025
Benzo(g,h,i)perylene	ug/L	0.04	J	0.029	ND	U	0.029
SPLP TPH							
Diesel Range Organics (DRO)	ug/L	6,700	Z	260	6,900	Z	260
Residual Range Organics (RRO)	ug/L	ND	U	520	ND	U	510

Notes:
MDL = Method Detection Limit
PAH's = Polynuclear Aromatic Hydrocarbons
SPLP = Synthetic Precipitation Leaching Procedure
TPH = Total Petroleum Hydrocarbons
ug/L = micrograms per liter
ND = Not detected
QUAL = Qualifier
D = The reported result is from a dilution
J = The result is an estimated value.
U = The analyte was analyzed for, but was not detected at or above the MRL/MDL.
Z = The chromatographic fingerprint does not resemble a petroleum product.

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LONGVIEW WOOD TREATING SITE

KEMRON PROJECT # SE-0397

TABLE 9

OPTIMIZATION EVALUATIONS

Mixture Designs, UCS, Permeability, and Volumetric Expansion Testing

KEMRON SAMPLE NO.	UNTREATED MATERIAL TYPE	REAGENT TYPE	Reagent ID			Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Cure Days	Volumetric Expansion (%)	Unconfined Compressive Strength				Permeabilty (k)			
										Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	UCS (lb/in²)	Moisture Content (%)	Bulk Density (lb/ft³)	Dry Density (lb/ft³)	Perm (cm/sec)
0397-017A	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150* (113.6**)	7		32.3	117.5	88.9	23.7				
								28	30.36	33.2	115.5	86.8	184.5	34.9	105.2	78.0	5.5E-07
0397-017DUP	TP-02	NewCem Slag Cement / Bentonite / Organoclay SS 199	920	807	922	12.5 / 2 / 2	150	3	48.21								
								7	42.86								
								28	42.86	36.4	106.1	77.8	180.2				
0397-026	TP-02	Portland Cement #842/Bentonite	842	807	-	8 / 2	150	7	28.57	33.8	103.3	77.2	31.9				
								14		33.0	105.6	79.4	44.9				
								28	31.25	33.2	106.8	80.2	243.3***	30.2	102.0	78.0	2.6E -07
								56	27.55	32.7	104.2	78.5	77.7				
0397-027	TP-02	NewCem Slag Cement/ Portland Cement/Bentonite	920	842	807	6 / 2 / 2	150	7	25.80	34.1	106.1	79.1	68.8				
								14		34.1	106.1	79.2	127.7				
								28	29.64	34.6	104.9	78.0	239.8	33.4	106.0	79.5	3.3E-07
								56	31.21	32.7	105.6	79.6	333.1				
0397-028	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	920	807	926	8 / 2 / 0.5	175	7	36.61	39.7	100.7	72.1	91.7				
								14		37.9	102.7	74.5	119.1				
								28	34.82	37.6	103.0	74.8	245.5	38.0	102.0	74.1	1.9E-07
								56	36.07	36.0	102.6	75.4	383.5				
								86	25.51	34.9	102.1	75.7	355.3				
0397-029	TP-02	NewCem Slag Cement/Bentonite/Organoclay SS 199/Caustic Soda	920	807	922/926	8 / 2 / 0.5 / 0.5	175	7	35.71	39.7	105.1	75.2	44.8				
								14		38.3	106.3	76.8	117.7				
								28	37.86								
								56	38.21	35.1	103.5	76.6	358.3				
0397-030	TP-02	NewCem Slag Cement/Bentonite/Caustic Soda	920	807	926	10 / 2 / 0.5	175	7	40.18	39.3	106.1	76.2	120.8				
								14		37.9	104.1	75.5	192.0				
								28	40.80								
								56	40.09	35.8	100.9	74.3	341.1				
0397-031	TP-02	NewCem Slag Cement/Bentonite/OrganoClay SS199 /Caustic Soda	920	807	922/926	10 / 2 / 0.5 / 0.5	175	7	40.18	38.6	106.6	76.9	127.1				
								14		37.8	105.5	76.5	221.5				
								28	40.45								
								56	42.59	35.5	104.6	77.2	433.9				

Notes:

* For Mix 0397-017A, the mixing procedure used by CETCO was replicated. Cetco based on a 150% water addition by Slag Cement weight only. This resulted in a 113.6% water additon rate by total reagent weight

**The water addition rate was calculated on the total weight of the reagents utilized

= Not Tested

URS CORPORATION
LONGVIEW SOLIDIFICATION
KEMRON PROJECT No: SE0397

TABLE 10

OPTIMIZATION MIXTURE EVALUATIONS
Summary of SPLP Results

		0397-017A		0397-017 DUP		0397-028	
TESTING PARAMETER	**UNIT**	**Results**	**Qual**	**Results**	**Qual**	**Results**	**Qual**
SPLP PAH's							
Naphthalene	ug/L	1,800		1,700		5,400	J
Acenaphthylene	ug/L	3.4		3.6		9.0	J
Acenaphthene	ug/L	280		250		440	J
Fluorene	ug/L	99	J	94		250	J
Phenanthrene	ug/L	140		140		270	J
Anthracene	ug/L	17		18		36	J
Fluoranthene	ug/L	16		16		24	J
Pyrene	ug/L	9.3		9.4		13	J
Benz(a)anthracene	ug/L	0.43		0.43		0.71	J
Chrysene	ug/L	0.35		0.38		0.46	J
Benzo(b)fluoranthene	ug/L	0.046	J	0.045	J	0.049	J
Benzo(k)fluoranthene	ug/L	0.20	U	0.20	U	0.028	J
Benzo(a)pyrene	ug/L	0.20	U	0.20	U	0.21	U
Indeno(1,2,3-cd)pyrene	ug/L	0.031	J	0.20	U	0.21	U
Dibenz(a,h)anthracene	ug/L	0.20	U	0.20	U	0.21	U
Benzo(g,h,i)perylene	ug/L	0.040	J	0.20	U	0.21	U
2-Methylnaphthalene	ug/L	380		340		790	J
Dibenzofuran	ug/L	97	J	95		290	J
SPLP TPH							
Diesel Range Organics (DRO)	ug/L	6,700		6,900		17,000	J
Residual Range Organics (RRO)	ug/L	520	U	510	U	920	J

Notes:
PAH's = Polynuclear Aromatic Hydrocarbons
SPLP = Synthetic Precipitation Leaching Procedure
TPH = Total Petroleum Hydrocarbons

ug/L = micrograms per liter

QUAL = Qualifier
J = The result is an estimated value.
U = The analyte was analyzed for, but was not detected at or above the outlined value.

URS CORPORATION
LONGVIEW SOLIDIFICATION
KEMRON PROJECT No: SE0397

TABLE 11

SUMMARY OF ANS 16.1 LEACHABILITY RESULTS

TESTING PARAMETER	SAMPLE 0397-017 DUP			SAMPLE 0397-026
	5-DAY			5-DAY
	RESULTS (ug/L)	MRL	MDL	RESULTS (ug/L)
TPH				
Diesel Range Organics (DRO)	**500**	260	-	1,300
Residual Range Organics (RRO)	ND	550	-	< 560
PAH's				
Naphthalene	81 D	1.5	0.31	170
2-Methylnaphthalene	15 D	0.07	0.0087	0.54
Acenaphthylene	0.20	0.0037	0.00041	21
Acenaphthene	15 D	0.074	0.0079	16
Dibenzofuran	8.2 D	0.074	0.0092	44
Fluorene	9.3 D	0.074	0.0092	5.7
Phenanthrene	15 D	0.074	0.016	11
Anthracene	1.6	0.0037	0.00032	5.9
Fluoranthene	2.1	0.0037	0.0005	0.56
Pyrene	1.3	0.0037	0.00085	0.47
Benz(a)anthracene	0.830	0.0037	0.00037	0.085
Chrysene	0.0700	0.0037	0.00071	< 0.039
Benzo(b)fluoranthene	0.0120	0.0037	0.00028	< 0.039
Benzo(k)fluoranthene	0.0036 J	0.0037	0.00045	< 0.039
Benzo(a)pyrene	0.0055	0.0037	0.00045	< 0.039
Indeno(1,2,3-cd)pyrene	0.0086 J	0.0037	0.00048	< 0.039
Dibenz(a,h)anthracene	ND	0.0037	0.00049	30
Benzo(g,h,i)perylene	0.0076 J	0.0037	0.00040	15

Notes:
MRL = Method Reporting Limit
MDL = Method Detection Limit

PAH's = Polynuclear Aromatic Hydrocarbons

TPH = Total Petroleum Hydrocarbons
ug/L = micrograms per liter
D = The reported result is from a dilution.
J = The result is an estimated value.
"<" indicates that the compound was not detected above the value presented.

URS CORPORATION
LONGVIEW SOLIDIFICATION
KEMRON PROJECT No: SE0397
TABLE # 12
SUMMARY OF ANS 16.1 LEACHABILITY RESULTS

	SAMPLE 0397-017A													
	2-HOUR		7-HOUR		24-HOUR		2-DAY		3-DAY		4-DAY		5-DAY	
TESTING PARAMETER	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MRL	RESULTS (ug/L)	MRL	RESULTS (ug/L)	MRL
TPH														
Diesel Range Organics (DRO)	390 Z	12.00	710 Z	12	1,600 Z	12	1,600 Z	12	1,100 Z	270	1,100 Z	270	570 Z	290
Residual Range Organics (RRO)	35 J	21.00	33 J	20	53 J	21	56 J	20	ND	540	ND	540	ND	570
PAH's														
Naphthalene	71 D	0.15	130 D	0.15	340 D	0.29	310 D	0.30	270 D	0.8	310 D	0.77	100 D	1.5
2-Methylnaphthalene	13 D	0.0042	22 D	0.0840	57 D	0.1700	55 D	0.1700	48 D	0.8	56 D	0.77	17 D	0.074
Acenaphthylene	0.16	0.00039	0.22	0.00039	0.40	0.00038	0.37	0.00039	0.57 D	0.040	0.63 D	0.039	0.23	0.0037
Acenaphthene	12 D	0.0038	16 D	0.0038	41 D	0.150	38 D	0.0076	36 D	0.80	42 D	0.77	16 D	0.074
Dibenzofuran	6.5 D	0.0044	8.4 D	0.0044	21 D	0.0086	20 D	0.0089	17 D	0.040	19 D	0.039	9.2 D	0.074
Fluorene	8.2 D	0.0044	10 D	0.0044	25 D	0.0086	23 D	0.0089	20 D	0.040	22 D	0.039	11 D	0.074
Phenanthrene	13 D	0.0075	12 D	0.0076	28 D	0.015	28 D	0.016	29 D	0.80	31 D	0.77	18 D	0.074
Anthracene	1.7	0.0003	1.5	0.00031	4.3 D	0.006	4.2 D	0.0062	3.8 D	0.040	4.1 D	0.039	2.00	0.0037
Fluoranthene	2.7 D	0.0048	1.8	0.00048	4.1 D	0.0094	4.2 D	0.0097	4.5 D	0.040	4.7 D	0.039	3.5 D	0.074
Pyrene	1.6	0.00081	1.0	0.00082	2 D	0.016	2.2 D	0.017	2.6 D	0.040	2.8 D	0.039	1.7	0.0037
Benz(a)anthracene	0.13	0.00036	0.10	0.00036	0.18	0.00035	0.180	0.00036	0.15 D	0.040	0.17 D	0.039	0.11	0.0037
Chrysene	0.064	0.00068	0.055	0.00068	0.085	0.00067	0.080	0.00069	0.087 D	0.040	0.1 D	0.039	0.088	0.0037
Benzo(b)fluoranthene	0.011	0.00026	0.019	0.00027	0.023	0.00026	0.018	0.00027	0.018 J,D	0.040	0.026 J,D	0.039	0.015	0.0037
Benzo(k)fluoranthene	0.0034 J	0.00043	0.0079	0.00043	0.0078	0.00042	0.0048	0.00044	0.0065 J,D	0.040	0.0083 J,D	0.039	0.0047	0.0037
Benzo(a)pyrene	0.0066	0.00043	0.013	0.00043	0.013	0.00042	0.0098	0.00044	0.0081 J,D	0.040	0.012 J,D	0.039	0.008	0.0037
Indeno(1,2,3-cd)pyrene	0.00078 J	0.00046	0.0036 J	0.00046	0.003 J	0.00045	0.0017 J	0.00047	ND	0.040	ND	0.039	0.0013 J	0.0037
Dibenz(a,h)anthracene	ND	0.00047	0.0011 J	0.00047	0.0012 J	0.00046	0.00063 J	0.00048	ND	0.040	ND	0.039	0.00053 J	0.0037
Benzo(g,h,i)perylene	0.00068 J	0.00038	0.0029 J	0.00038	0.0026 J	0.00037	0.0014 J	0.00038	ND	0.040	ND	0.039	0.001 J	0.0037

Notes:
MDL = Method Detection Limit
MRL = Method Reporting Limit
PAH's = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
ug/L = micrograms per liter
ND = Not Detected
D = The reported result is from a dilution.
J = The result is an estimated value.
Z = The chromatographic fingerprint does not resemble a petroleum product.

URS CORPORATION
LONGVIEW SOLIDIFICATION
KEMRON PROJECT No: SE0397

TABLE 13

SUMMARY OF ANS 16.1 LEACHABILITY RESULTS

TESTING PARAMETER	SAMPLE 0397-028													
	2-HOUR		7-HOUR		24-HOUR		2-DAY		3-DAY		4-DAY		5-DAY	
	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MDL	RESULTS (ug/L)	MRL	RESULTS (ug/L)	MRL	RESULTS (ug/L)	MRL
TPH														
Diesel Range Organics (DRO)	520 Z	270	570 Z	280	930 Z	250	910 Z	280	920 Z	310	1,000 Z	310	860 Z	290
Residual Range Organics (RRO)	ND	540	ND	550	ND	500	ND	550	ND	610	ND	610	ND	580
PAH's														
Naphthalene	30 D	0.015	64 D	0.071	170 D	0.079	120 D	0.071	140 D	0.071	120 D	0.071	100 D	0.071
2-Methylnaphthalene	61 D	0.008	12 D	0.0400	34 D	0.0440	23 D	0.0400	29 D	0.04	26 D	0.04	22 D	0.04
Acenaphthylene	0.12	0.00037	0.19	0.00037	0.41	0.00041	0.30	0.00037	0.44 D	0.0037	0.390 D	0.0037	0.34 D	0.0037
Acenaphthene	6.0 D	0.0072	11 D	0.036	29 D	0.040	20 D	0.036	24 D	0.0360	19 D	0.0360	17 D	0.0360
Dibenzofuran	4.1 D	0.0084	6.6 D	0.042	19 D	0.047	14 D	0.042	14 D	0.0042	12 D	0.0042	11 D	0.0042
Fluorene	4.6 D	0.0084	8.3 D	0.042	22 D	0.047	16 D	0.042	16 D	0.0042	14 D	0.0042	13 D	0.0042
Phenanthrene	7.2 D	0.015	13 D	0.072	42 D	0.08	35 D	0.072	41 D	0.072	35 D	0.072	31 D	0.072
Anthracene	0.980 D	0.00029	1.4	0.00029	5.6 D	0.032	5.4 D	0.029	5.3 D	0.0029	4.7 D	0.0029	4.4 D	0.0029
Fluoranthene	1.0	0.00046	1.7	0.00046	6.9 D	0.051	7.0 D	0.046	8.2 D	0.0046	7.3 D	0.0046	7.7 D	0.0046
Pyrene	0.660	0.00078	1.1	0.00078	4.3 D	0.086	4.3 D	0.078	4.8 D	0.0078	4.2 D	0.0078	4.5 D	0.0078
Benz(a)anthracene	0.094	0.00034	0.12	0.00034	0.33	0.00038	0.350	0.00034	0.390 D	0.0034	0.330 D	0.0034	0.380 D	0.0034
Chrysene	0.071	0.00027	0.100	0.00027	0.270	0.000372	0.270	0.00027	0.390 D	0.0065	0.320 D	0.0065	0.380 D	0.0065
Benzo(b)fluoranthene	0.027	0.00025	0.030	0.00025	0.068	0.00028	0.052	0.00025	0.0065 D	0.0025	0.048 D	0.0025	0.058 D	0.0025
Benzo(k)fluoranthene	0.012	0.00041	0.0110	0.00041	0.0230	0.00046	0.0160	0.00041	0.0026 JD	0.0041	0.022 JD	0.0041	0.025 JD	0.0041
Benzo(a)pyrene	0.019	0.00041	0.017	0.00041	0.034	0.00046	0.0240	0.00041	0.0034 D	0.0041	0.023 JD	0.0041	0.029 JD	0.0041
Indeno(1,2,3-cd)pyrene	0.0057	0.00044	0.0045	0.00044	0.0095	0.00049	0.0047	0.00044	0.0020 JD	0.0044	0.0096 JD	0.0044	0.0081 JD	0.0044
Dibenz(a,h)anthracene	0.0015 J	0.00045	0.0013 J	0.00045	0.0025 J	0.0005	0.0012 J	0.00045	0.0011 JD	0.0045	0.0059 JD	0.0045	ND	0.0045
Benzo(g,h,i)perylene	0.0052	0.00036	0.0041	0.00036	0.0074	0.0004	0.0032 J	0.00036	0.0023 JD	0.0036	0.0097JD	0.0036	0.0088 JD	0.0036

Notes:
MDL = Method Detection Limit
MRL = Method Reporting Limit
PAH's = Polynuclear Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
ug/L = micrograms per liter
ND = Not Detected
D = The reported result is from a dilution.
J = The result is an estimated value.
Z = The chromatographic fingerprint does not resemble a petroleum product.

URS CORPORATION
LONGVIEW SOLIDIFICATION
KEMRON PROJECT No: SE0397

TABLE 14

OPTIMIZATION MIXTURE EVALUATIONS
Summary of Wipe, Total, TCLP, and SPLP Results

TESTING PARAMETER	0397-028							
	WIPE Results (ug/Wipe)	Qual	Total Results (mg/kg)	Qual	TCLP Results (ug/L)	Qual	SPLP Results (ug/L)	Qual
PAHs								
Naphthalene	0.48	J	150,000	J	5,100	J	5,400	J
Acenaphthylene	0.010		1,300	J	8.4	J	9.0	J
Acenaphthene	0.26	J	91,000	J	420	J	440	J
Fluorene	0.28		86,000	J	230	J	250	J
Phenanthrene	1.1		250,000	J	260	J	270	J
Anthracene	0.21		48,000	J	31	J	36	J
Fluoranthene	0.62		110,000	J	22	J	24	J
Pyrene	0.44		74,000	J	13	J	13	J
Benz(a)anthracene	0.13		17,000	J	0.58	J	0.71	J
Chrysene	0.12		19,000	J	0.48	J	0.46	J
Benzo(b)fluoranthene	0.085		9,600	J	0.063	J	0.049	J
Benzo(k)fluoranthene	0.033		3,600	J	0.034	J	0.028	J
Benzo(a)pyrene	0.090	J	6,100	J	0.22	U	0.21	U
Indeno(1,2,3-cd)pyrene	0.024		2,000	J	0.22	U	0.21	U
Dibenz(a,h)anthracene	0.0065		510	J	0.22	U	0.21	U
Benzo(g,h,i)perylene	0.022		1,600	J	0.22	U	0.21	U
2-Methylnaphthalene	0.18	J	84,000	J	750	J	790	J
Dibenzofuran	0.20		67,000	J	260	J	290	J
TPHs								
Diesel Range Organics (DRO)	500	U	4,300	J	15,000	J	17,000	J
Residual Range Organics (RRO)	560	J	1,000	J	540	U	920	J

Notes:
PAH's = Polynuclear Aromatic Hydrocarbons
SPLP = Synthetic Precipitation Leaching Procedure
TCLP = Toxicity Characteristic Leaching Procedure
TPH = Total Petroleum Hydrocarbons

ug/L = micrograms per liter

QUAL = Qualifier
J = The result is an estimated value.
U = The analyte was analyzed for, but was not detected at or above the outlined value.

APPENDIX A

UNTREATED PHYSICAL PROPERTIES TESTING

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	URS Longview Treatability Study
PROJECT No.:	SE-0397
SAMPLE No.:	TP-01 (2-7.5)
TESTING DATE:	08/29/11
TESTED BY:	SEM
TRACKING CODE:	7471_MC

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	52.25	g	53.16	g	59.21	g
3. WT WET SOIL + TARE	112.89	g	119.28	g	114.79	g
4. WT DRY SOIL + TARE	98.31	g	103.04	g	101.53	g
5. WT WATER, Ww	14.58	g	16.25	g	13.25	g
6. WT DRY SOIL, Ws	46.06	g	49.88	g	42.32	g
7. ASTM MOISTURE CONTENT	31.65	%	32.57	%	31.32	%
8. PERCENT SOLIDS	75.96	%	75.43	%	76.15	%
9. AVERAGE ASTM MOISTURE CONTENT	31.85	%				
10. AVERAGE PERCENT SOLIDS	75.85	%				

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	URS Longview Treatability Study
PROJECT No.:	SE-0397
SAMPLE No.:	TP-02
TESTING DATE:	08/29/11
TESTED BY:	SEM
TRACKING CODE:	7472_MC

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	57.00	g	46.89	g	53.55	g
3. WT WET SOIL + TARE	111.14	g	108.05	g	116.38	g
4. WT DRY SOIL + TARE	100.52	g	95.58	g	104.16	g
5. WT WATER, Ww	10.62	g	12.47	g	12.22	g
6. WT DRY SOIL, Ws	43.52	g	48.69	g	50.60	g
7. ASTM MOISTURE CONTENT	24.40	%	25.62	%	24.15	%
8. PERCENT SOLIDS	80.39	%	79.61	%	80.55	%
9. AVERAGE ASTM MOISTURE CONTENT	24.72	%				
10. AVERAGE PERCENT SOLIDS	80.18	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	URS Longview Treatability Study
PROJECT No.:	SE-0397
SAMPLE No.:	TP-01 (2-7.5)
TESTING DATE:	8/29/2011
TESTED BY:	SEM
TRACKING CODE:	7471_LI

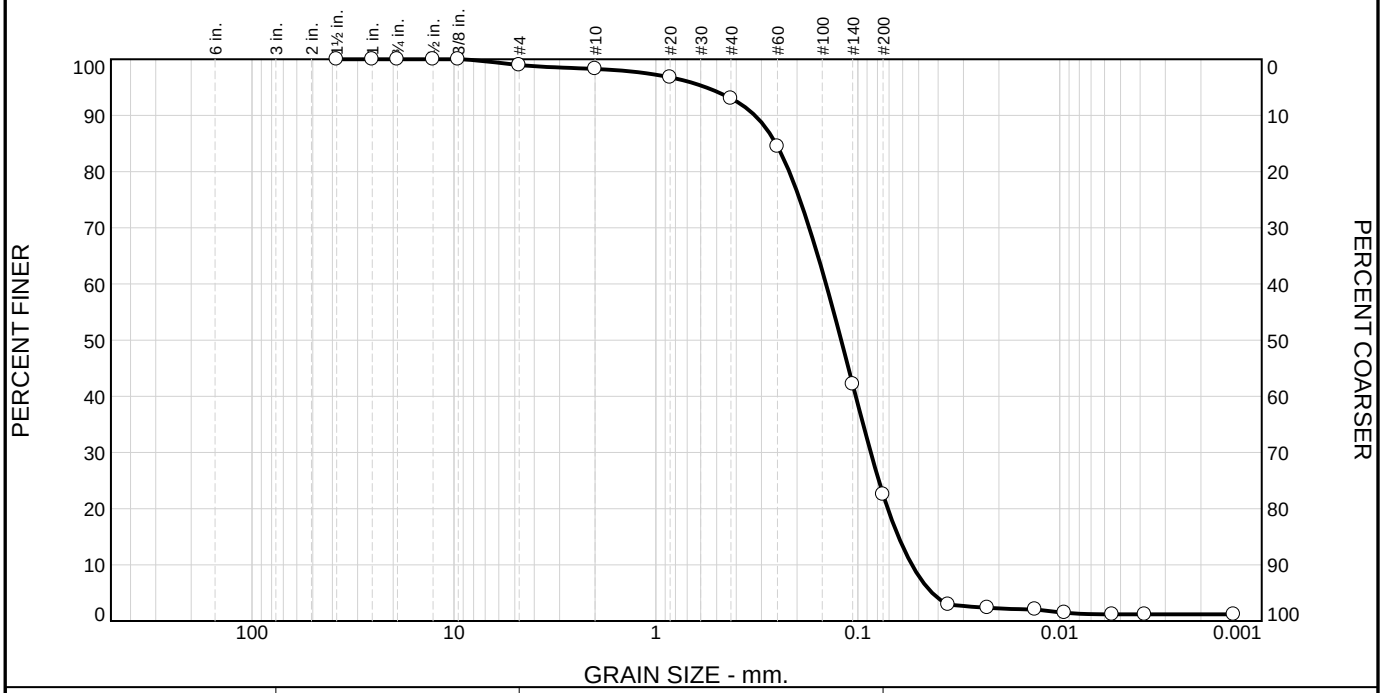
MOISTURE CONTENT / LOSS ON IGNITION						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	52.251	g	53.160	g	59.214	g
3. WT WET SOIL + TARE	112.895	g	119.284	g	114.786	g
4. WT DRY SOIL + TARE	98.314	g	103.039	g	101.533	g
5. WT WATER, Ww	14.581	g	16.245	g	13.254	g
6. WT DRY SOIL, Ws	46.064	g	49.879	g	42.319	g
7. WT FINAL SOIL + TARE	97.377	g	102.029	g	100.801	g
8. WT FINAL SOIL, Wf	45.126	g	48.869	g	41.587	g
9. WT ORGANICS, Wo	0.937	g	1.010	g	0.731	g
10. MOISTURE CONTENT(ASTM)	31.65	%	32.57	%	31.32	%
11. LOSS ON IGNITION	2.03	%	2.02	%	1.73	%
12. AVERAGE MOISTURE CONTENT	31.85	%				
13. AVERAGE LOSS ON IGNITION	1.93	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	URS Longview Treatability Study
PROJECT No.:	SE-0397
SAMPLE No.:	TP-02
TESTING DATE:	8/29/2011
TESTED BY:	SEM
TRACKING CODE:	7472_LI

MOISTURE CONTENT / LOSS ON IGNITION						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	56.999	g	46.894	g	53.553	g
3. WT WET SOIL + TARE	111.135	g	108.052	g	116.378	g
4. WT DRY SOIL + TARE	100.518	g	95.581	g	104.157	g
5. WT WATER, Ww	10.617	g	12.472	g	12.221	g
6. WT DRY SOIL, Ws	43.520	g	48.686	g	50.603	g
7. WT FINAL SOIL + TARE	100.049	g	94.941	g	103.611	g
8. WT FINAL SOIL, Wf	43.051	g	48.047	g	50.057	g
9. WT ORGANICS, Wo	0.469	g	0.640	g	0.546	g
10. MOISTURE CONTENT(ASTM)	24.40	%	25.62	%	24.15	%
11. LOSS ON IGNITION	1.08	%	1.31	%	1.08	%
12. AVERAGE MOISTURE CONTENT	24.72	%				
13. AVERAGE LOSS ON IGNITION	1.16	%				

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	0.7	5.3	70.5	21.3	1.2

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	99.0		
#10	98.3		
#20	96.8		
#40	93.0		
#60	84.5		
#140	42.2		
#200	22.5		
0.0357 mm.	2.9		
0.0228 mm.	2.4		
0.0133 mm.	2.1		
0.0095 mm.	1.5		
0.0055 mm.	1.2		
0.0038 mm.	1.2		
0.0014 mm.	1.2		

* (no specification provided)

Material Description

Dark grey silty sand

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SM **AASHTO (M 145)=**

Coefficients

D_{90}= D_{85}= D_{60}= 0.1438
D_{50}= 0.1208 D_{30}= 0.0863 D_{15}= 0.0629
D_{10}= 0.0540 C_u= 2.66 C_c= 0.96

Remarks

F.M.=0.59

Date Received: 8/24/2011 **Date Tested:** 9/2/2011

Tested By: SEM

Checked By: TAJ

Title: Program Manager

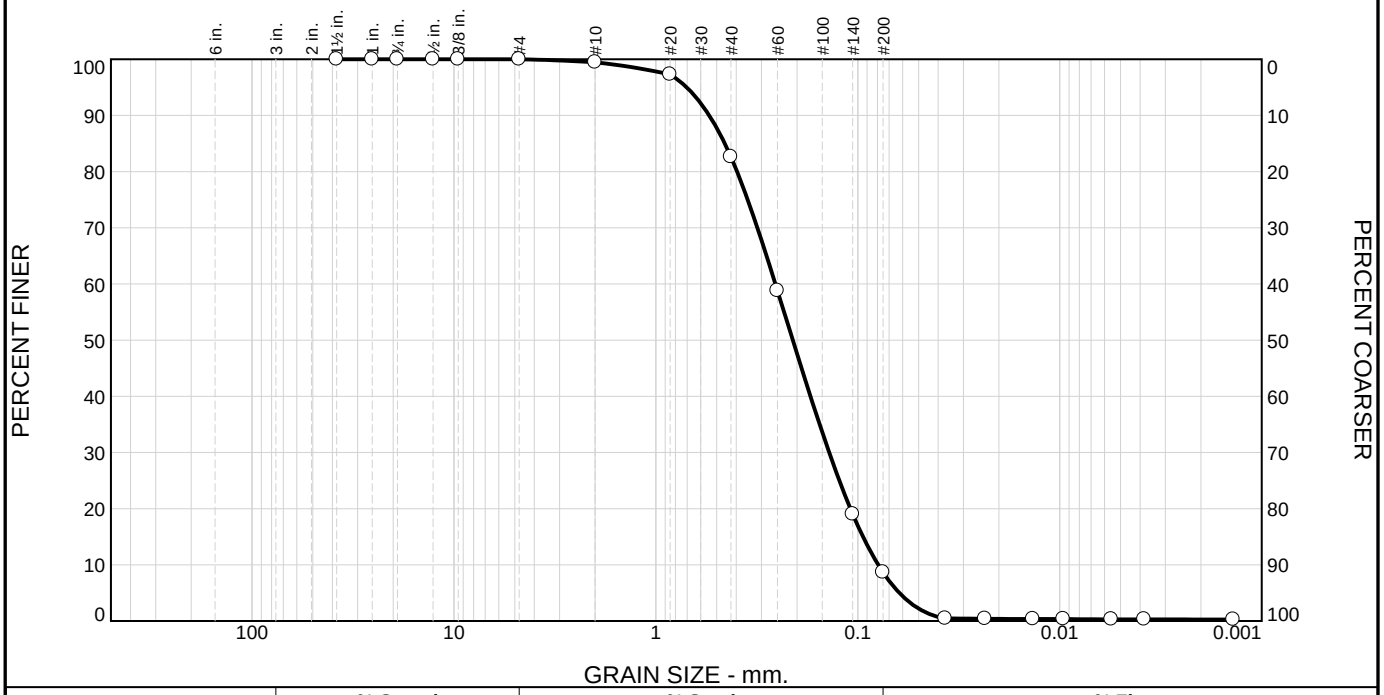
Sample Number: TP-01 (2-7.5) **Date Sampled:** 8/22/2011

KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: URS
Project: URS Longview Solidification

Project No: SE 0397 **Lab ID** 7471_GR

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	16.9	74.0	8.3	0.3

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
#4	100.0		
#10	99.5		
#20	97.3		
#40	82.6		
#60	58.8		
#140	19.0		
#200	8.6		
0.0369 mm.	0.5		
0.0234 mm.	0.4		
0.0136 mm.	0.4		
0.0096 mm.	0.4		
0.0055 mm.	0.3		
0.0038 mm.	0.3		
0.0014 mm.	0.3		

* (no specification provided)

Material Description

Very dark grey poorly graded sand with silt

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=**

Coefficients

D_{90}= D_{85}= D_{60}= 0.2560
D_{50}= 0.2099 D_{30}= 0.1386 D_{15}= 0.0943
D_{10}= 0.0793 C_u= 3.23 C_c= 0.95

Remarks

F.M.=1.09

Date Received: 8/24/2011 **Date Tested:** 9/2/2011

Tested By: SEM

Checked By: TAJ

Title: Program Manager

Sample Number: TP-02 **Date Sampled:** 8/22/2011

KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: URS
Project: URS Longview Solidification

Project No: SE 0397 **Lab ID** 7472_GR

APPENDIX B

UNTREATED ANALYTICAL REPORTS

Provided in Clients Report

APPENDIX C

MIXTURE DEVELOPMENT SHEETS

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-001
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	7.50 %	142.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	71.3 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-002
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	12.50 %	237.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	118.8 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-003
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	12.50 %	237.5 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	413.3 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	3.5	4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-004
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	7.50 %	142.5 g
Hydrated Lime #917	7.50 %	142.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	77 %	219.5 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.5	3.25	3.75	3.75	3.75

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-005
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	12.50 %	237.5 g
Bentonite #807	2.00 %	38.0 g
Organoclay SS 199 #922	0.50 %	9.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	427.5 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-006
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	7.50 %	142.5 g
Class "C" Flyash #921	7.50 %	142.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	142.5 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	3.75	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-007
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement # 920	15.00 %	285.0 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	132 %	426.4 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.0	0.0	0.0	0.0	0.25

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-007 A
MIXING DATE:	18-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement # 920	15.00 %	285.0 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	%	0.0 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.0	0.0	0.0		

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-008
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
50:50 TerraCem #916	12.50 %	237.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	118.8 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	4.25	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-009
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-01
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
50:50 TerraCem # 916	15.00 %	285.0 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	135 %	436.1 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.25	3.5	4.25	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-010
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	12.50 %	237.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	118.8 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-011
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	12.50 %	237.5 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	413.3 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	3.25	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-012
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	17.50 %	332.5 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	125 %	463.1 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-013
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	7.50 %	142.5 g
Hydrated Lime #917	7.50 %	142.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	75 %	213.8 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	3.25	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-014
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	7.50 %	142.5 g
Hydrated Lime #917	12.50 %	237.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	75 %	285.0 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.25	2.5	3.0	3.75	4.25

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-015
MIXING DATE:	5-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	10.00 %	190.0 g
Hydrated Lime #917	12.50 %	237.5 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	75 %	320.6 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	2.5	3.75	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-016
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	12.50 %	237.5 g
Bentonite #807	2.00 %	38.0 g
Organoclay SS 199 #922	0.50 %	9.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	427.5 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.0	0.0	2.5	4.25	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-017
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	12.50 %	237.5 g
Bentonite #807	2.00 %	38.0 g
Organoclay SS 199 #922	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	470.3 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.0	0.0	1.25	3.0	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-017A
MIXING DATE:	17-Jan-12	MIXED BY:	SEM

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,700 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	12.50 %	212.5 g
Bentonite #807	2.00 %	34.0 g
Organoclay SS 199 #922	2.00 %	34.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:NewCem Slag Cement)	150 %	318.8 g

OBSERVATIONS / NOTES

UCS @ 7 Day and 28 Day
*Perm @ 28 Day
*Analytical Testing for DRO and PAH @ 28 days
VE @ 28 days
Full ANS 16.1 5-day
Using the following Procedure replicating CETCO:
Organoclay added to the soil and mixed by hand, then allowed to sit for 2 hours. Then the Cement and bentonite were mixed together and added to the soil/organoclay mix. Water was added and mixed with blender
Water addtion rate by total reagent weight is 113.6%.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)					

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT (in):	1.46
28 DAY VOLUMETRIC EXPANSION (%):	30.36		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-017 Dup
MIXING DATE:	17-Jan-12	MIXED BY:	SEM

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**950 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	12.50 %	118.8 g
Bentonite #807	2.00 %	19.0 g
Organoclay SS 199 #922	2.00 %	19.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	235.1 g

OBSERVATIONS / NOTES

UCS @ 28 Day
VE @ 3 Day, 7 Day, and 28 Day
SPLP Analysis @ 28 day- 1 week TAT
5 Day ANS 16.1

144 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)					

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT AT 3 DAYS (in):	1.66
3-DAY VOLUMETRIC EXPANSION (%):	48.21		
		FINAL HEIGHT AT 7 DAYS (in):	1.60
7- DAY VOLUMETRIC EXPANSION (%):	42.86		
		FINAL HEIGHT AT 28 DAYS (in):	1.60
28- DAY VOLUMETRIC EXPANSION (%):	42.86		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-018
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	17.50 %	332.5 g
Bentonite #807	2.00 %	38.0 g
Organoclay SS 199 #922	0.50 %	9.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	570.0 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.5	3.75	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-019
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	10.00 %	190.0 g
Bentonite #807	2.00 %	38.0 g
Organoclay SS 199 #922	0.50 %	9.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	356.3 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	3.25	4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-020
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	15.00 %	285.0 g
Bentonite #807	2.00 %	38.0 g
Organoclay SS 199 #922	0.50 %	9.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	498.8 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	3.25	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-021
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	10.00 %	190.0 g
Class "C" Flyash #921	10.00 %	190.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	190.0 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	>4.5	>4.5	>4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-022
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	10.00 %	190.0 g
Class "C" Fly Ash #921	10.00 %	190.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	50 %	190.0 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.0	1.75	3.25	3.75	3.75

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-023
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	15.00 %	285.0 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	132 %	426.4 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.0	3.25	4.5	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-024
MIXING DATE:	7-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
50:50 TerraCem #916	15.00 %	285.0 g
Bentonite #807	2.00 %	38.0 g
Organoclay SS 199 #922	0.50 %	9.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	135 %	448.9 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	2.75	3.25	4.25	>4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-025
MIXING DATE:	6-Oct-11	MIXED BY:	SEM/JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,900 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
50:50 TerraCem #916	15.00 %	285.0 g
Bentonite #807	2.00 %	38.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	135 %	436.1 g

OBSERVATIONS / NOTES

Pocket Penetrometer @ Days 1,3,5,7,14, and 28
UCS @ 7 Day or 28 Day
*Perm @ 28 Day
*Analytical Testing
*ANS 16.1
*= Potential Testing for study
250 g of water added to bentonite initially
The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.25	2.5	4.0	4.5	>4.5

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	FINAL HEIGHT (in):
VOLUMETRIC EXPANSION (%):	#DIV/0!

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-026
MIXING DATE:	11-Apr-12	MIXED BY:	JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**2,500 g**

REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Portland Cement #842	8.00 %	200.0 g
Bentonite #807	2.00 %	50.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	375.0 g

OBSERVATIONS / NOTES

UCS @ 7, 14, 28, and 49 Days
VE @ 7 and 28 Days
SPLP and TCLP Analysis @ 28 days
5 Day ANS 16.1
Permeability Test

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	4.5		>4.5	>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT AT 7 DAYS (in):	1.44
7- DAY VOLUMETRIC EXPANSION (%):	28.57		
		FINAL HEIGHT AT 28 DAYS (in):	1.47
28- DAY VOLUMETRIC EXPANSION (%):	31.25		
		FINAL HEIGHT AT 56 DAYS (in):	1.43
56- DAY VOLUMETRIC EXPANSION (%):	27.55		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-027
MIXING DATE:	11-Apr-12	MIXED BY:	JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**2,500 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	6.00 %	150.0 g
Portland Cement #842	2.00 %	50.0 g
Bentonite #807	2.00 %	50.0 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	150 %	375.0 g

OBSERVATIONS / NOTES

UCS @ 7, 14, 28, and 49 Days
VE @ 7 and 28 Days
SPLP and TCLP Analysis @ 28 days
5 Day ANS 16.1
Permeability Test

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	4.25		>4.5	>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT AT 7 DAYS (in):	1.41
7- DAY VOLUMETRIC EXPANSION (%):	25.80		
		FINAL HEIGHT AT 28 DAYS (in):	1.45
28- DAY VOLUMETRIC EXPANSION (%):	29.64		
		FINAL HEIGHT AT 56 DAYS (in):	1.47
56- DAY VOLUMETRIC EXPANSION (%):	31.21		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-028
MIXING DATE:	11-Apr-12	MIXED BY:	JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**2,500 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	8.00 %	200.0 g
Bentonite #807	2.00 %	50.0 g
Caustic Soda Beads #926	0.50 %	12.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	175 %	459.4 g

OBSERVATIONS / NOTES

UCS @ 7, 14, 28, and 49 Days
VE @ 7 and 28 Days
SPLP and TCLP Analysis @ 28 days
5 Day ANS 16.1
Permeability Test

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.75		>4.5	>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT AT 7 DAYS (in):	1.53
7- DAY VOLUMETRIC EXPANSION (%):	36.61		
		FINAL HEIGHT AT 28 DAYS (in):	1.51
28- DAY VOLUMETRIC EXPANSION (%):	34.82		
		FINAL HEIGHT AT 56 DAYS (in):	1.52
56- DAY VOLUMETRIC EXPANSION (%):	36.07		
		FINAL HEIGHT AT 56 DAYS (in):	1.41
86- DAY VOLUMETRIC EXPANSION (%):	25.51		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-029
MIXING DATE:	11-Apr-12	MIXED BY:	JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,300 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	8.00 %	104.0 g
Bentonite #807	2.00 %	26.0 g
Organoclay #922	0.50 %	6.5 g
Caustic Soda Beads #926	0.50 %	6.5 g
	%	0.0 g
Water Addition (water:reagent)	175 %	250.3 g

OBSERVATIONS / NOTES

UCS @ 7, 14, 28, and 49 Days
VE @ 7 and 28 Days
SPLP and TCLP Analysis @ 28 days
5 Day ANS 16.1
Permeability Test

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	0.75		>4.5	>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT AT 7 DAYS (in):	1.52
7- DAY VOLUMETRIC EXPANSION (%):	35.71		
		FINAL HEIGHT AT 28 DAYS (in):	1.54
28- DAY VOLUMETRIC EXPANSION (%):	37.86		
		FINAL HEIGHT AT 56 DAYS (in):	1.55
56- DAY VOLUMETRIC EXPANSION (%):	38.21		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-030
MIXING DATE:	11-Apr-12	MIXED BY:	JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,300 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	10.00 %	130.0 g
Bentonite #807	2.00 %	26.0 g
Caustic Soda Beads #926	0.50 %	6.5 g
	%	0.0 g
	%	0.0 g
Water Addition (water:reagent)	175 %	284.4 g

OBSERVATIONS / NOTES

UCS @ 7, 14, 28, and 49 Days
VE @ 7 and 28 Days
SPLP and TCLP Analysis @ 28 days
5 Day ANS 16.1
Permeability Test

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	1.25		>4.5	>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT AT 7 DAYS (in):	1.57
7- DAY VOLUMETRIC EXPANSION (%):	40.18		
		FINAL HEIGHT AT 28 DAYS (in):	1.58
28- DAY VOLUMETRIC EXPANSION (%):	40.80		
		FINAL HEIGHT AT 56 DAYS (in):	1.57
56- DAY VOLUMETRIC EXPANSION (%):	40.09		

MIX DEVELOPMENT DATA SHEET

PROJECT:	Longview Wood Treating Site	MIX No.	
PROJECT No.:	SE-0397		SE0397-031
MIXING DATE:	11-Apr-12	MIXED BY:	JGS

UNTREATED MATERIAL TYPE		TP-02
WEIGHT OF UNTREATED MATERIAL		**1,300 g**
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
NewCem Slag Cement #920	10.00 %	130.0 g
Bentonite #807	2.00 %	26.0 g
Organoclay #922	0.50 %	6.5 g
Caustic Soda Beads #926	0.50 %	6.5 g
	%	0.0 g
Water Addition (water:reagent)	175 %	295.8 g

OBSERVATIONS / NOTES

UCS @ 7, 14, 28, and 49 Days
VE @ 7 and 28 Days
SPLP and TCLP Analysis @ 28 days
5 Day ANS 16.1
Permeability Test

The water addition will be adjusted to create a pumpable reagent slurry.

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)	1	3	5	7	14
PENETROMETER (tons/ftý)	2.0		>4.5	>4.5	

VOLUMETRIC EXPANSION

INITIAL HEIGHT (in):	1.12	FINAL HEIGHT AT 7 DAYS (in):	1.57
7- DAY VOLUMETRIC EXPANSION (%):	40.18		
		FINAL HEIGHT AT 28 DAYS (in):	1.57
28- DAY VOLUMETRIC EXPANSION (%):	40.45		
		FINAL HEIGHT AT 56 DAYS (in):	1.60
56- DAY VOLUMETRIC EXPANSION (%):	42.59		

APPENDIX D

UNCONFINED COMPRESSIVE STRENGTH DATA SHEETS

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-001 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7604_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-001 (9 day)	
2. WT MOISTURE TIN (tare weight)	67.30	g
3. WT WET SOIL + TARE	157.63	g
4. WT DRY SOIL + TARE	135.39	g
5. WT WATER, Ww	22.24	g
6. WT DRY SOIL, Ws	68.09	g
7. MOISTURE CONTENT, W	**32.66**	**%**

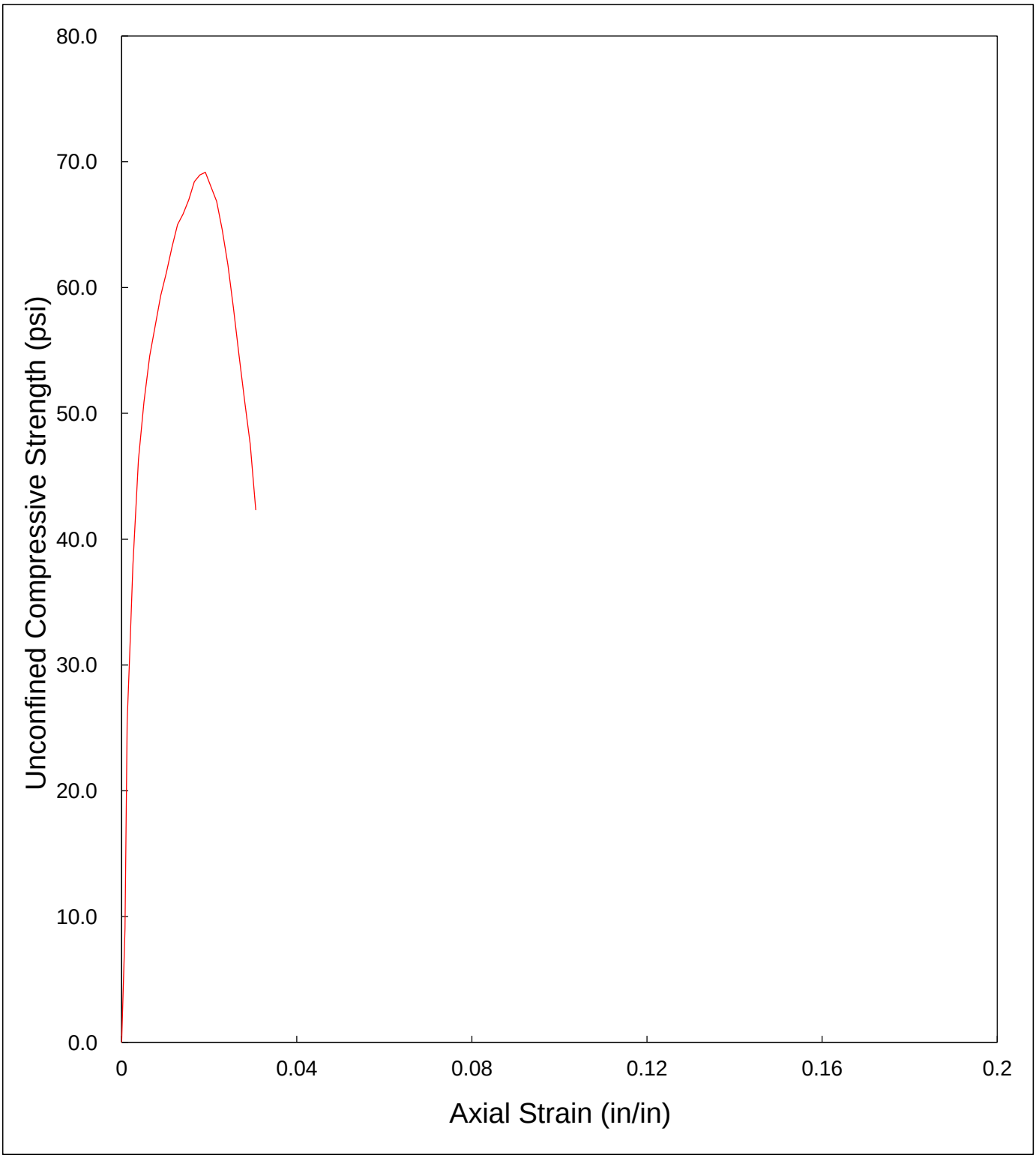
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.91	in.
No. 2	2.02	in.	3.92	in.
No. 3	2.03	in.	3.92	in.
Average	**2.02**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***367.63***	***g***
Initial Area, Ao	3.20	in^2
Initial Volume, Vo	12.55	in^3
Initial Bulk Unit Weight,	111.6	lb/ft^3
Initial Dry Unit Weight	84.1	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	69.2	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.205	0.0000	0.0
29	0.003	0.003	3.207	0.0008	9.0
82	0.005	0.005	3.209	0.0013	25.6
98	0.007	0.007	3.210	0.0018	30.5
122	0.010	0.010	3.213	0.0026	38.0
149	0.015	0.015	3.217	0.0038	46.3
164	0.020	0.020	3.221	0.0051	50.9
176	0.025	0.025	3.225	0.0064	54.6
184	0.030	0.030	3.229	0.0077	57.0
192	0.035	0.035	3.234	0.0089	59.4
198	0.040	0.040	3.238	0.0102	61.2
205	0.045	0.045	3.242	0.0115	63.2
211	0.050	0.050	3.246	0.0128	65.0
214	0.055	0.055	3.250	0.0140	65.8
218	0.060	0.060	3.255	0.0153	67.0
223	0.065	0.065	3.259	0.0166	68.4
225	0.070	0.070	3.263	0.0179	69.0
226	0.075	0.075	3.267	0.0191	69.2
219	0.085	0.085	3.276	0.0217	66.9
212	0.090	0.090	3.280	0.0230	64.6
203	0.095	0.095	3.284	0.0243	61.8
192	0.100	0.100	3.289	0.0255	58.4
180	0.105	0.105	3.293	0.0268	54.7
168	0.110	0.110	3.297	0.0281	51.0
157	0.115	0.115	3.302	0.0294	47.6
140	0.120	0.120	3.306	0.0306	42.3

UNCONFINED COMPRESSION TESTING

Sample No. 0397-001 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-001 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7604_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	32.7	**%**
BULK UNIT WEIGHT	111.6	lb/ft^3
DRY UNIT WEIGHT	84.1	lb/ft^3
UCS *	69.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-002 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7605_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-002 (9 day)	
2. WT MOISTURE TIN (tare weight)	67.01	g
3. WT WET SOIL + TARE	179.94	g
4. WT DRY SOIL + TARE	152.76	g
5. WT WATER, Ww	27.18	g
6. WT DRY SOIL, Ws	85.75	g
7. MOISTURE CONTENT, W	**31.70**	**%**

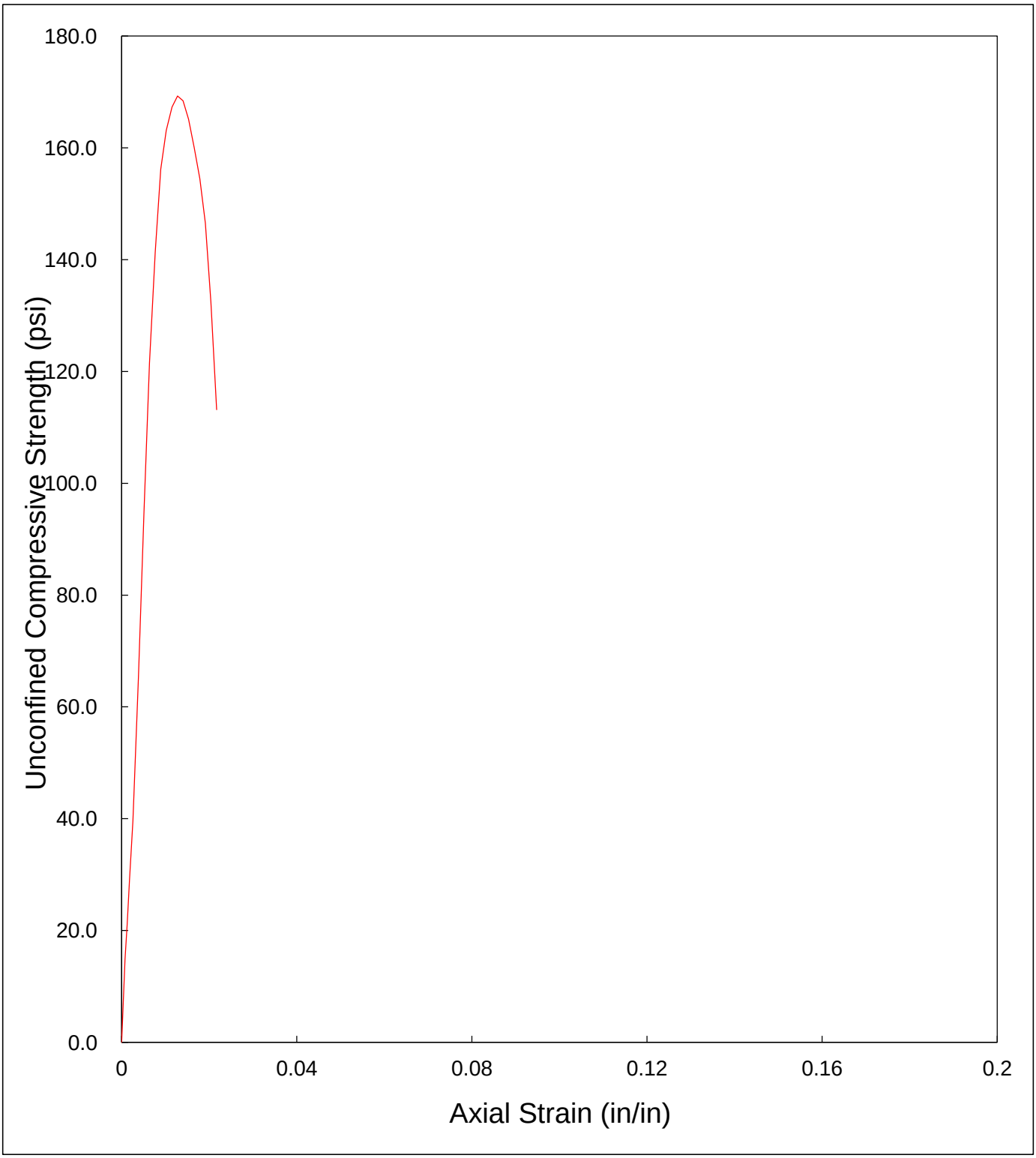
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.92	in.
No. 2	2.01	in.	3.92	in.
No. 3	2.01	in.	3.92	in.
Average	**2.01**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***373.58***	***g***
Initial Area, Ao	3.17	in^2
Initial Volume, Vo	12.44	in^3
Initial Bulk Unit Weight,	114.4	lb/ft^3
Initial Dry Unit Weight	86.9	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	169.3	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.173	0.0000	0.0
47	0.003	0.003	3.176	0.0008	14.8
67	0.005	0.005	3.177	0.0013	21.1
93	0.007	0.007	3.179	0.0018	29.3
126	0.010	0.010	3.181	0.0026	39.6
208	0.015	0.015	3.185	0.0038	65.3
302	0.020	0.020	3.189	0.0051	94.7
388	0.025	0.025	3.193	0.0064	121.5
452	0.030	0.030	3.198	0.0077	141.4
500	0.035	0.035	3.202	0.0089	156.2
523	0.040	0.040	3.206	0.0102	163.1
537	0.045	0.045	3.210	0.0115	167.3
544	0.050	0.050	3.214	0.0128	169.3
542	0.055	0.055	3.218	0.0140	168.4
532	0.060	0.060	3.222	0.0153	165.1
516	0.065	0.065	3.227	0.0166	159.9
499	0.070	0.070	3.231	0.0179	154.5
474	0.075	0.075	3.235	0.0191	146.5
429	0.080	0.080	3.239	0.0204	132.4
367	0.085	0.085	3.243	0.0217	113.2

UNCONFINED COMPRESSION TESTING

Sample No. 0397-002 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-002 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7605_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	31.7	**%**
BULK UNIT WEIGHT	114.4	lb/ft^3
DRY UNIT WEIGHT	86.9	lb/ft^3
UCS *	169.3	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-003 (8 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7606_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-003 (8 day)	
2. WT MOISTURE TIN (tare weight)	68.86	g
3. WT WET SOIL + TARE	145.15	g
4. WT DRY SOIL + TARE	120.60	g
5. WT WATER, Ww	24.55	g
6. WT DRY SOIL, Ws	51.74	g
7. MOISTURE CONTENT, W	**47.45**	**%**

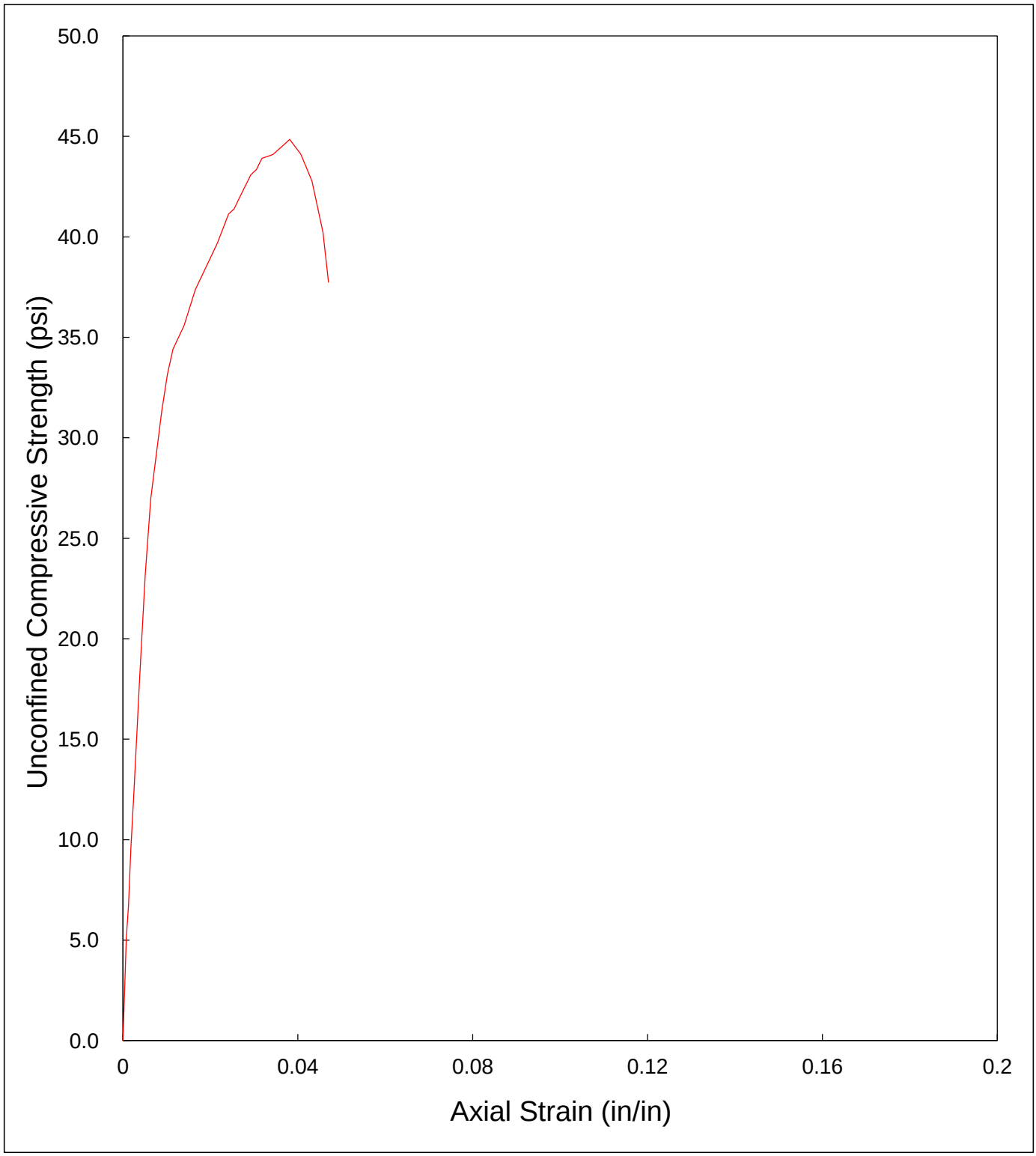
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.94	in.
No. 2	2.00	in.	3.94	in.
No. 3	2.00	in.	3.92	in.
Average	**2.00**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***348.87***	***g***
Initial Area, Ao	3.13	in^2
Initial Volume, Vo	12.32	in^3
Initial Bulk Unit Weight,	107.9	lb/ft^3
Initial Dry Unit Weight	73.2	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	44.9	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.131	0.0000	0.0
16	0.003	0.003	3.134	0.0008	5.1
21	0.005	0.005	3.135	0.0013	6.7
30	0.007	0.007	3.137	0.0018	9.6
39	0.010	0.010	3.139	0.0025	12.4
57	0.015	0.015	3.143	0.0038	18.1
73	0.020	0.020	3.147	0.0051	23.2
85	0.025	0.025	3.151	0.0064	27.0
99	0.035	0.035	3.159	0.0089	31.3
105	0.040	0.040	3.163	0.0102	33.2
109	0.045	0.045	3.167	0.0114	34.4
113	0.055	0.055	3.176	0.0140	35.6
119	0.065	0.065	3.184	0.0165	37.4
123	0.075	0.075	3.192	0.0191	38.5
127	0.085	0.085	3.200	0.0216	39.7
132	0.095	0.095	3.209	0.0242	41.1
133	0.100	0.100	3.213	0.0254	41.4
135	0.105	0.105	3.217	0.0267	42.0
139	0.115	0.115	3.225	0.0292	43.1
140	0.120	0.120	3.230	0.0305	43.3
142	0.125	0.125	3.234	0.0318	43.9
143	0.135	0.135	3.242	0.0343	44.1
145	0.145	0.145	3.251	0.0369	44.6
146	0.150	0.150	3.255	0.0381	44.9
144	0.160	0.160	3.264	0.0407	44.1
142	0.165	0.165	3.268	0.0419	43.4
140	0.170	0.170	3.273	0.0432	42.8
136	0.175	0.175	3.277	0.0445	41.5
132	0.180	0.180	3.281	0.0458	40.2
124	0.185	0.185	3.286	0.0470	37.7

UNCONFINED COMPRESSION TESTING

Sample No. 0397-003 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-003 (8 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7606_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	47.4	**%**
BULK UNIT WEIGHT	107.9	lb/ft^3
DRY UNIT WEIGHT	73.2	lb/ft^3
UCS *	44.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-004 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7607_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-004 (9 day)	
2. WT MOISTURE TIN (tare weight)	66.40	g
3. WT WET SOIL + TARE	165.80	g
4. WT DRY SOIL + TARE	137.76	g
5. WT WATER, Ww	28.04	g
6. WT DRY SOIL, Ws	71.36	g
7. MOISTURE CONTENT, W	**39.29**	**%**

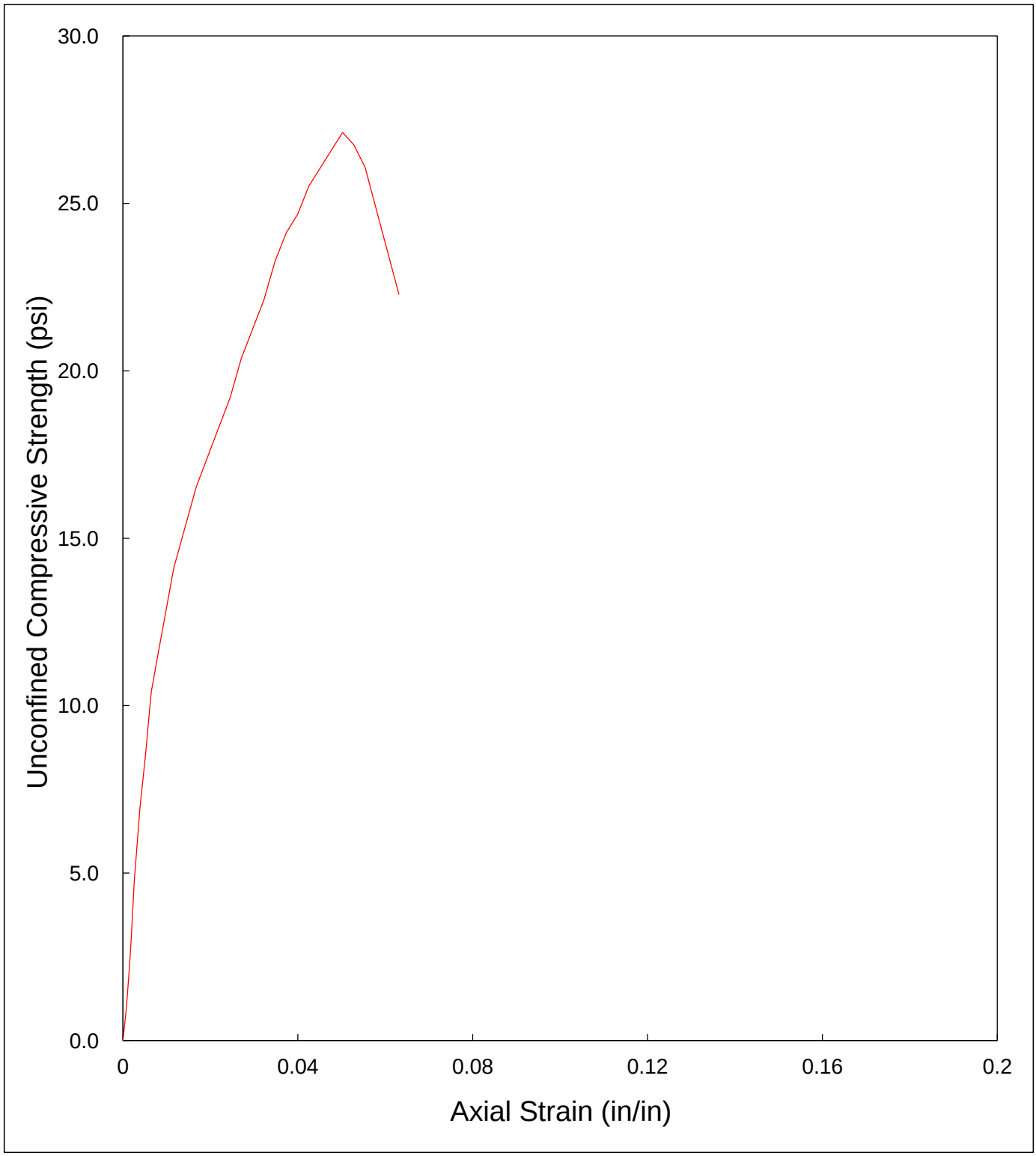
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.88	in.
No. 2	2.00	in.	3.88	in.
No. 3	2.01	in.	3.88	in.
Average	**2.00**	**in.**	**3.88**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***357.82***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	12.23	in^3
Initial Bulk Unit Weight,	111.5	lb/ft^3
Initial Dry Unit Weight	80.0	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	27.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.152	0.0000	0.0
3	0.003	0.003	3.155	0.0008	1.0
6	0.005	0.005	3.156	0.0013	1.9
9	0.007	0.007	3.158	0.0018	2.9
15	0.010	0.010	3.160	0.0026	4.7
22	0.015	0.015	3.164	0.0039	7.0
27	0.020	0.020	3.168	0.0052	8.5
33	0.025	0.025	3.173	0.0064	10.4
36	0.030	0.030	3.177	0.0077	11.3
39	0.035	0.035	3.181	0.0090	12.3
45	0.045	0.045	3.189	0.0116	14.1
49	0.055	0.055	3.197	0.0142	15.3
53	0.065	0.065	3.206	0.0168	16.5
56	0.075	0.075	3.214	0.0193	17.4
59	0.085	0.085	3.223	0.0219	18.3
62	0.095	0.095	3.231	0.0245	19.2
66	0.105	0.105	3.240	0.0271	20.4
69	0.115	0.115	3.248	0.0296	21.2
72	0.125	0.125	3.257	0.0322	22.1
76	0.135	0.135	3.266	0.0348	23.3
79	0.145	0.145	3.274	0.0374	24.1
81	0.155	0.155	3.283	0.0399	24.7
84	0.165	0.165	3.292	0.0425	25.5
86	0.175	0.175	3.301	0.0451	26.1
88	0.185	0.185	3.310	0.0477	26.6
90	0.195	0.195	3.319	0.0503	27.1
89	0.205	0.205	3.328	0.0528	26.7
87	0.215	0.215	3.337	0.0554	26.1
83	0.225	0.225	3.346	0.0580	24.8
79	0.235	0.235	3.355	0.0606	23.5
75	0.245	0.245	3.365	0.0631	22.3

UNCONFINED COMPRESSION TESTING

Sample No. 0397-004 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-004 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7607_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	39.3	**%**
BULK UNIT WEIGHT	111.5	lb/ft^3
DRY UNIT WEIGHT	80.0	lb/ft^3
UCS *	27.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-005 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7608_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-005 (8 day)	
2. WT MOISTURE TIN (tare weight)	50.97	g
3. WT WET SOIL + TARE	136.48	g
4. WT DRY SOIL + TARE	110.20	g
5. WT WATER, Ww	26.28	g
6. WT DRY SOIL, Ws	59.23	g
7. MOISTURE CONTENT, W	**44.37**	**%**

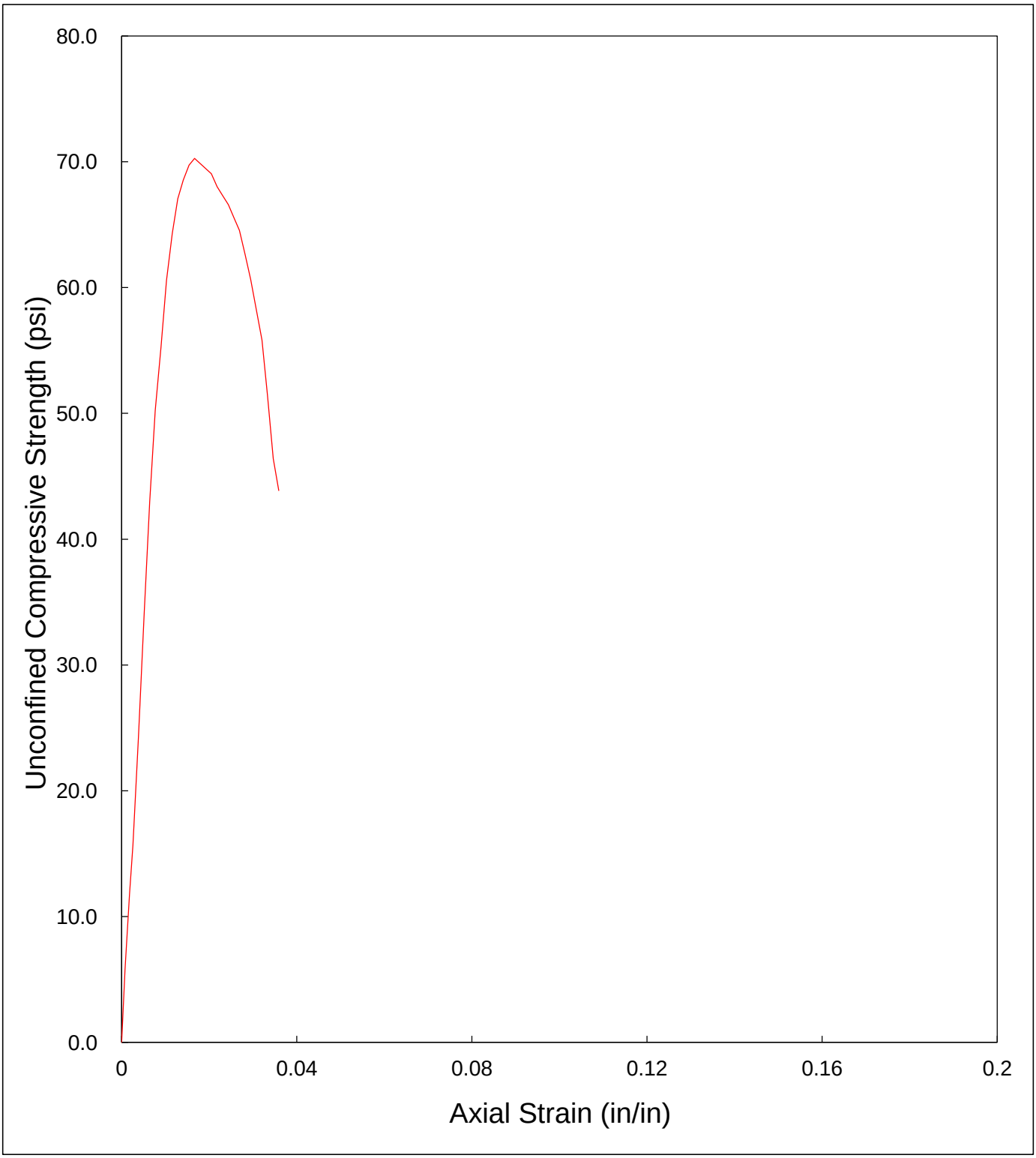
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.98	in.	3.90	in.
No. 2	1.99	in.	3.90	in.
No. 3	2.01	in.	3.90	in.
Average	**1.99**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***347.02***	***g***
Initial Area, Ao	3.12	in^2
Initial Volume, Vo	12.17	in^3
Initial Bulk Unit Weight,	108.6	lb/ft^3
Initial Dry Unit Weight	75.2	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	70.3	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.121	0.0000	0.0
18	0.003	0.003	3.123	0.0008	5.8
27	0.005	0.005	3.125	0.0013	8.6
37	0.007	0.007	3.126	0.0018	11.8
49	0.010	0.010	3.129	0.0026	15.7
76	0.015	0.015	3.133	0.0038	24.3
107	0.020	0.020	3.137	0.0051	34.1
135	0.025	0.025	3.141	0.0064	43.0
158	0.030	0.030	3.145	0.0077	50.2
174	0.035	0.035	3.149	0.0090	55.3
191	0.040	0.040	3.153	0.0103	60.6
203	0.045	0.045	3.157	0.0115	64.3
212	0.050	0.050	3.161	0.0128	67.1
217	0.055	0.055	3.165	0.0141	68.6
221	0.060	0.060	3.169	0.0154	69.7
223	0.065	0.065	3.174	0.0167	70.3
221	0.075	0.075	3.182	0.0192	69.5
220	0.080	0.080	3.186	0.0205	69.1
217	0.085	0.085	3.190	0.0218	68.0
215	0.090	0.090	3.194	0.0231	67.3
213	0.095	0.095	3.199	0.0244	66.6
210	0.100	0.100	3.203	0.0256	65.6
207	0.105	0.105	3.207	0.0269	64.5
201	0.110	0.110	3.211	0.0282	62.6
195	0.115	0.115	3.215	0.0295	60.6
180	0.125	0.125	3.224	0.0321	55.8
166	0.130	0.130	3.228	0.0333	51.4
150	0.135	0.135	3.233	0.0346	46.4
142	0.140	0.140	3.237	0.0359	43.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-005 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-005 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7608_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	44.4	**%**
BULK UNIT WEIGHT	108.6	lb/ft^3
DRY UNIT WEIGHT	75.2	lb/ft^3
UCS *	70.3	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-006 (8 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7609_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-006 (8 day)	
2. WT MOISTURE TIN (tare weight)	233.02	g
3. WT WET SOIL + TARE	354.66	g
4. WT DRY SOIL + TARE	324.97	g
5. WT WATER, Ww	29.69	g
6. WT DRY SOIL, Ws	91.95	g
7. MOISTURE CONTENT, W	**32.29**	**%**

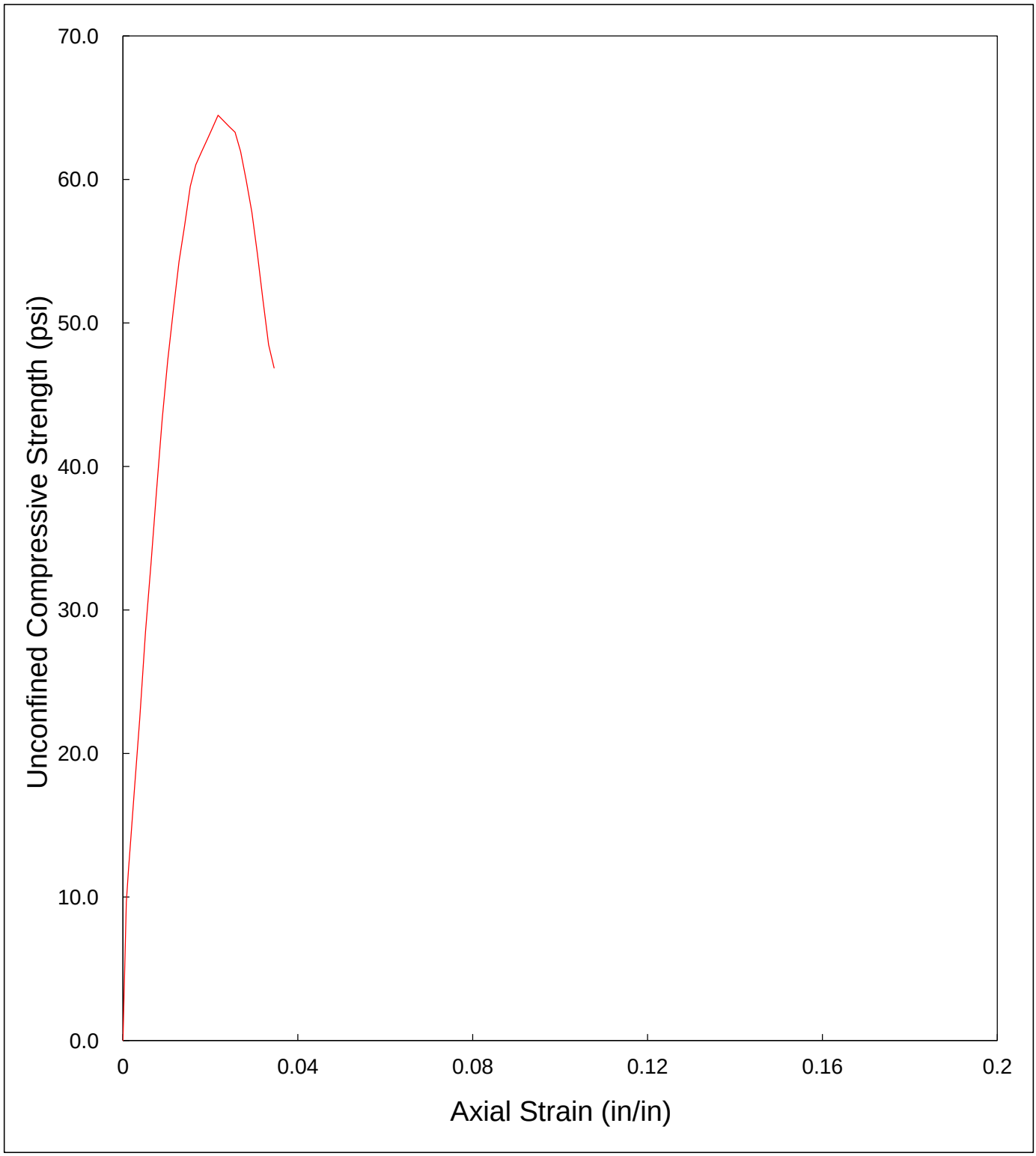
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.90	in.
No. 2	1.99	in.	3.91	in.
No. 3	1.99	in.	3.90	in.
Average	**1.99**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***373.95***	***g***
Initial Area, Ao	3.11	in^2
Initial Volume, Vo	12.14	in^3
Initial Bulk Unit Weight,	117.3	lb/ft^3
Initial Dry Unit Weight	88.7	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	64.5	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.110	0.0000	0.0
30	0.003	0.003	3.113	0.0008	9.6
37	0.005	0.005	3.114	0.0013	11.9
44	0.007	0.007	3.116	0.0018	14.1
54	0.010	0.010	3.118	0.0026	17.3
70	0.015	0.015	3.122	0.0038	22.4
89	0.020	0.020	3.126	0.0051	28.5
104	0.025	0.025	3.130	0.0064	33.2
120	0.030	0.030	3.134	0.0077	38.3
136	0.035	0.035	3.138	0.0090	43.3
149	0.040	0.040	3.142	0.0102	47.4
160	0.045	0.045	3.147	0.0115	50.8
171	0.050	0.050	3.151	0.0128	54.3
179	0.055	0.055	3.155	0.0141	56.7
188	0.060	0.060	3.159	0.0154	59.5
193	0.065	0.065	3.163	0.0167	61.0
196	0.070	0.070	3.167	0.0179	61.9
199	0.075	0.075	3.171	0.0192	62.8
202	0.080	0.080	3.175	0.0205	63.6
205	0.085	0.085	3.179	0.0218	64.5
203	0.095	0.095	3.188	0.0243	63.7
202	0.100	0.100	3.192	0.0256	63.3
198	0.105	0.105	3.196	0.0269	61.9
192	0.110	0.110	3.200	0.0282	60.0
185	0.115	0.115	3.205	0.0295	57.7
176	0.120	0.120	3.209	0.0307	54.8
166	0.125	0.125	3.213	0.0320	51.7
156	0.130	0.130	3.217	0.0333	48.5
151	0.135	0.135	3.222	0.0346	46.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-006 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-006 (8 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7609_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	32.3	**%**
BULK UNIT WEIGHT	117.3	lb/ft^3
DRY UNIT WEIGHT	88.7	lb/ft^3
UCS *	64.5	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-008 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7610_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-008 (9 day)	
2. WT MOISTURE TIN (tare weight)	63.54	g
3. WT WET SOIL + TARE	152.51	g
4. WT DRY SOIL + TARE	129.83	g
5. WT WATER, Ww	22.68	g
6. WT DRY SOIL, Ws	66.29	g
7. MOISTURE CONTENT, W	**34.21**	**%**

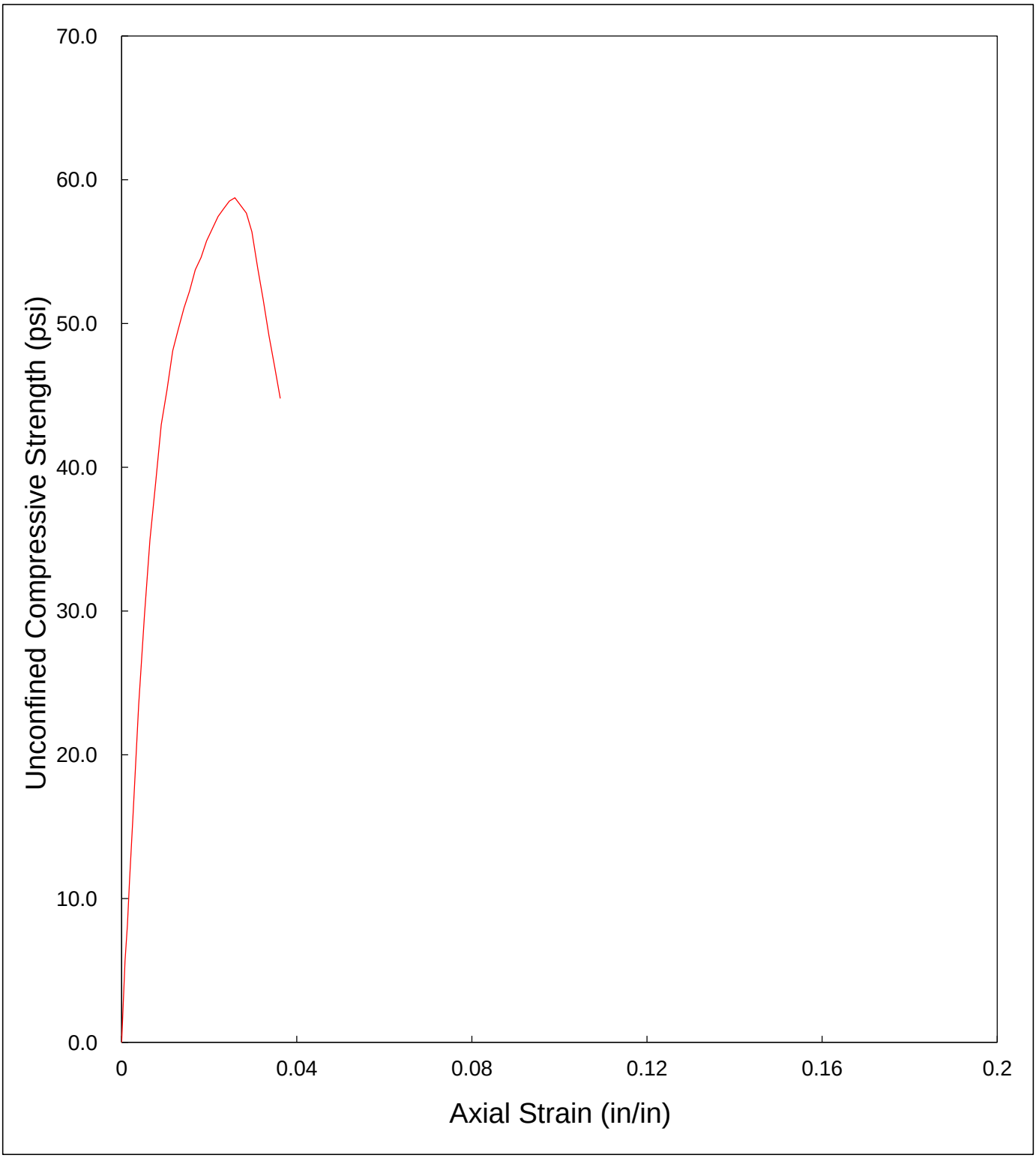
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.86	in.
No. 2	2.01	in.	3.86	in.
No. 3	2.03	in.	3.87	in.
Average	**2.01**	**in.**	**3.86**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***367.30***	***g***
Initial Area, Ao	3.18	in^2
Initial Volume, Vo	12.30	in^3
Initial Bulk Unit Weight,	113.8	lb/ft^3
Initial Dry Unit Weight	84.8	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	58.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.184	0.0000	0.0
18	0.003	0.003	3.186	0.0008	5.6
26	0.005	0.005	3.188	0.0013	8.2
36	0.007	0.007	3.189	0.0018	11.3
50	0.010	0.010	3.192	0.0026	15.7
75	0.015	0.015	3.196	0.0039	23.5
95	0.020	0.020	3.200	0.0052	29.7
112	0.025	0.025	3.204	0.0065	35.0
125	0.030	0.030	3.209	0.0078	39.0
138	0.035	0.035	3.213	0.0091	43.0
146	0.040	0.040	3.217	0.0104	45.4
155	0.045	0.045	3.221	0.0116	48.1
160	0.050	0.050	3.225	0.0129	49.6
165	0.055	0.055	3.230	0.0142	51.1
169	0.060	0.060	3.234	0.0155	52.3
174	0.065	0.065	3.238	0.0168	53.7
177	0.070	0.070	3.242	0.0181	54.6
181	0.075	0.075	3.247	0.0194	55.7
184	0.080	0.080	3.251	0.0207	56.6
187	0.085	0.085	3.255	0.0220	57.4
189	0.090	0.090	3.260	0.0233	58.0
191	0.095	0.095	3.264	0.0246	58.5
192	0.100	0.100	3.268	0.0259	58.7
189	0.110	0.110	3.277	0.0285	57.7
185	0.115	0.115	3.281	0.0298	56.4
177	0.120	0.120	3.286	0.0311	53.9
170	0.125	0.125	3.290	0.0324	51.7
162	0.130	0.130	3.294	0.0336	49.2
155	0.135	0.135	3.299	0.0349	47.0
148	0.140	0.140	3.303	0.0362	44.8

UNCONFINED COMPRESSION TESTING

Sample No. 0397-008 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-008 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7610_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.2	**%**
BULK UNIT WEIGHT	113.8	lb/ft^3
DRY UNIT WEIGHT	84.8	lb/ft^3
UCS *	58.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-009 (8 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7611_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-009 (8 day)	
2. WT MOISTURE TIN (tare weight)	88.28	g
3. WT WET SOIL + TARE	167.92	g
4. WT DRY SOIL + TARE	141.81	g
5. WT WATER, Ww	26.11	g
6. WT DRY SOIL, Ws	53.53	g
7. MOISTURE CONTENT, W	**48.78**	**%**

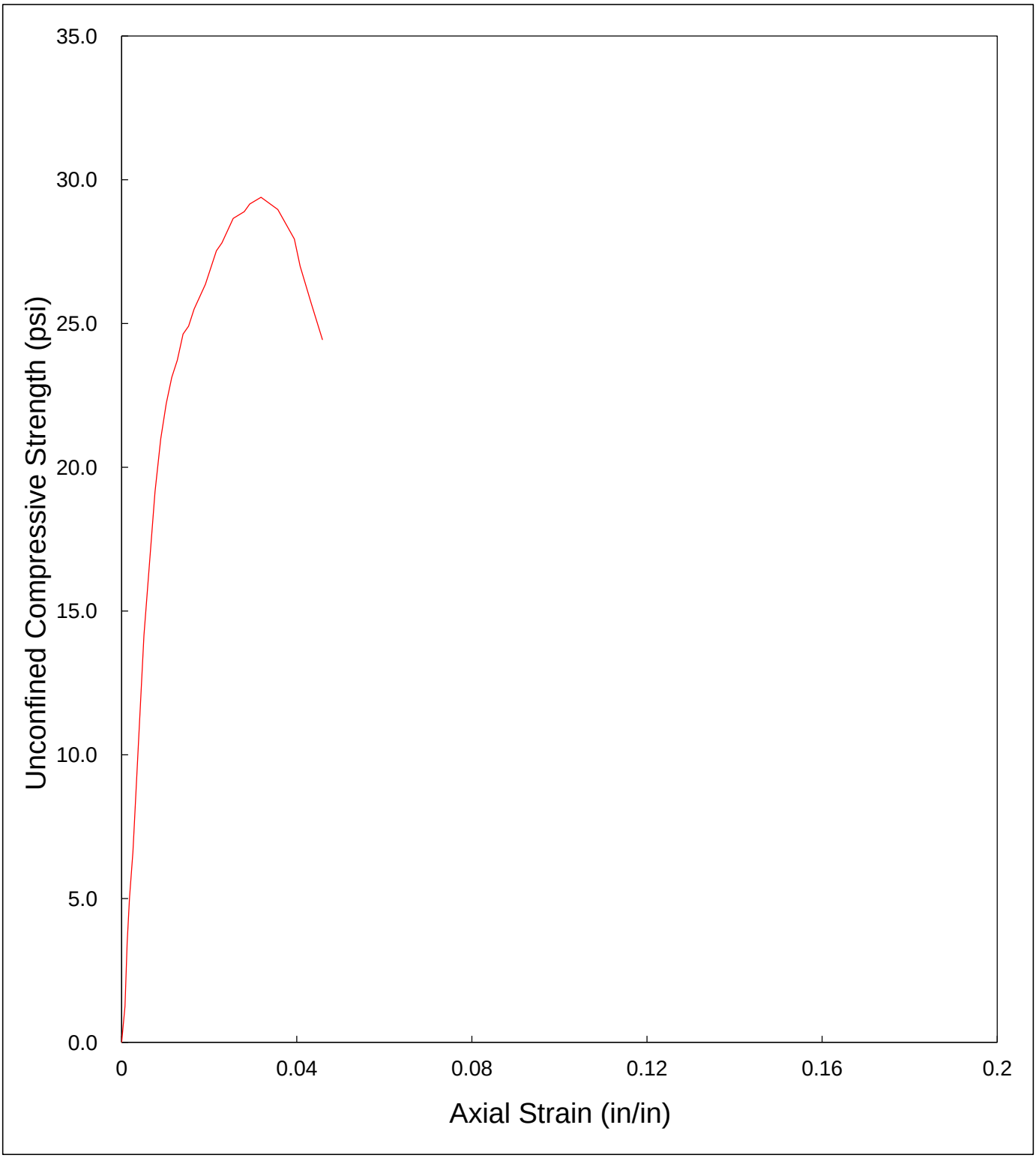
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.92	in.
No. 2	2.01	in.	3.93	in.
No. 3	2.01	in.	3.93	in.
Average	**2.01**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***344.20***	***g***
Initial Area, Ao	3.16	in^2
Initial Volume, Vo	12.42	in^3
Initial Bulk Unit Weight,	105.6	lb/ft^3
Initial Dry Unit Weight	71.0	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	29.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.163	0.0000	0.0
4	0.003	0.003	3.165	0.0008	1.3
11	0.005	0.005	3.167	0.0013	3.5
16	0.007	0.007	3.168	0.0018	5.1
21	0.010	0.010	3.171	0.0025	6.6
33	0.015	0.015	3.175	0.0038	10.4
45	0.020	0.020	3.179	0.0051	14.2
53	0.025	0.025	3.183	0.0064	16.7
61	0.030	0.030	3.187	0.0076	19.1
67	0.035	0.035	3.191	0.0089	21.0
71	0.040	0.040	3.195	0.0102	22.2
74	0.045	0.045	3.199	0.0115	23.1
76	0.050	0.050	3.203	0.0127	23.7
79	0.055	0.055	3.207	0.0140	24.6
80	0.060	0.060	3.212	0.0153	24.9
82	0.065	0.065	3.216	0.0166	25.5
85	0.075	0.075	3.224	0.0191	26.4
87	0.080	0.080	3.228	0.0204	26.9
89	0.085	0.085	3.233	0.0216	27.5
90	0.090	0.090	3.237	0.0229	27.8
93	0.100	0.100	3.245	0.0255	28.7
94	0.110	0.110	3.254	0.0280	28.9
95	0.115	0.115	3.258	0.0293	29.2
96	0.125	0.125	3.267	0.0318	29.4
95	0.140	0.140	3.279	0.0357	29.0
94	0.145	0.145	3.284	0.0369	28.6
93	0.150	0.150	3.288	0.0382	28.3
92	0.155	0.155	3.293	0.0395	27.9
89	0.160	0.160	3.297	0.0407	27.0
85	0.170	0.170	3.306	0.0433	25.7
81	0.180	0.180	3.315	0.0458	24.4

UNCONFINED COMPRESSION TESTING

Sample No. 0397-009 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-009 (8 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7611_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	48.8	**%**
BULK UNIT WEIGHT	105.6	lb/ft^3
DRY UNIT WEIGHT	71.0	lb/ft^3
UCS *	29.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-010 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7612_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-010 (9 day)	
2. WT MOISTURE TIN (tare weight)	63.35	g
3. WT WET SOIL + TARE	117.91	g
4. WT DRY SOIL + TARE	107.33	g
5. WT WATER, Ww	10.58	g
6. WT DRY SOIL, Ws	43.98	g
7. MOISTURE CONTENT, W	**24.06**	**%**

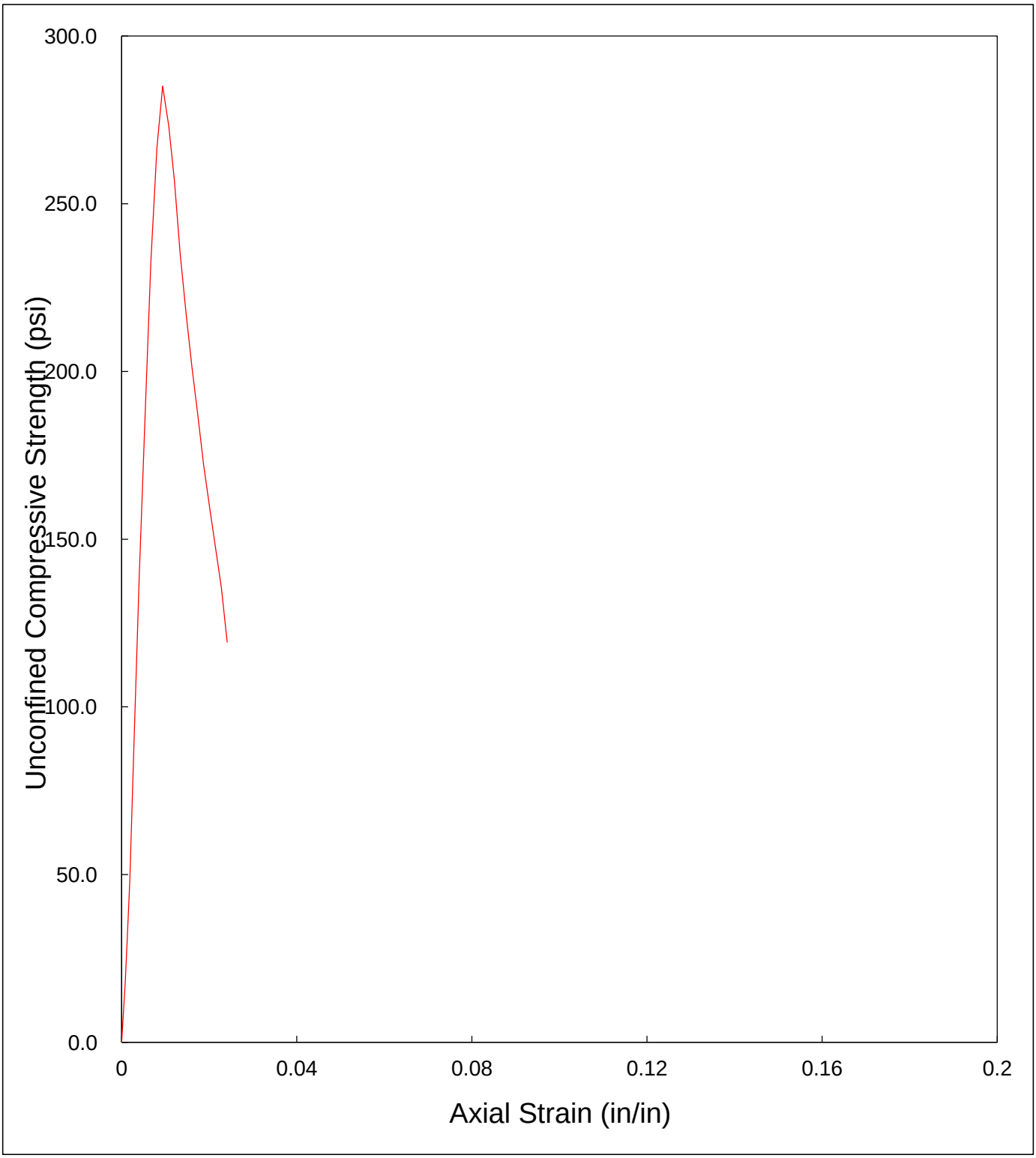
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.98	in.	3.73	in.
No. 2	1.97	in.	3.73	in.
No. 3	1.98	in.	3.74	in.
Average	**1.98**	**in.**	**3.73**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***382.14***	***g***
Initial Area, Ao	3.07	in^2
Initial Volume, Vo	11.46	in^3
Initial Bulk Unit Weight,	127.1	lb/ft^3
Initial Dry Unit Weight	102.4	lb/ft^3
15 % Strain (0.15 Lo)	0.56	in.
UCS	285.0	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.069	0.0000	0.0
55	0.003	0.003	3.071	0.0008	17.9
98	0.005	0.005	3.073	0.0013	31.9
148	0.007	0.007	3.074	0.0019	48.1
257	0.010	0.010	3.077	0.0027	83.5
426	0.015	0.015	3.081	0.0040	138.3
578	0.020	0.020	3.085	0.0054	187.3
720	0.025	0.025	3.089	0.0067	233.1
825	0.030	0.030	3.094	0.0080	266.7
883	0.035	0.035	3.098	0.0094	285.0
848	0.040	0.040	3.102	0.0107	273.4
798	0.045	0.045	3.106	0.0121	256.9
731	0.050	0.050	3.110	0.0134	235.0
676	0.055	0.055	3.115	0.0147	217.0
628	0.060	0.060	3.119	0.0161	201.4
583	0.065	0.065	3.123	0.0174	186.7
538	0.070	0.070	3.127	0.0188	172.0
499	0.075	0.075	3.132	0.0201	159.3
463	0.080	0.080	3.136	0.0214	147.6
425	0.085	0.085	3.140	0.0228	135.3
375	0.090	0.090	3.145	0.0241	119.3

UNCONFINED COMPRESSION TESTING

Sample No. 0397-010 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-010 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7612_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	24.1	**%**
BULK UNIT WEIGHT	127.1	lb/ft^3
DRY UNIT WEIGHT	102.4	lb/ft^3
UCS *	285.0	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-011 (8 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7613_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-011 (8 day)	
2. WT MOISTURE TIN (tare weight)	69.75	g
3. WT WET SOIL + TARE	145.63	g
4. WT DRY SOIL + TARE	124.32	g
5. WT WATER, Ww	21.31	g
6. WT DRY SOIL, Ws	54.57	g
7. MOISTURE CONTENT, W	**39.05**	**%**

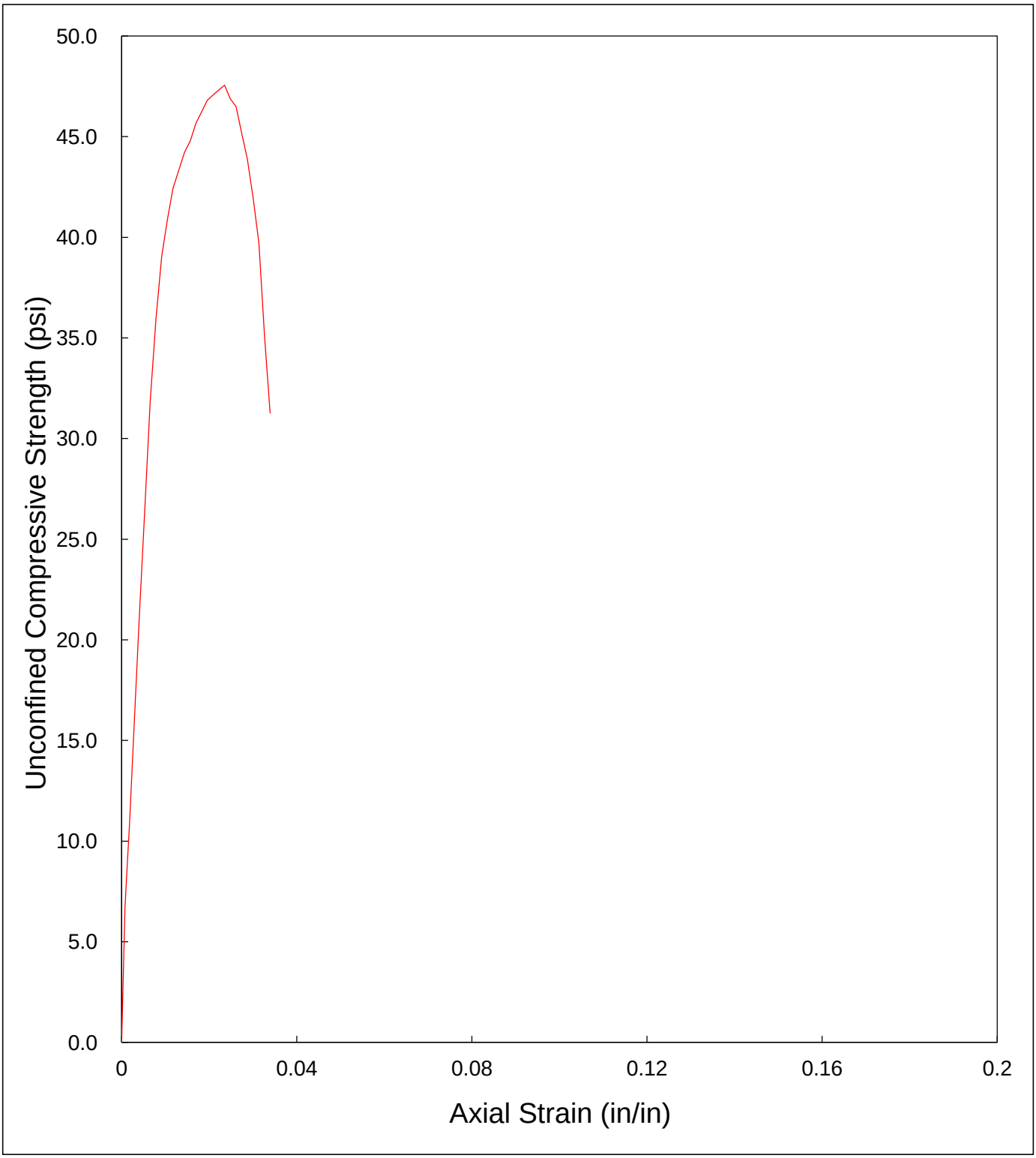
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.82	in.
No. 2	1.99	in.	3.83	in.
No. 3	2.00	in.	3.84	in.
Average	**1.99**	**in.**	**3.83**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***347.17***	***g***
Initial Area, Ao	3.12	in^2
Initial Volume, Vo	11.95	in^3
Initial Bulk Unit Weight,	110.7	lb/ft^3
Initial Dry Unit Weight	79.6	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	47.6	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.121	0.0000	0.0
21	0.003	0.003	3.123	0.0008	6.7
28	0.005	0.005	3.125	0.0013	9.0
34	0.007	0.007	3.126	0.0018	10.9
46	0.010	0.010	3.129	0.0026	14.7
65	0.015	0.015	3.133	0.0039	20.7
82	0.020	0.020	3.137	0.0052	26.1
100	0.025	0.025	3.141	0.0065	31.8
113	0.030	0.030	3.145	0.0078	35.9
123	0.035	0.035	3.149	0.0091	39.1
129	0.040	0.040	3.154	0.0104	40.9
134	0.045	0.045	3.158	0.0117	42.4
137	0.050	0.050	3.162	0.0131	43.3
140	0.055	0.055	3.166	0.0144	44.2
142	0.060	0.060	3.170	0.0157	44.8
145	0.065	0.065	3.175	0.0170	45.7
147	0.070	0.070	3.179	0.0183	46.2
149	0.075	0.075	3.183	0.0196	46.8
150	0.080	0.080	3.187	0.0209	47.1
151	0.085	0.085	3.192	0.0222	47.3
152	0.090	0.090	3.196	0.0235	47.6
150	0.095	0.095	3.200	0.0248	46.9
149	0.100	0.100	3.204	0.0261	46.5
145	0.105	0.105	3.209	0.0274	45.2
141	0.110	0.110	3.213	0.0287	43.9
135	0.115	0.115	3.217	0.0300	42.0
128	0.120	0.120	3.222	0.0313	39.7
113	0.125	0.125	3.226	0.0326	35.0
101	0.130	0.130	3.230	0.0339	31.3

UNCONFINED COMPRESSION TESTING

Sample No. 0397-011 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-011 (8 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7613_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	39.1	**%**
BULK UNIT WEIGHT	110.7	lb/ft^3
DRY UNIT WEIGHT	79.6	lb/ft^3
UCS *	47.6	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-012 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7614_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-012 (8 day)	
2. WT MOISTURE TIN (tare weight)	66.97	g
3. WT WET SOIL + TARE	170.51	g
4. WT DRY SOIL + TARE	140.20	g
5. WT WATER, Ww	30.31	g
6. WT DRY SOIL, Ws	73.23	g
7. MOISTURE CONTENT, W	**41.39**	**%**

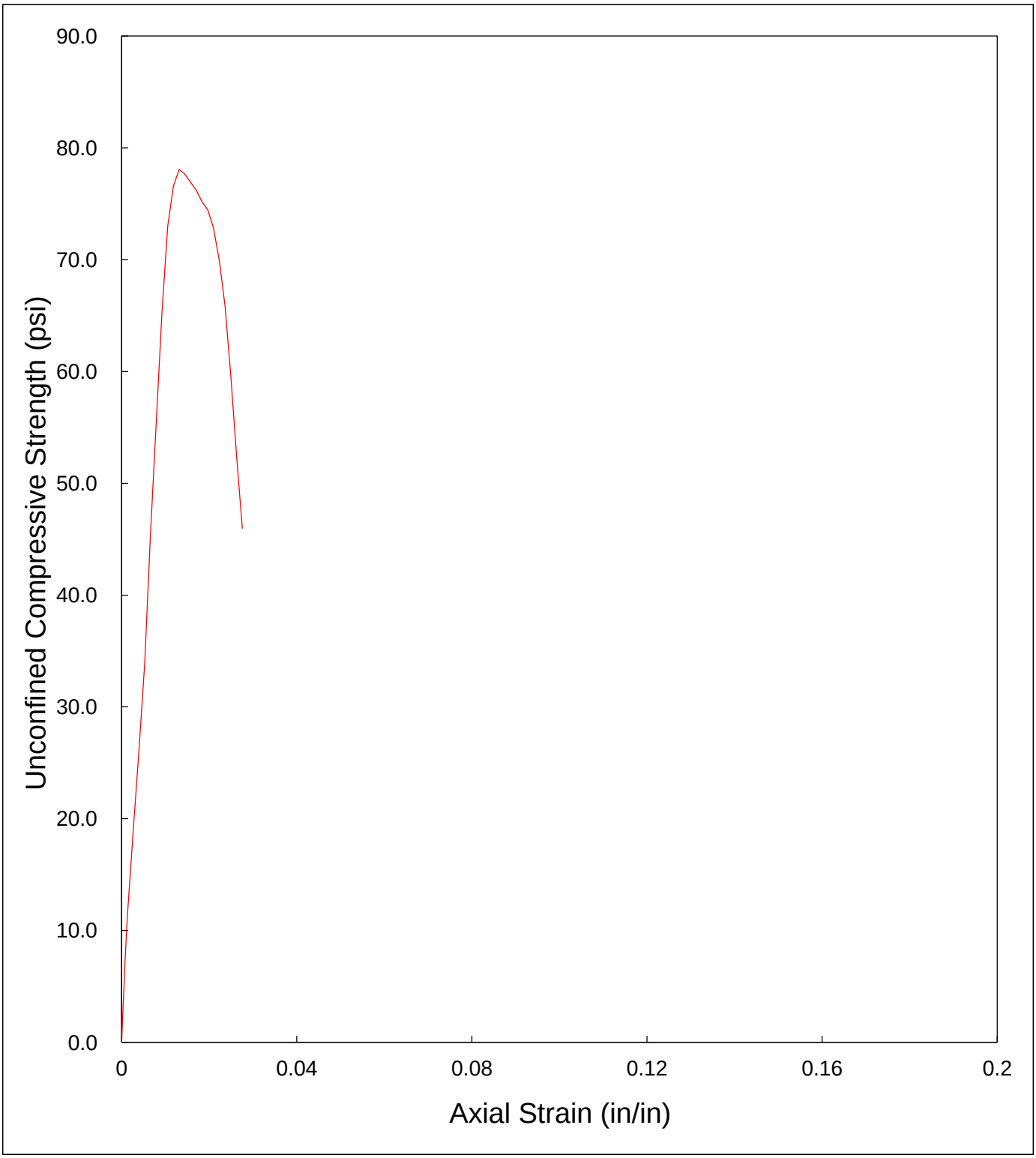
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.80	in.
No. 2	2.01	in.	3.81	in.
No. 3	2.02	in.	3.82	in.
Average	**2.01**	**in.**	**3.81**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***345.37***	***g***
Initial Area, Ao	3.17	in^2
Initial Volume, Vo	12.09	in^3
Initial Bulk Unit Weight,	108.8	lb/ft^3
Initial Dry Unit Weight	77.0	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	78.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.173	0.0000	0.0
23	0.003	0.003	3.176	0.0008	7.2
36	0.005	0.005	3.177	0.0013	11.3
46	0.007	0.007	3.179	0.0018	14.5
60	0.010	0.010	3.181	0.0026	18.9
83	0.015	0.015	3.186	0.0039	26.1
108	0.020	0.020	3.190	0.0052	33.9
145	0.025	0.025	3.194	0.0066	45.4
177	0.030	0.030	3.198	0.0079	55.3
209	0.035	0.035	3.203	0.0092	65.3
234	0.040	0.040	3.207	0.0105	73.0
246	0.045	0.045	3.211	0.0118	76.6
251	0.050	0.050	3.215	0.0131	78.1
250	0.055	0.055	3.220	0.0144	77.7
248	0.060	0.060	3.224	0.0157	76.9
246	0.065	0.065	3.228	0.0171	76.2
243	0.070	0.070	3.232	0.0184	75.2
241	0.075	0.075	3.237	0.0197	74.5
236	0.080	0.080	3.241	0.0210	72.8
227	0.085	0.085	3.245	0.0223	69.9
214	0.090	0.090	3.250	0.0236	65.8
194	0.095	0.095	3.254	0.0249	59.6
171	0.100	0.100	3.259	0.0262	52.5
150	0.105	0.105	3.263	0.0276	46.0

UNCONFINED COMPRESSION TESTING

Sample No. 0397-012 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-012 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7614_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	41.4	**%**
BULK UNIT WEIGHT	108.8	lb/ft^3
DRY UNIT WEIGHT	77.0	lb/ft^3
UCS *	78.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-013 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7615_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-013 (9 day)	
2. WT MOISTURE TIN (tare weight)	63.77	g
3. WT WET SOIL + TARE	155.32	g
4. WT DRY SOIL + TARE	133.78	g
5. WT WATER, Ww	21.54	g
6. WT DRY SOIL, Ws	70.01	g
7. MOISTURE CONTENT, W	**30.77**	**%**

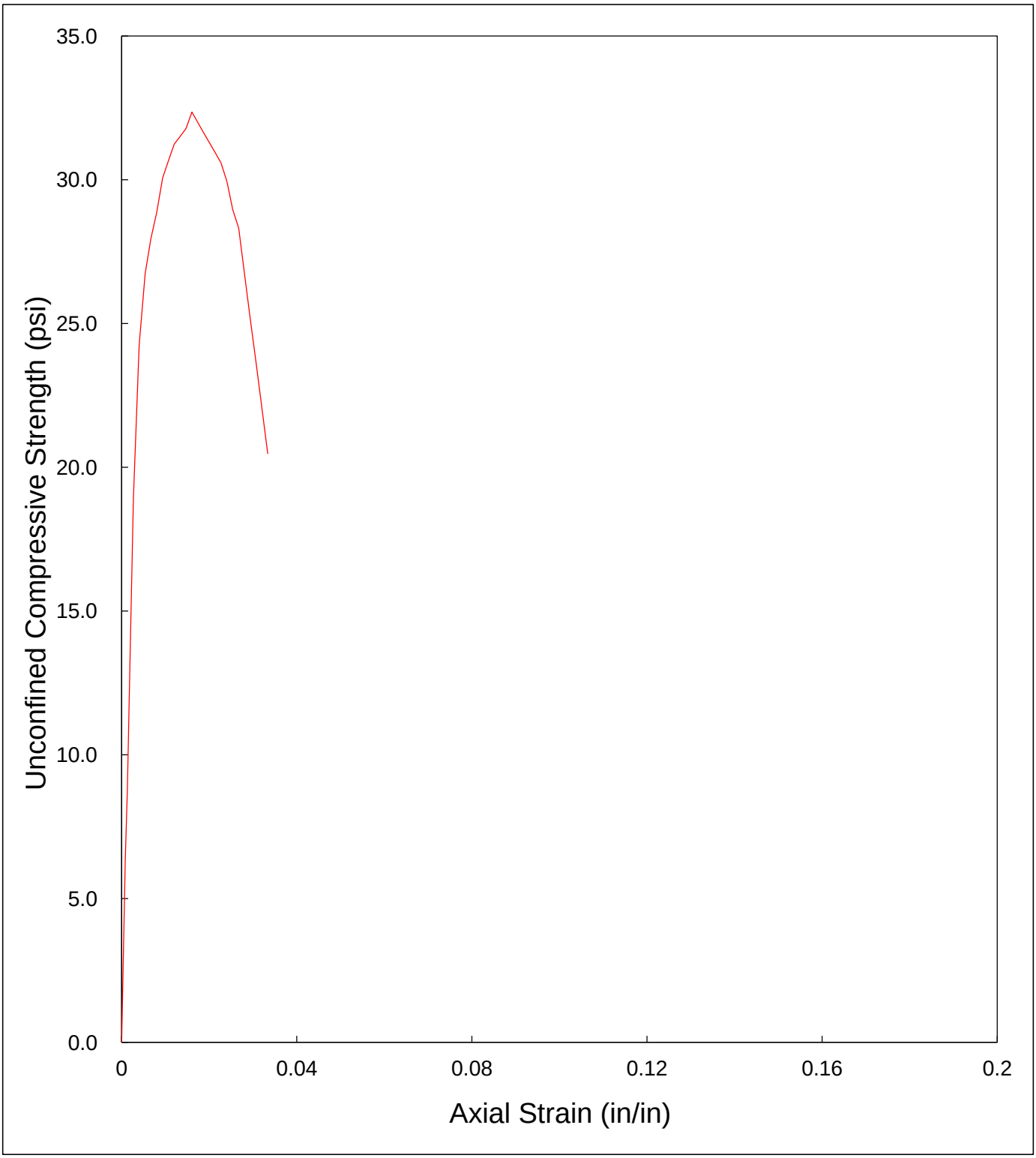
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.76	in.
No. 2	2.01	in.	3.72	in.
No. 3	2.00	in.	3.75	in.
Average	**2.01**	**in.**	**3.74**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***357.81***	***g***
Initial Area, Ao	3.16	in^2
Initial Volume, Vo	11.84	in^3
Initial Bulk Unit Weight,	115.1	lb/ft^3
Initial Dry Unit Weight	88.0	lb/ft^3
15 % Strain (0.15 Lo)	0.56	in.
UCS	32.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.163	0.0000	0.0
20	0.003	0.003	3.165	0.0008	6.3
28	0.005	0.005	3.167	0.0013	8.8
41	0.007	0.007	3.168	0.0019	12.9
60	0.010	0.010	3.171	0.0027	18.9
77	0.015	0.015	3.175	0.0040	24.2
85	0.020	0.020	3.180	0.0053	26.7
89	0.025	0.025	3.184	0.0067	28.0
92	0.030	0.030	3.188	0.0080	28.9
96	0.035	0.035	3.192	0.0093	30.1
98	0.040	0.040	3.197	0.0107	30.7
100	0.045	0.045	3.201	0.0120	31.2
101	0.050	0.050	3.205	0.0134	31.5
102	0.055	0.055	3.210	0.0147	31.8
104	0.060	0.060	3.214	0.0160	32.4
102	0.070	0.070	3.223	0.0187	31.6
100	0.080	0.080	3.232	0.0214	30.9
99	0.085	0.085	3.236	0.0227	30.6
97	0.090	0.090	3.240	0.0240	29.9
94	0.095	0.095	3.245	0.0254	29.0
92	0.100	0.100	3.249	0.0267	28.3
87	0.105	0.105	3.254	0.0280	26.7
82	0.110	0.110	3.258	0.0294	25.2
77	0.115	0.115	3.263	0.0307	23.6
72	0.120	0.120	3.267	0.0321	22.0
67	0.125	0.125	3.272	0.0334	20.5

UNCONFINED COMPRESSION TESTING

Sample No. 0397-013 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-013 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7615_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	30.8	**%**
BULK UNIT WEIGHT	115.1	lb/ft^3
DRY UNIT WEIGHT	88.0	lb/ft^3
UCS *	32.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-014 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7616_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-014 (9 day)	
2. WT MOISTURE TIN (tare weight)	66.10	g
3. WT WET SOIL + TARE	170.64	g
4. WT DRY SOIL + TARE	144.02	g
5. WT WATER, Ww	26.62	g
6. WT DRY SOIL, Ws	77.92	g
7. MOISTURE CONTENT, W	**34.16**	**%**

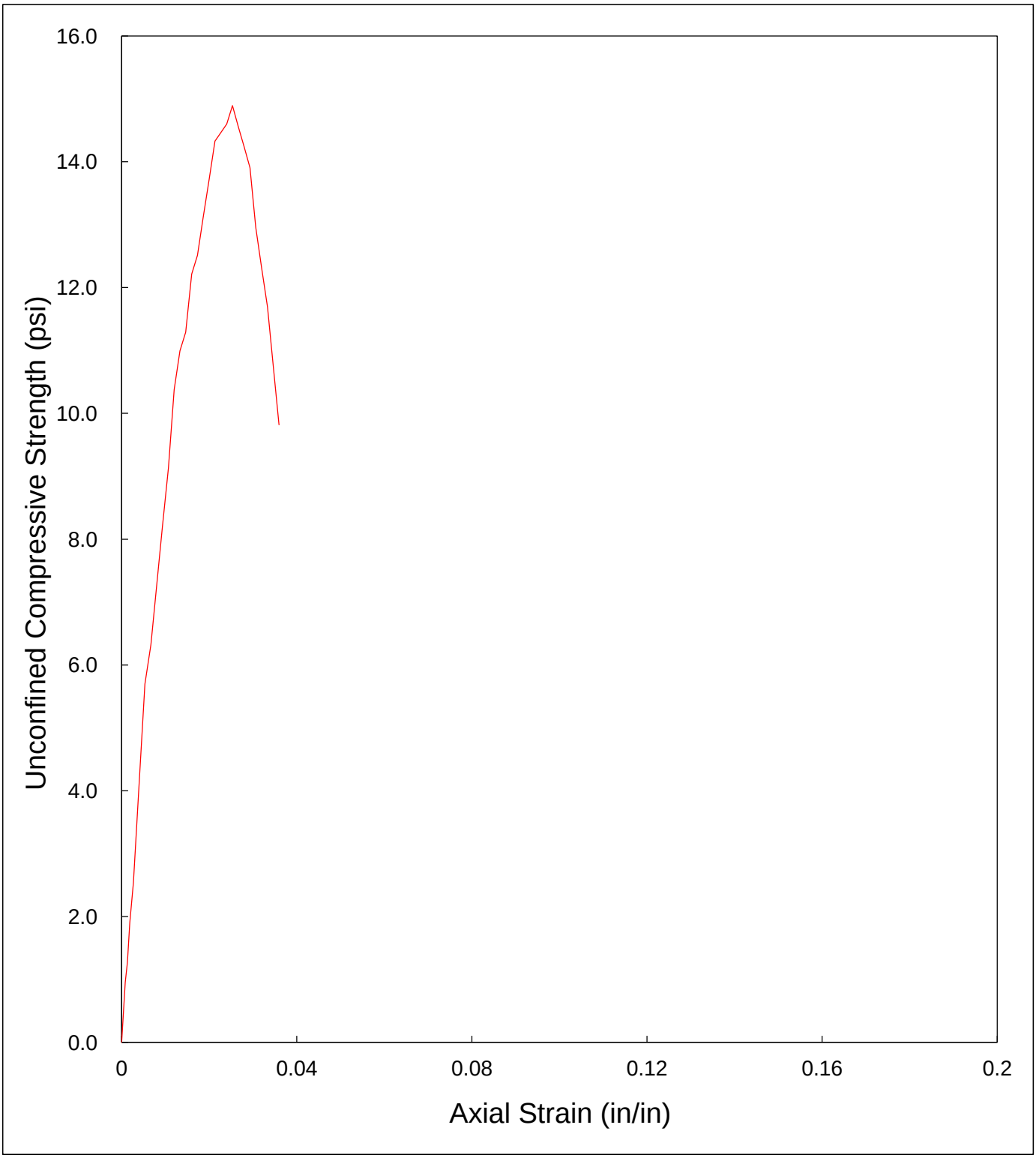
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.75	in.
No. 2	2.00	in.	3.75	in.
No. 3	2.01	in.	3.76	in.
Average	**2.00**	**in.**	**3.75**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***342.34***	***g***
Initial Area, Ao	3.14	in^2
Initial Volume, Vo	11.79	in^3
Initial Bulk Unit Weight,	110.6	lb/ft^3
Initial Dry Unit Weight	82.4	lb/ft^3
15 % Strain (0.15 Lo)	0.56	in.
UCS	14.9	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.142	0.0000	0.0
3	0.003	0.003	3.144	0.0008	1.0
4	0.005	0.005	3.146	0.0013	1.3
6	0.007	0.007	3.147	0.0019	1.9
8	0.010	0.010	3.150	0.0027	2.5
13	0.015	0.015	3.154	0.0040	4.1
18	0.020	0.020	3.158	0.0053	5.7
20	0.025	0.025	3.163	0.0067	6.3
23	0.030	0.030	3.167	0.0080	7.3
26	0.035	0.035	3.171	0.0093	8.2
29	0.040	0.040	3.175	0.0107	9.1
33	0.045	0.045	3.180	0.0120	10.4
35	0.050	0.050	3.184	0.0133	11.0
36	0.055	0.055	3.188	0.0147	11.3
39	0.060	0.060	3.193	0.0160	12.2
40	0.065	0.065	3.197	0.0173	12.5
42	0.070	0.070	3.201	0.0187	13.1
44	0.075	0.075	3.206	0.0200	13.7
46	0.080	0.080	3.210	0.0213	14.3
47	0.090	0.090	3.219	0.0240	14.6
48	0.095	0.095	3.223	0.0253	14.9
47	0.100	0.100	3.228	0.0266	14.6
46	0.105	0.105	3.232	0.0280	14.2
45	0.110	0.110	3.236	0.0293	13.9
42	0.115	0.115	3.241	0.0306	13.0
40	0.120	0.120	3.245	0.0320	12.3
38	0.125	0.125	3.250	0.0333	11.7
35	0.130	0.130	3.254	0.0346	10.8
32	0.135	0.135	3.259	0.0360	9.8

UNCONFINED COMPRESSION TESTING

Sample No. 0397-014 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-014 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7616_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.2	**%**
BULK UNIT WEIGHT	110.6	lb/ft^3
DRY UNIT WEIGHT	82.4	lb/ft^3
UCS *	14.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-015 (9 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7617_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-015 (9 day)	
2. WT MOISTURE TIN (tare weight)	69.19	g
3. WT WET SOIL + TARE	163.49	g
4. WT DRY SOIL + TARE	139.41	g
5. WT WATER, Ww	24.08	g
6. WT DRY SOIL, Ws	70.22	g
7. MOISTURE CONTENT, W	**34.29**	**%**

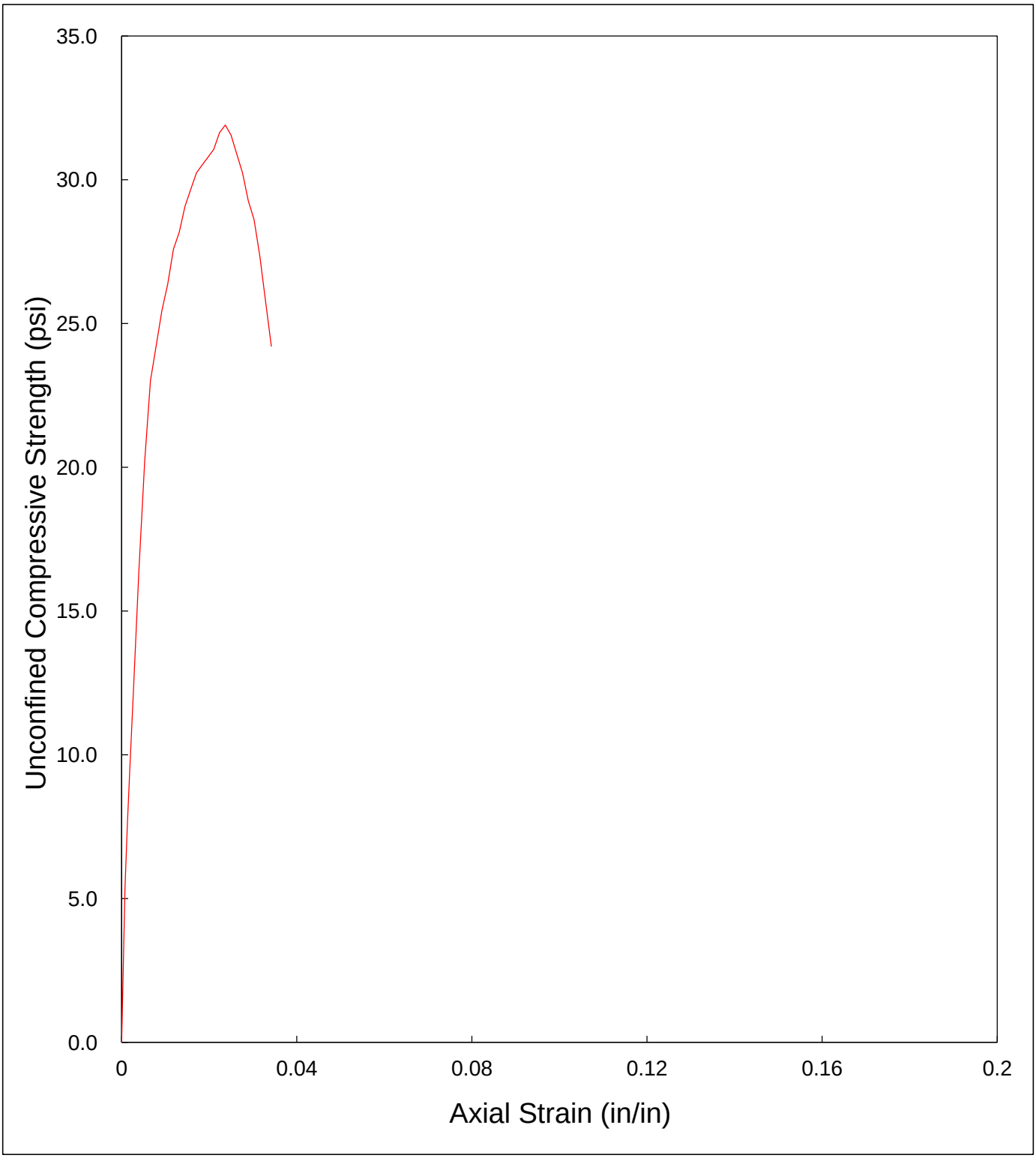
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.80	in.
No. 2	2.00	in.	3.80	in.
No. 3	2.01	in.	3.80	in.
Average	**2.00**	**in.**	**3.80**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***348.29***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	11.98	in^3
Initial Bulk Unit Weight,	110.8	lb/ft^3
Initial Dry Unit Weight	82.5	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	31.9	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.152	0.0000	0.0
17	0.003	0.003	3.155	0.0008	5.4
24	0.005	0.005	3.156	0.0013	7.6
30	0.007	0.007	3.158	0.0018	9.5
38	0.010	0.010	3.160	0.0026	12.0
52	0.015	0.015	3.165	0.0039	16.4
64	0.020	0.020	3.169	0.0053	20.2
73	0.025	0.025	3.173	0.0066	23.0
77	0.030	0.030	3.177	0.0079	24.2
81	0.035	0.035	3.181	0.0092	25.5
84	0.040	0.040	3.186	0.0105	26.4
88	0.045	0.045	3.190	0.0118	27.6
90	0.050	0.050	3.194	0.0132	28.2
93	0.055	0.055	3.198	0.0145	29.1
95	0.060	0.060	3.203	0.0158	29.7
97	0.065	0.065	3.207	0.0171	30.2
98	0.070	0.070	3.211	0.0184	30.5
99	0.075	0.075	3.216	0.0197	30.8
100	0.080	0.080	3.220	0.0211	31.1
102	0.085	0.085	3.224	0.0224	31.6
103	0.090	0.090	3.229	0.0237	31.9
102	0.095	0.095	3.233	0.0250	31.6
100	0.100	0.100	3.237	0.0263	30.9
98	0.105	0.105	3.242	0.0276	30.2
95	0.110	0.110	3.246	0.0289	29.3
93	0.115	0.115	3.250	0.0303	28.6
89	0.120	0.120	3.255	0.0316	27.3
84	0.125	0.125	3.259	0.0329	25.8
79	0.130	0.130	3.264	0.0342	24.2

UNCONFINED COMPRESSION TESTING

Sample No. 0397-015 (9 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-015 (9 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7617_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.3	**%**
BULK UNIT WEIGHT	110.8	lb/ft^3
DRY UNIT WEIGHT	82.5	lb/ft^3
UCS *	31.9	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-016 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7618_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-016 (8 day)	
2. WT MOISTURE TIN (tare weight)	69.70	g
3. WT WET SOIL + TARE	157.98	g
4. WT DRY SOIL + TARE	130.81	g
5. WT WATER, Ww	27.17	g
6. WT DRY SOIL, Ws	61.11	g
7. MOISTURE CONTENT, W	**44.46**	**%**

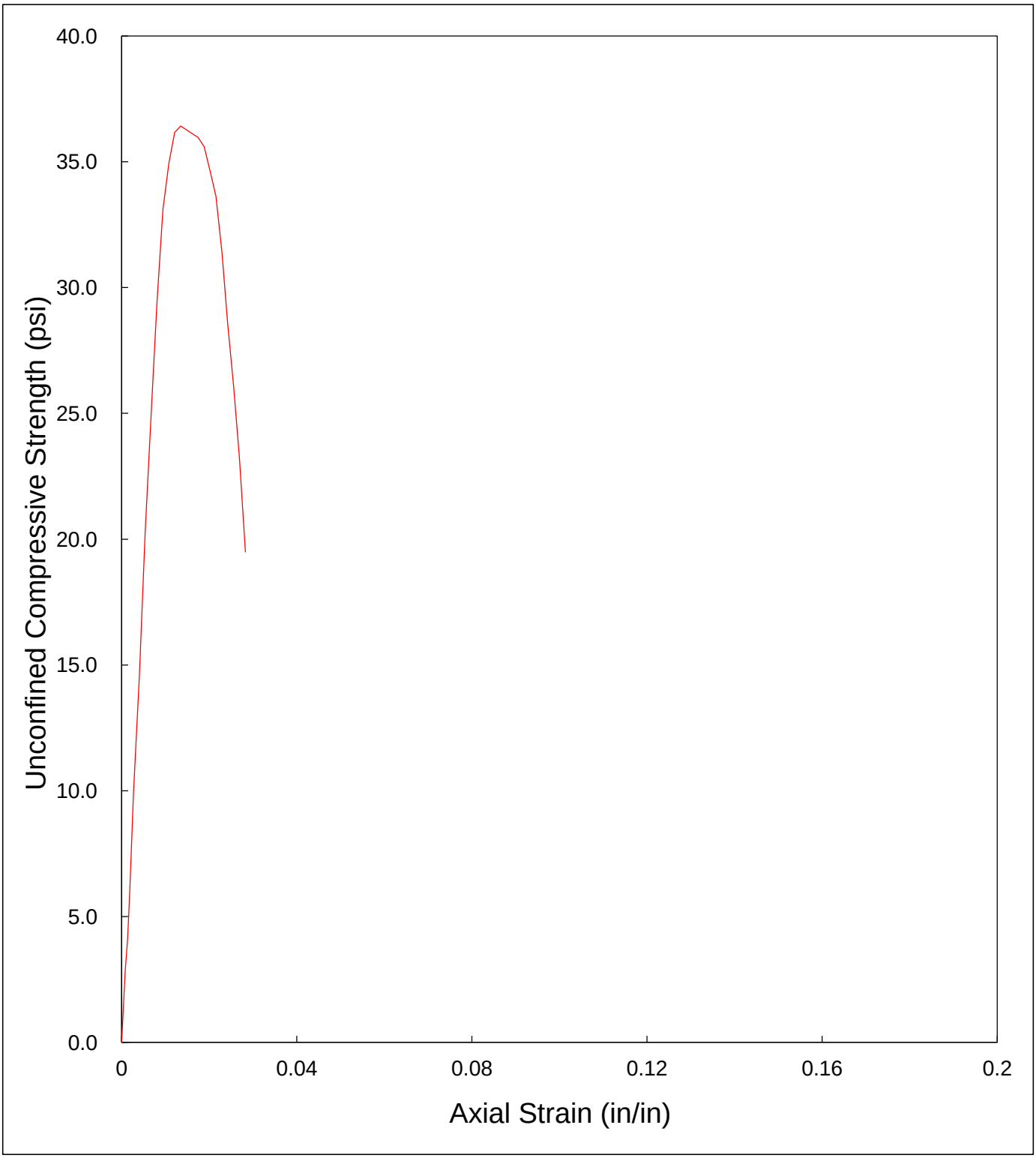
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.98	in.	3.71	in.
No. 2	2.00	in.	3.71	in.
No. 3	2.02	in.	3.72	in.
Average	**2.00**	**in.**	**3.71**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***332.80***	***g***
Initial Area, Ao	3.14	in^2
Initial Volume, Vo	11.67	in^3
Initial Bulk Unit Weight,	108.7	lb/ft^3
Initial Dry Unit Weight	75.2	lb/ft^3
15 % Strain (0.15 Lo)	0.56	in.
UCS	36.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.142	0.0000	0.0
9	0.003	0.003	3.144	0.0008	2.9
13	0.005	0.005	3.146	0.0013	4.1
19	0.007	0.007	3.148	0.0019	6.0
31	0.010	0.010	3.150	0.0027	9.8
46	0.015	0.015	3.154	0.0040	14.6
64	0.020	0.020	3.159	0.0054	20.3
79	0.025	0.025	3.163	0.0067	25.0
93	0.030	0.030	3.167	0.0081	29.4
105	0.035	0.035	3.171	0.0094	33.1
111	0.040	0.040	3.176	0.0108	35.0
115	0.045	0.045	3.180	0.0121	36.2
116	0.050	0.050	3.184	0.0135	36.4
115	0.065	0.065	3.198	0.0175	36.0
114	0.070	0.070	3.202	0.0189	35.6
111	0.075	0.075	3.206	0.0202	34.6
108	0.080	0.080	3.211	0.0215	33.6
101	0.085	0.085	3.215	0.0229	31.4
92	0.090	0.090	3.220	0.0242	28.6
84	0.095	0.095	3.224	0.0256	26.1
75	0.100	0.100	3.229	0.0269	23.2
63	0.105	0.105	3.233	0.0283	19.5

UNCONFINED COMPRESSION TESTING

Sample No. 0397-016 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-016 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7618_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	44.5	**%**
BULK UNIT WEIGHT	108.7	lb/ft^3
DRY UNIT WEIGHT	75.2	lb/ft^3
UCS *	36.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-017 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7619_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-017 (8 day)	
2. WT MOISTURE TIN (tare weight)	52.77	g
3. WT WET SOIL + TARE	134.66	g
4. WT DRY SOIL + TARE	110.25	g
5. WT WATER, Ww	24.41	g
6. WT DRY SOIL, Ws	57.48	g
7. MOISTURE CONTENT, W	**42.47**	**%**

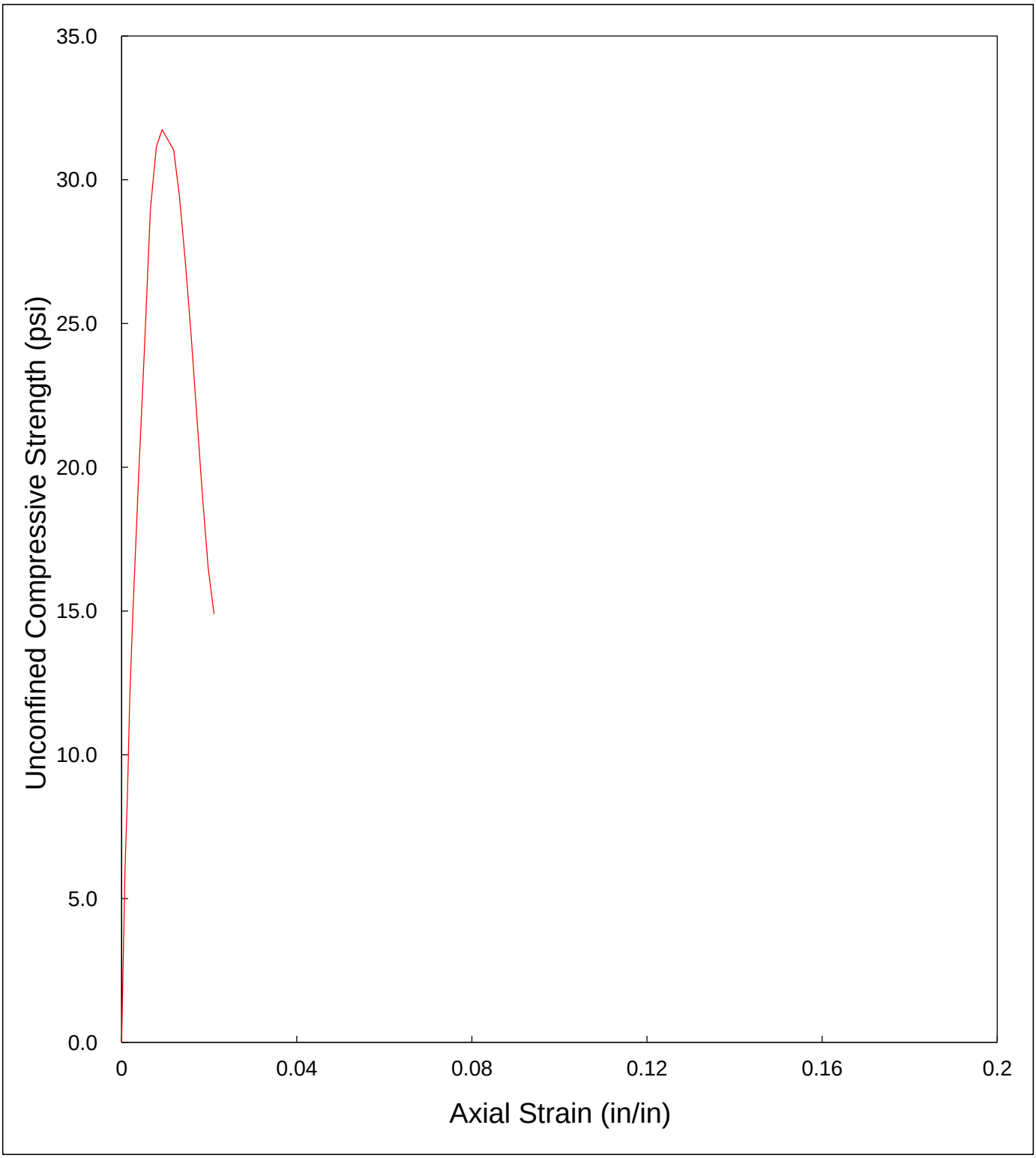
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.78	in.
No. 2	2.00	in.	3.79	in.
No. 3	2.01	in.	3.80	in.
Average	**2.00**	**in.**	**3.79**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***337.66***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	11.95	in^3
Initial Bulk Unit Weight,	107.7	lb/ft^3
Initial Dry Unit Weight	75.6	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	31.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.152	0.0000	0.0
19	0.003	0.003	3.155	0.0008	6.0
27	0.005	0.005	3.156	0.0013	8.6
38	0.007	0.007	3.158	0.0018	12.0
48	0.010	0.010	3.160	0.0026	15.2
63	0.015	0.015	3.165	0.0040	19.9
77	0.020	0.020	3.169	0.0053	24.3
92	0.025	0.025	3.173	0.0066	29.0
99	0.030	0.030	3.177	0.0079	31.2
101	0.035	0.035	3.181	0.0092	31.7
100	0.040	0.040	3.186	0.0106	31.4
99	0.045	0.045	3.190	0.0119	31.0
94	0.050	0.050	3.194	0.0132	29.4
87	0.055	0.055	3.198	0.0145	27.2
79	0.060	0.060	3.203	0.0158	24.7
70	0.065	0.065	3.207	0.0172	21.8
61	0.070	0.070	3.211	0.0185	19.0
53	0.075	0.075	3.216	0.0198	16.5
48	0.080	0.080	3.220	0.0211	14.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-017 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-017 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7619_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	42.5	**%**
BULK UNIT WEIGHT	107.7	lb/ft^3
DRY UNIT WEIGHT	75.6	lb/ft^3
UCS *	31.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-018 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7620_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-018 (8 day)	
2. WT MOISTURE TIN (tare weight)	63.93	g
3. WT WET SOIL + TARE	148.82	g
4. WT DRY SOIL + TARE	123.42	g
5. WT WATER, Ww	25.40	g
6. WT DRY SOIL, Ws	59.49	g
7. MOISTURE CONTENT, W	**42.70**	**%**

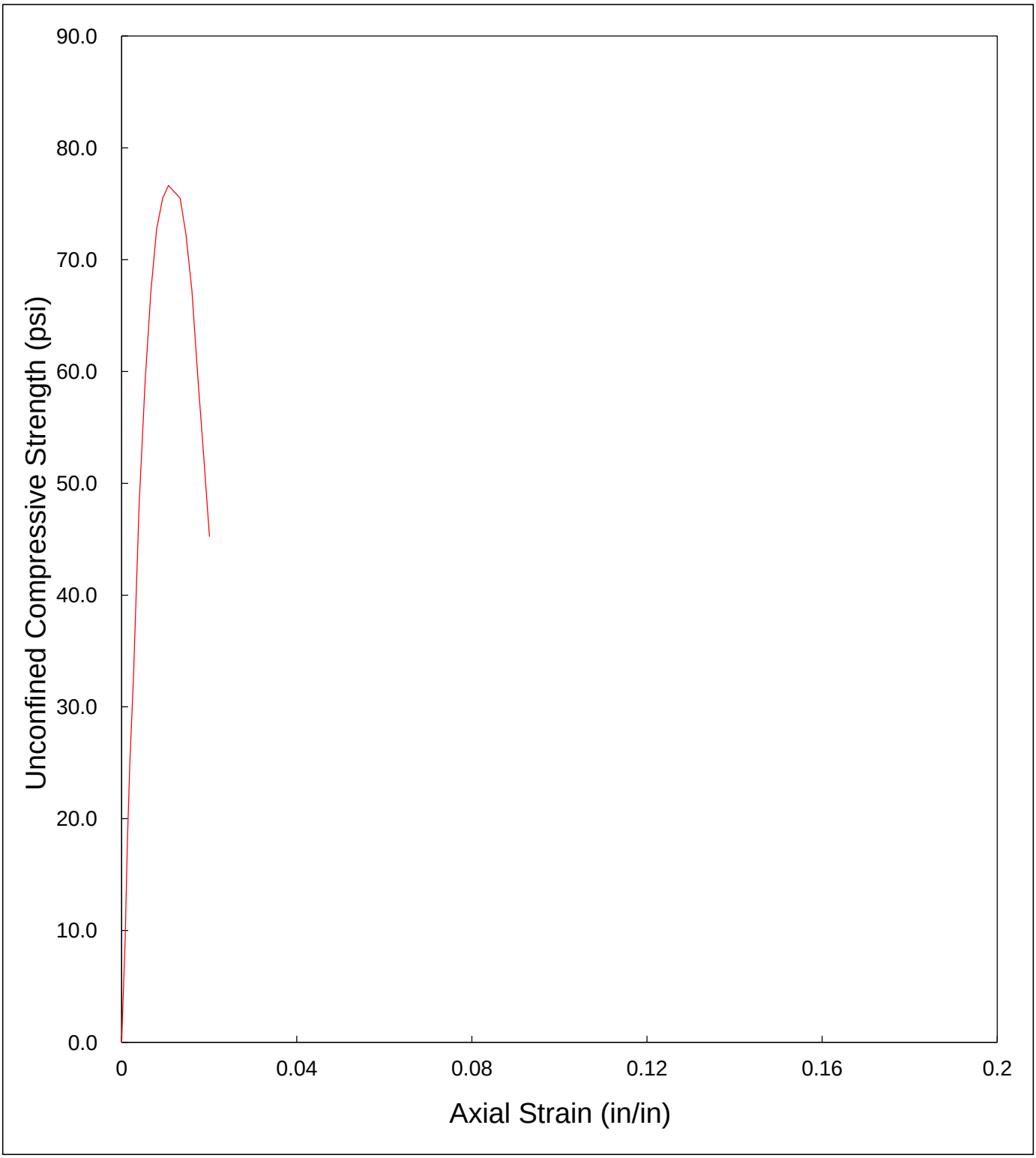
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.74	in.
No. 2	2.01	in.	3.74	in.
No. 3	2.01	in.	3.74	in.
Average	**2.01**	**in.**	**3.74**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***338.31***	***g***
Initial Area, Ao	3.16	in^2
Initial Volume, Vo	11.83	in^3
Initial Bulk Unit Weight,	109.0	lb/ft^3
Initial Dry Unit Weight	76.4	lb/ft^3
15 % Strain (0.15 Lo)	0.56	in.
UCS	76.6	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.163	0.0000	0.0
30	0.003	0.003	3.165	0.0008	9.5
57	0.005	0.005	3.167	0.0013	18.0
79	0.007	0.007	3.169	0.0019	24.9
103	0.010	0.010	3.171	0.0027	32.5
153	0.015	0.015	3.175	0.0040	48.2
188	0.020	0.020	3.180	0.0053	59.1
214	0.025	0.025	3.184	0.0067	67.2
232	0.030	0.030	3.188	0.0080	72.8
241	0.035	0.035	3.192	0.0094	75.5
245	0.040	0.040	3.197	0.0107	76.6
242	0.050	0.050	3.205	0.0134	75.5
232	0.055	0.055	3.210	0.0147	72.3
216	0.060	0.060	3.214	0.0160	67.2
192	0.065	0.065	3.219	0.0174	59.7
169	0.070	0.070	3.223	0.0187	52.4
146	0.075	0.075	3.227	0.0201	45.2

UNCONFINED COMPRESSION TESTING

Sample No. 0397-018 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-018 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7620_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	42.7	**%**
BULK UNIT WEIGHT	109.0	lb/ft^3
DRY UNIT WEIGHT	76.4	lb/ft^3
UCS *	76.6	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-019 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7621_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-019 (8 day)	
2. WT MOISTURE TIN (tare weight)	66.24	g
3. WT WET SOIL + TARE	177.00	g
4. WT DRY SOIL + TARE	145.17	g
5. WT WATER, Ww	31.83	g
6. WT DRY SOIL, Ws	78.93	g
7. MOISTURE CONTENT, W	**40.33**	**%**

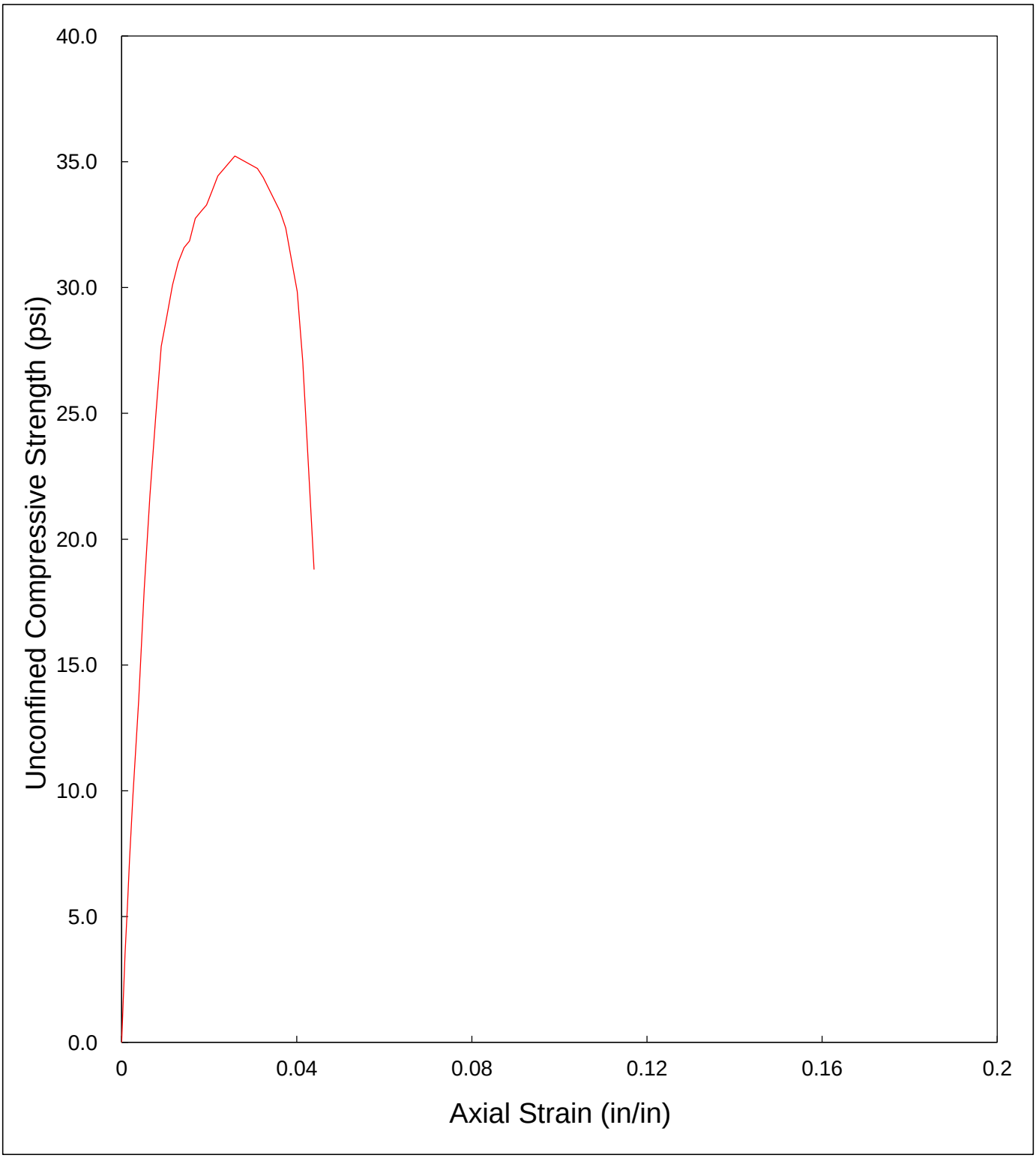
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.86	in.
No. 2	2.00	in.	3.87	in.
No. 3	2.01	in.	3.87	in.
Average	**2.00**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***349.13***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	12.19	in^3
Initial Bulk Unit Weight,	109.1	lb/ft^3
Initial Dry Unit Weight	77.8	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	35.2	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.152	0.0000	0.0
11	0.003	0.003	3.155	0.0008	3.5
17	0.005	0.005	3.156	0.0013	5.4
23	0.007	0.007	3.158	0.0018	7.3
31	0.010	0.010	3.160	0.0026	9.8
43	0.015	0.015	3.164	0.0039	13.6
57	0.020	0.020	3.168	0.0052	18.0
69	0.025	0.025	3.173	0.0065	21.7
79	0.030	0.030	3.177	0.0078	24.9
88	0.035	0.035	3.181	0.0091	27.7
92	0.040	0.040	3.185	0.0103	28.9
96	0.045	0.045	3.189	0.0116	30.1
99	0.050	0.050	3.193	0.0129	31.0
101	0.055	0.055	3.198	0.0142	31.6
102	0.060	0.060	3.202	0.0155	31.9
105	0.065	0.065	3.206	0.0168	32.8
106	0.070	0.070	3.210	0.0181	33.0
107	0.075	0.075	3.214	0.0194	33.3
109	0.080	0.080	3.219	0.0207	33.9
111	0.085	0.085	3.223	0.0220	34.4
112	0.090	0.090	3.227	0.0233	34.7
113	0.095	0.095	3.231	0.0246	35.0
114	0.100	0.100	3.236	0.0259	35.2
113	0.120	0.120	3.253	0.0310	34.7
112	0.125	0.125	3.257	0.0323	34.4
108	0.140	0.140	3.270	0.0362	33.0
106	0.145	0.145	3.275	0.0375	32.4
102	0.150	0.150	3.279	0.0388	31.1
98	0.155	0.155	3.284	0.0401	29.8
89	0.160	0.160	3.288	0.0414	27.1
62	0.170	0.170	3.297	0.0440	18.8

UNCONFINED COMPRESSION TESTING

Sample No. 0397-019 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-019 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7621_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	40.3	**%**
BULK UNIT WEIGHT	109.1	lb/ft^3
DRY UNIT WEIGHT	77.8	lb/ft^3
UCS *	35.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-020 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7622_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-020 (8 day)	
2. WT MOISTURE TIN (tare weight)	69.39	g
3. WT WET SOIL + TARE	160.56	g
4. WT DRY SOIL + TARE	133.12	g
5. WT WATER, Ww	27.44	g
6. WT DRY SOIL, Ws	63.73	g
7. MOISTURE CONTENT, W	**43.06**	**%**

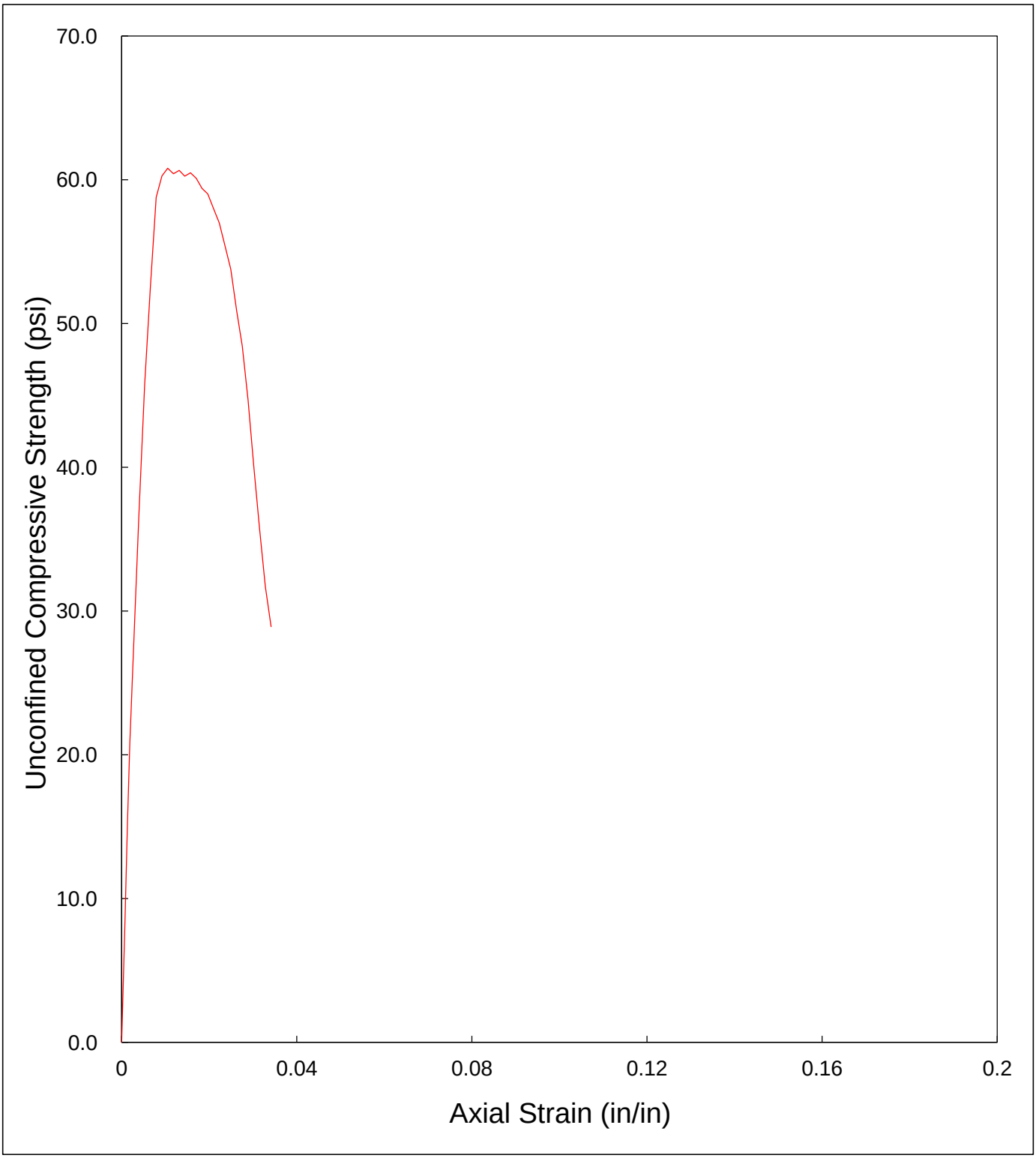
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.80	in.
No. 2	2.01	in.	3.81	in.
No. 3	2.02	in.	3.82	in.
Average	**2.01**	**in.**	**3.81**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***336.71***	***g***
Initial Area, Ao	3.17	in^2
Initial Volume, Vo	12.09	in^3
Initial Bulk Unit Weight,	106.1	lb/ft^3
Initial Dry Unit Weight	74.2	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	60.8	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.173	0.0000	0.0
27	0.003	0.003	3.176	0.0008	8.5
48	0.005	0.005	3.177	0.0013	15.1
66	0.007	0.007	3.179	0.0018	20.8
85	0.010	0.010	3.181	0.0026	26.7
117	0.015	0.015	3.186	0.0039	36.7
146	0.020	0.020	3.190	0.0052	45.8
168	0.025	0.025	3.194	0.0066	52.6
188	0.030	0.030	3.198	0.0079	58.8
193	0.035	0.035	3.203	0.0092	60.3
195	0.040	0.040	3.207	0.0105	60.8
194	0.045	0.045	3.211	0.0118	60.4
195	0.050	0.050	3.215	0.0131	60.6
194	0.055	0.055	3.220	0.0144	60.3
195	0.060	0.060	3.224	0.0157	60.5
194	0.065	0.065	3.228	0.0171	60.1
192	0.070	0.070	3.232	0.0184	59.4
191	0.075	0.075	3.237	0.0197	59.0
188	0.080	0.080	3.241	0.0210	58.0
185	0.085	0.085	3.245	0.0223	57.0
180	0.090	0.090	3.250	0.0236	55.4
175	0.095	0.095	3.254	0.0249	53.8
166	0.100	0.100	3.259	0.0262	50.9
158	0.105	0.105	3.263	0.0276	48.4
146	0.110	0.110	3.267	0.0289	44.7
131	0.115	0.115	3.272	0.0302	40.0
117	0.120	0.120	3.276	0.0315	35.7
104	0.125	0.125	3.281	0.0328	31.7
95	0.130	0.130	3.285	0.0341	28.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-020 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-020 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7622_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	43.1	**%**
BULK UNIT WEIGHT	106.1	lb/ft^3
DRY UNIT WEIGHT	74.2	lb/ft^3
UCS *	60.8	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-021 (8 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7623_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-021 (8 day)	
2. WT MOISTURE TIN (tare weight)	62.34	g
3. WT WET SOIL + TARE	161.63	g
4. WT DRY SOIL + TARE	141.82	g
5. WT WATER, Ww	19.81	g
6. WT DRY SOIL, Ws	79.48	g
7. MOISTURE CONTENT, W	**24.92**	**%**

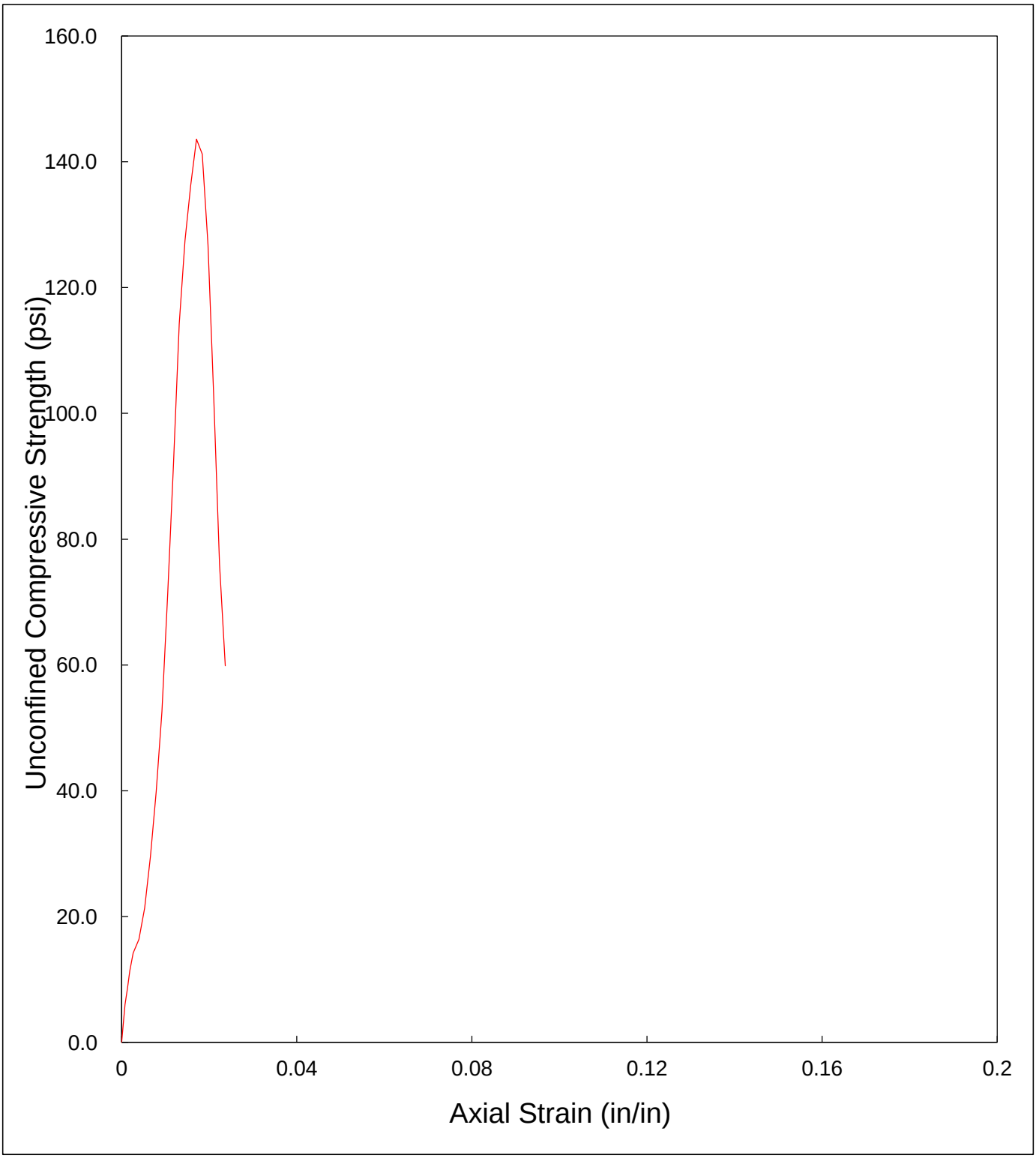
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.97	in.	3.79	in.
No. 2	2.01	in.	3.80	in.
No. 3	2.04	in.	3.81	in.
Average	**2.01**	**in.**	**3.80**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***381.69***	***g***
Initial Area, Ao	3.16	in^2
Initial Volume, Vo	12.02	in^3
Initial Bulk Unit Weight,	121.0	lb/ft^3
Initial Dry Unit Weight	96.9	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	143.6	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.163	0.0000	0.0
19	0.003	0.003	3.165	0.0008	6.0
27	0.005	0.005	3.167	0.0013	8.5
36	0.007	0.007	3.168	0.0018	11.4
45	0.010	0.010	3.171	0.0026	14.2
52	0.015	0.015	3.175	0.0039	16.4
68	0.020	0.020	3.179	0.0053	21.4
94	0.025	0.025	3.184	0.0066	29.5
127	0.030	0.030	3.188	0.0079	39.8
168	0.035	0.035	3.192	0.0092	52.6
228	0.040	0.040	3.196	0.0105	71.3
294	0.045	0.045	3.200	0.0118	91.9
366	0.050	0.050	3.205	0.0132	114.2
409	0.055	0.055	3.209	0.0145	127.5
438	0.060	0.060	3.213	0.0158	136.3
462	0.065	0.065	3.218	0.0171	143.6
455	0.070	0.070	3.222	0.0184	141.2
409	0.075	0.075	3.226	0.0197	126.8
331	0.080	0.080	3.231	0.0211	102.5
246	0.085	0.085	3.235	0.0224	76.0
194	0.090	0.090	3.239	0.0237	59.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-021 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-021 (8 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7623_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	24.9	**%**
BULK UNIT WEIGHT	121.0	lb/ft^3
DRY UNIT WEIGHT	96.9	lb/ft^3
UCS *	143.6	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-022 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7624_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-022 (8 day)	
2. WT MOISTURE TIN (tare weight)	63.92	g
3. WT WET SOIL + TARE	167.25	g
4. WT DRY SOIL + TARE	143.63	g
5. WT WATER, Ww	23.62	g
6. WT DRY SOIL, Ws	79.71	g
7. MOISTURE CONTENT, W	**29.63**	**%**

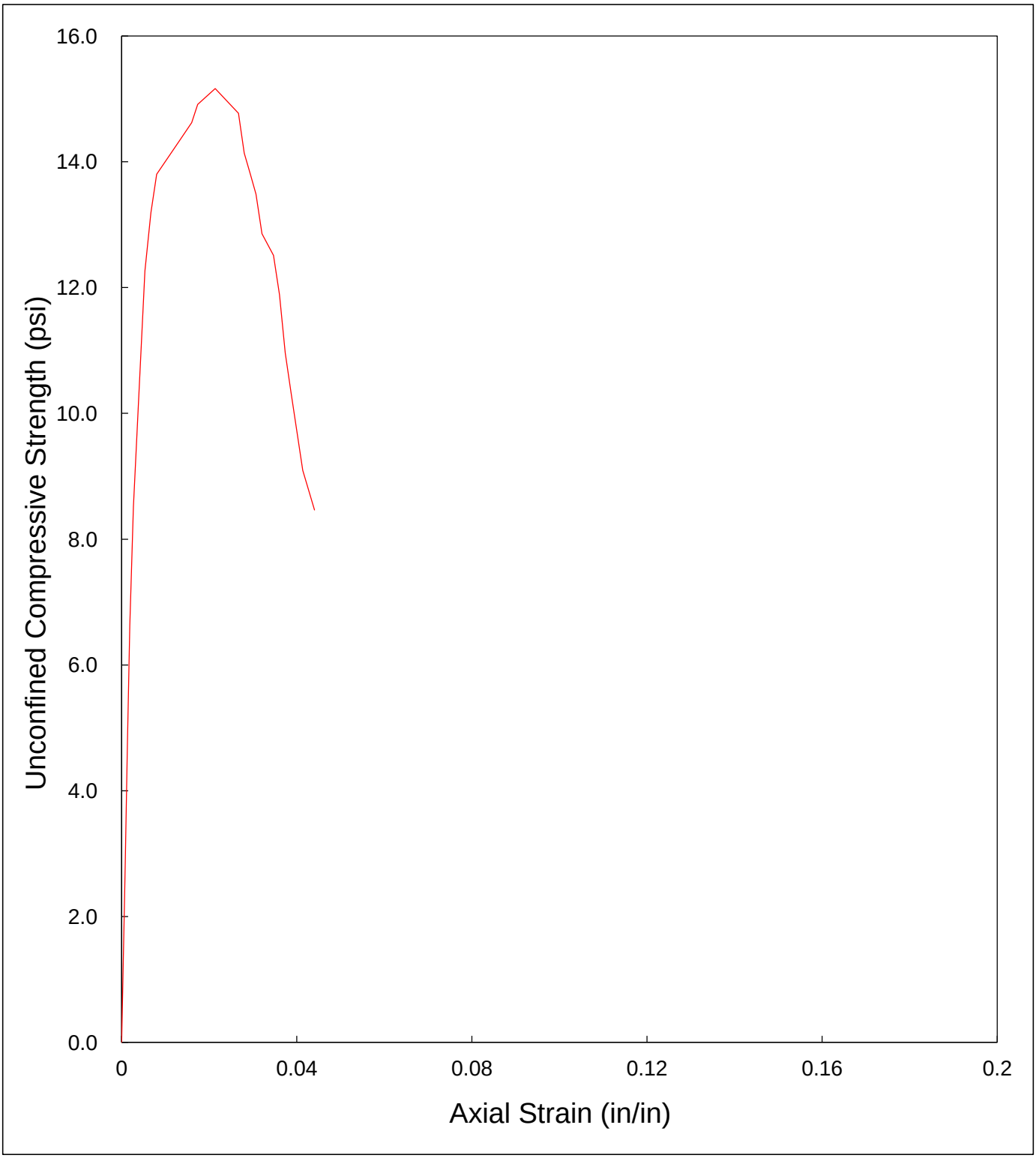
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.75	in.
No. 2	2.01	in.	3.75	in.
No. 3	2.01	in.	3.74	in.
Average	**2.01**	**in.**	**3.75**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***368.21***	***g***
Initial Area, Ao	3.16	in^2
Initial Volume, Vo	11.85	in^3
Initial Bulk Unit Weight,	118.4	lb/ft^3
Initial Dry Unit Weight	91.3	lb/ft^3
15 % Strain (0.15 Lo)	0.56	in.
UCS	15.2	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.163	0.0000	0.0
9	0.003	0.003	3.165	0.0008	2.8
15	0.005	0.005	3.167	0.0013	4.7
21	0.007	0.007	3.168	0.0019	6.6
27	0.010	0.010	3.171	0.0027	8.5
33	0.015	0.015	3.175	0.0040	10.4
39	0.020	0.020	3.180	0.0053	12.3
42	0.025	0.025	3.184	0.0067	13.2
44	0.030	0.030	3.188	0.0080	13.8
45	0.040	0.040	3.197	0.0107	14.1
46	0.050	0.050	3.205	0.0133	14.4
47	0.060	0.060	3.214	0.0160	14.6
48	0.065	0.065	3.218	0.0173	14.9
49	0.080	0.080	3.232	0.0214	15.2
48	0.100	0.100	3.249	0.0267	14.8
46	0.105	0.105	3.254	0.0280	14.1
45	0.110	0.110	3.258	0.0294	13.8
44	0.115	0.115	3.263	0.0307	13.5
42	0.120	0.120	3.267	0.0320	12.9
41	0.130	0.130	3.276	0.0347	12.5
39	0.135	0.135	3.281	0.0360	11.9
36	0.140	0.140	3.285	0.0374	11.0
34	0.145	0.145	3.290	0.0387	10.3
30	0.155	0.155	3.299	0.0414	9.1
28	0.165	0.165	3.308	0.0440	8.5

UNCONFINED COMPRESSION TESTING

Sample No. 0397-022 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-022 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7624_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	29.6	**%**
BULK UNIT WEIGHT	118.4	lb/ft^3
DRY UNIT WEIGHT	91.3	lb/ft^3
UCS *	15.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-023 (8 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7625_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-023 (8 day)	
2. WT MOISTURE TIN (tare weight)	66.49	g
3. WT WET SOIL + TARE	146.67	g
4. WT DRY SOIL + TARE	123.33	g
5. WT WATER, Ww	23.34	g
6. WT DRY SOIL, Ws	56.84	g
7. MOISTURE CONTENT, W	**41.06**	**%**

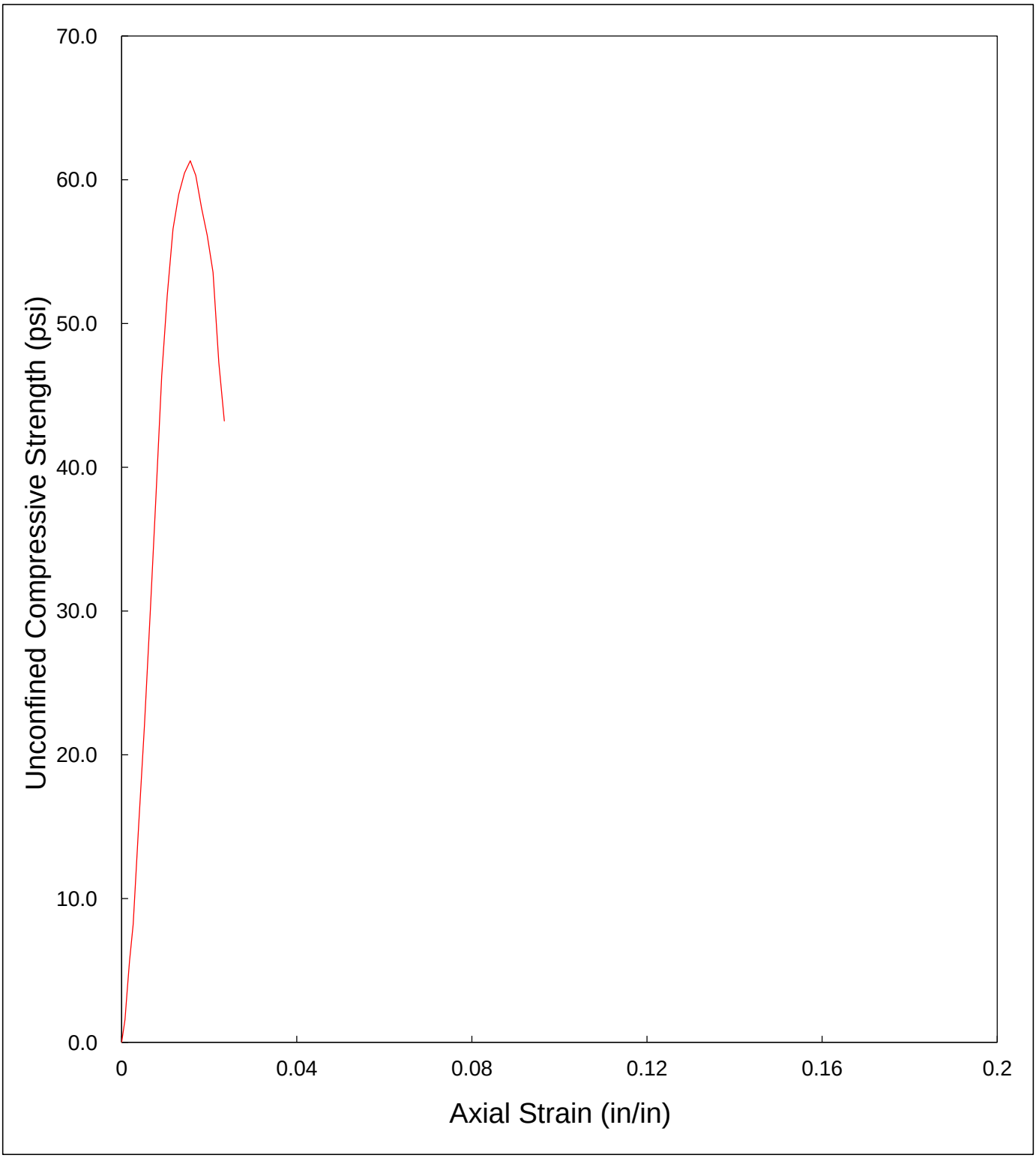
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.83	in.
No. 2	2.00	in.	3.83	in.
No. 3	2.02	in.	3.84	in.
Average	**2.01**	**in.**	**3.83**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***343.23***	***g***
Initial Area, Ao	3.16	in^2
Initial Volume, Vo	12.12	in^3
Initial Bulk Unit Weight,	107.9	lb/ft^3
Initial Dry Unit Weight	76.5	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	61.3	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.163	0.0000	0.0
5	0.003	0.003	3.165	0.0008	1.6
12	0.005	0.005	3.167	0.0013	3.8
18	0.007	0.007	3.168	0.0018	5.7
26	0.010	0.010	3.171	0.0026	8.2
48	0.015	0.015	3.175	0.0039	15.1
70	0.020	0.020	3.179	0.0052	22.0
95	0.025	0.025	3.183	0.0065	29.8
121	0.030	0.030	3.188	0.0078	38.0
148	0.035	0.035	3.192	0.0091	46.4
166	0.040	0.040	3.196	0.0104	51.9
181	0.045	0.045	3.200	0.0117	56.6
189	0.050	0.050	3.204	0.0130	59.0
194	0.055	0.055	3.209	0.0143	60.5
197	0.060	0.060	3.213	0.0157	61.3
194	0.065	0.065	3.217	0.0170	60.3
187	0.070	0.070	3.221	0.0183	58.0
181	0.075	0.075	3.226	0.0196	56.1
173	0.080	0.080	3.230	0.0209	53.6
153	0.085	0.085	3.234	0.0222	47.3
140	0.090	0.090	3.239	0.0235	43.2

UNCONFINED COMPRESSION TESTING

Sample No. 0397-023 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-023 (8 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7625_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	41.1	**%**
BULK UNIT WEIGHT	107.9	lb/ft^3
DRY UNIT WEIGHT	76.5	lb/ft^3
UCS *	61.3	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-024 (8 day)		
TESTING DATE:	15-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7626_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-024 (8 day)	
2. WT MOISTURE TIN (tare weight)	70.20	g
3. WT WET SOIL + TARE	166.57	g
4. WT DRY SOIL + TARE	139.84	g
5. WT WATER, Ww	26.73	g
6. WT DRY SOIL, Ws	69.64	g
7. MOISTURE CONTENT, W	**38.38**	**%**

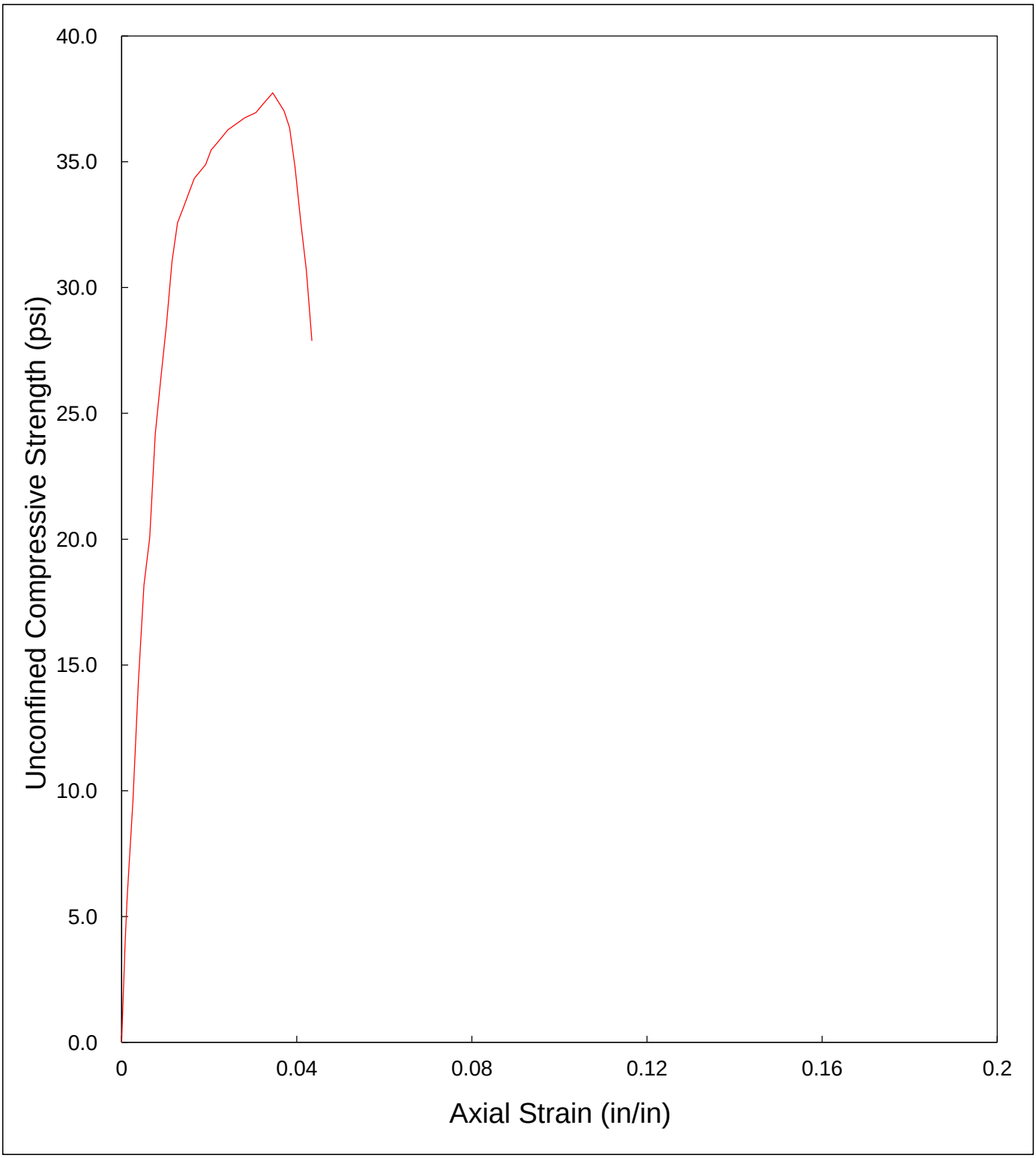
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.97	in.	3.90	in.
No. 2	2.00	in.	3.91	in.
No. 3	2.01	in.	3.92	in.
Average	**1.99**	**in.**	**3.91**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***347.92***	***g***
Initial Area, Ao	3.12	in^2
Initial Volume, Vo	12.20	in^3
Initial Bulk Unit Weight,	108.6	lb/ft^3
Initial Dry Unit Weight	78.5	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	37.7	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.121	0.0000	0.0
12	0.003	0.003	3.123	0.0008	3.8
18	0.005	0.005	3.125	0.0013	5.8
23	0.007	0.007	3.126	0.0018	7.4
30	0.010	0.010	3.129	0.0026	9.6
45	0.015	0.015	3.133	0.0038	14.4
57	0.020	0.020	3.137	0.0051	18.2
63	0.025	0.025	3.141	0.0064	20.1
76	0.030	0.030	3.145	0.0077	24.2
83	0.035	0.035	3.149	0.0090	26.4
90	0.040	0.040	3.153	0.0102	28.5
98	0.045	0.045	3.157	0.0115	31.0
103	0.050	0.050	3.161	0.0128	32.6
105	0.055	0.055	3.165	0.0141	33.2
107	0.060	0.060	3.169	0.0153	33.8
109	0.065	0.065	3.173	0.0166	34.3
111	0.075	0.075	3.182	0.0192	34.9
113	0.080	0.080	3.186	0.0205	35.5
114	0.085	0.085	3.190	0.0217	35.7
115	0.090	0.090	3.194	0.0230	36.0
116	0.095	0.095	3.198	0.0243	36.3
118	0.110	0.110	3.211	0.0281	36.7
119	0.120	0.120	3.219	0.0307	37.0
120	0.125	0.125	3.224	0.0320	37.2
122	0.135	0.135	3.232	0.0345	37.7
120	0.145	0.145	3.241	0.0371	37.0
118	0.150	0.150	3.245	0.0384	36.4
113	0.155	0.155	3.250	0.0396	34.8
106	0.160	0.160	3.254	0.0409	32.6
100	0.165	0.165	3.258	0.0422	30.7
91	0.170	0.170	3.263	0.0435	27.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-024 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-024 (8 day)		
TESTING DATE:	10/15/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7626_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	38.4	**%**
BULK UNIT WEIGHT	108.6	lb/ft^3
DRY UNIT WEIGHT	78.5	lb/ft^3
UCS *	37.7	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-025 (8 day)		
TESTING DATE:	14-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7627_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-025 (8 day)	
2. WT MOISTURE TIN (tare weight)	63.70	g
3. WT WET SOIL + TARE	165.25	g
4. WT DRY SOIL + TARE	136.53	g
5. WT WATER, Ww	28.72	g
6. WT DRY SOIL, Ws	72.83	g
7. MOISTURE CONTENT, W	**39.43**	**%**

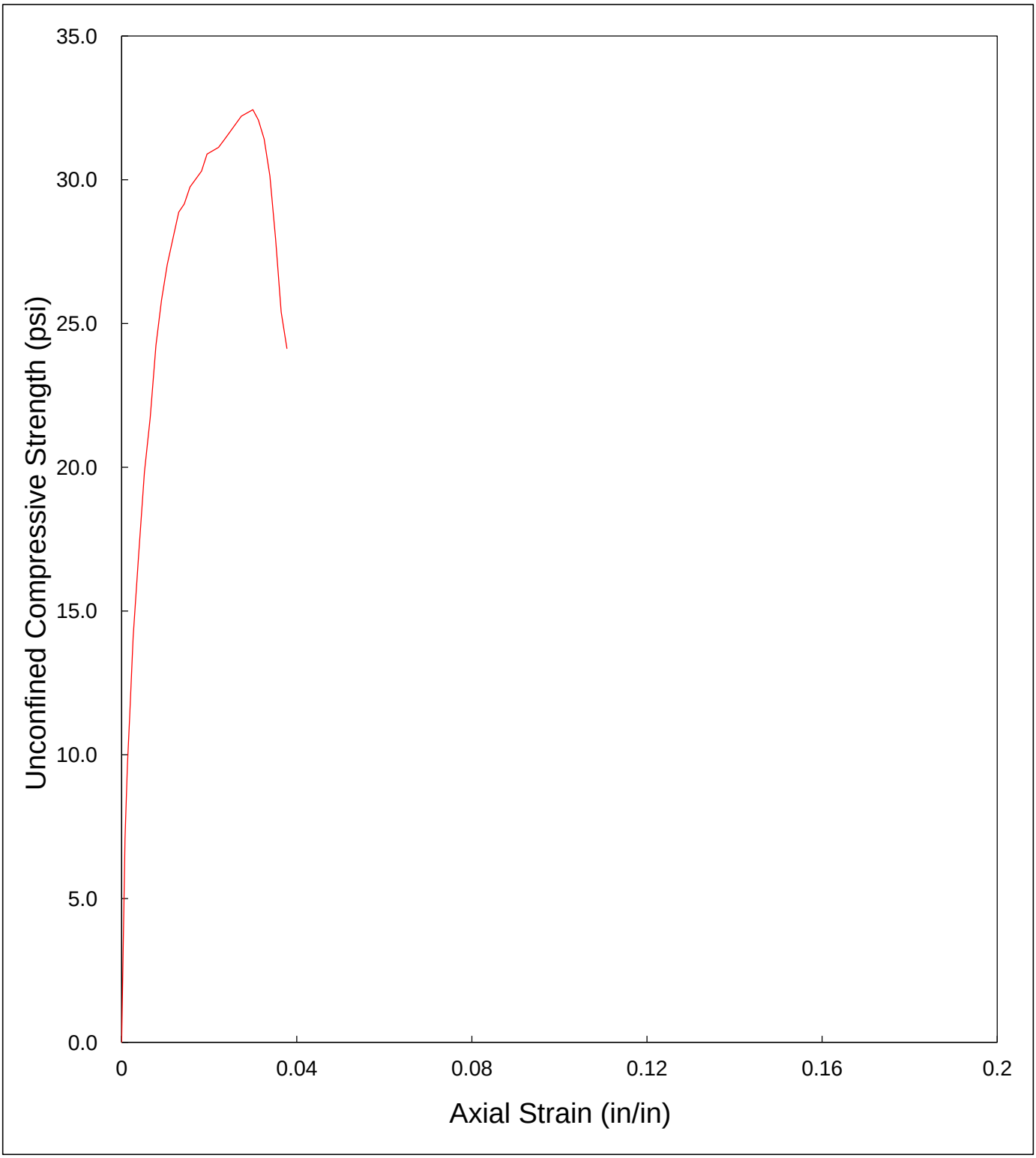
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.82	in.
No. 2	1.99	in.	3.88	in.
No. 3	1.98	in.	3.82	in.
Average	**1.99**	**in.**	**3.84**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***347.08***	***g***
Initial Area, Ao	3.11	in^2
Initial Volume, Vo	11.94	in^3
Initial Bulk Unit Weight,	110.7	lb/ft^3
Initial Dry Unit Weight	79.4	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	32.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.110	0.0000	0.0
22	0.003	0.003	3.113	0.0008	7.1
30	0.005	0.005	3.114	0.0013	9.6
35	0.007	0.007	3.116	0.0018	11.2
44	0.010	0.010	3.118	0.0026	14.1
53	0.015	0.015	3.122	0.0039	17.0
62	0.020	0.020	3.127	0.0052	19.8
68	0.025	0.025	3.131	0.0065	21.7
76	0.030	0.030	3.135	0.0078	24.2
81	0.035	0.035	3.139	0.0091	25.8
85	0.040	0.040	3.143	0.0104	27.0
88	0.045	0.045	3.147	0.0117	28.0
91	0.050	0.050	3.151	0.0130	28.9
92	0.055	0.055	3.155	0.0143	29.2
94	0.060	0.060	3.160	0.0156	29.8
95	0.065	0.065	3.164	0.0169	30.0
96	0.070	0.070	3.168	0.0182	30.3
98	0.075	0.075	3.172	0.0195	30.9
99	0.085	0.085	3.181	0.0221	31.1
100	0.090	0.090	3.185	0.0234	31.4
101	0.095	0.095	3.189	0.0247	31.7
103	0.105	0.105	3.198	0.0273	32.2
104	0.115	0.115	3.206	0.0299	32.4
103	0.120	0.120	3.211	0.0313	32.1
101	0.125	0.125	3.215	0.0326	31.4
97	0.130	0.130	3.219	0.0339	30.1
90	0.135	0.135	3.224	0.0352	27.9
82	0.140	0.140	3.228	0.0365	25.4
78	0.145	0.145	3.232	0.0378	24.1

UNCONFINED COMPRESSION TESTING

Sample No. 0397-025 (8 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-025 (8 day)		
TESTING DATE:	10/14/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS/SEM	TRACKING CODE:	7627_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	39.4	**%**
BULK UNIT WEIGHT	110.7	lb/ft^3
DRY UNIT WEIGHT	79.4	lb/ft^3
UCS *	32.4	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE-0397		
SAMPLE No.:	0397-022 (17 day)		
TESTING DATE:	24-Oct-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS	TRACKING CODE:	7677_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-022 (17 day)	
2. WT MOISTURE TIN (tare weight)	230.74	g
3. WT WET SOIL + TARE	364.75	g
4. WT DRY SOIL + TARE	333.82	g
5. WT WATER, Ww	30.93	g
6. WT DRY SOIL, Ws	103.08	g
7. MOISTURE CONTENT, W	**30.01**	**%**

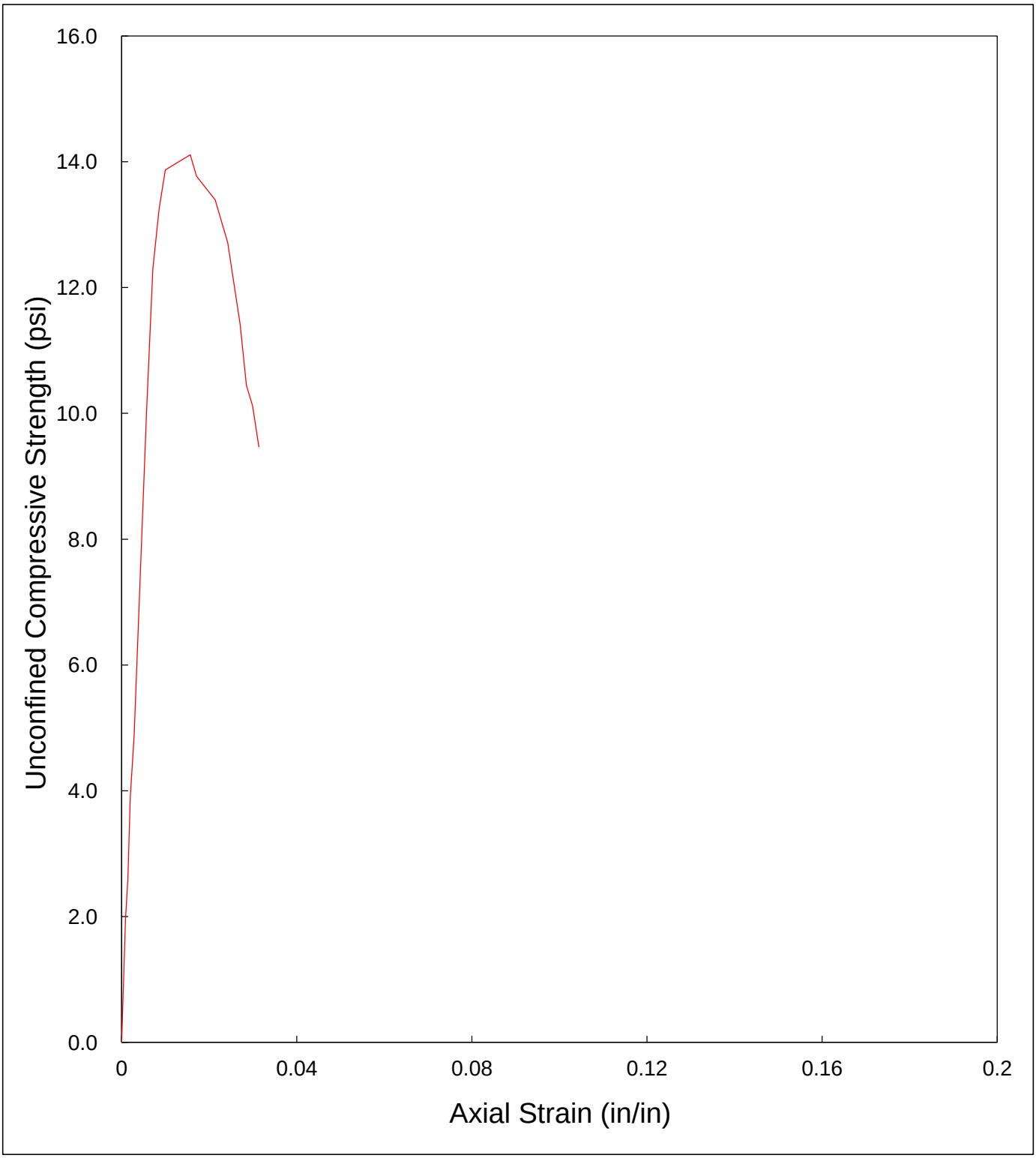
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.98	in.	3.52	in.
No. 2	1.99	in.	3.52	in.
No. 3	1.96	in.	3.48	in.
Average	**1.98**	**in.**	**3.51**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***344.60***	***g***
Initial Area, Ao	3.07	in^2
Initial Volume, Vo	10.76	in^3
Initial Bulk Unit Weight,	122.0	lb/ft^3
Initial Dry Unit Weight	93.8	lb/ft^3
15 % Strain (0.15 Lo)	0.53	in.
UCS	14.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.069	0.0000	0.0
6	0.003	0.003	3.071	0.0009	2.0
8	0.005	0.005	3.073	0.0014	2.6
12	0.007	0.007	3.075	0.0020	3.9
15	0.010	0.010	3.077	0.0029	4.9
23	0.015	0.015	3.082	0.0043	7.5
31	0.020	0.020	3.086	0.0057	10.0
38	0.025	0.025	3.091	0.0071	12.3
41	0.030	0.030	3.095	0.0086	13.2
43	0.035	0.035	3.100	0.0100	13.9
44	0.055	0.055	3.118	0.0157	14.1
43	0.060	0.060	3.122	0.0171	13.8
42	0.075	0.075	3.136	0.0214	13.4
41	0.080	0.080	3.140	0.0228	13.1
40	0.085	0.085	3.145	0.0242	12.7
38	0.090	0.090	3.150	0.0257	12.1
36	0.095	0.095	3.154	0.0271	11.4
33	0.100	0.100	3.159	0.0285	10.4
32	0.105	0.105	3.163	0.0299	10.1
30	0.110	0.110	3.168	0.0314	9.5

UNCONFINED COMPRESSION TESTING

Sample No. 0397-022 (17 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating Site		
PROJECT No.:	SE-0397		
SAMPLE No.:	0397-022 (17 day)		
TESTING DATE:	10/24/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS	TRACKING CODE:	7677_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	30.0	**%**
BULK UNIT WEIGHT	122.0	lb/ft^3
DRY UNIT WEIGHT	93.8	lb/ft^3
UCS *	14.1	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-010 69Day		
TESTING DATE:	13-Dec-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JPM	TRACKING CODE:	7794

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-010	
2. WT MOISTURE TIN (tare weight)	109.96	g
3. WT WET SOIL + TARE	215.47	g
4. WT DRY SOIL + TARE	195.61	g
5. WT WATER, Ww	19.86	g
6. WT DRY SOIL, Ws	85.65	g
7. MOISTURE CONTENT, W	**23.19**	**%**

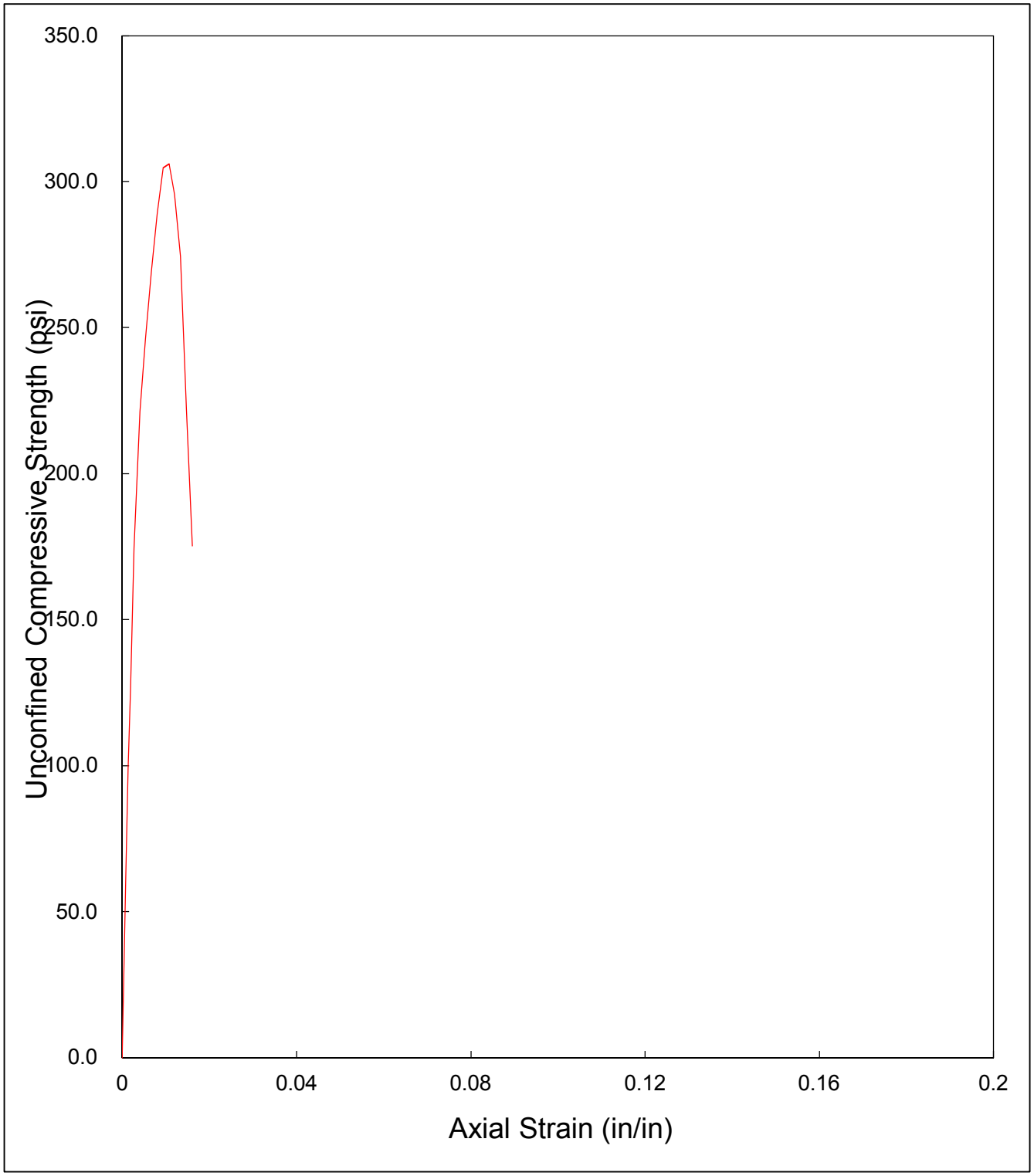
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.01	in.	3.75	in.
No. 2	1.99	in.	3.74	in.
No. 3	1.99	in.	3.75	in.
Average	**2.00**	**in.**	**3.75**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***378.28***	***g***
Initial Area, Ao	3.13	in²
Initial Volume, Vo	11.73	in³
Initial Bulk Unit Weight,	122.8	lb/ft³
Initial Dry Unit Weight	99.7	lb/ft³
15 % Strain (0.15 Lo)	0.56	in.
UCS	306.2	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.131	0.0000	0.0
186	0.003	0.003	3.134	0.0008	59.4
310	0.005	0.005	3.135	0.0013	98.9
397	0.007	0.007	3.137	0.0019	126.6
548	0.010	0.010	3.140	0.0027	174.5
696	0.015	0.015	3.144	0.0040	221.4
774	0.020	0.020	3.148	0.0053	245.9
848	0.025	0.025	3.152	0.0067	269.0
913	0.030	0.030	3.156	0.0080	289.3
963	0.035	0.035	3.161	0.0093	304.7
969	0.040	0.040	3.165	0.0107	306.2
937	0.045	0.045	3.169	0.0120	295.7
871	0.050	0.050	3.173	0.0133	274.5
706	0.055	0.055	3.178	0.0147	222.2
558	0.060	0.060	3.182	0.0160	175.4

UNCONFINED COMPRESSION TESTING

Sample No. 0397-010 69Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-010 69Day		
TESTING DATE:	12/13/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JPM	TRACKING CODE:	7794

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	23.2	**%**
BULK UNIT WEIGHT	122.8	lb/ft³
DRY UNIT WEIGHT	99.7	lb/ft³
UCS *	306.2	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-016 67 Day		
TESTING DATE:	13-Dec-11	LOADING RATE:	0.04 in./min.
TESTED BY:	JPM	TRACKING CODE:	7795

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-016	
2. WT MOISTURE TIN (tare weight)	114.03	g
3. WT WET SOIL + TARE	227.86	g
4. WT DRY SOIL + TARE	196.08	g
5. WT WATER, Ww	31.78	g
6. WT DRY SOIL, Ws	82.05	g
7. MOISTURE CONTENT, W	**38.73**	**%**

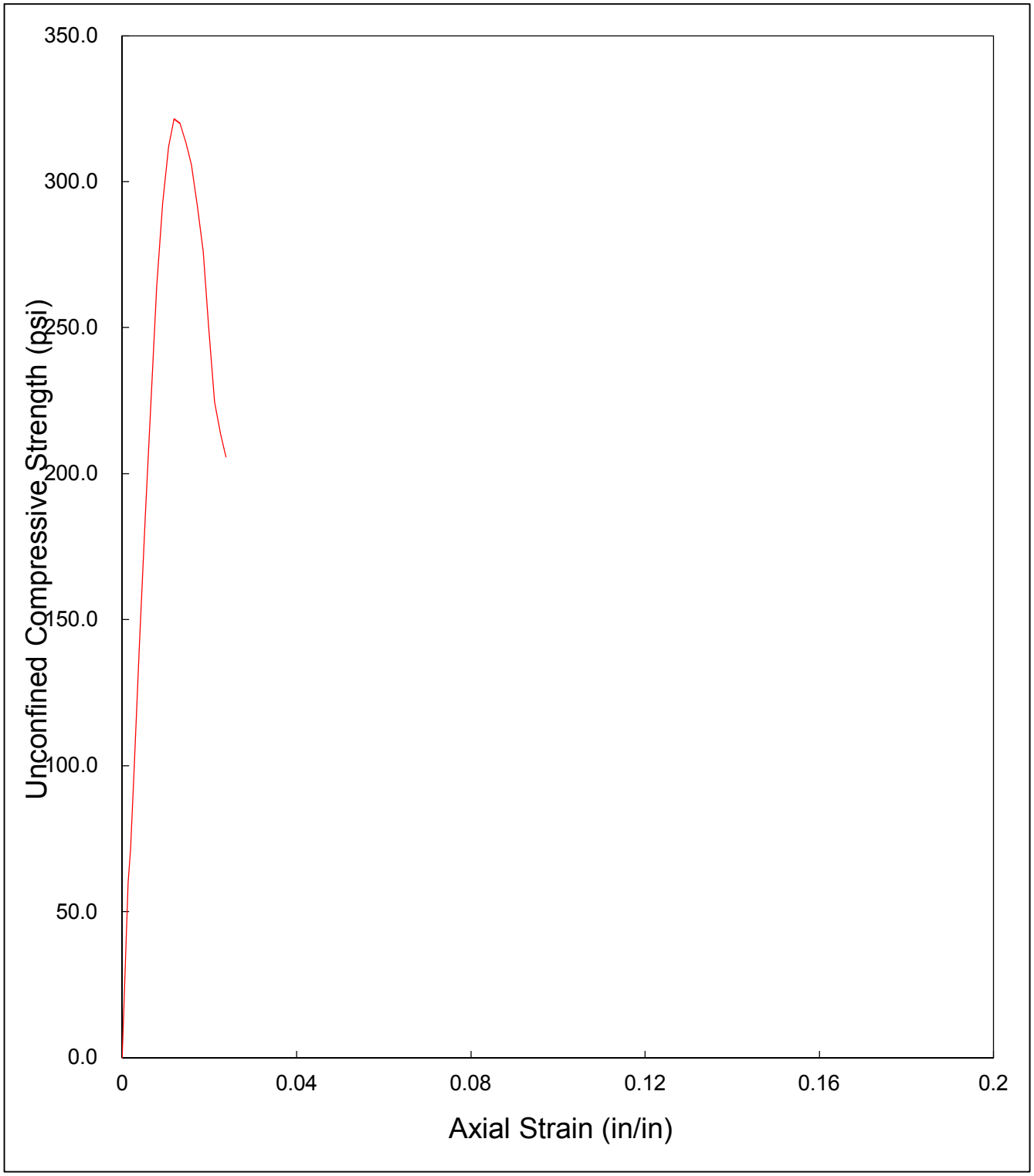
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.17	in.	3.77	in.
No. 2	2.18	in.	3.80	in.
No. 3	2.17	in.	3.77	in.
Average	**2.17**	**in.**	**3.78**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***337.59***	***g***
Initial Area, Ao	3.71	in²
Initial Volume, Vo	14.02	in³
Initial Bulk Unit Weight,	91.7	lb/ft³
Initial Dry Unit Weight	66.1	lb/ft³
15 % Strain (0.15 Lo)	0.57	in.
UCS	321.5	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.710	0.0000	0.0
129	0.003	0.003	3.713	0.0008	34.7
222	0.005	0.005	3.715	0.0013	59.8
265	0.007	0.007	3.717	0.0019	71.3
364	0.010	0.010	3.720	0.0026	97.9
528	0.015	0.015	3.725	0.0040	141.8
694	0.020	0.020	3.729	0.0053	186.1
848	0.025	0.025	3.734	0.0066	227.1
989	0.030	0.030	3.739	0.0079	264.5
1096	0.035	0.035	3.744	0.0093	292.7
1170	0.040	0.040	3.749	0.0106	312.0
1207	0.045	0.045	3.754	0.0119	321.5
1203	0.050	0.050	3.759	0.0132	320.0
1180	0.055	0.055	3.765	0.0146	313.5
1153	0.060	0.060	3.770	0.0159	305.9
1102	0.065	0.065	3.775	0.0172	291.9
1044	0.070	0.070	3.780	0.0185	276.2
947	0.075	0.075	3.785	0.0198	250.2
851	0.080	0.080	3.790	0.0212	224.5
811	0.085	0.085	3.795	0.0225	213.7
782	0.090	0.090	3.800	0.0238	205.8

UNCONFINED COMPRESSION TESTING

Sample No. 0397-016 67 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-016 67 Day		
TESTING DATE:	12/13/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JPM	TRACKING CODE:	7795

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	38.7	**%**
BULK UNIT WEIGHT	91.7	lb/ft³
DRY UNIT WEIGHT	66.1	lb/ft³
UCS *	321.5	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-017 67 Day
TESTING DATE: 13-Dec-11
TESTED BY: JPM

LOADING RATE: 0.04 in./min.
TRACKING CODE: 7796

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-017	
2. WT MOISTURE TIN (tare weight)	113.55	g
3. WT WET SOIL + TARE	230.09	g
4. WT DRY SOIL + TARE	196.04	g
5. WT WATER, Ww	34.05	g
6. WT DRY SOIL, Ws	82.49	g
7. MOISTURE CONTENT, W	**41.28**	**%**

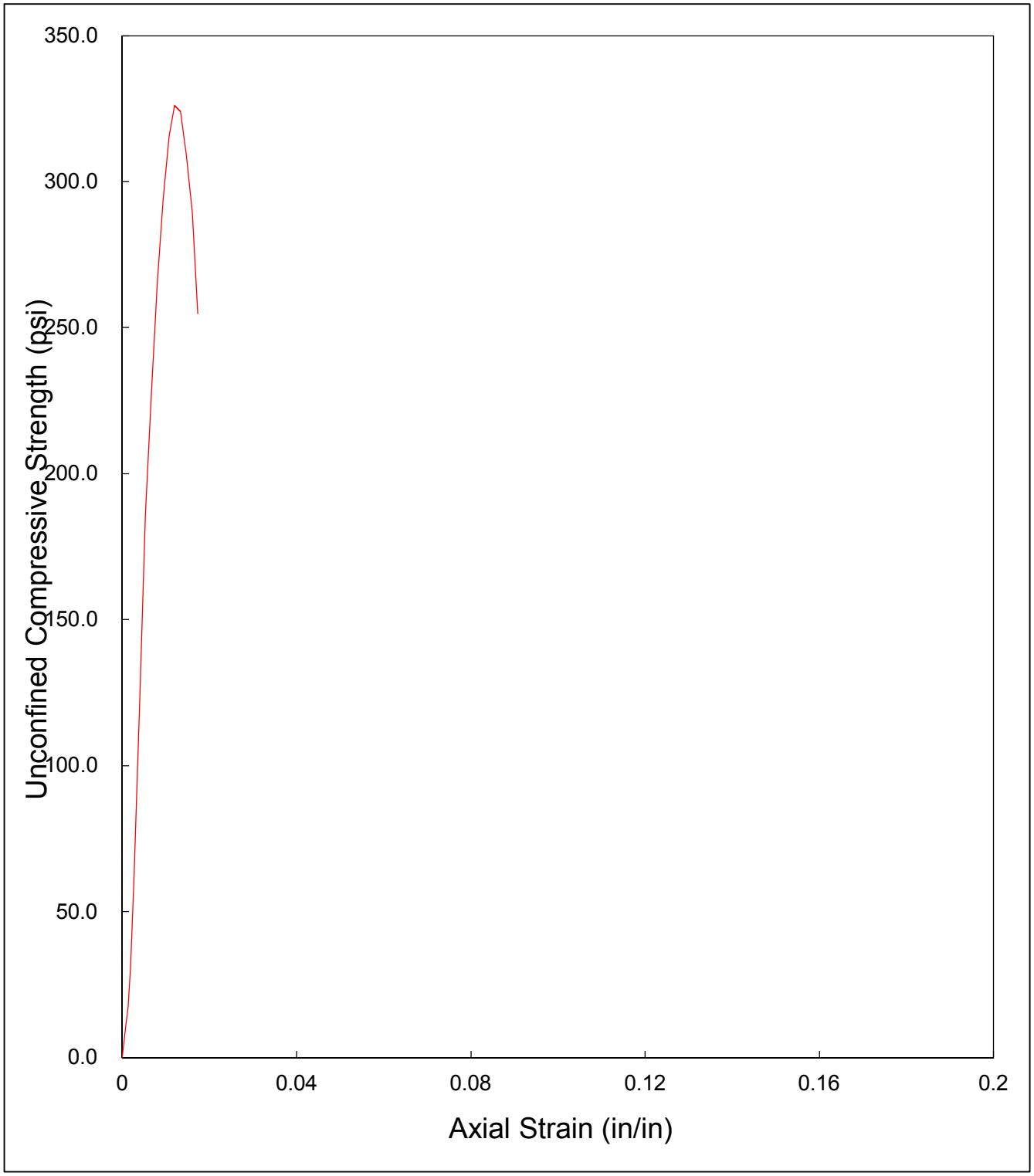
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.75	in.
No. 2	2.02	in.	3.75	in.
No. 3	2.01	in.	3.74	in.
Average	**2.01**	**in.**	**3.75**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***332.76***	***g***
Initial Area, Ao	3.17	in²
Initial Volume, Vo	11.89	in³
Initial Bulk Unit Weight,	106.6	lb/ft³
Initial Dry Unit Weight	75.5	lb/ft³
15 % Strain (0.15 Lo)	0.56	in.
UCS	326.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.173	0.0000	0.0
33	0.003	0.003	3.176	0.0008	10.4
55	0.005	0.005	3.177	0.0013	17.3
99	0.007	0.007	3.179	0.0019	31.1
197	0.010	0.010	3.182	0.0027	61.9
397	0.015	0.015	3.186	0.0040	124.6
593	0.020	0.020	3.190	0.0053	185.9
725	0.025	0.025	3.194	0.0067	227.0
848	0.030	0.030	3.199	0.0080	265.1
942	0.035	0.035	3.203	0.0093	294.1
1012	0.040	0.040	3.207	0.0107	315.5
1047	0.045	0.045	3.212	0.0120	326.0
1042	0.050	0.050	3.216	0.0133	324.0
995	0.055	0.055	3.220	0.0147	309.0
933	0.060	0.060	3.225	0.0160	289.3
823	0.065	0.065	3.229	0.0173	254.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-017 67 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-017 67 Day		
TESTING DATE:	12/13/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JPM	TRACKING CODE:	7796

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	41.3	**%**
BULK UNIT WEIGHT	106.6	lb/ft³
DRY UNIT WEIGHT	75.5	lb/ft³
UCS *	326.0	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-019 67 Day
TESTING DATE: 13-Dec-11
TESTED BY: JPM

LOADING RATE: 0.04 in./min.
TRACKING CODE: 7797

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-019	
2. WT MOISTURE TIN (tare weight)	113.14	g
3. WT WET SOIL + TARE	252.65	g
4. WT DRY SOIL + TARE	213.87	g
5. WT WATER, Ww	38.78	g
6. WT DRY SOIL, Ws	100.73	g
7. MOISTURE CONTENT, W	**38.50**	**%**

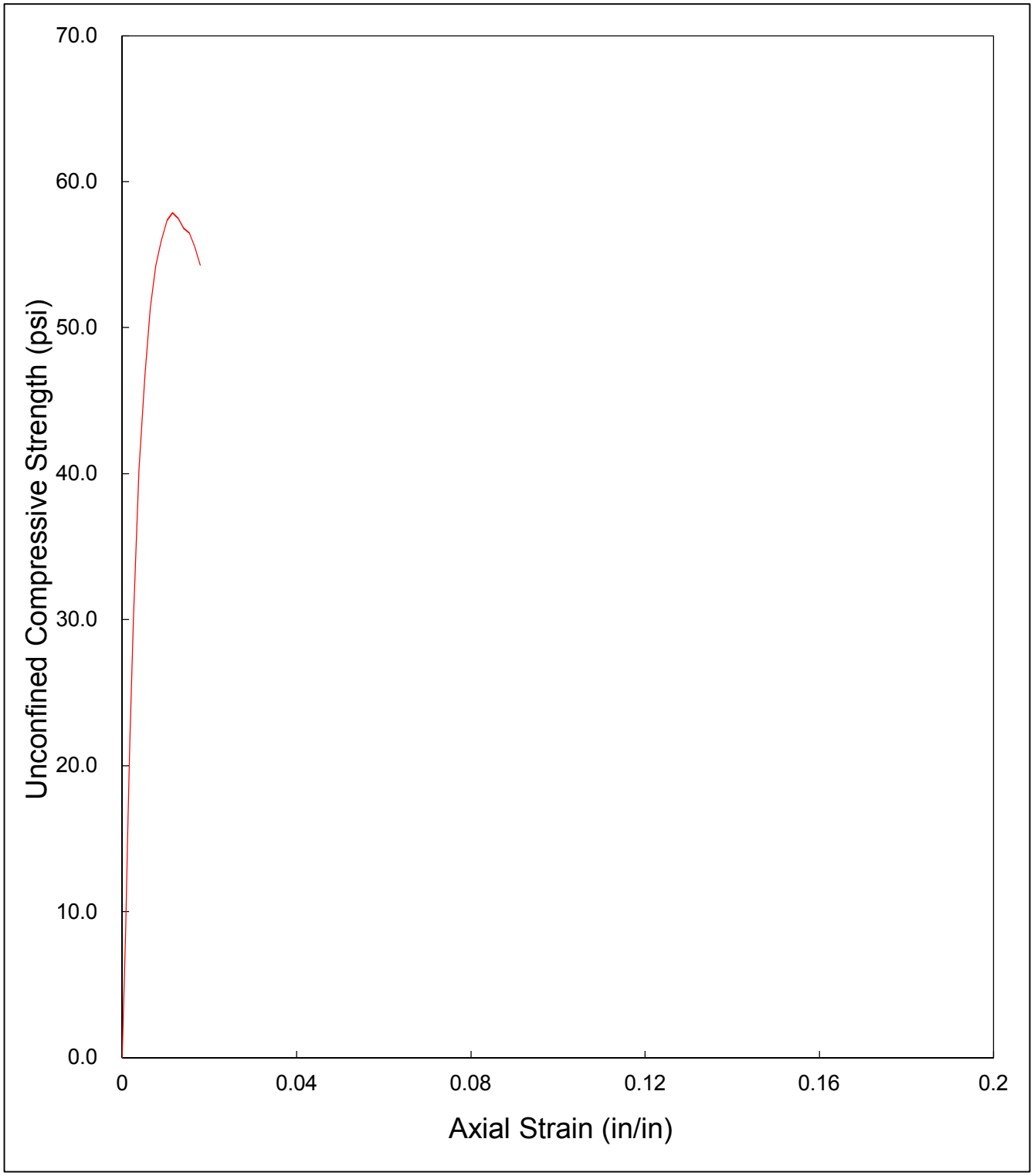
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.07	in.	3.91	in.
No. 2	2.08	in.	3.92	in.
No. 3	2.06	in.	3.90	in.
Average	**2.07**	**in.**	**3.91**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***348.44***	***g***
Initial Area, Ao	3.37	in²
Initial Volume, Vo	13.16	in³
Initial Bulk Unit Weight,	100.9	lb/ft³
Initial Dry Unit Weight	72.8	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	57.9	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.365	0.0000	0.0
29	0.003	0.003	3.368	0.0008	8.6
56	0.005	0.005	3.370	0.0013	16.6
75	0.007	0.007	3.371	0.0018	22.2
102	0.010	0.010	3.374	0.0026	30.2
136	0.015	0.015	3.378	0.0038	40.3
158	0.020	0.020	3.383	0.0051	46.7
174	0.025	0.025	3.387	0.0064	51.4
184	0.030	0.030	3.391	0.0077	54.3
190	0.035	0.035	3.396	0.0090	56.0
195	0.040	0.040	3.400	0.0102	57.4
197	0.045	0.045	3.405	0.0115	57.9
196	0.050	0.050	3.409	0.0128	57.5
194	0.055	0.055	3.413	0.0141	56.8
193	0.060	0.060	3.418	0.0153	56.5
190	0.065	0.065	3.422	0.0166	55.5
186	0.070	0.070	3.427	0.0179	54.3

UNCONFINED COMPRESSION TESTING

Sample No. 0397-019 67 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-019 67 Day		
TESTING DATE:	12/13/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JPM	TRACKING CODE:	7797

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	38.5	**%**
BULK UNIT WEIGHT	100.9	lb/ft³
DRY UNIT WEIGHT	72.8	lb/ft³
UCS *	57.9	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-024 67 Day
TESTING DATE: 13-Dec-11
TESTED BY: JPM

LOADING RATE: 0.04 in./min.
TRACKING CODE: 7798

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-024	
2. WT MOISTURE TIN (tare weight)	114.15	g
3. WT WET SOIL + TARE	239.64	g
4. WT DRY SOIL + TARE	206.03	g
5. WT WATER, Ww	33.61	g
6. WT DRY SOIL, Ws	91.88	g
7. MOISTURE CONTENT, W	**36.58**	**%**

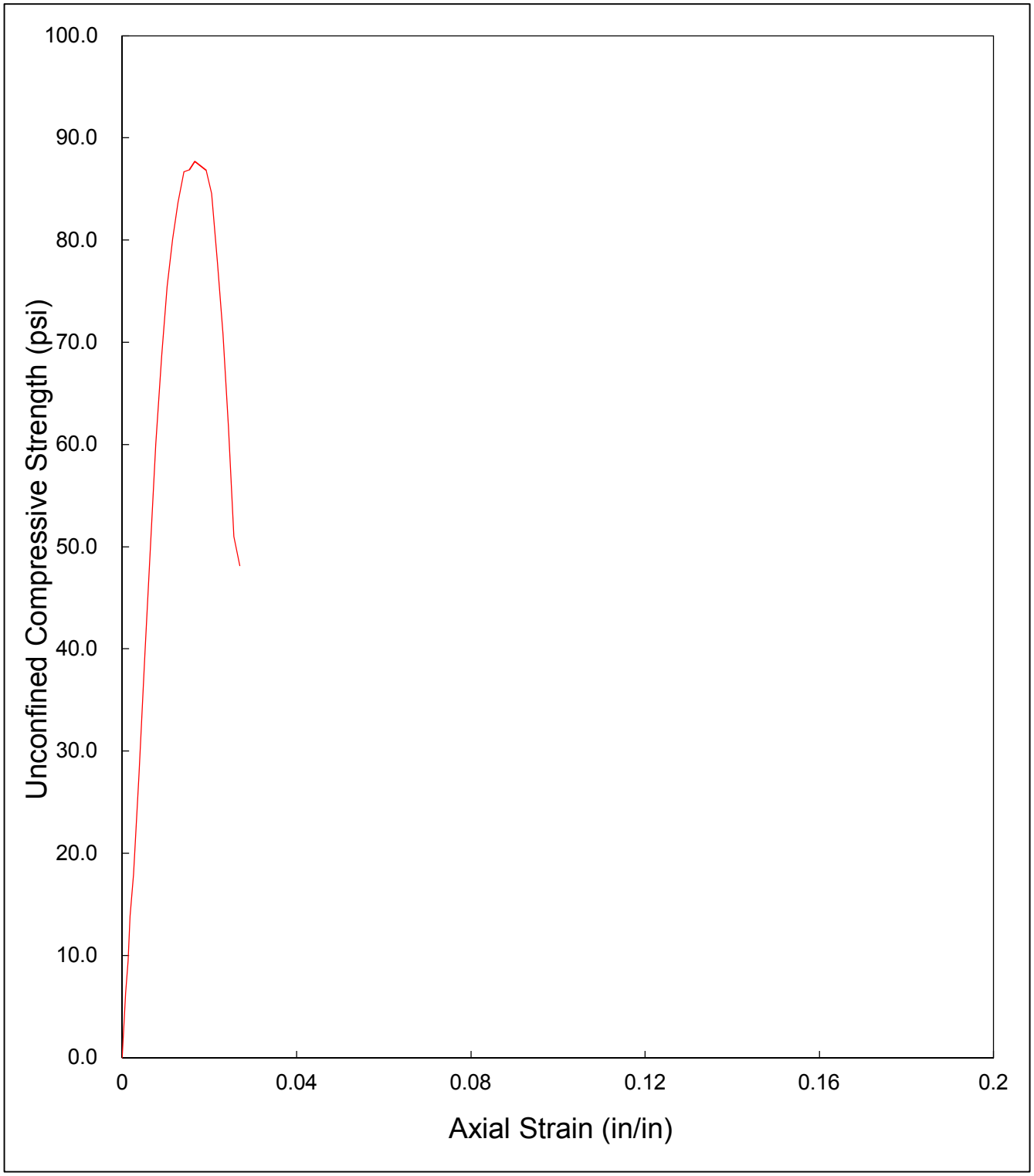
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.01	in.	3.91	in.
No. 2	2.00	in.	3.89	in.
No. 3	2.02	in.	3.90	in.
Average	**2.01**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***342.32***	***g***
Initial Area, Ao	3.17	in²
Initial Volume, Vo	12.38	in³
Initial Bulk Unit Weight,	105.4	lb/ft³
Initial Dry Unit Weight	77.2	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	87.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.173	0.0000	0.0
20	0.003	0.003	3.176	0.0008	6.3
30	0.005	0.005	3.177	0.0013	9.4
44	0.007	0.007	3.179	0.0018	13.8
57	0.010	0.010	3.181	0.0026	17.9
88	0.015	0.015	3.185	0.0038	27.6
126	0.020	0.020	3.189	0.0051	39.5
159	0.025	0.025	3.194	0.0064	49.8
192	0.030	0.030	3.198	0.0077	60.0
220	0.035	0.035	3.202	0.0090	68.7
242	0.040	0.040	3.206	0.0103	75.5
257	0.045	0.045	3.210	0.0115	80.1
269	0.050	0.050	3.214	0.0128	83.7
279	0.055	0.055	3.218	0.0141	86.7
280	0.060	0.060	3.223	0.0154	86.9
283	0.065	0.065	3.227	0.0167	87.7
281	0.075	0.075	3.235	0.0192	86.9
274	0.080	0.080	3.240	0.0205	84.6
252	0.085	0.085	3.244	0.0218	77.7
230	0.090	0.090	3.248	0.0231	70.8
201	0.095	0.095	3.252	0.0244	61.8
166	0.100	0.100	3.257	0.0256	51.0
157	0.105	0.105	3.261	0.0269	48.1

UNCONFINED COMPRESSION TESTING

Sample No. 0397-024 67 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-024 67 Day		
TESTING DATE:	12/13/2011	LOADING RATE:	0.04 in./min.
TESTED BY:	JPM	TRACKING CODE:	7798

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	36.6	**%**
BULK UNIT WEIGHT	105.4	lb/ft³
DRY UNIT WEIGHT	77.2	lb/ft³
UCS *	87.7	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview		
PROJECT No.:	SE-0397		
SAMPLE No.:	0397-017 (101 day)		
TESTING DATE:	16-Jan-12	LOADING RATE:	0.04 in./min.
TESTED BY:	SEM	TRACKING CODE:	7830_US

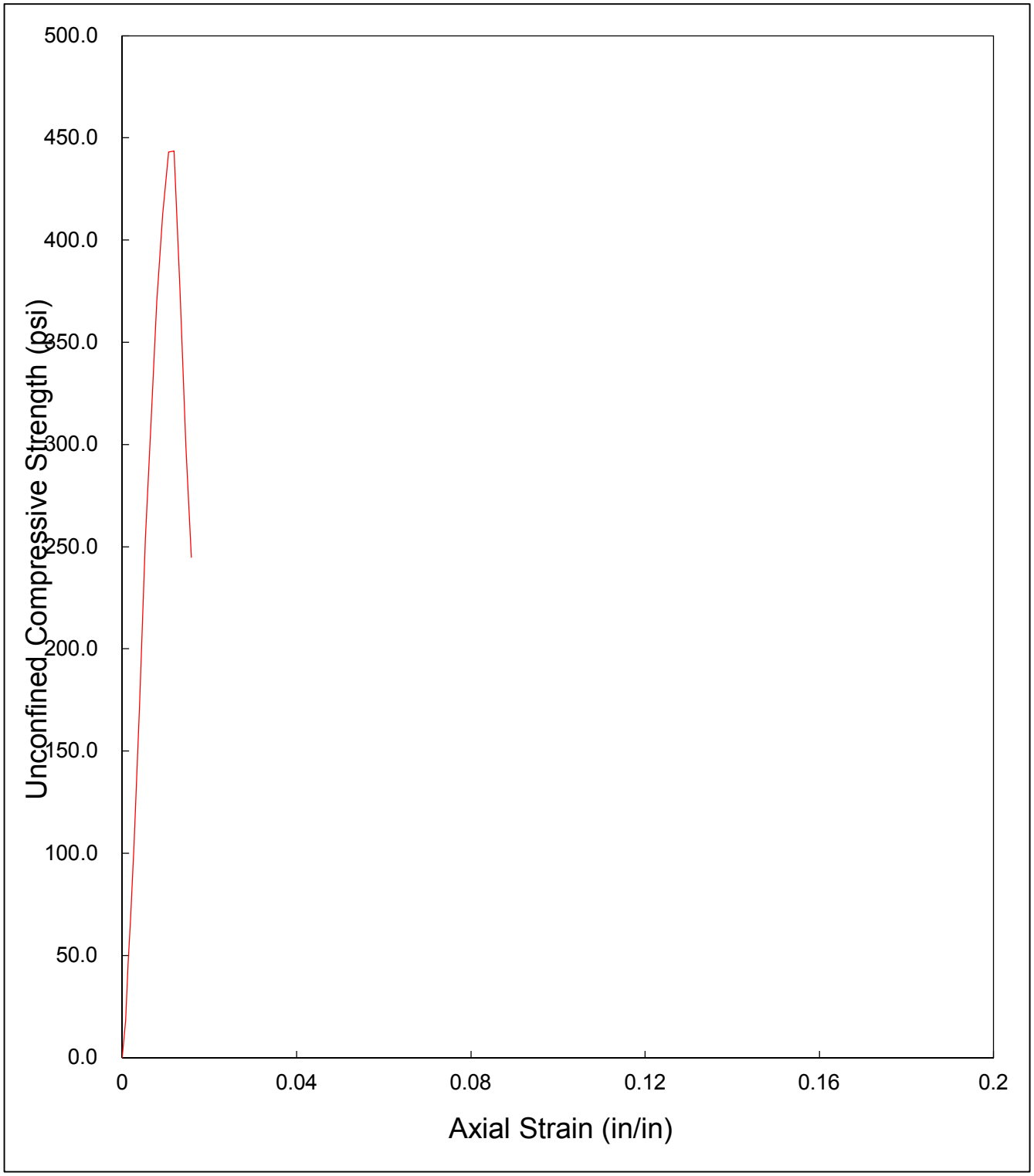
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-017	
2. WT MOISTURE TIN (tare weight)	114.14	g
3. WT WET SOIL + TARE	227.24	g
4. WT DRY SOIL + TARE	195.90	g
5. WT WATER, Ww	31.34	g
6. WT DRY SOIL, Ws	81.76	g
7. MOISTURE CONTENT, W	**38.33**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.77	in.
No. 2	2.00	in.	3.78	in.
No. 3	2.02	in.	3.79	in.
Average	**2.01**	**in.**	**3.78**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***333.02***	***g***
Initial Area, Ao	3.16	in²
Initial Volume, Vo	11.95	in³
Initial Bulk Unit Weight,	106.1	lb/ft³
Initial Dry Unit Weight	76.7	lb/ft³
15 % Strain (0.15 Lo)	0.57	in.
UCS	443.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.163	0.0000	0.0
57	0.003	0.003	3.165	0.0008	18.0
146	0.005	0.005	3.167	0.0013	46.1
215	0.007	0.007	3.168	0.0019	67.9
330	0.010	0.010	3.171	0.0026	104.1
543	0.015	0.015	3.175	0.0040	171.0
808	0.020	0.020	3.179	0.0053	254.1
999	0.025	0.025	3.184	0.0066	313.8
1179	0.030	0.030	3.188	0.0079	369.8
1317	0.035	0.035	3.192	0.0093	412.6
1416	0.040	0.040	3.196	0.0106	443.0
1420	0.045	0.045	3.201	0.0119	443.7
1204	0.050	0.050	3.205	0.0132	375.7
959	0.055	0.055	3.209	0.0146	298.8
787	0.060	0.060	3.214	0.0159	244.9

UNCONFINED COMPRESSION TESTING
Sample No. 0397-017 (101 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview		
PROJECT No.:	SE-0397		
SAMPLE No.:	0397-017 (101 day)		
TESTING DATE:	1/16/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	SEM	TRACKING CODE:	7830_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	38.3	**%**
BULK UNIT WEIGHT	106.1	lb/ft³
DRY UNIT WEIGHT	76.7	lb/ft³
UCS *	443.7	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017 Dup (7 day)		
TESTING DATE:	24-Jan-12	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS	TRACKING CODE:	7846_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-017 Dup (7 day)	
2. WT MOISTURE TIN (tare weight)	170.45	g
3. WT WET SOIL + TARE	270.74	g
4. WT DRY SOIL + TARE	242.45	g
5. WT WATER, Ww	28.29	g
6. WT DRY SOIL, Ws	72.00	g
7. MOISTURE CONTENT, W	**39.29**	**%**

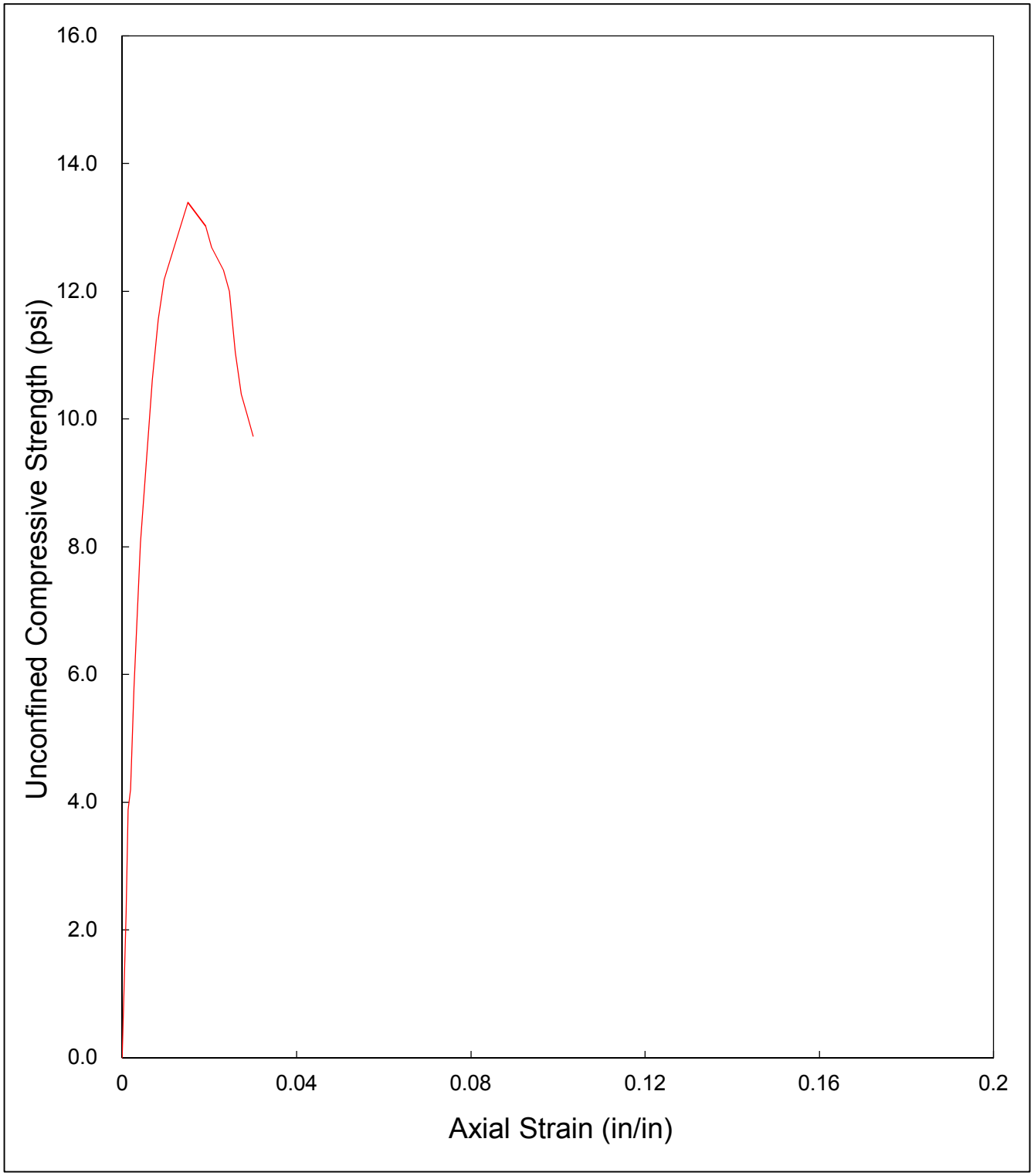
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.98	in.	3.64	in.
No. 2	1.99	in.	3.68	in.
No. 3	1.98	in.	3.67	in.
Average	**1.98**	**in.**	**3.66**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***326.73***	***g***
Initial Area, Ao	3.09	in²
Initial Volume, Vo	11.32	in³
Initial Bulk Unit Weight,	110.0	lb/ft³
Initial Dry Unit Weight	79.0	lb/ft³
15 % Strain (0.15 Lo)	0.55	in.
UCS	13.4	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.089	0.0000	0.0
7	0.003	0.003	3.092	0.0008	2.3
12	0.005	0.005	3.094	0.0014	3.9
13	0.007	0.007	3.095	0.0019	4.2
18	0.010	0.010	3.098	0.0027	5.8
25	0.015	0.015	3.102	0.0041	8.1
29	0.020	0.020	3.106	0.0055	9.3
33	0.025	0.025	3.111	0.0068	10.6
36	0.030	0.030	3.115	0.0082	11.6
38	0.035	0.035	3.119	0.0096	12.2
39	0.040	0.040	3.124	0.0109	12.5
40	0.045	0.045	3.128	0.0123	12.8
41	0.050	0.050	3.132	0.0136	13.1
42	0.055	0.055	3.137	0.0150	13.4
41	0.070	0.070	3.150	0.0191	13.0
40	0.075	0.075	3.154	0.0205	12.7
39	0.085	0.085	3.163	0.0232	12.3
38	0.090	0.090	3.167	0.0246	12.0
35	0.095	0.095	3.172	0.0259	11.0
33	0.100	0.100	3.176	0.0273	10.4
32	0.105	0.105	3.181	0.0287	10.1
31	0.110	0.110	3.185	0.0300	9.7

UNCONFINED COMPRESSION TESTING

Sample No.0397-017 Dup (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017 Dup (7 day)		
TESTING DATE:	1/24/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS	TRACKING CODE:	7846_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	39.3	**%**
BULK UNIT WEIGHT	110.0	lb/ft³
DRY UNIT WEIGHT	79.0	lb/ft³
UCS *	13.4	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017A (7 day)		
TESTING DATE:	24-Jan-12	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS	TRACKING CODE:	7847_US

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-017A (7 day)	
2. WT MOISTURE TIN (tare weight)	172.20	g
3. WT WET SOIL + TARE	312.33	g
4. WT DRY SOIL + TARE	278.15	g
5. WT WATER, Ww	34.18	g
6. WT DRY SOIL, Ws	105.95	g
7. MOISTURE CONTENT, W	**32.26**	**%**

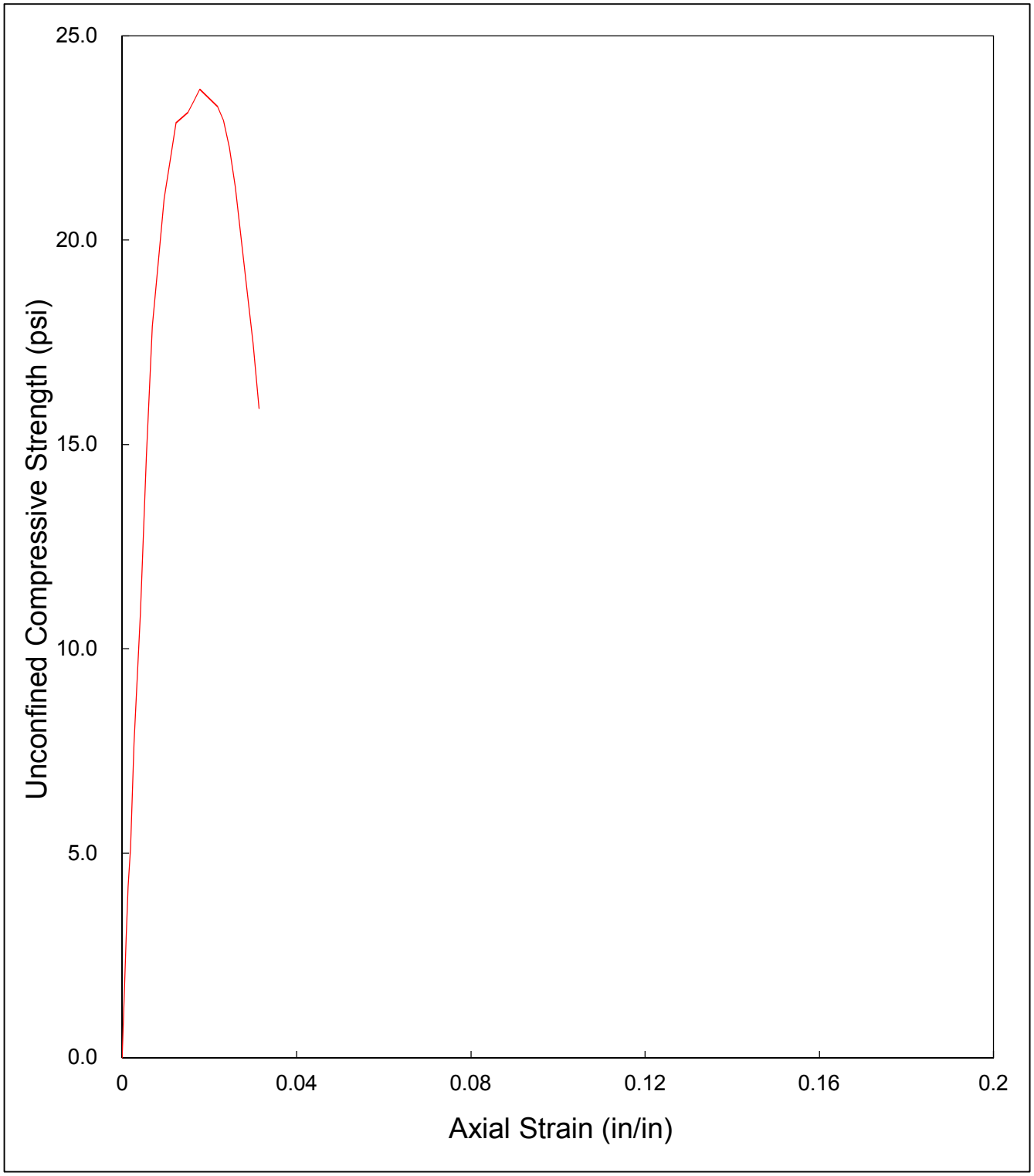
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.64	in.
No. 2	1.99	in.	3.68	in.
No. 3	1.98	in.	3.67	in.
Average	**1.99**	**in.**	**3.66**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***351.50***	***g***
Initial Area, Ao	3.11	in²
Initial Volume, Vo	11.39	in³
Initial Bulk Unit Weight,	117.5	lb/ft³
Initial Dry Unit Weight	88.9	lb/ft³
15 % Strain (0.15 Lo)	0.55	in.
UCS	23.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.110	0.0000	0.0
9	0.003	0.003	3.113	0.0008	2.9
13	0.005	0.005	3.115	0.0014	4.2
16	0.007	0.007	3.116	0.0019	5.1
24	0.010	0.010	3.119	0.0027	7.7
34	0.015	0.015	3.123	0.0041	10.9
46	0.020	0.020	3.127	0.0055	14.7
56	0.025	0.025	3.132	0.0068	17.9
61	0.030	0.030	3.136	0.0082	19.5
66	0.035	0.035	3.140	0.0096	21.0
69	0.040	0.040	3.145	0.0109	21.9
72	0.045	0.045	3.149	0.0123	22.9
73	0.055	0.055	3.158	0.0150	23.1
74	0.060	0.060	3.162	0.0164	23.4
75	0.065	0.065	3.166	0.0177	23.7
74	0.080	0.080	3.180	0.0218	23.3
73	0.085	0.085	3.184	0.0232	22.9
71	0.090	0.090	3.189	0.0246	22.3
68	0.095	0.095	3.193	0.0259	21.3
64	0.100	0.100	3.198	0.0273	20.0
60	0.105	0.105	3.202	0.0287	18.7
56	0.110	0.110	3.207	0.0300	17.5
51	0.115	0.115	3.211	0.0314	15.9

UNCONFINED COMPRESSION TESTING

Sample No. 0397-017A (7 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017A (7 day)		
TESTING DATE:	1/24/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	JGS	TRACKING CODE:	7847_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	32.3	**%**
BULK UNIT WEIGHT	117.5	lb/ft³
DRY UNIT WEIGHT	88.9	lb/ft³
UCS *	23.7	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017 A (28 day)		
TESTING DATE:	14-Feb-12	LOADING RATE:	0.04 in./min.
TESTED BY:	SEM	TRACKING CODE:	7901_US

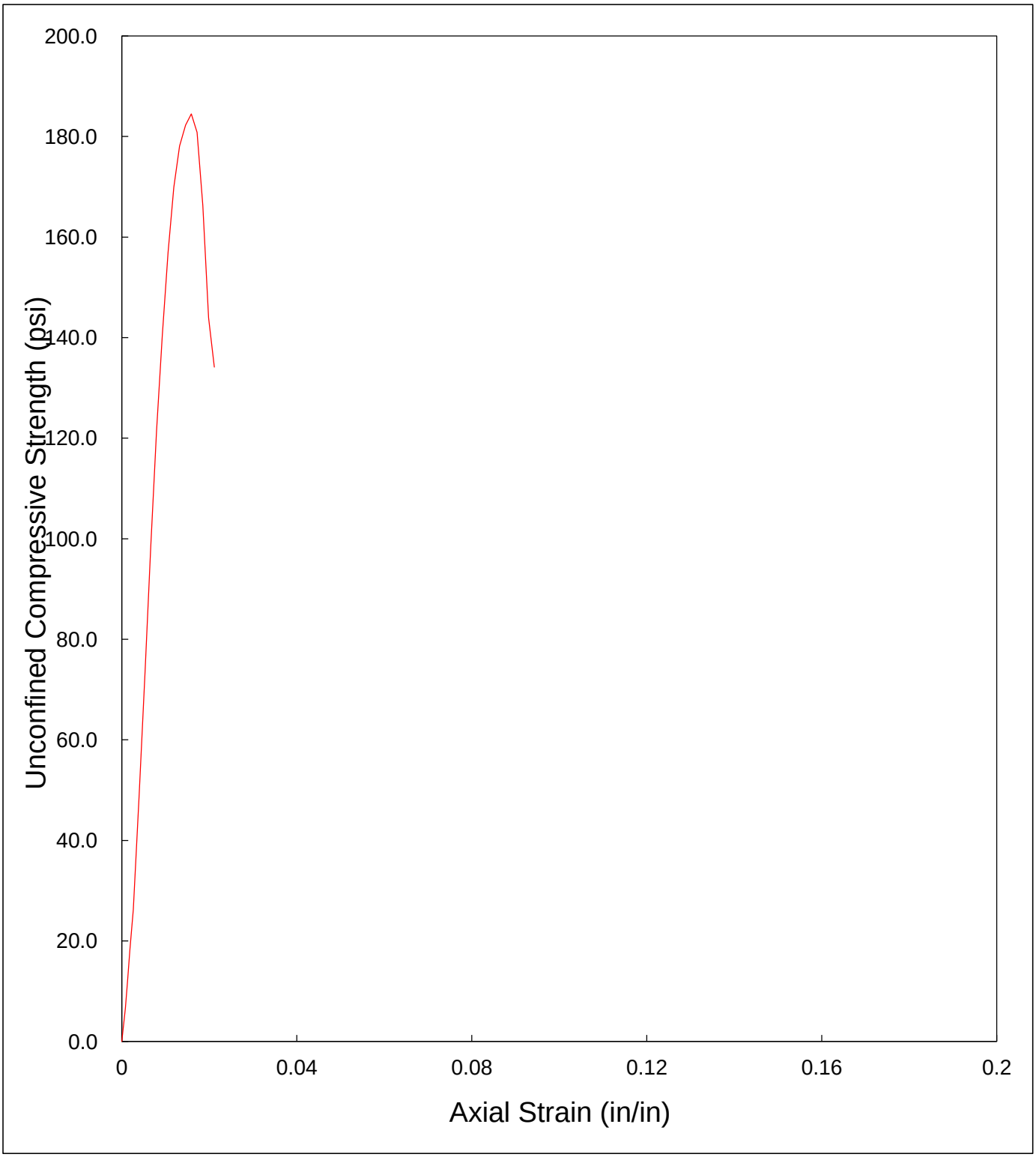
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-017 A	
2. WT MOISTURE TIN (tare weight)	63.91	g
3. WT WET SOIL + TARE	118.06	g
4. WT DRY SOIL + TARE	104.57	g
5. WT WATER, Ww	13.49	g
6. WT DRY SOIL, Ws	40.66	g
7. MOISTURE CONTENT, W	**33.18**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.78	in.
No. 2	2.00	in.	3.78	in.
No. 3	2.01	in.	3.78	in.
Average	**2.00**	**in.**	**3.78**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***361.38***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	11.91	in^3
Initial Bulk Unit Weight,	115.5	lb/ft^3
Initial Dry Unit Weight	86.8	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	184.5	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.152	0.0000	0.0
21	0.003	0.003	3.155	0.0008	6.7
38	0.005	0.005	3.156	0.0013	12.0
58	0.007	0.007	3.158	0.0019	18.4
83	0.010	0.010	3.160	0.0026	26.3
154	0.015	0.015	3.165	0.0040	48.7
233	0.020	0.020	3.169	0.0053	73.5
313	0.025	0.025	3.173	0.0066	98.6
386	0.030	0.030	3.177	0.0079	121.5
447	0.035	0.035	3.182	0.0093	140.5
500	0.040	0.040	3.186	0.0106	156.9
542	0.045	0.045	3.190	0.0119	169.9
569	0.050	0.050	3.194	0.0132	178.1
583	0.055	0.055	3.199	0.0146	182.3
591	0.060	0.060	3.203	0.0159	184.5
580	0.065	0.065	3.207	0.0172	180.8
534	0.070	0.070	3.212	0.0185	166.3
463	0.075	0.075	3.216	0.0198	144.0
432	0.080	0.080	3.220	0.0212	134.2

UNCONFINED COMPRESSION TESTING
Sample No. 0397-017 A (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017 A (28 day)		
TESTING DATE:	2/14/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	SEM	TRACKING CODE:	7901_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	33.2	**%**
BULK UNIT WEIGHT	115.5	lb/ft^3
DRY UNIT WEIGHT	86.8	lb/ft^3
UCS *	184.5	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017 DUP (28 day)		
TESTING DATE:	14-Feb-12	LOADING RATE:	0.04 in./min.
TESTED BY:	SEM	TRACKING CODE:	7902_US

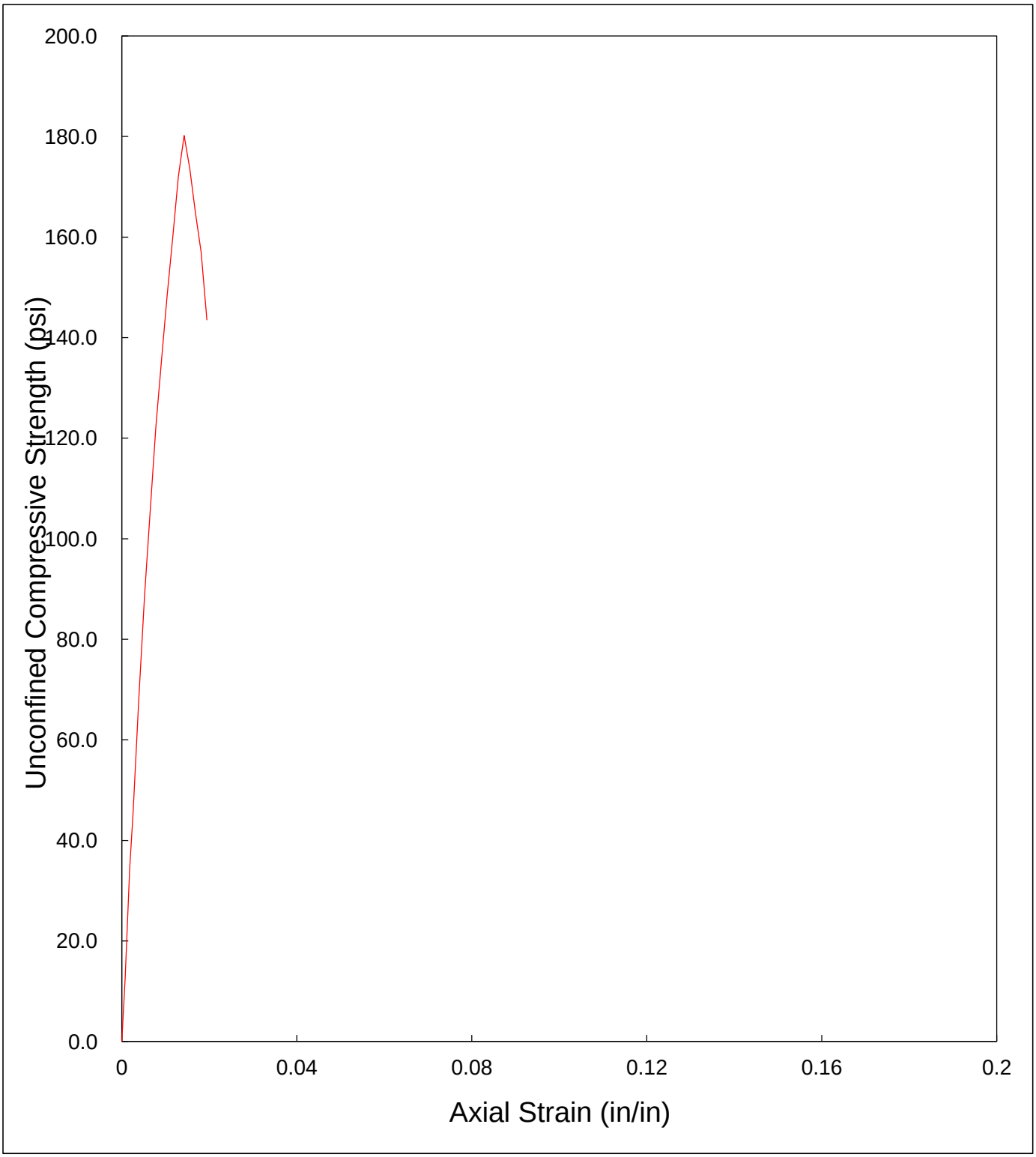
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-017 DUP	
2. WT MOISTURE TIN (tare weight)	68.87	g
3. WT WET SOIL + TARE	119.34	g
4. WT DRY SOIL + TARE	105.87	g
5. WT WATER, Ww	13.47	g
6. WT DRY SOIL, Ws	37.00	g
7. MOISTURE CONTENT, W	**36.41**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.01	in.	3.86	in.
No. 2	2.01	in.	3.86	in.
No. 3	2.02	in.	3.86	in.
Average	**2.01**	**in.**	**3.86**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***342.26***	***g***
Initial Area, Ao	3.18	in^2
Initial Volume, Vo	12.29	in^3
Initial Bulk Unit Weight,	106.1	lb/ft^3
Initial Dry Unit Weight	77.8	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	180.2	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.184	0.0000	0.0
40	0.003	0.003	3.186	0.0008	12.6
77	0.005	0.005	3.188	0.0013	24.2
110	0.007	0.007	3.189	0.0018	34.5
145	0.010	0.010	3.192	0.0026	45.4
218	0.015	0.015	3.196	0.0039	68.2
284	0.020	0.020	3.200	0.0052	88.7
337	0.025	0.025	3.204	0.0065	105.2
392	0.030	0.030	3.209	0.0078	122.2
436	0.035	0.035	3.213	0.0091	135.7
477	0.040	0.040	3.217	0.0104	148.3
516	0.045	0.045	3.221	0.0117	160.2
555	0.050	0.050	3.225	0.0130	172.1
582	0.055	0.055	3.230	0.0142	180.2
561	0.060	0.060	3.234	0.0155	173.5
534	0.065	0.065	3.238	0.0168	164.9
509	0.070	0.070	3.242	0.0181	157.0
466	0.075	0.075	3.247	0.0194	143.5

UNCONFINED COMPRESSION TESTING
Sample No0397-017 DUP (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview		
PROJECT No.:	SH0397		
SAMPLE No.:	0397-017 DUP (28 day)		
TESTING DATE:	2/14/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	SEM	TRACKING CODE:	7902_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	36.4	**%**
BULK UNIT WEIGHT	106.1	lb/ft^3
DRY UNIT WEIGHT	77.8	lb/ft^3
UCS *	180.2	lb/in^2

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-026 7 Day
TESTING DATE: 18-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 7996_US

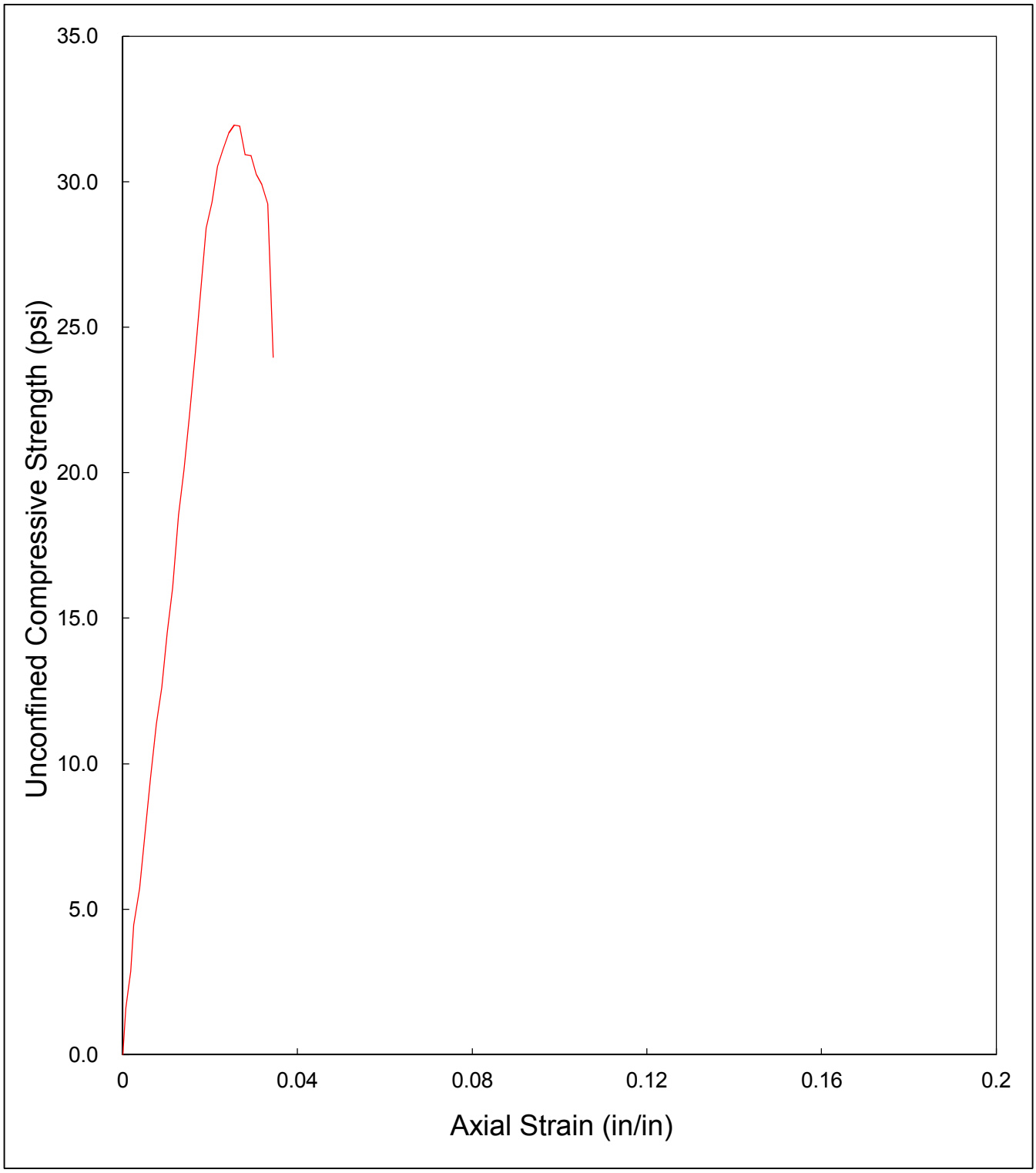
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-026	
2. WT MOISTURE TIN (tare weight)	112.64	g
3. WT WET SOIL + TARE	169.76	g
4. WT DRY SOIL + TARE	155.32	g
5. WT WATER, Ww	14.44	g
6. WT DRY SOIL, Ws	42.68	g
7. MOISTURE CONTENT, W	**33.83**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.92	in.
No. 2	2.00	in.	3.92	in.
No. 3	2.00	in.	3.92	in.
Average	**2.00**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***333.86***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.31	in³
Initial Bulk Unit Weight,	103.3	lb/ft³
Initial Dry Unit Weigh	77.2	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	31.9	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.142	0.0000	0.0
5	0.003	0.003	3.144	0.0008	1.6
7	0.005	0.005	3.146	0.0013	2.2
9	0.007	0.007	3.147	0.0018	2.9
14	0.010	0.010	3.150	0.0026	4.4
18	0.015	0.015	3.154	0.0038	5.7
24	0.020	0.020	3.158	0.0051	7.6
30	0.025	0.025	3.162	0.0064	9.5
36	0.030	0.030	3.166	0.0077	11.4
40	0.035	0.035	3.170	0.0089	12.6
46	0.040	0.040	3.174	0.0102	14.5
51	0.045	0.045	3.178	0.0115	16.0
59	0.050	0.050	3.182	0.0128	18.5
64	0.055	0.055	3.186	0.0140	20.1
70	0.060	0.060	3.190	0.0153	21.9
77	0.065	0.065	3.195	0.0166	24.1
84	0.070	0.070	3.199	0.0179	26.3
91	0.075	0.075	3.203	0.0191	28.4
94	0.080	0.080	3.207	0.0204	29.3
98	0.085	0.085	3.211	0.0217	30.5
100	0.090	0.090	3.215	0.0230	31.1
102	0.095	0.095	3.220	0.0242	31.7
103	0.100	0.100	3.224	0.0255	31.9
103	0.105	0.105	3.228	0.0268	31.9
100	0.110	0.110	3.232	0.0281	30.9
100	0.115	0.115	3.237	0.0293	30.9
98	0.120	0.120	3.241	0.0306	30.2
97	0.125	0.125	3.245	0.0319	29.9
95	0.130	0.130	3.249	0.0332	29.2
78	0.135	0.135	3.254	0.0345	24.0

UNCONFINED COMPRESSION TESTING
Sample No. 0397-026 7 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-026 7 Day		
TESTING DATE:	4/18/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	7996_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	33.8	**%**
BULK UNIT WEIGHT	103.3	lb/ft³
DRY UNIT WEIGHT	77.2	lb/ft³
UCS *	31.9	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-027 7 Day		
TESTING DATE:	18-Apr-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	7997_US

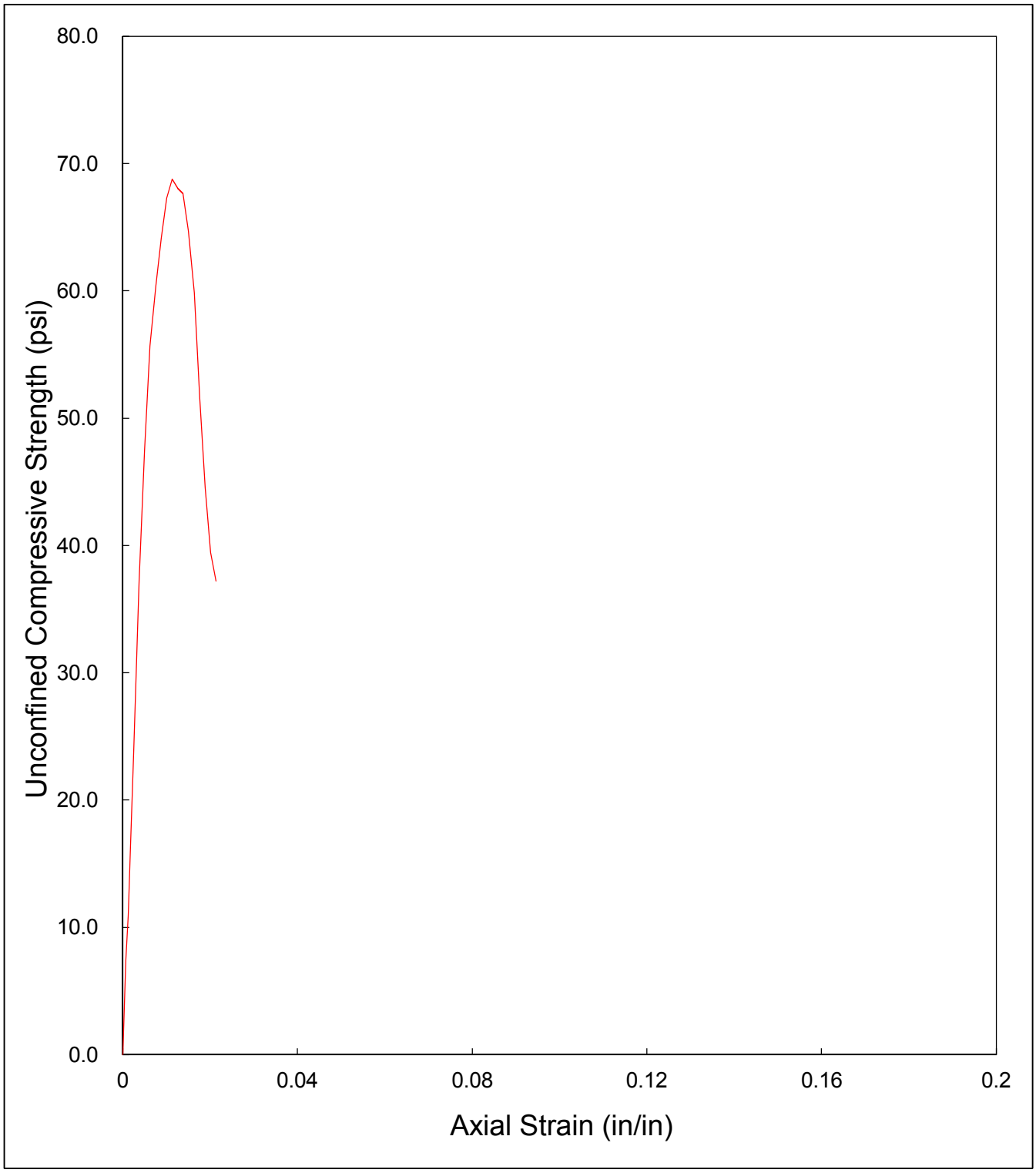
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-027	
2. WT MOISTURE TIN (tare weight)	66.28	g
3. WT WET SOIL + TARE	130.15	g
4. WT DRY SOIL + TARE	113.91	g
5. WT WATER, Ww	16.24	g
6. WT DRY SOIL, Ws	47.63	g
7. MOISTURE CONTENT, W	**34.10**	**%**

SOIL SPECIMEN DIMENSIONS	*DIAMETER*	*LENGTH*
No. 1	1.99 in.	3.97 in.
No. 2	1.99 in.	3.98 in.
No. 3	1.99 in.	3.97 in.
Average	**1.99 in.**	**3.98 in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***343.85***	***g***
Initial Area, Ac	3.11	in²
Initial Volume, Vc	12.35	in³
Initial Bulk Unit Weight,	106.1	lb/ft³
Initial Dry Unit Weigh	79.1	lb/ft³
15 % Strain (0.15 Lo)	0.60	in.
UCS	68.8	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.105	0.0000	0.0
23	0.003	0.003	3.107	0.0008	7.4
34	0.005	0.005	3.109	0.0013	10.9
49	0.007	0.007	3.111	0.0018	15.8
74	0.010	0.010	3.113	0.0025	23.8
116	0.015	0.015	3.117	0.0038	37.2
148	0.020	0.020	3.121	0.0050	47.4
174	0.025	0.025	3.125	0.0063	55.7
189	0.030	0.030	3.129	0.0075	60.4
201	0.035	0.035	3.133	0.0088	64.2
211	0.040	0.040	3.137	0.0101	67.3
216	0.045	0.045	3.141	0.0113	68.8
214	0.050	0.050	3.145	0.0126	68.1
213	0.055	0.055	3.149	0.0138	67.6
204	0.060	0.060	3.153	0.0151	64.7
189	0.065	0.065	3.157	0.0163	59.9
163	0.070	0.070	3.161	0.0176	51.6
141	0.075	0.075	3.165	0.0189	44.6
125	0.080	0.080	3.169	0.0201	39.4
118	0.085	0.085	3.173	0.0214	37.2

UNCONFINED COMPRESSION TESTING
Sample No. 0397-027 7 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-027 7 Day		
TESTING DATE:	4/18/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	7997_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.1	**%**
BULK UNIT WEIGHT	106.1	lb/ft³
DRY UNIT WEIGHT	79.1	lb/ft³
UCS *	68.8	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-028 7 Day		
TESTING DATE:	18-Apr-12	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	7998_US

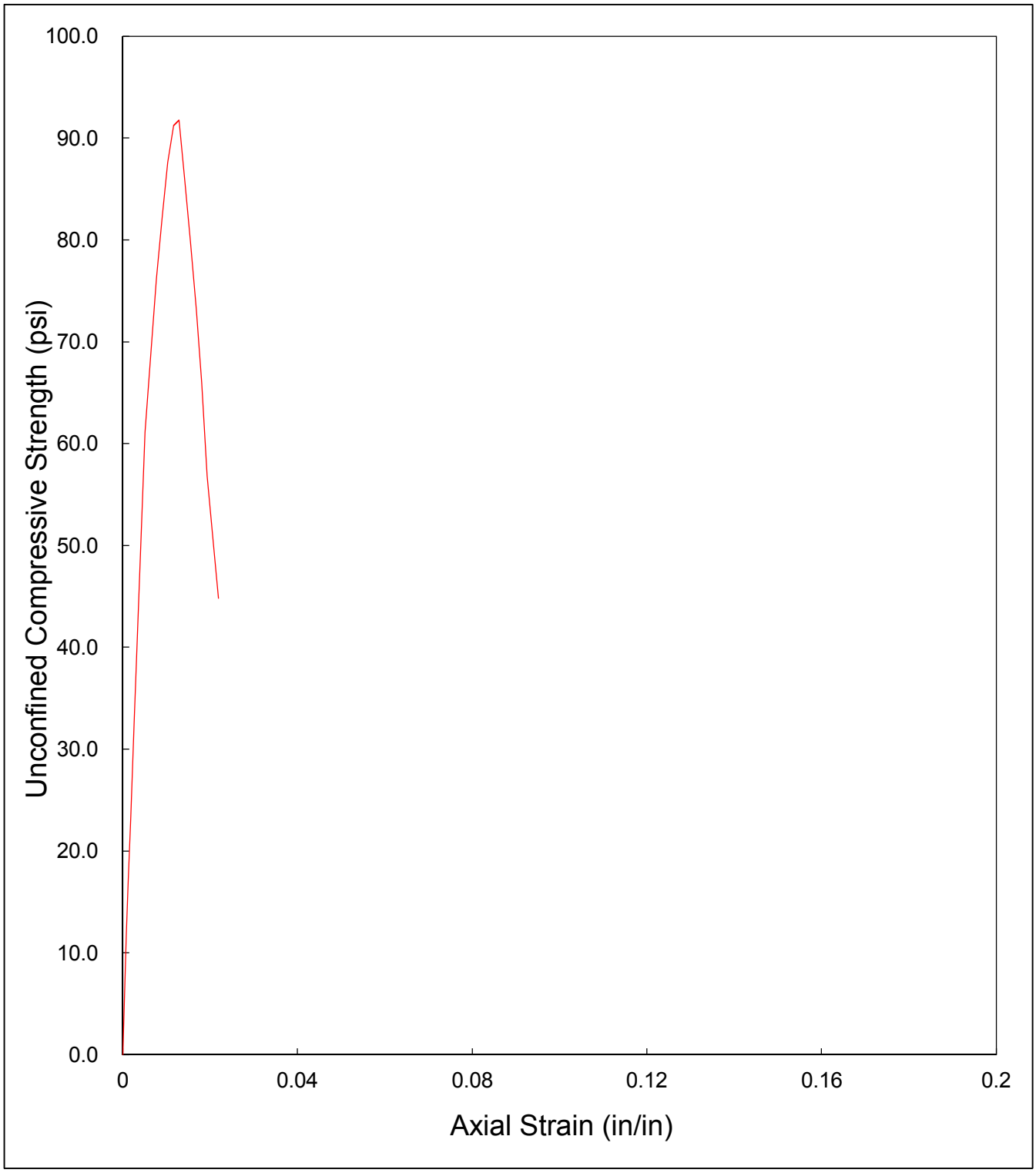
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-028	
2. WT MOISTURE TIN (tare weight)	87.22	g
3. WT WET SOIL + TARE	146.55	g
4. WT DRY SOIL + TARE	129.70	g
5. WT WATER, Ww	16.85	g
6. WT DRY SOIL, Ws	42.48	g
7. MOISTURE CONTENT, W	**39.67**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.87	in.
No. 2	2.00	in.	3.86	in.
No. 3	2.00	in.	3.87	in.
Average	**2.00**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***321.35***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.16	in³
Initial Bulk Unit Weight,	100.7	lb/ft³
Initial Dry Unit Weigh	72.1	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	91.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.142	0.0000	0.0
37	0.003	0.003	3.144	0.0008	11.8
54	0.005	0.005	3.146	0.0013	17.2
73	0.007	0.007	3.147	0.0018	23.2
103	0.010	0.010	3.150	0.0026	32.7
148	0.015	0.015	3.154	0.0039	46.9
193	0.020	0.020	3.158	0.0052	61.1
218	0.025	0.025	3.162	0.0065	68.9
241	0.030	0.030	3.166	0.0078	76.1
261	0.035	0.035	3.170	0.0090	82.3
278	0.040	0.040	3.174	0.0103	87.6
290	0.045	0.045	3.179	0.0116	91.2
292	0.050	0.050	3.183	0.0129	91.7
273	0.055	0.055	3.187	0.0142	85.7
255	0.060	0.060	3.191	0.0155	79.9
234	0.065	0.065	3.195	0.0168	73.2
211	0.070	0.070	3.199	0.0181	65.9
182	0.075	0.075	3.204	0.0194	56.8
162	0.080	0.080	3.208	0.0207	50.5
144	0.085	0.085	3.212	0.0220	44.8

UNCONFINED COMPRESSION TESTING
Sample No. 0397-028 7 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-028 7 Day		
TESTING DATE:	4/18/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	7998_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	39.7	**%**
BULK UNIT WEIGHT	100.7	lb/ft³
DRY UNIT WEIGHT	72.1	lb/ft³
UCS *	91.7	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-029 7 Day
TESTING DATE: 18-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 7999_US

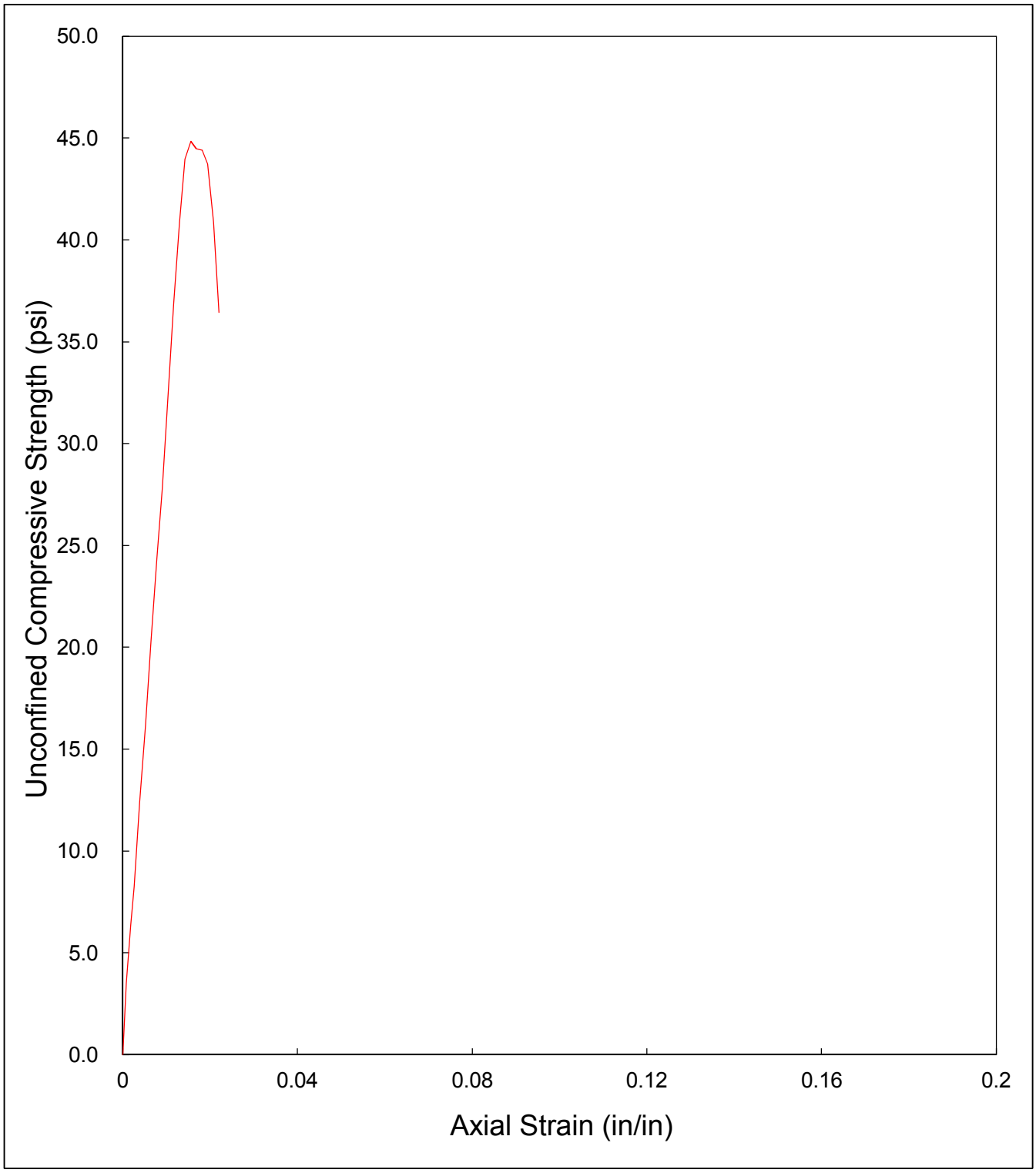
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-029	
2. WT MOISTURE TIN (tare weight)	63.72	g
3. WT WET SOIL + TARE	111.40	g
4. WT DRY SOIL + TARE	97.85	g
5. WT WATER, Ww	13.55	g
6. WT DRY SOIL, Ws	34.13	g
7. MOISTURE CONTENT, W	**39.70**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.85	in.
No. 2	2.00	in.	3.85	in.
No. 3	2.00	in.	3.86	in.
Average	**2.00**	**in.**	**3.85**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***333.62***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.09	in³
Initial Bulk Unit Weight,	105.1	lb/ft³
Initial Dry Unit Weigh	75.2	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	44.8	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.139	0.0000	0.0
11	0.003	0.003	3.142	0.0008	3.5
15	0.005	0.005	3.144	0.0013	4.8
20	0.007	0.007	3.145	0.0018	6.4
26	0.010	0.010	3.148	0.0026	8.3
39	0.015	0.015	3.152	0.0039	12.4
51	0.020	0.020	3.156	0.0052	16.2
64	0.025	0.025	3.160	0.0065	20.3
77	0.030	0.030	3.164	0.0078	24.3
88	0.035	0.035	3.168	0.0091	27.8
103	0.040	0.040	3.172	0.0104	32.5
117	0.045	0.045	3.177	0.0117	36.8
130	0.050	0.050	3.181	0.0130	40.9
140	0.055	0.055	3.185	0.0143	44.0
143	0.060	0.060	3.189	0.0156	44.8
142	0.065	0.065	3.193	0.0169	44.5
142	0.070	0.070	3.198	0.0182	44.4
140	0.075	0.075	3.202	0.0195	43.7
131	0.080	0.080	3.206	0.0208	40.9
117	0.085	0.085	3.210	0.0221	36.4

UNCONFINED COMPRESSION TESTING
Sample No. 0397-029 7 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-029 7 Day		
TESTING DATE:	4/18/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	7999_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	39.7	**%**
BULK UNIT WEIGHT	105.1	lb/ft³
DRY UNIT WEIGHT	75.2	lb/ft³
UCS *	44.8	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-031 7 Day
TESTING DATE: 18-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8000_US

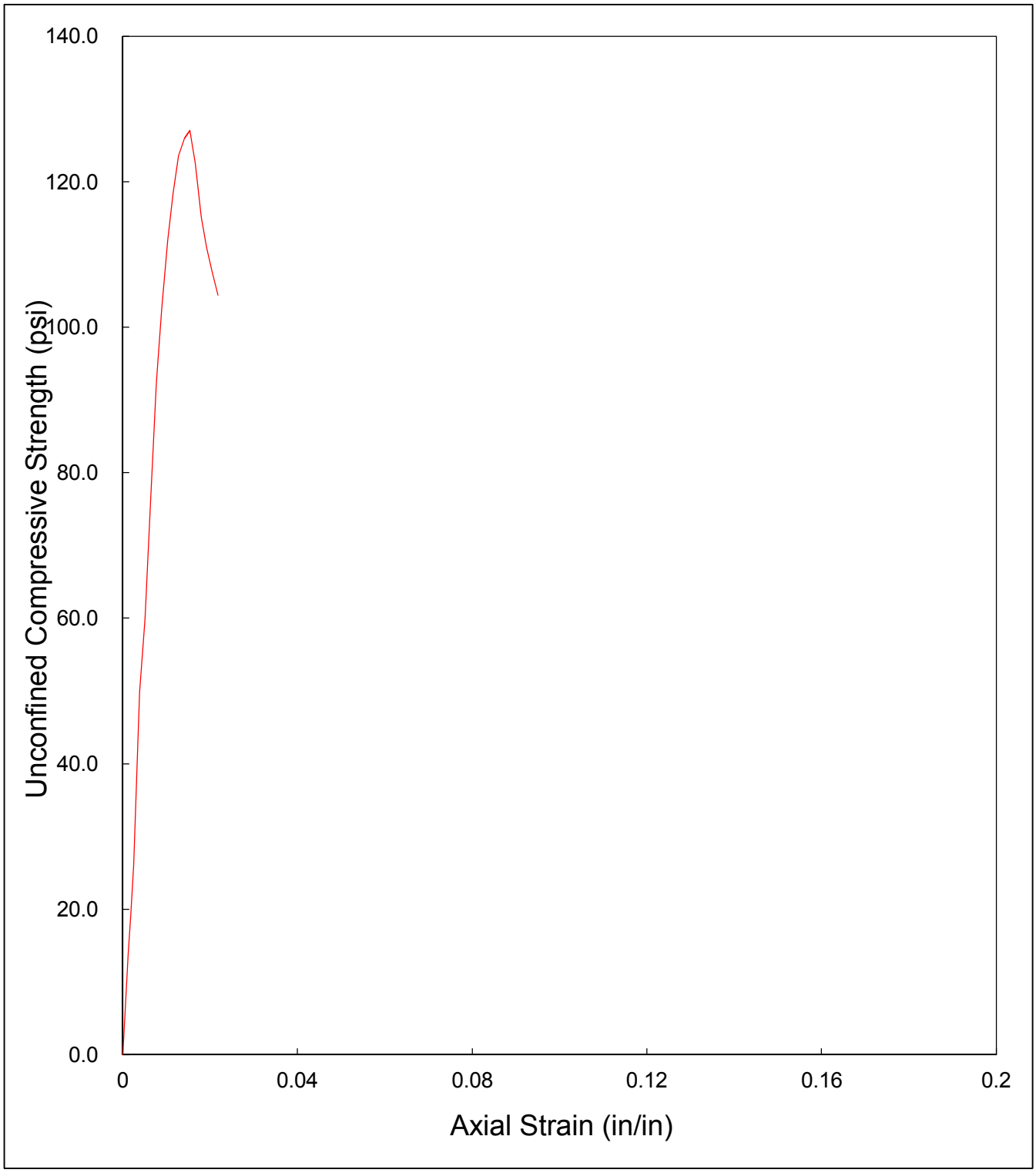
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-031	
2. WT MOISTURE TIN (tare weight)	67.30	g
3. WT WET SOIL + TARE	105.54	g
4. WT DRY SOIL + TARE	94.90	g
5. WT WATER, Ww	10.64	g
6. WT DRY SOIL, Ws	27.60	g
7. MOISTURE CONTENT, W	**38.55**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.90	in.
No. 2	2.00	in.	3.90	in.
No. 3	2.00	in.	3.90	in.
Average	**2.00**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***342.51***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.25	in³
Initial Bulk Unit Weight,	106.6	lb/ft³
Initial Dry Unit Weigh	76.9	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	127.1	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.138	0.0000	0.0
28	0.003	0.003	3.141	0.0008	8.9
44	0.005	0.005	3.142	0.0013	14.0
60	0.007	0.007	3.144	0.0018	19.1
82	0.010	0.010	3.147	0.0026	26.1
157	0.015	0.015	3.151	0.0038	49.8
189	0.020	0.020	3.155	0.0051	59.9
239	0.025	0.025	3.159	0.0064	75.7
292	0.030	0.030	3.163	0.0077	92.3
325	0.035	0.035	3.167	0.0090	102.6
355	0.040	0.040	3.171	0.0103	112.0
376	0.045	0.045	3.175	0.0115	118.4
393	0.050	0.050	3.179	0.0128	123.6
401	0.055	0.055	3.183	0.0141	126.0
405	0.060	0.060	3.187	0.0154	127.1
391	0.065	0.065	3.192	0.0167	122.5
368	0.070	0.070	3.196	0.0179	115.2
355	0.075	0.075	3.200	0.0192	110.9
345	0.080	0.080	3.204	0.0205	107.7
335	0.085	0.085	3.208	0.0218	104.4

UNCONFINED COMPRESSION TESTING
Sample No. 0397-031 7 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-031 7 Day		
TESTING DATE:	4/18/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8000_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	38.6	**%**
BULK UNIT WEIGHT	106.6	lb/ft³
DRY UNIT WEIGHT	76.9	lb/ft³
UCS *	127.1	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-030 7 Day
TESTING DATE: 18-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8001_US

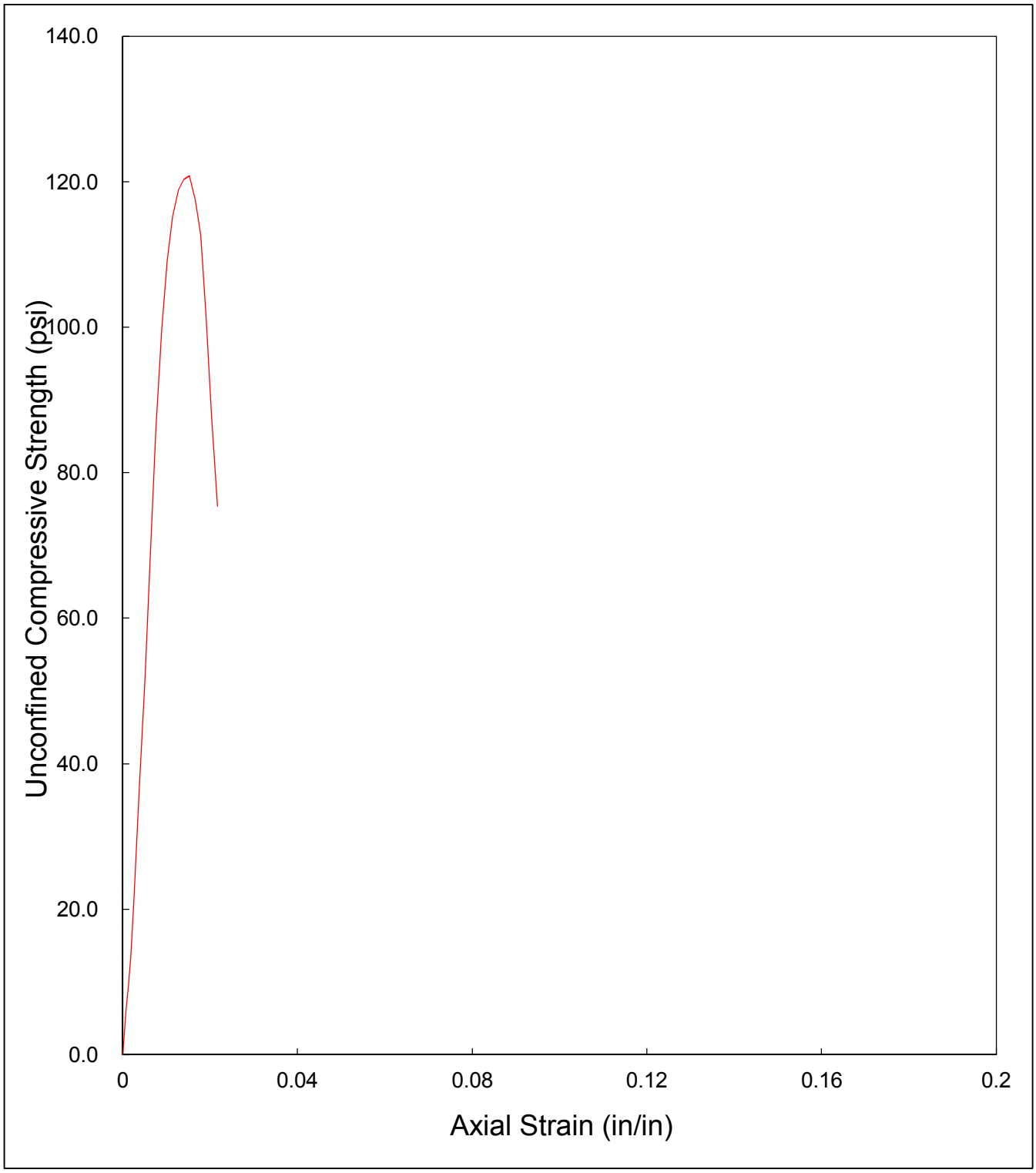
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-030	
2. WT MOISTURE TIN (tare weight)	63.56	g
3. WT WET SOIL + TARE	119.54	g
4. WT DRY SOIL + TARE	103.76	g
5. WT WATER, Ww	15.78	g
6. WT DRY SOIL, Ws	40.20	g
7. MOISTURE CONTENT, W	**39.25**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.93	in.
No. 2	2.00	in.	3.92	in.
No. 3	2.00	in.	3.92	in.
Average	**2.00**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***342.77***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.31	in³
Initial Bulk Unit Weight,	106.1	lb/ft³
Initial Dry Unit Weigh	76.2	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	120.8	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.138	0.0000	0.0
18	0.003	0.003	3.141	0.0008	5.7
29	0.005	0.005	3.142	0.0013	9.2
42	0.007	0.007	3.144	0.0018	13.4
65	0.010	0.010	3.146	0.0025	20.7
118	0.015	0.015	3.150	0.0038	37.5
163	0.020	0.020	3.155	0.0051	51.7
218	0.025	0.025	3.159	0.0064	69.0
272	0.030	0.030	3.163	0.0076	86.0
316	0.035	0.035	3.167	0.0089	99.8
346	0.040	0.040	3.171	0.0102	109.1
366	0.045	0.045	3.175	0.0115	115.3
378	0.050	0.050	3.179	0.0127	118.9
383	0.055	0.055	3.183	0.0140	120.3
385	0.060	0.060	3.187	0.0153	120.8
375	0.065	0.065	3.191	0.0166	117.5
360	0.070	0.070	3.195	0.0178	112.7
324	0.075	0.075	3.200	0.0191	101.3
281	0.080	0.080	3.204	0.0204	87.7
242	0.085	0.085	3.208	0.0217	75.4

UNCONFINED COMPRESSION TESTING
Sample No. 0397-030 7 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-030 7 Day		
TESTING DATE:	4/18/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8001_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	39.3	**%**
BULK UNIT WEIGHT	106.1	lb/ft³
DRY UNIT WEIGHT	76.2	lb/ft³
UCS *	120.8	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-026 14 Day
TESTING DATE: 25-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8038_US

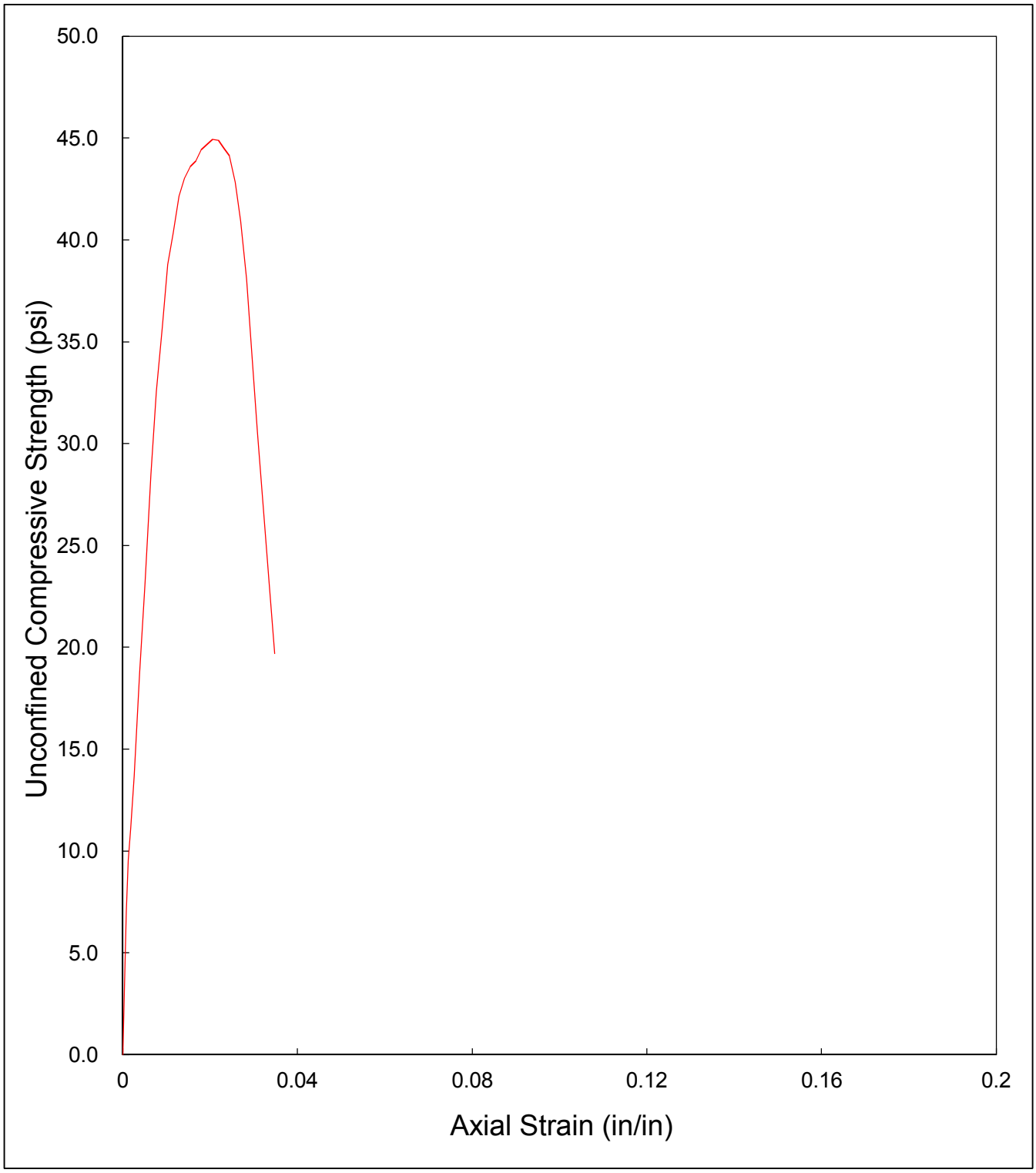
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-026	
2. WT MOISTURE TIN (tare weight)	52.71	g
3. WT WET SOIL + TARE	82.00	g
4. WT DRY SOIL + TARE	74.74	g
5. WT WATER, Ww	7.26	g
6. WT DRY SOIL, Ws	22.03	g
7. MOISTURE CONTENT, W	**32.96**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.89	in.
No. 2	2.00	in.	3.88	in.
No. 3	2.00	in.	3.89	in.
Average	**2.00**	**in.**	**3.88**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***337.76***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.19	in³
Initial Bulk Unit Weight,	105.6	lb/ft³
Initial Dry Unit Weigh	79.4	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	44.9	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.138	0.0000	0.0
22	0.003	0.003	3.141	0.0008	7.0
30	0.005	0.005	3.142	0.0013	9.5
35	0.007	0.007	3.144	0.0018	11.1
43	0.010	0.010	3.147	0.0026	13.7
59	0.015	0.015	3.151	0.0039	18.7
73	0.020	0.020	3.155	0.0051	23.1
90	0.025	0.025	3.159	0.0064	28.5
103	0.030	0.030	3.163	0.0077	32.6
113	0.035	0.035	3.167	0.0090	35.7
123	0.040	0.040	3.171	0.0103	38.8
128	0.045	0.045	3.175	0.0116	40.3
134	0.050	0.050	3.179	0.0129	42.1
137	0.055	0.055	3.184	0.0142	43.0
139	0.060	0.060	3.188	0.0154	43.6
140	0.065	0.065	3.192	0.0167	43.9
142	0.070	0.070	3.196	0.0180	44.4
143	0.075	0.075	3.200	0.0193	44.7
144	0.080	0.080	3.204	0.0206	44.9
144	0.085	0.085	3.209	0.0219	44.9
143	0.090	0.090	3.213	0.0232	44.5
142	0.095	0.095	3.217	0.0245	44.1
138	0.100	0.100	3.221	0.0257	42.8
132	0.105	0.105	3.226	0.0270	40.9
123	0.110	0.110	3.230	0.0283	38.1
111	0.115	0.115	3.234	0.0296	34.3
99	0.120	0.120	3.239	0.0309	30.6
87	0.125	0.125	3.243	0.0322	26.8
76	0.130	0.130	3.247	0.0335	23.4
64	0.135	0.135	3.251	0.0348	19.7

UNCONFINED COMPRESSION TESTING
Sample No. 0397-026 14 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-026 14 Day		
TESTING DATE:	4/25/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8038_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	33.0	**%**
BULK UNIT WEIGHT	105.6	lb/ft³
DRY UNIT WEIGHT	79.4	lb/ft³
UCS *	44.9	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-027 14 Day
TESTING DATE: 25-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8039_US

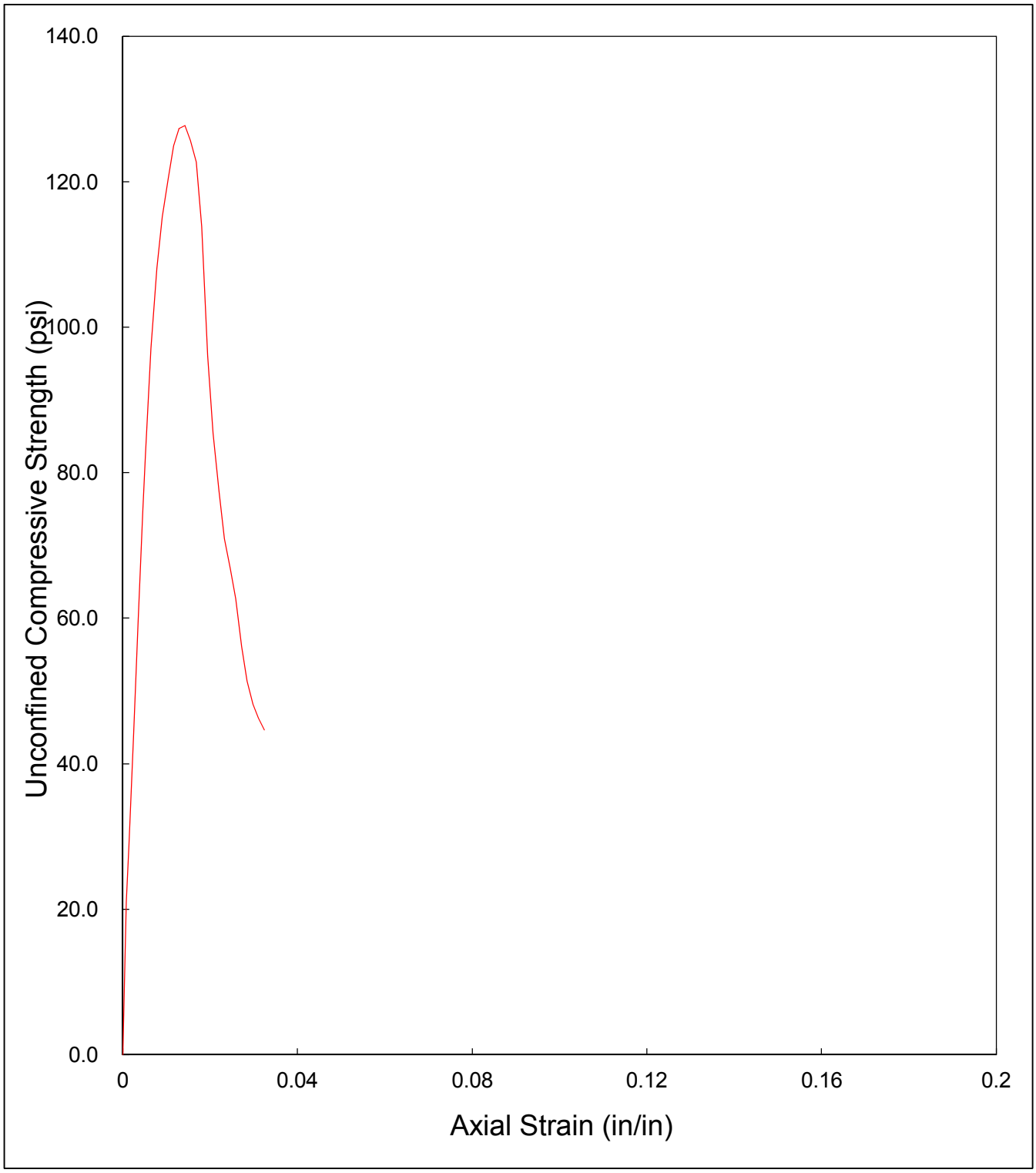
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-027	
2. WT MOISTURE TIN (tare weight)	69.73	g
3. WT WET SOIL + TARE	106.85	g
4. WT DRY SOIL + TARE	97.42	g
5. WT WATER, Ww	9.43	g
6. WT DRY SOIL, Ws	27.69	g
7. MOISTURE CONTENT, W	**34.06**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.86	in.
No. 2	2.00	in.	3.86	in.
No. 3	2.00	in.	3.86	in.
Average	**2.00**	**in.**	**3.86**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***337.68***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.12	in³
Initial Bulk Unit Weight,	106.1	lb/ft³
Initial Dry Unit Weigh	79.2	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	127.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.141	0.0000	0.0
66	0.003	0.003	3.143	0.0008	21.0
84	0.005	0.005	3.145	0.0013	26.7
107	0.007	0.007	3.146	0.0018	34.0
147	0.010	0.010	3.149	0.0026	46.7
202	0.015	0.015	3.153	0.0039	64.1
261	0.020	0.020	3.157	0.0052	82.7
307	0.025	0.025	3.161	0.0065	97.1
342	0.030	0.030	3.165	0.0078	108.1
365	0.035	0.035	3.169	0.0091	115.2
382	0.040	0.040	3.173	0.0104	120.4
397	0.045	0.045	3.178	0.0117	124.9
405	0.050	0.050	3.182	0.0130	127.3
407	0.055	0.055	3.186	0.0143	127.7
401	0.060	0.060	3.190	0.0155	125.7
392	0.065	0.065	3.194	0.0168	122.7
364	0.070	0.070	3.199	0.0181	113.8
308	0.075	0.075	3.203	0.0194	96.2
274	0.080	0.080	3.207	0.0207	85.4
249	0.085	0.085	3.211	0.0220	77.5
228	0.090	0.090	3.216	0.0233	70.9
215	0.095	0.095	3.220	0.0246	66.8
202	0.100	0.100	3.224	0.0259	62.7
181	0.105	0.105	3.228	0.0272	56.1
166	0.110	0.110	3.233	0.0285	51.4
156	0.115	0.115	3.237	0.0298	48.2
150	0.120	0.120	3.241	0.0311	46.3
145	0.125	0.125	3.246	0.0324	44.7

UNCONFINED COMPRESSION TESTING
Sample No. 0397-027 14 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-027 14 Day		
TESTING DATE:	4/25/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8039_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.1	**%**
BULK UNIT WEIGHT	106.1	lb/ft³
DRY UNIT WEIGHT	79.2	lb/ft³
UCS *	127.7	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-028 14 Day
TESTING DATE: 25-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8040_US

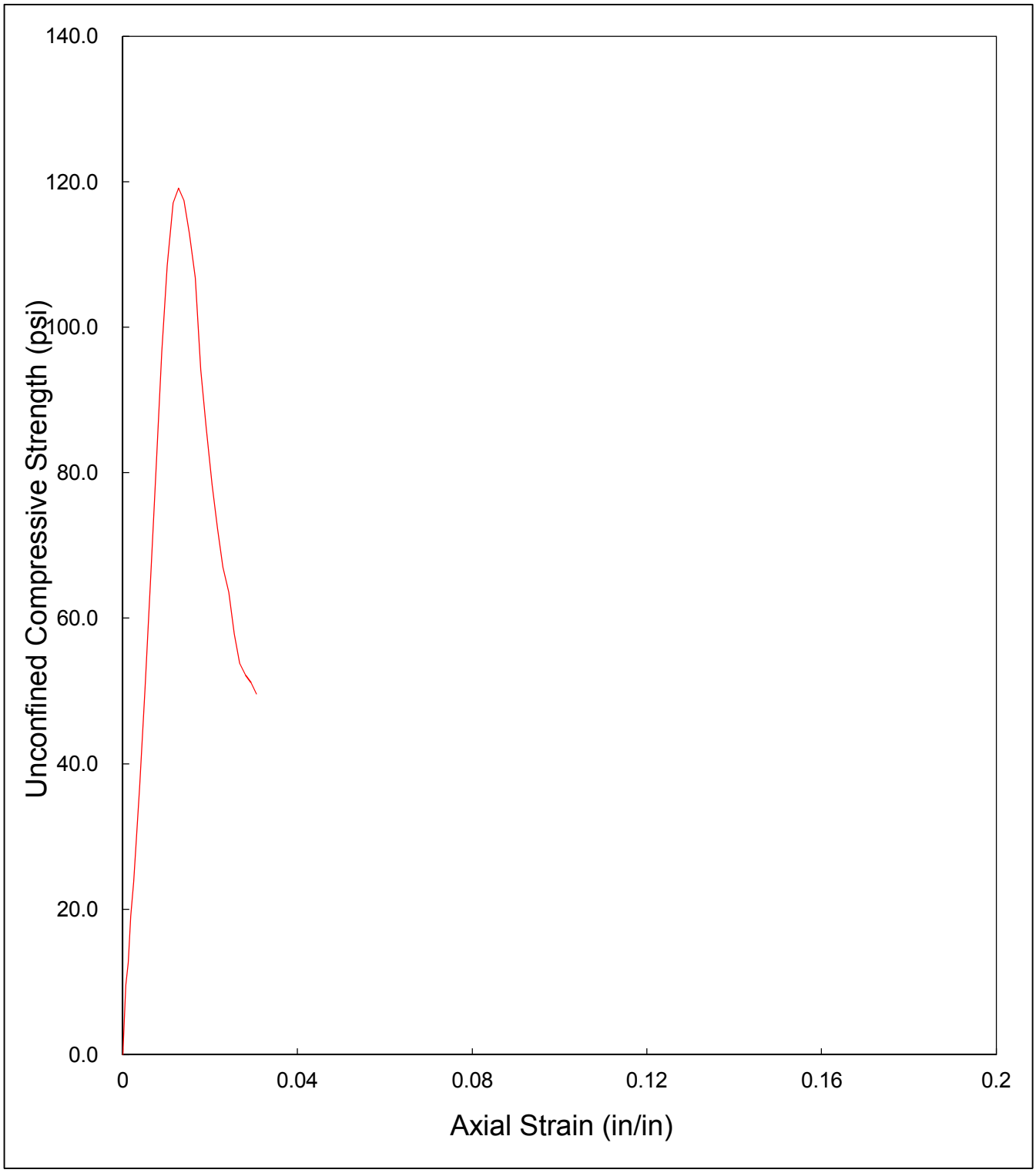
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-028	
2. WT MOISTURE TIN (tare weight)	63.93	g
3. WT WET SOIL + TARE	110.37	g
4. WT DRY SOIL + TARE	97.62	g
5. WT WATER, Ww	12.75	g
6. WT DRY SOIL, Ws	33.69	g
7. MOISTURE CONTENT, W	**37.85**	**%**

SOIL SPECIMEN DIMENSIONS		
	DIAMETER	*LENGTH*
No. 1	2.00 in.	3.91 in.
No. 2	2.01 in.	3.92 in.
No. 3	2.00 in.	3.92 in.
Average	**2.00 in.**	**3.92 in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***332.53***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	12.33	in³
Initial Bulk Unit Weight,	102.7	lb/ft³
Initial Dry Unit Weigh	74.5	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	119.1	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.149	0.0000	0.0
30	0.003	0.003	3.151	0.0008	9.5
40	0.005	0.005	3.153	0.0013	12.7
60	0.007	0.007	3.155	0.0018	19.0
75	0.010	0.010	3.157	0.0026	23.8
116	0.015	0.015	3.161	0.0038	36.7
159	0.020	0.020	3.165	0.0051	50.2
206	0.025	0.025	3.169	0.0064	65.0
258	0.030	0.030	3.173	0.0077	81.3
307	0.035	0.035	3.177	0.0089	96.6
345	0.040	0.040	3.181	0.0102	108.4
373	0.045	0.045	3.186	0.0115	117.1
380	0.050	0.050	3.190	0.0128	119.1
375	0.055	0.055	3.194	0.0140	117.4
361	0.060	0.060	3.198	0.0153	112.9
342	0.065	0.065	3.202	0.0166	106.8
302	0.070	0.070	3.206	0.0179	94.2
277	0.075	0.075	3.210	0.0192	86.3
252	0.080	0.080	3.215	0.0204	78.4
233	0.085	0.085	3.219	0.0217	72.4
216	0.090	0.090	3.223	0.0230	67.0
205	0.095	0.095	3.227	0.0243	63.5
187	0.100	0.100	3.231	0.0255	57.9
174	0.105	0.105	3.236	0.0268	53.8
169	0.110	0.110	3.240	0.0281	52.2
166	0.115	0.115	3.244	0.0294	51.2
161	0.120	0.120	3.248	0.0306	49.6

UNCONFINED COMPRESSION TESTING
Sample No. 0397-028 14 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-028 14 Day		
TESTING DATE:	4/25/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8040_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	37.8	**%**
BULK UNIT WEIGHT	102.7	lb/ft³
DRY UNIT WEIGHT	74.5	lb/ft³
UCS *	119.1	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-029 14 Day
TESTING DATE: 25-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8041_US

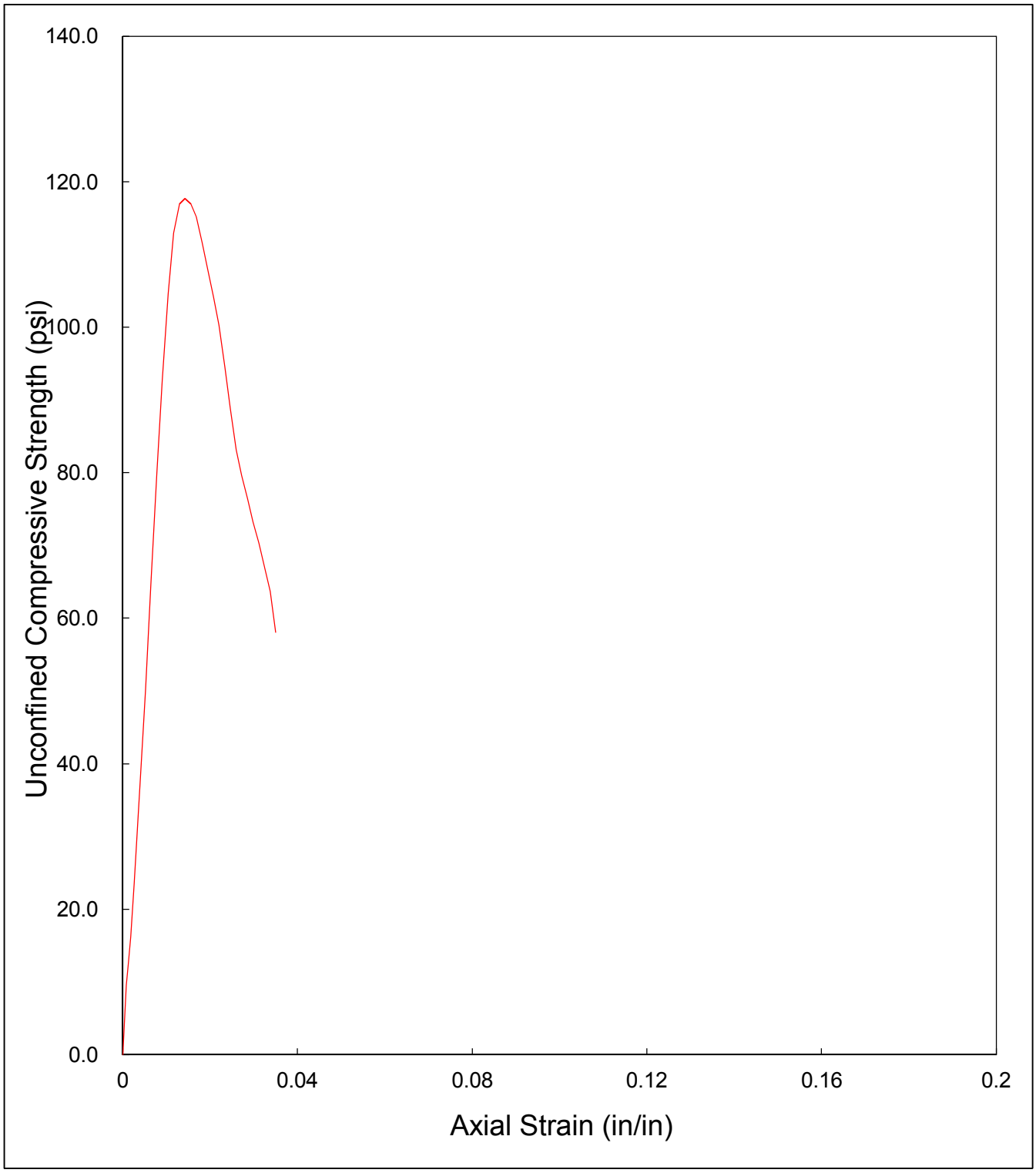
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-029	
2. WT MOISTURE TIN (tare weight)	63.35	g
3. WT WET SOIL + TARE	96.98	g
4. WT DRY SOIL + TARE	87.66	g
5. WT WATER, Ww	9.32	g
6. WT DRY SOIL, Ws	24.31	g
7. MOISTURE CONTENT, W	**38.34**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.85	in.
No. 2	2.00	in.	3.85	in.
No. 3	2.00	in.	3.86	in.
Average	**2.00**	**in.**	**3.85**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***337.58***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.10	in³
Initial Bulk Unit Weight,	106.3	lb/ft³
Initial Dry Unit Weigh	76.8	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	117.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.141	0.0000	0.0
30	0.003	0.003	3.143	0.0008	9.5
39	0.005	0.005	3.145	0.0013	12.4
51	0.007	0.007	3.146	0.0018	16.2
74	0.010	0.010	3.149	0.0026	23.5
114	0.015	0.015	3.153	0.0039	36.2
158	0.020	0.020	3.157	0.0052	50.0
205	0.025	0.025	3.161	0.0065	64.9
253	0.030	0.030	3.165	0.0078	79.9
294	0.035	0.035	3.169	0.0091	92.8
332	0.040	0.040	3.173	0.0104	104.6
359	0.045	0.045	3.178	0.0117	113.0
372	0.050	0.050	3.182	0.0130	116.9
375	0.055	0.055	3.186	0.0143	117.7
373	0.060	0.060	3.190	0.0156	116.9
368	0.065	0.065	3.194	0.0169	115.2
357	0.070	0.070	3.199	0.0182	111.6
346	0.075	0.075	3.203	0.0195	108.0
334	0.080	0.080	3.207	0.0208	104.1
322	0.085	0.085	3.211	0.0221	100.3
304	0.090	0.090	3.216	0.0234	94.5
286	0.095	0.095	3.220	0.0247	88.8
268	0.100	0.100	3.224	0.0260	83.1
257	0.105	0.105	3.229	0.0273	79.6
247	0.110	0.110	3.233	0.0285	76.4
237	0.115	0.115	3.237	0.0298	73.2
228	0.120	0.120	3.242	0.0311	70.3
218	0.125	0.125	3.246	0.0324	67.2
207	0.130	0.130	3.250	0.0337	63.7
189	0.135	0.135	3.255	0.0350	58.1

UNCONFINED COMPRESSION TESTING
Sample No. 0397-029 14 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-029 14 Day		
TESTING DATE:	4/25/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8041_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	38.3	**%**
BULK UNIT WEIGHT	106.3	lb/ft³
DRY UNIT WEIGHT	76.8	lb/ft³
UCS *	117.7	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-030 14 Day
TESTING DATE: 25-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8042_US

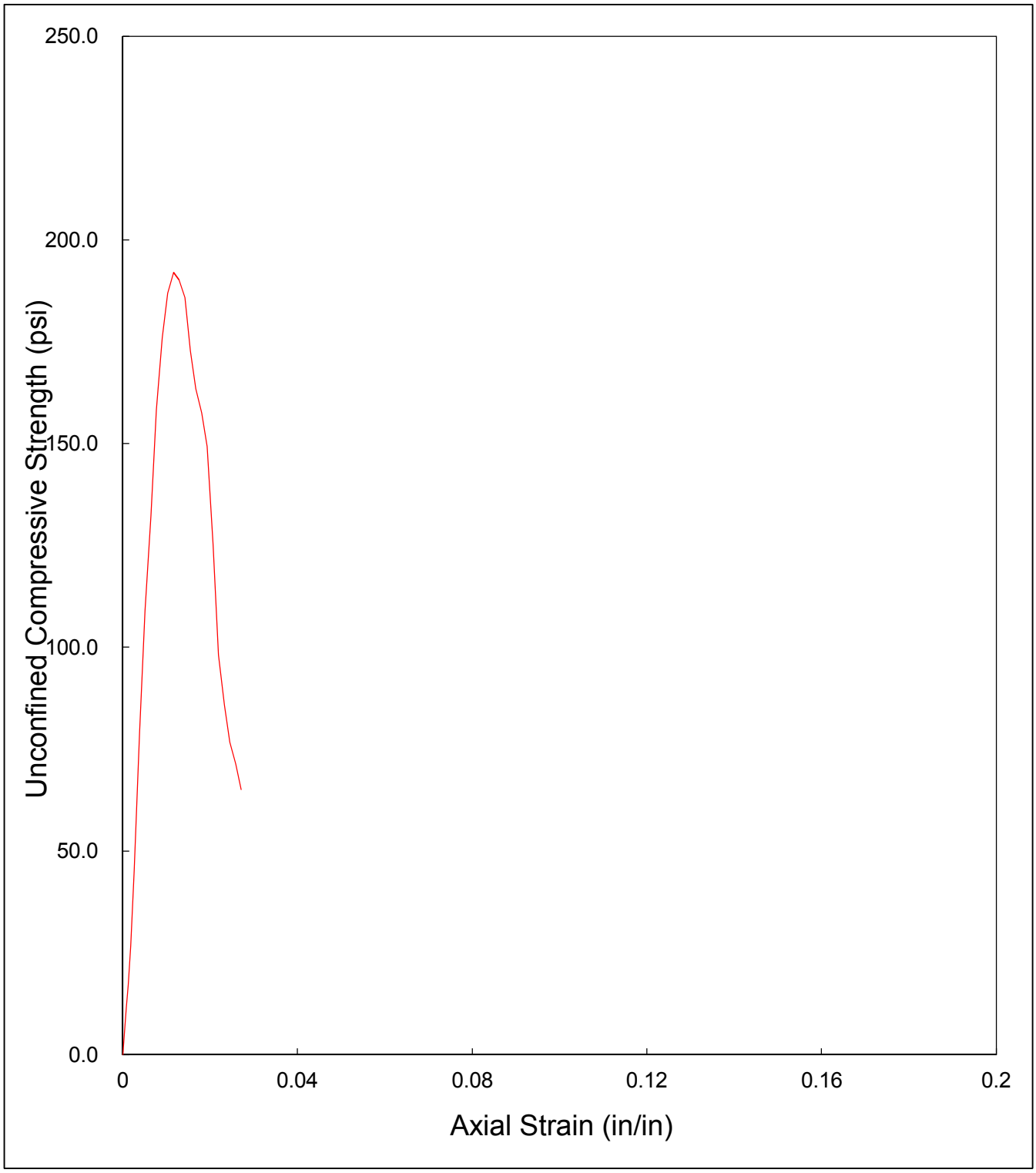
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-030	
2. WT MOISTURE TIN (tare weight)	68.88	g
3. WT WET SOIL + TARE	98.87	g
4. WT DRY SOIL + TARE	90.63	g
5. WT WATER, Ww	8.24	g
6. WT DRY SOIL, Ws	21.75	g
7. MOISTURE CONTENT, W	**37.89**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.87	in.
No. 2	2.00	in.	3.87	in.
No. 3	2.00	in.	3.87	in.
Average	**2.00**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***332.32***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.16	in³
Initial Bulk Unit Weight,	104.1	lb/ft³
Initial Dry Unit Weigh	75.5	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	192.0	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.141	0.0000	0.0
36	0.003	0.003	3.143	0.0008	11.5
54	0.005	0.005	3.145	0.0013	17.2
84	0.007	0.007	3.146	0.0018	26.7
142	0.010	0.010	3.149	0.0026	45.1
250	0.015	0.015	3.153	0.0039	79.3
344	0.020	0.020	3.157	0.0052	109.0
418	0.025	0.025	3.161	0.0065	132.2
501	0.030	0.030	3.165	0.0077	158.3
558	0.035	0.035	3.169	0.0090	176.1
593	0.040	0.040	3.173	0.0103	186.9
610	0.045	0.045	3.177	0.0116	192.0
605	0.050	0.050	3.182	0.0129	190.2
592	0.055	0.055	3.186	0.0142	185.8
551	0.060	0.060	3.190	0.0155	172.7
522	0.065	0.065	3.194	0.0168	163.4
504	0.070	0.070	3.198	0.0181	157.6
478	0.075	0.075	3.203	0.0194	149.3
402	0.080	0.080	3.207	0.0207	125.4
315	0.085	0.085	3.211	0.0220	98.1
276	0.090	0.090	3.215	0.0232	85.8
247	0.095	0.095	3.220	0.0245	76.7
230	0.100	0.100	3.224	0.0258	71.3
210	0.105	0.105	3.228	0.0271	65.1

UNCONFINED COMPRESSION TESTING
Sample No. 0397-030 14 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-030 14 Day		
TESTING DATE:	4/25/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8042_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	37.9	**%**
BULK UNIT WEIGHT	104.1	lb/ft³
DRY UNIT WEIGHT	75.5	lb/ft³
UCS *	192.0	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-031 14 Day
TESTING DATE: 25-Apr-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8043_US

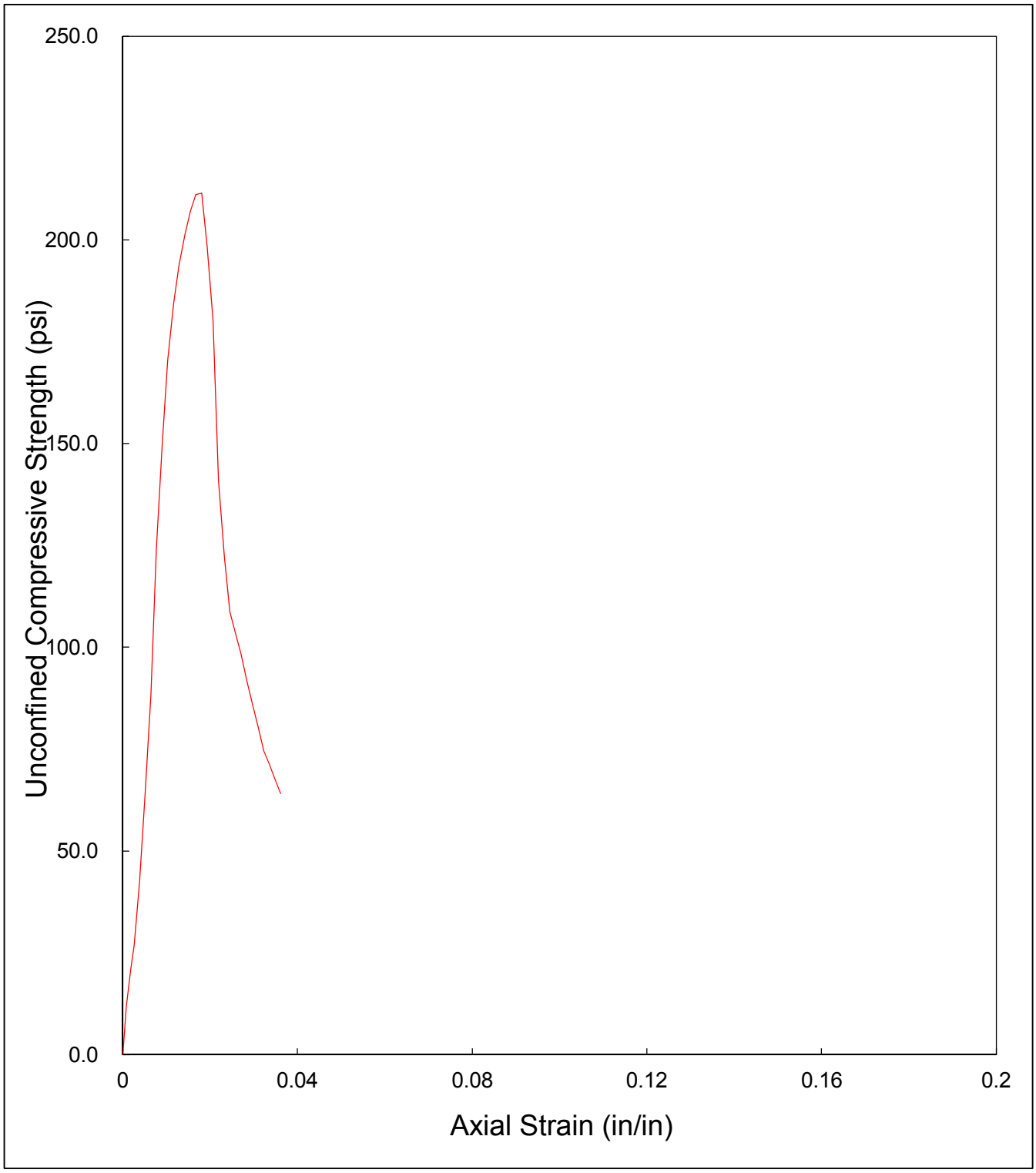
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-031	
2. WT MOISTURE TIN (tare weight)	66.05	g
3. WT WET SOIL + TARE	109.85	g
4. WT DRY SOIL + TARE	97.83	g
5. WT WATER, Ww	12.02	g
6. WT DRY SOIL, Ws	31.78	g
7. MOISTURE CONTENT, W	**37.82**	**%**

SOIL SPECIMEN DIMENSIONS		
	DIAMETER	*LENGTH*
No. 1	2.00 in.	3.87 in.
No. 2	2.01 in.	3.87 in.
No. 3	2.01 in.	3.88 in.
Average	**2.01 in.**	**3.87 in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***338.58***	***g***
Initial Area, Ac	3.16	in²
Initial Volume, Vc	12.23	in³
Initial Bulk Unit Weight,	105.5	lb/ft³
Initial Dry Unit Weigh	76.5	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	211.5	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.158	0.0000	0.0
37	0.003	0.003	3.160	0.0008	11.7
50	0.005	0.005	3.162	0.0013	15.8
66	0.007	0.007	3.163	0.0018	20.9
85	0.010	0.010	3.166	0.0026	26.8
135	0.015	0.015	3.170	0.0039	42.6
202	0.020	0.020	3.174	0.0052	63.6
281	0.025	0.025	3.178	0.0065	88.4
395	0.030	0.030	3.182	0.0077	124.1
478	0.035	0.035	3.186	0.0090	150.0
544	0.040	0.040	3.191	0.0103	170.5
589	0.045	0.045	3.195	0.0116	184.4
620	0.050	0.050	3.199	0.0129	193.8
645	0.055	0.055	3.203	0.0142	201.4
664	0.060	0.060	3.207	0.0155	207.0
678	0.065	0.065	3.212	0.0168	211.1
680	0.070	0.070	3.216	0.0181	211.5
639	0.075	0.075	3.220	0.0194	198.4
581	0.080	0.080	3.224	0.0207	180.2
455	0.085	0.085	3.228	0.0219	140.9
395	0.090	0.090	3.233	0.0232	122.2
352	0.095	0.095	3.237	0.0245	108.7
336	0.100	0.100	3.241	0.0258	103.7
319	0.105	0.105	3.246	0.0271	98.3
299	0.110	0.110	3.250	0.0284	92.0
280	0.115	0.115	3.254	0.0297	86.0
263	0.120	0.120	3.259	0.0310	80.7
243	0.125	0.125	3.263	0.0323	74.5
233	0.130	0.130	3.267	0.0336	71.3
221	0.135	0.135	3.272	0.0349	67.5
210	0.140	0.140	3.276	0.0361	64.1

UNCONFINED COMPRESSION TESTING
Sample No. 0397-031 14 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-031 14 Day		
TESTING DATE:	4/25/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8043_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	37.8	**%**
BULK UNIT WEIGHT	105.5	lb/ft³
DRY UNIT WEIGHT	76.5	lb/ft³
UCS *	211.5	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-026 21 Day
TESTING DATE: 9-May-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8063_US

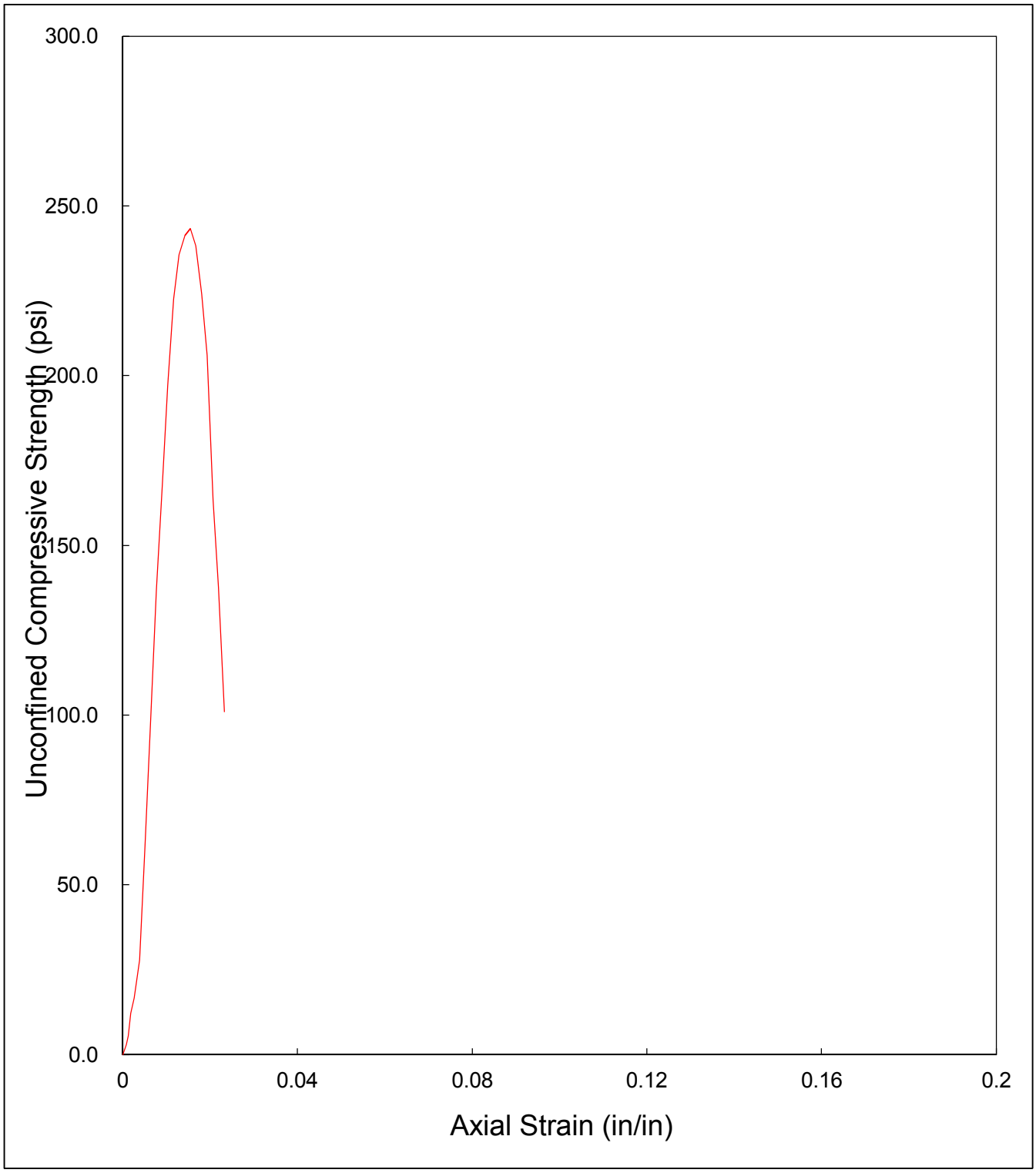
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-026	
2. WT MOISTURE TIN (tare weight)	114.15	g
3. WT WET SOIL + TARE	174.05	g
4. WT DRY SOIL + TARE	159.12	g
5. WT WATER, Ww	14.93	g
6. WT DRY SOIL, Ws	44.97	g
7. MOISTURE CONTENT, W	**33.20**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	1.99	in.	3.86	in.
No. 2	1.99	in.	3.88	in.
No. 3	1.99	in.	3.87	in.
Average	**1.99**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***336.91***	***g***
Initial Area, Ac	3.10	in²
Initial Volume, Vc	12.02	in³
Initial Bulk Unit Weight,	106.8	lb/ft³
Initial Dry Unit Weigh	80.2	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	243.3	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.104	0.0000	0.0
9	0.003	0.003	3.106	0.0008	2.9
17	0.005	0.005	3.108	0.0013	5.5
38	0.007	0.007	3.110	0.0018	12.2
52	0.010	0.010	3.112	0.0026	16.7
87	0.015	0.015	3.116	0.0039	27.9
192	0.020	0.020	3.120	0.0052	61.5
314	0.025	0.025	3.124	0.0065	100.5
428	0.030	0.030	3.128	0.0077	136.8
525	0.035	0.035	3.132	0.0090	167.6
618	0.040	0.040	3.136	0.0103	197.0
699	0.045	0.045	3.141	0.0116	222.6
741	0.050	0.050	3.145	0.0129	235.6
760	0.055	0.055	3.149	0.0142	241.4
767	0.060	0.060	3.153	0.0155	243.3
752	0.065	0.065	3.157	0.0168	238.2
708	0.070	0.070	3.161	0.0181	224.0
652	0.075	0.075	3.165	0.0194	206.0
518	0.080	0.080	3.170	0.0207	163.4
437	0.085	0.085	3.174	0.0220	137.7
321	0.090	0.090	3.178	0.0232	101.0

UNCONFINED COMPRESSION TESTING
Sample No. 0397-026 21 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-026 21 Day		
TESTING DATE:	5/9/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8063_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	33.2	**%**
BULK UNIT WEIGHT	106.8	lb/ft³
DRY UNIT WEIGHT	80.2	lb/ft³
UCS *	243.3	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-027 21 Day
TESTING DATE: 9-May-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8064_US

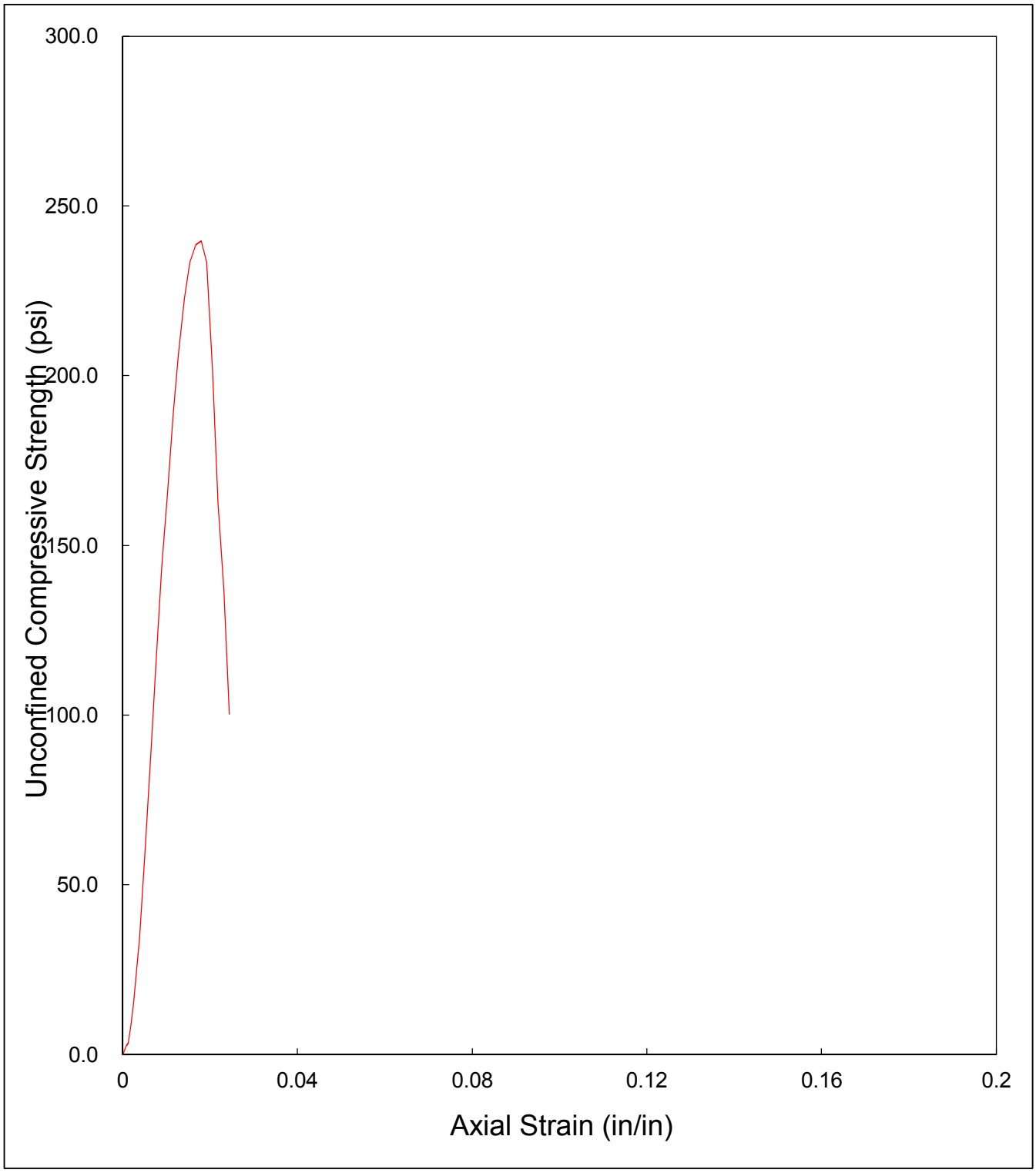
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-027	
2. WT MOISTURE TIN (tare weight)	111.27	g
3. WT WET SOIL + TARE	162.40	g
4. WT DRY SOIL + TARE	149.26	g
5. WT WATER, Ww	13.14	g
6. WT DRY SOIL, Ws	37.99	g
7. MOISTURE CONTENT, W	**34.59**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.89	in.
No. 2	2.00	in.	3.90	in.
No. 3	2.00	in.	3.89	in.
Average	**2.00**	**in.**	**3.89**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***336.91***	***g***
Initial Area, Ac	3.14	in²
Initial Volume, Vc	12.23	in³
Initial Bulk Unit Weight,	104.9	lb/ft³
Initial Dry Unit Weigh	78.0	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	239.8	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.142	0.0000	0.0
8	0.003	0.003	3.144	0.0008	2.5
11	0.005	0.005	3.146	0.0013	3.5
26	0.007	0.007	3.147	0.0018	8.3
49	0.010	0.010	3.150	0.0026	15.6
109	0.015	0.015	3.154	0.0039	34.6
189	0.020	0.020	3.158	0.0051	59.9
282	0.025	0.025	3.162	0.0064	89.2
371	0.030	0.030	3.166	0.0077	117.2
456	0.035	0.035	3.170	0.0090	143.8
527	0.040	0.040	3.174	0.0103	166.0
599	0.045	0.045	3.178	0.0116	188.5
658	0.050	0.050	3.182	0.0128	206.8
710	0.055	0.055	3.187	0.0141	222.8
745	0.060	0.060	3.191	0.0154	233.5
762	0.065	0.065	3.195	0.0167	238.5
767	0.070	0.070	3.199	0.0180	239.8
748	0.075	0.075	3.203	0.0193	233.5
646	0.080	0.080	3.207	0.0205	201.4
522	0.085	0.085	3.212	0.0218	162.5
440	0.090	0.090	3.216	0.0231	136.8
323	0.095	0.095	3.220	0.0244	100.3

UNCONFINED COMPRESSION TESTING
Sample No. 0397-027 21 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-027 21 Day		
TESTING DATE:	5/9/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8064_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.6	**%**
BULK UNIT WEIGHT	104.9	lb/ft³
DRY UNIT WEIGHT	78.0	lb/ft³
UCS *	239.8	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-028 21 Day
TESTING DATE: 9-May-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8065_US

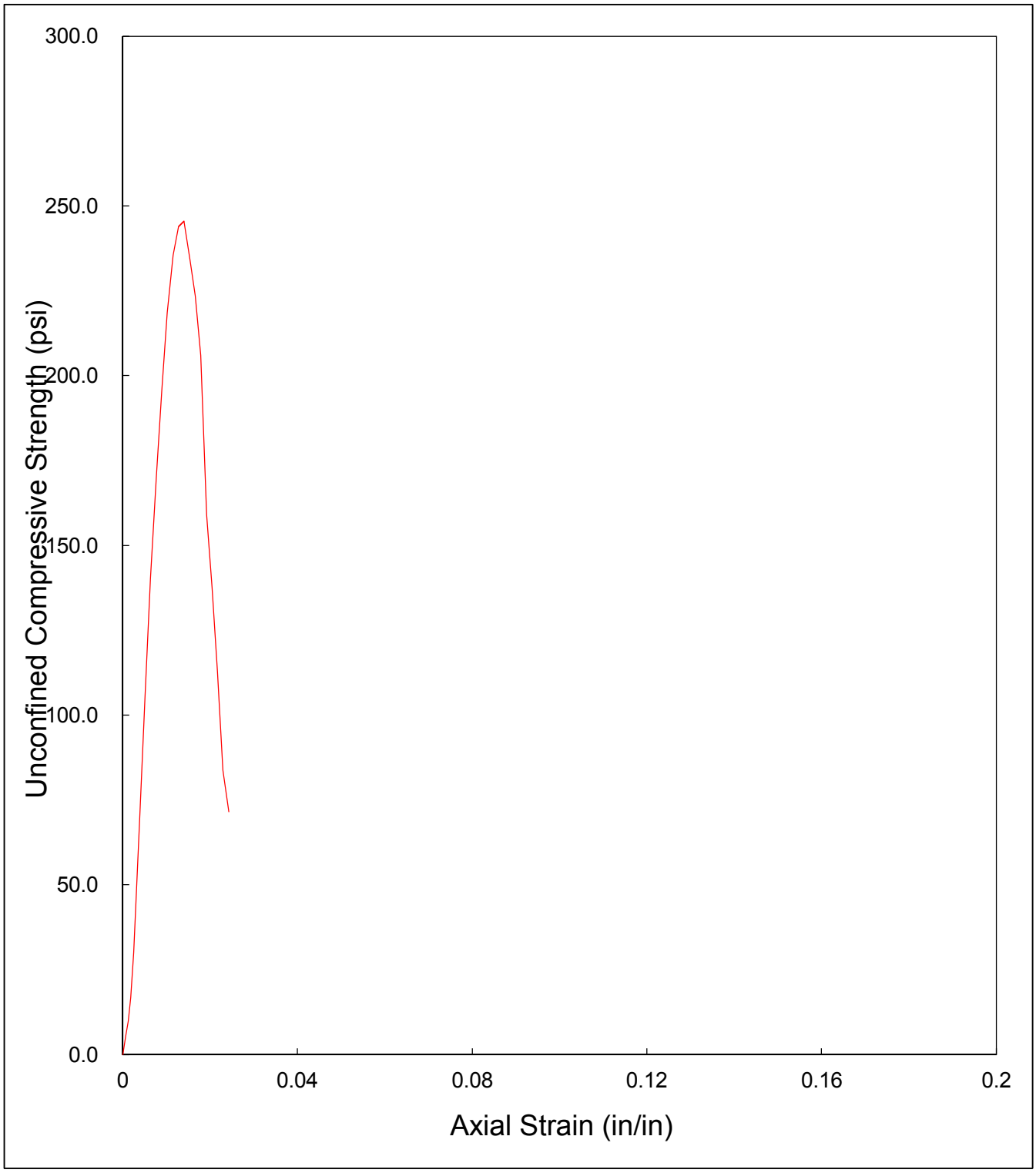
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-028	
2. WT MOISTURE TIN (tare weight)	113.63	g
3. WT WET SOIL + TARE	161.03	g
4. WT DRY SOIL + TARE	148.07	g
5. WT WATER, Ww	12.96	g
6. WT DRY SOIL, Ws	34.44	g
7. MOISTURE CONTENT, W	**37.63**	**%**

SOIL SPECIMEN DIMENSIONS		
	DIAMETER	***LENGTH***
No. 1	2.00 in.	3.91 in.
No. 2	2.01 in.	3.91 in.
No. 3	2.00 in.	3.92 in.
Average	**2.00 in.**	**3.91 in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***333.38***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	12.33	in³
Initial Bulk Unit Weight,	103.0	lb/ft³
Initial Dry Unit Weigh	74.8	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	245.5	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.152	0.0000	0.0
18	0.003	0.003	3.154	0.0008	5.7
31	0.005	0.005	3.156	0.0013	9.8
53	0.007	0.007	3.158	0.0018	16.8
95	0.010	0.010	3.160	0.0026	30.1
218	0.015	0.015	3.164	0.0038	68.9
334	0.020	0.020	3.168	0.0051	105.4
445	0.025	0.025	3.172	0.0064	140.3
541	0.030	0.030	3.176	0.0077	170.3
622	0.035	0.035	3.181	0.0089	195.6
696	0.040	0.040	3.185	0.0102	218.5
751	0.045	0.045	3.189	0.0115	235.5
779	0.050	0.050	3.193	0.0128	244.0
785	0.055	0.055	3.197	0.0141	245.5
750	0.060	0.060	3.201	0.0153	234.3
716	0.065	0.065	3.205	0.0166	223.4
661	0.070	0.070	3.209	0.0179	206.0
511	0.075	0.075	3.214	0.0192	159.0
443	0.080	0.080	3.218	0.0204	137.7
363	0.085	0.085	3.222	0.0217	112.7
270	0.090	0.090	3.226	0.0230	83.7
231	0.095	0.095	3.231	0.0243	71.5

UNCONFINED COMPRESSION TESTING
Sample No. 0397-028 21 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-028 21 Day		
TESTING DATE:	5/9/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8065_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	37.6	**%**
BULK UNIT WEIGHT	103.0	lb/ft³
DRY UNIT WEIGHT	74.8	lb/ft³
UCS *	245.5	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-026 56 Day
TESTING DATE: 6-Jun-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8132_US

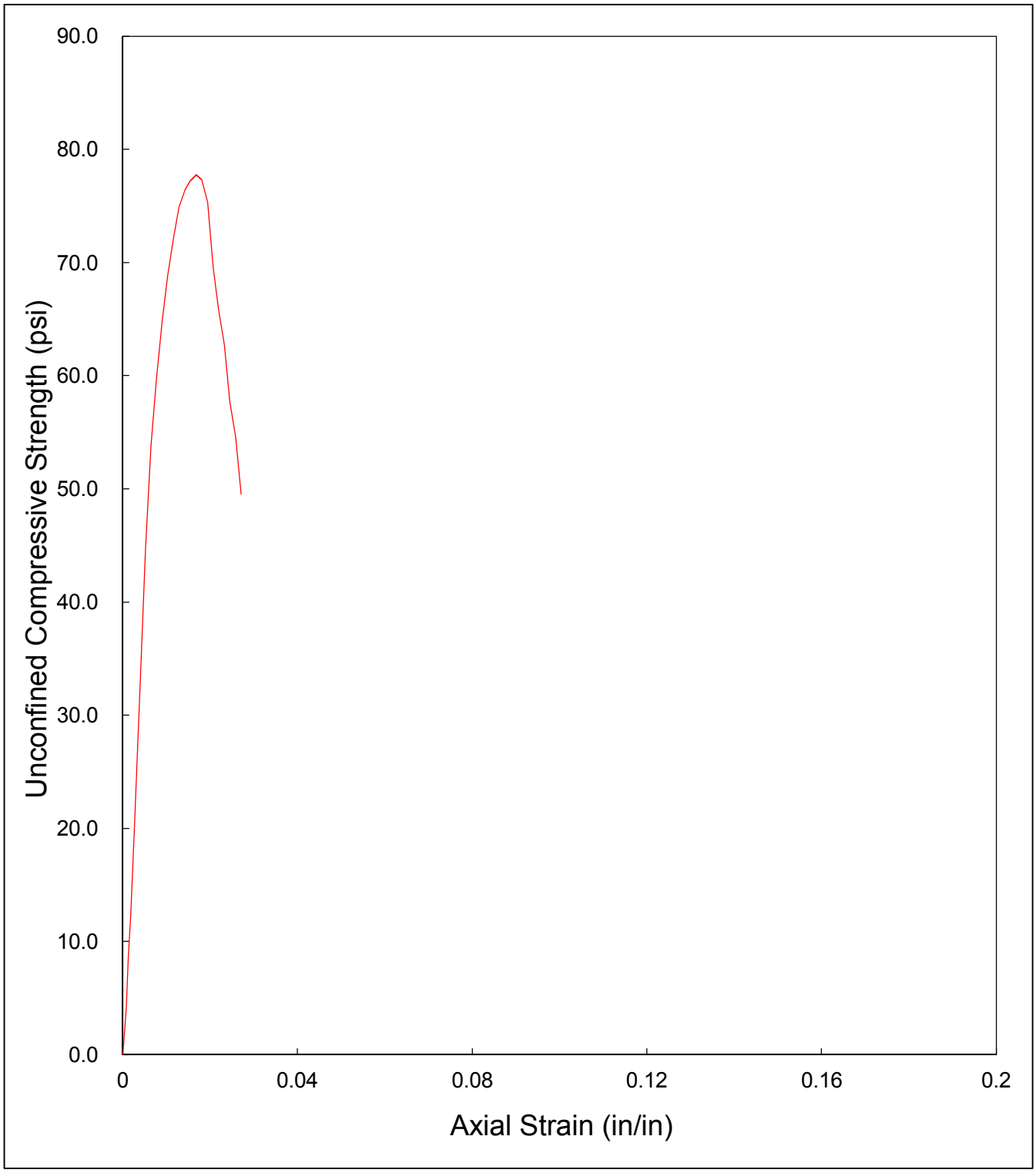
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-026	
2. WT MOISTURE TIN (tare weight)	66.15	g
3. WT WET SOIL + TARE	120.01	g
4. WT DRY SOIL + TARE	106.74	g
5. WT WATER, Ww	13.27	g
6. WT DRY SOIL, Ws	40.59	g
7. MOISTURE CONTENT, W	**32.69**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.02	in.	3.86	in.
No. 2	2.00	in.	3.87	in.
No. 3	2.00	in.	3.87	in.
Average	**2.01**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***334.34***	***g***
Initial Area, Ac	3.16	in²
Initial Volume, Vc	12.23	in³
Initial Bulk Unit Weight,	104.2	lb/ft³
Initial Dry Unit Weigh	78.5	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	77.7	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.162	0.0000	0.0
13	0.003	0.003	3.164	0.0008	4.1
27	0.005	0.005	3.166	0.0013	8.5
39	0.007	0.007	3.167	0.0018	12.3
62	0.010	0.010	3.170	0.0026	19.6
100	0.015	0.015	3.174	0.0039	31.5
142	0.020	0.020	3.178	0.0052	44.7
171	0.025	0.025	3.182	0.0065	53.7
190	0.030	0.030	3.186	0.0078	59.6
207	0.035	0.035	3.190	0.0090	64.9
220	0.040	0.040	3.195	0.0103	68.9
231	0.045	0.045	3.199	0.0116	72.2
240	0.050	0.050	3.203	0.0129	74.9
245	0.055	0.055	3.207	0.0142	76.4
248	0.060	0.060	3.211	0.0155	77.2
250	0.065	0.065	3.216	0.0168	77.7
249	0.070	0.070	3.220	0.0181	77.3
243	0.075	0.075	3.224	0.0194	75.4
225	0.080	0.080	3.228	0.0207	69.7
213	0.085	0.085	3.233	0.0220	65.9
203	0.090	0.090	3.237	0.0233	62.7
187	0.095	0.095	3.241	0.0246	57.7
177	0.100	0.100	3.245	0.0259	54.5
161	0.105	0.105	3.250	0.0271	49.5

UNCONFINED COMPRESSION TESTING
Sample No. 0397-026 56 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-026 56 Day		
TESTING DATE:	6/6/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8132_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	32.7	**%**
BULK UNIT WEIGHT	104.2	lb/ft³
DRY UNIT WEIGHT	78.5	lb/ft³
UCS *	77.7	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-027 56 Day
TESTING DATE: 6-Jun-12
TESTED BY: LAM

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8133_US

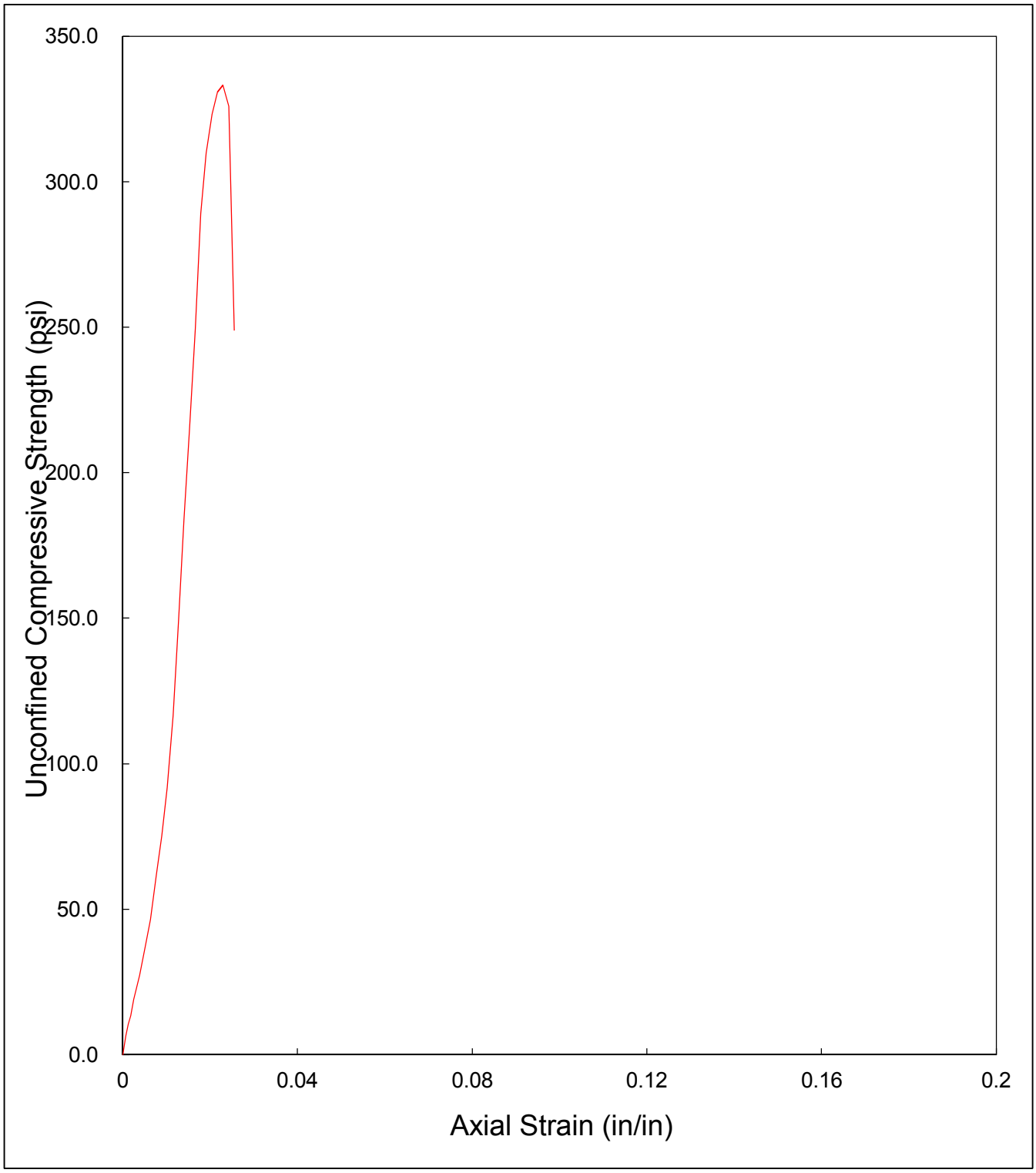
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-027	
2. WT MOISTURE TIN (tare weight)	87.22	g
3. WT WET SOIL + TARE	130.28	g
4. WT DRY SOIL + TARE	119.67	g
5. WT WATER, Ww	10.61	g
6. WT DRY SOIL, Ws	32.45	g
7. MOISTURE CONTENT, W	**32.70**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.91	in.
No. 2	2.01	in.	3.94	in.
No. 3	2.00	in.	3.90	in.
Average	**2.00**	**in.**	**3.92**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***341.59***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	12.32	in³
Initial Bulk Unit Weight,	105.6	lb/ft³
Initial Dry Unit Weigh	79.6	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	333.1	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.147	0.0000	0.0
20	0.003	0.003	3.149	0.0008	6.4
33	0.005	0.005	3.151	0.0013	10.5
42	0.007	0.007	3.152	0.0018	13.3
60	0.010	0.010	3.155	0.0026	19.0
86	0.015	0.015	3.159	0.0038	27.2
116	0.020	0.020	3.163	0.0051	36.7
147	0.025	0.025	3.167	0.0064	46.4
196	0.030	0.030	3.171	0.0077	61.8
239	0.035	0.035	3.175	0.0089	75.3
292	0.040	0.040	3.179	0.0102	91.8
371	0.045	0.045	3.183	0.0115	116.5
475	0.050	0.050	3.188	0.0128	149.0
587	0.055	0.055	3.192	0.0140	183.9
685	0.060	0.060	3.196	0.0153	214.3
798	0.065	0.065	3.200	0.0166	249.4
926	0.070	0.070	3.204	0.0179	289.0
994	0.075	0.075	3.208	0.0192	309.8
1038	0.080	0.080	3.212	0.0204	323.1
1064	0.085	0.085	3.217	0.0217	330.8
1073	0.090	0.090	3.221	0.0230	333.1
1051	0.095	0.095	3.225	0.0243	325.9
804	0.100	0.100	3.229	0.0255	249.0

UNCONFINED COMPRESSION TESTING
Sample No. 0397-027 56 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-027 56 Day		
TESTING DATE:	6/6/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	LAM	TRACKING CODE:	8133_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	32.7	**%**
BULK UNIT WEIGHT	105.6	lb/ft³
DRY UNIT WEIGHT	79.6	lb/ft³
UCS *	333.1	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-028 56 Day
TESTING DATE: 6-Jun-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8134_US

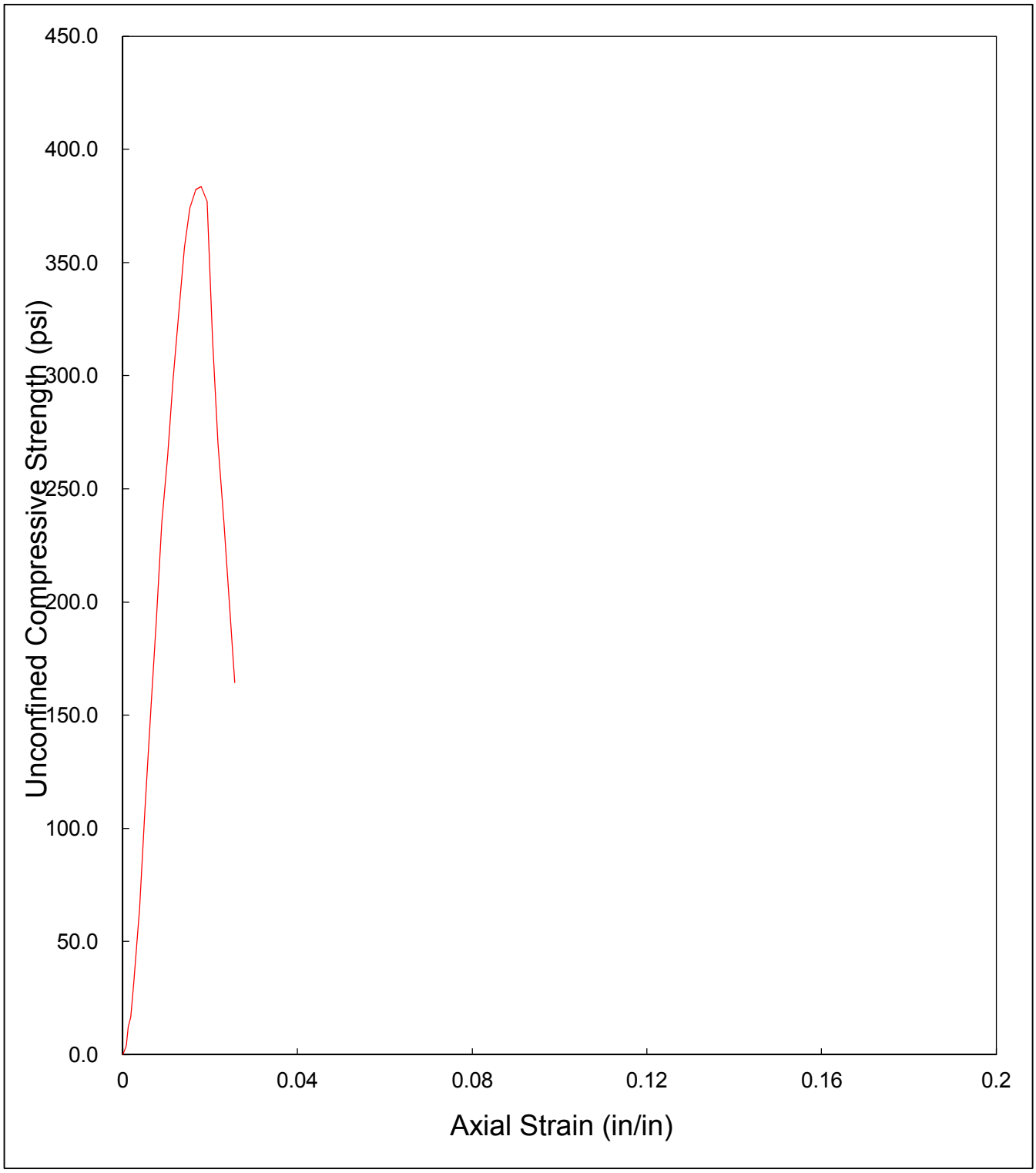
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-028	
2. WT MOISTURE TIN (tare weight)	68.91	g
3. WT WET SOIL + TARE	142.05	g
4. WT DRY SOIL + TARE	122.70	g
5. WT WATER, Ww	19.35	g
6. WT DRY SOIL, Ws	53.79	g
7. MOISTURE CONTENT, W	**35.97**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.01	in.	3.88	in.
No. 2	2.01	in.	3.89	in.
No. 3	2.00	in.	3.90	in.
Average	**2.01**	**in.**	**3.89**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***331.20***	***g***
Initial Area, Ac	3.16	in²
Initial Volume, Vc	12.30	in³
Initial Bulk Unit Weight,	102.6	lb/ft³
Initial Dry Unit Weigh	75.4	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	383.5	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.163	0.0000	0.0
12	0.003	0.003	3.165	0.0008	3.8
39	0.005	0.005	3.167	0.0013	12.3
52	0.007	0.007	3.168	0.0018	16.4
99	0.010	0.010	3.171	0.0026	31.2
205	0.015	0.015	3.175	0.0039	64.6
346	0.020	0.020	3.179	0.0051	108.8
487	0.025	0.025	3.183	0.0064	153.0
612	0.030	0.030	3.187	0.0077	192.0
750	0.035	0.035	3.191	0.0090	235.0
846	0.040	0.040	3.195	0.0103	264.8
955	0.045	0.045	3.200	0.0116	298.5
1054	0.050	0.050	3.204	0.0129	329.0
1144	0.055	0.055	3.208	0.0141	356.6
1202	0.060	0.060	3.212	0.0154	374.2
1229	0.065	0.065	3.216	0.0167	382.1
1235	0.070	0.070	3.221	0.0180	383.5
1216	0.075	0.075	3.225	0.0193	377.1
1020	0.080	0.080	3.229	0.0206	315.9
873	0.085	0.085	3.233	0.0219	270.0
762	0.090	0.090	3.237	0.0231	235.4
648	0.095	0.095	3.242	0.0244	199.9
534	0.100	0.100	3.246	0.0257	164.5

UNCONFINED COMPRESSION TESTING
Sample No. 0397-028 56 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-028 56 Day		
TESTING DATE:	6/6/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8134_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	36.0	**%**
BULK UNIT WEIGHT	102.6	lb/ft³
DRY UNIT WEIGHT	75.4	lb/ft³
UCS *	383.5	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-029 56 Day
TESTING DATE: 6-Jun-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8135_US

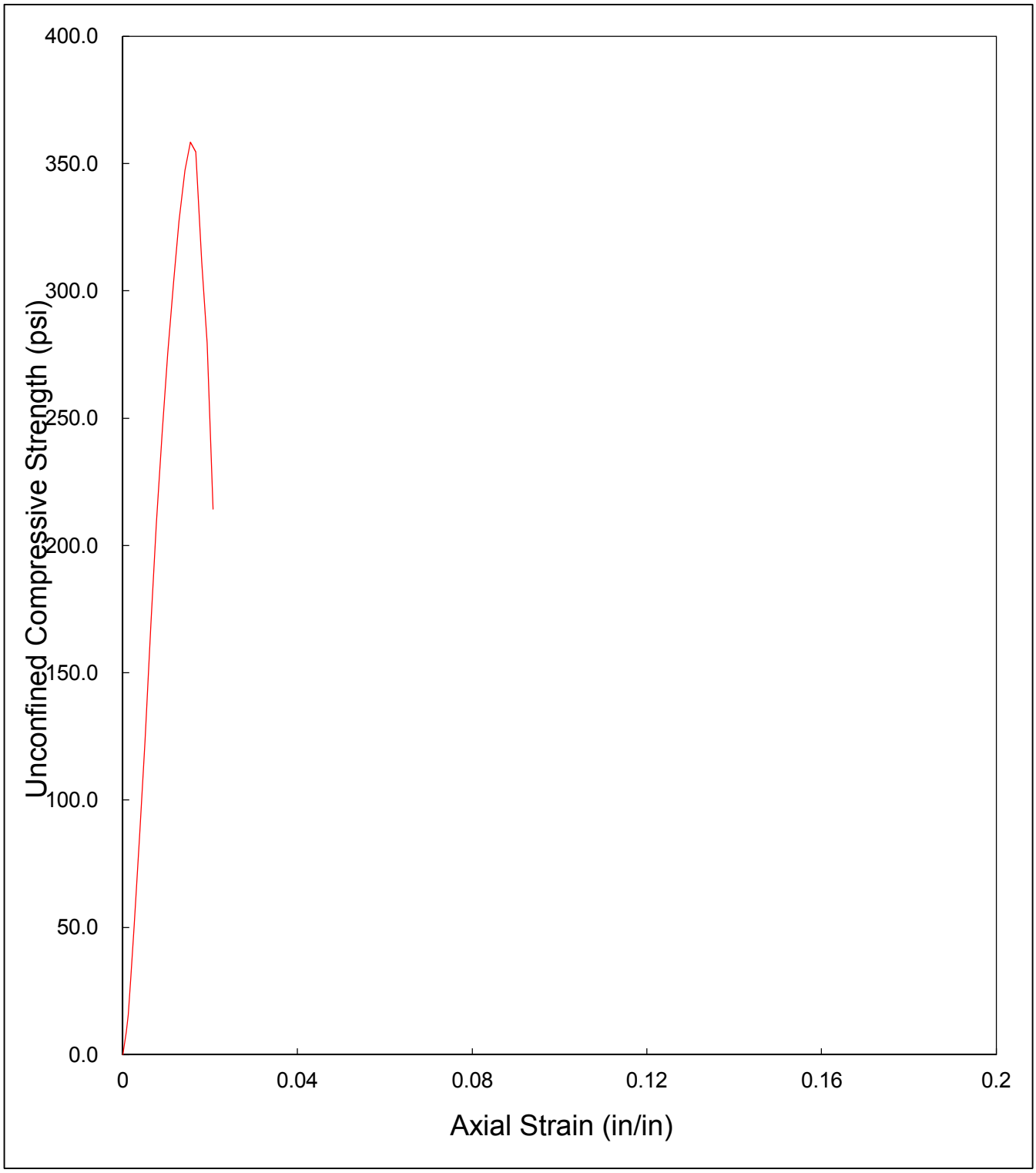
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-029	
2. WT MOISTURE TIN (tare weight)	69.76	g
3. WT WET SOIL + TARE	142.94	g
4. WT DRY SOIL + TARE	123.92	g
5. WT WATER, Ww	19.02	g
6. WT DRY SOIL, Ws	54.16	g
7. MOISTURE CONTENT, W	**35.12**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.02	in.	3.87	in.
No. 2	2.01	in.	3.87	in.
No. 3	2.01	in.	3.88	in.
Average	**2.01**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***335.20***	***g***
Initial Area, Ac	3.18	in²
Initial Volume, Vc	12.33	in³
Initial Bulk Unit Weight,	103.5	lb/ft³
Initial Dry Unit Weigh	76.6	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	358.3	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.185	0.0000	0.0
28	0.003	0.003	3.187	0.0008	8.8
50	0.005	0.005	3.189	0.0013	15.7
95	0.007	0.007	3.190	0.0018	29.8
162	0.010	0.010	3.193	0.0026	50.7
275	0.015	0.015	3.197	0.0039	86.0
394	0.020	0.020	3.201	0.0052	123.1
543	0.025	0.025	3.205	0.0065	169.4
670	0.030	0.030	3.210	0.0077	208.8
787	0.035	0.035	3.214	0.0090	244.9
886	0.040	0.040	3.218	0.0103	275.3
978	0.045	0.045	3.222	0.0116	303.5
1057	0.050	0.050	3.226	0.0129	327.6
1122	0.055	0.055	3.231	0.0142	347.3
1159	0.060	0.060	3.235	0.0155	358.3
1148	0.065	0.065	3.239	0.0168	354.4
1010	0.070	0.070	3.243	0.0181	311.4
908	0.075	0.075	3.248	0.0194	279.6
697	0.080	0.080	3.252	0.0207	214.3

UNCONFINED COMPRESSION TESTING
Sample No. 0397-029 56 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-029 56 Day		
TESTING DATE:	6/6/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8135_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	35.1	**%**
BULK UNIT WEIGHT	103.5	lb/ft³
DRY UNIT WEIGHT	76.6	lb/ft³
UCS *	358.3	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-030 56 Day
TESTING DATE: 6-Jun-12
TESTED BY: LAM

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8136_US

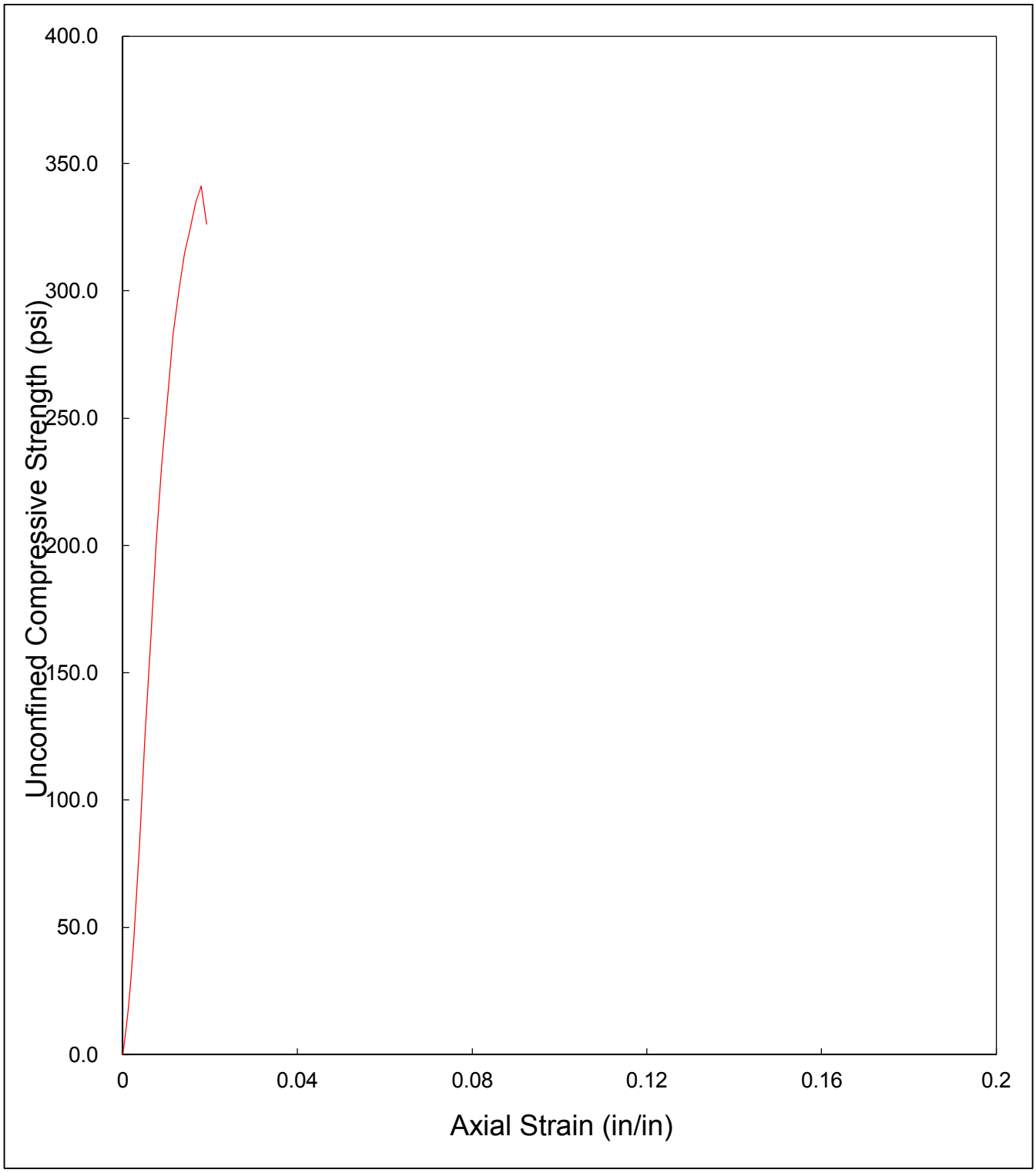
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-030	
2. WT MOISTURE TIN (tare weight)	63.59	g
3. WT WET SOIL + TARE	85.43	g
4. WT DRY SOIL + TARE	79.67	g
5. WT WATER, Ww	5.76	g
6. WT DRY SOIL, Ws	16.08	g
7. MOISTURE CONTENT, W	**35.82**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.07	in.	3.90	in.
No. 2	2.04	in.	3.90	in.
No. 3	2.00	in.	3.88	in.
Average	**2.03**	**in.**	**3.89**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***335.03***	***g***
Initial Area, Ac	3.25	in²
Initial Volume, Vc	12.65	in³
Initial Bulk Unit Weight,	100.9	lb/ft³
Initial Dry Unit Weigh	74.3	lb/ft³
15 % Strain (0.15 Lo)	0.58	in.
UCS	341.1	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.250	0.0000	0.0
35	0.003	0.003	3.253	0.0008	10.8
58	0.005	0.005	3.255	0.0013	17.8
94	0.007	0.007	3.256	0.0018	28.9
145	0.010	0.010	3.259	0.0026	44.5
271	0.015	0.015	3.263	0.0039	83.1
410	0.020	0.020	3.267	0.0051	125.5
537	0.025	0.025	3.271	0.0064	164.2
662	0.030	0.030	3.276	0.0077	202.1
761	0.035	0.035	3.280	0.0090	232.0
849	0.040	0.040	3.284	0.0103	258.5
931	0.045	0.045	3.288	0.0116	283.1
989	0.050	0.050	3.293	0.0128	300.4
1037	0.055	0.055	3.297	0.0141	314.5
1069	0.060	0.060	3.301	0.0154	323.8
1107	0.065	0.065	3.306	0.0167	334.9
1129	0.070	0.070	3.310	0.0180	341.1
1081	0.075	0.075	3.314	0.0193	326.2

UNCONFINED COMPRESSION TESTING
Sample No. 0397-030 56 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-030 56 Day		
TESTING DATE:	6/6/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	LAM	TRACKING CODE:	8136_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	35.8	**%**
BULK UNIT WEIGHT	100.9	lb/ft³
DRY UNIT WEIGHT	74.3	lb/ft³
UCS *	341.1	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-031 56 Day
TESTING DATE: 6-Jun-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8137_US

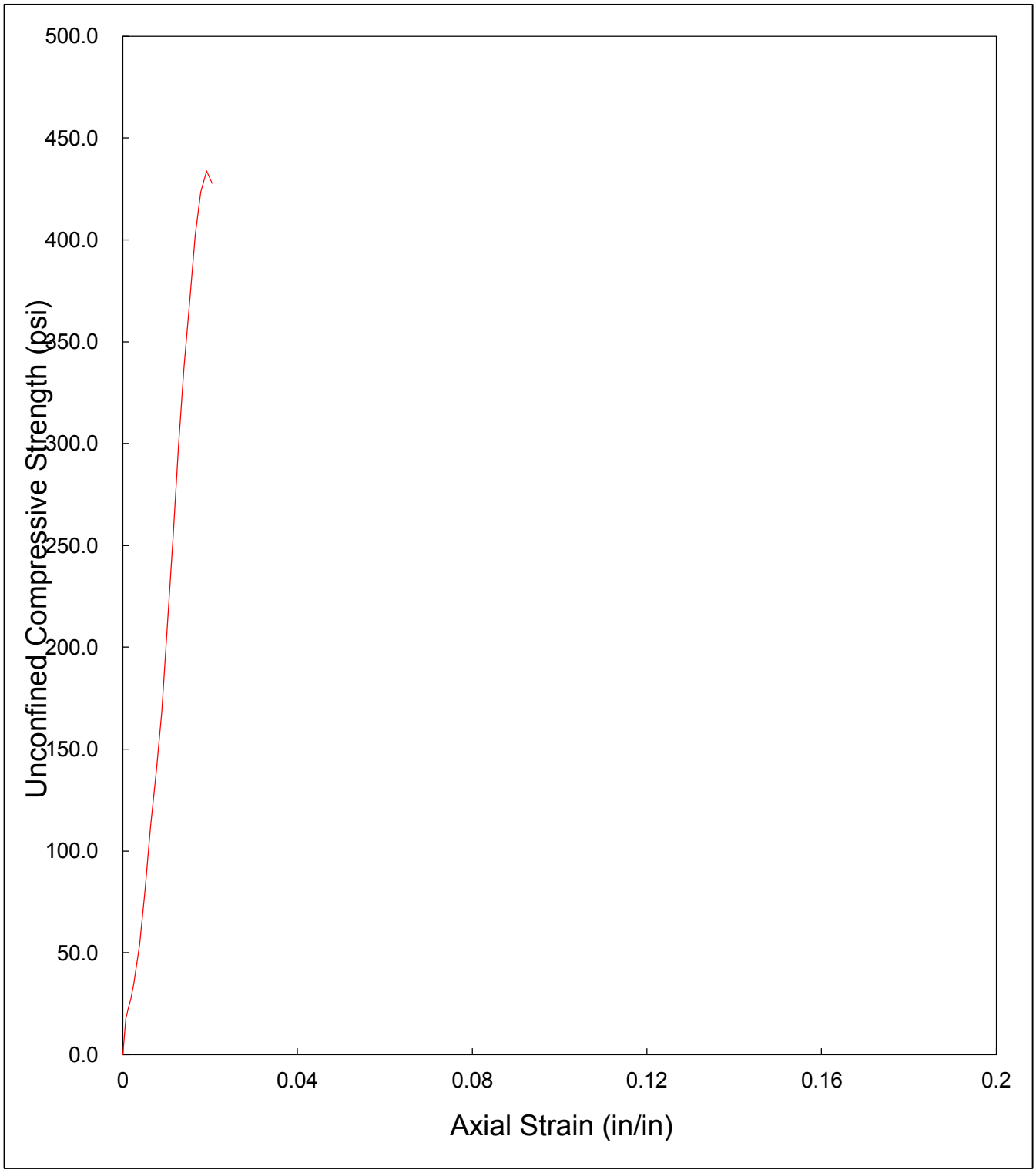
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-031	
2. WT MOISTURE TIN (tare weight)	88.32	g
3. WT WET SOIL + TARE	107.07	g
4. WT DRY SOIL + TARE	102.16	g
5. WT WATER, Ww	4.91	g
6. WT DRY SOIL, Ws	13.84	g
7. MOISTURE CONTENT, W	**35.48**	**%**

SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.02	in.	3.92	in.
No. 2	2.01	in.	3.91	in.
No. 3	2.01	in.	3.91	in.
Average	**2.01**	**in.**	**3.91**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***341.82***	***g***
Initial Area, Ac	3.18	in²
Initial Volume, Vc	12.45	in³
Initial Bulk Unit Weight,	104.6	lb/ft³
Initial Dry Unit Weigh	77.2	lb/ft³
15 % Strain (0.15 Lo)	0.59	in.
UCS	433.9	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.183	0.0000	0.0
56	0.003	0.003	3.185	0.0008	17.6
72	0.005	0.005	3.187	0.0013	22.6
86	0.007	0.007	3.188	0.0018	27.0
110	0.010	0.010	3.191	0.0026	34.5
172	0.015	0.015	3.195	0.0038	53.8
258	0.020	0.020	3.199	0.0051	80.7
357	0.025	0.025	3.203	0.0064	111.5
447	0.030	0.030	3.207	0.0077	139.4
541	0.035	0.035	3.211	0.0089	168.5
674	0.040	0.040	3.215	0.0102	209.6
819	0.045	0.045	3.220	0.0115	254.4
964	0.050	0.050	3.224	0.0128	299.0
1089	0.055	0.055	3.228	0.0141	337.4
1199	0.060	0.060	3.232	0.0153	371.0
1303	0.065	0.065	3.236	0.0166	402.6
1372	0.070	0.070	3.241	0.0179	423.4
1408	0.075	0.075	3.245	0.0192	433.9
1390	0.080	0.080	3.249	0.0205	427.8

UNCONFINED COMPRESSION TESTING
Sample No. 0397-031 56 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-031 56 Day		
TESTING DATE:	6/6/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8137_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	35.5	**%**
BULK UNIT WEIGHT	104.6	lb/ft³
DRY UNIT WEIGHT	77.2	lb/ft³
UCS *	433.9	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT: Longview Wood Treating
PROJECT No.: SE0397
SAMPLE No.: 0397-028 86 Day
TESTING DATE: 6-Jul-12
TESTED BY: MMR

LOADING RATE: 0.04 in./min.
TRACKING CODE: 8230_US

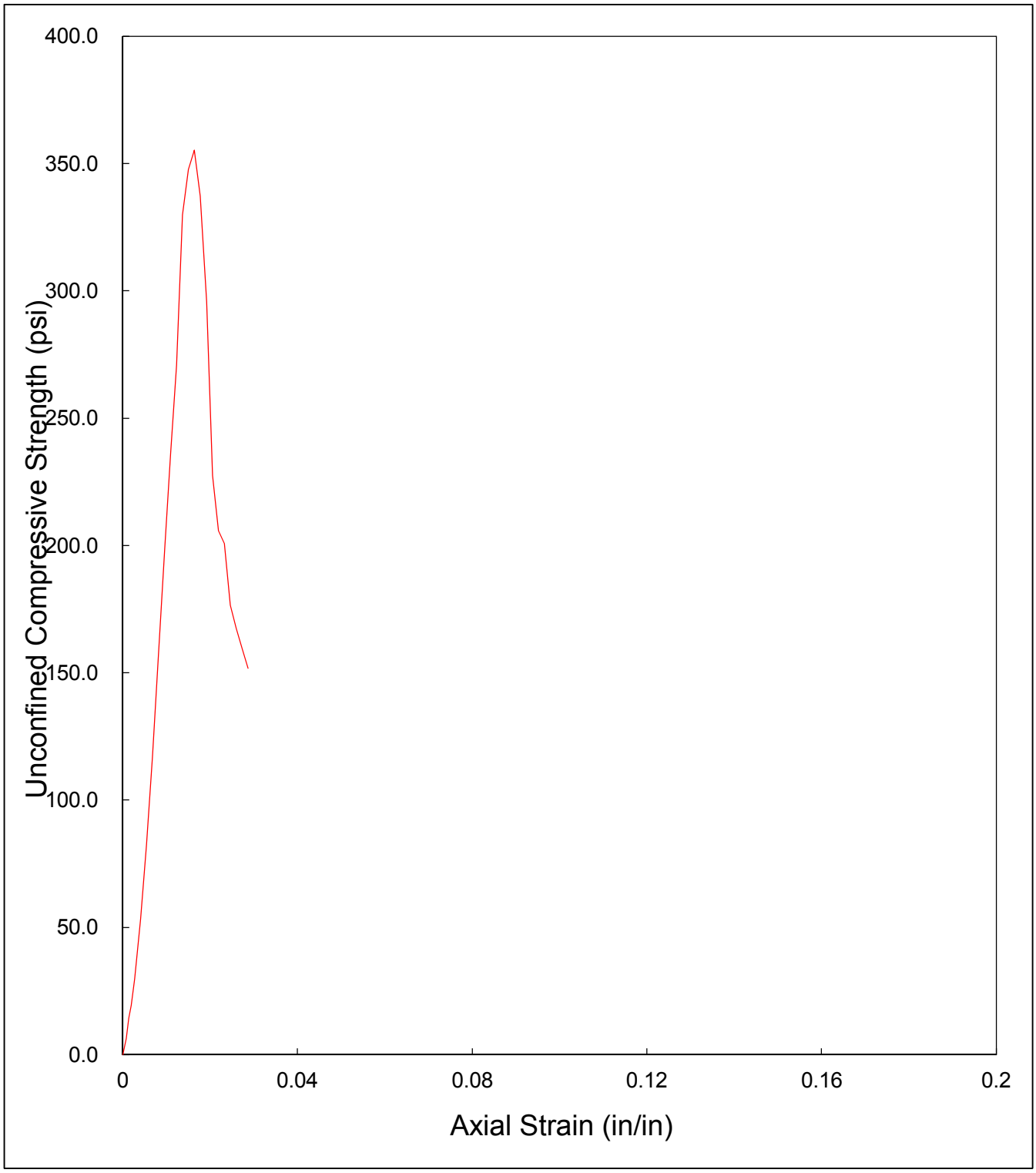
MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.	0397-028	
2. WT MOISTURE TIN (tare weight)	63.71	g
3. WT WET SOIL + TARE	102.81	g
4. WT DRY SOIL + TARE	92.70	g
5. WT WATER, Ww	10.11	g
6. WT DRY SOIL, Ws	28.99	g
7. MOISTURE CONTENT, W	**34.87**	**%**

SOIL SPECIMEN DIMENSIONS		
	DIAMETER	***LENGTH***
No. 1	2.01 in.	3.65 in.
No. 2	2.00 in.	3.64 in.
No. 3	2.00 in.	3.67 in.
Average	**2.00 in.**	**3.65 in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***308.23***	***g***
Initial Area, Ac	3.15	in²
Initial Volume, Vc	11.50	in³
Initial Bulk Unit Weight,	102.1	lb/ft³
Initial Dry Unit Weigh	75.7	lb/ft³
15 % Strain (0.15 Lo)	0.55	in.
UCS	355.3	lb/in²

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in²)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in²)
0	0.000	0.000	3.148	0.0000	0.0
20	0.003	0.003	3.150	0.0008	6.3
45	0.005	0.005	3.152	0.0014	14.3
61	0.007	0.007	3.154	0.0019	19.3
94	0.010	0.010	3.157	0.0027	29.8
168	0.015	0.015	3.161	0.0041	53.2
261	0.020	0.020	3.165	0.0055	82.5
370	0.025	0.025	3.170	0.0068	116.7
496	0.030	0.030	3.174	0.0082	156.3
632	0.035	0.035	3.178	0.0096	198.8
752	0.040	0.040	3.183	0.0110	236.3
863	0.045	0.045	3.187	0.0123	270.8
1053	0.050	0.050	3.192	0.0137	329.9
1111	0.055	0.055	3.196	0.0151	347.6
1137	0.060	0.060	3.200	0.0164	355.3
1081	0.065	0.065	3.205	0.0178	337.3
949	0.070	0.070	3.209	0.0192	295.7
731	0.075	0.075	3.214	0.0205	227.5
662	0.080	0.080	3.218	0.0219	205.7
647	0.085	0.085	3.223	0.0233	200.8
570	0.090	0.090	3.227	0.0246	176.6
541	0.095	0.095	3.232	0.0260	167.4
516	0.100	0.100	3.236	0.0274	159.4
492	0.105	0.105	3.241	0.0287	151.8

UNCONFINED COMPRESSION TESTING
Sample No. 0397-028 86 Day



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Longview Wood Treating		
PROJECT No.:	SE0397		
SAMPLE No.:	0397-028 86 Day		
TESTING DATE:	7/6/2012	LOADING RATE:	0.04 in./min.
TESTED BY:	MMR	TRACKING CODE:	8230_US

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	34.9	**%**
BULK UNIT WEIGHT	102.1	lb/ft³
DRY UNIT WEIGHT	75.7	lb/ft³
UCS *	355.3	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

APPENDIX E

PERMEABILITY DATA SHEETS

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7794_PM
SAMPLE No.:	0397-010	EQUIPMENT No.:	7A
TEST DATE:	12/12/2011		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	0397-010	0397-010
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	182.63 ***g***
3. WT WET SOIL + TARE	366.46 ***g***	549.55 ***g***
4. WT DRY SOIL + TARE	292.73 ***g***	475.36 ***g***
5. WT WATER, Ww	73.73 g	74.19 g
6. WT DRY SOIL, Ws	292.73 g	292.73 g
7. MOISTURE CONTENT, W	25.19 %	25.34 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.97 in.***	***1.62 in.***	***1.62 in.***
No. 2	***2.97 in.***	***2.97 in.***	***1.62 in.***	***1.62 in.***
No. 3	***2.98 in.***	***2.97 in.***	***1.63 in.***	***1.63 in.***
Average	2.97 in.	2.97 in.	1.62 in.	1.62 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***366.46 g***	***366.96 g***
Area, Ao	6.94 in^2	6.93 in^2
Volume, Vo	11.27 in^3	11.25 in^3
Bulk Unit Weight	123.9 lb/ft^3	124.3 lb/ft^3
Dry Unit Weight	98.9 lb/ft^3	99.2 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7794_PM
SAMPLE No.:	0397-010	EQUIPMENT No.:	7A
TEST DATE:	12/12/2011		

TEST	*TIME*	*TESTED*	*TEST PRESSURES (psi)*						
			APPLIED		*PORE*		*PRESSURE CHANGE*		
DATE	*(military)*	*BY*	*CELL*	*BACK*	*SAT.*	*TEST*	*CELL*	*PORE*	*B-Value*
12/13/11	14 : 10	SEM	7.0	5.0	6.2				
12/14/11	9 : 40	SEM	17.0	15.0	16.8	13.3	10.0	7.1	0.71
12/14/11	11 : 52	SEM	27.0	25.0	26.3	24.1	10.0	7.3	0.73
12/14/11	13 : 10	SEM	37.0	35.0	36.2	35.4	10.0	9.1	0.91
12/14/11	15 : 20	SEM	47.0	45.0	46.3	45.5	10.0	9.3	0.93
12/14/11	17 : 8	SEM	57.0	55.0	*	55.9	10.0	9.6	0.96
12/14/11	17 : 9	SEM	47.0	45.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	Longview		SEM
PROJECT No.:	SE-0397		7794_PM
SAMPLE No.:	0397-010		7A
TEST DATE:	12/12/2011		

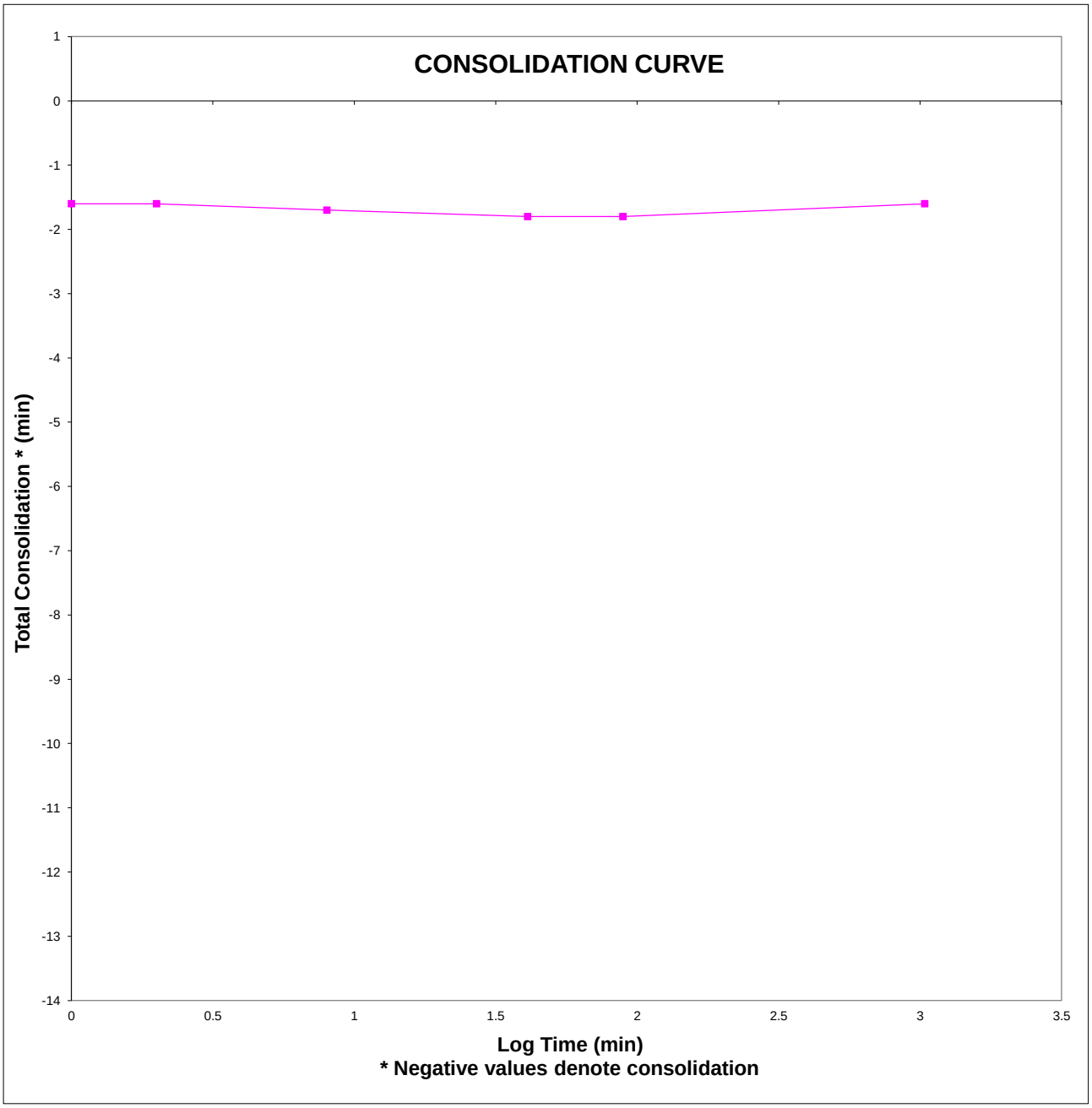
CELL PRESSURE: 55 psi **BACK PRESSURE:** 45 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML) READING BOTTOM*	*READING TOP*	*ACTUAL TOTAL (Ct)*
12 / 14 / 2011	SEM	17 : 14				25.0	25.0	0.0
12 / 14 / 2011	SEM	17 : 15	1	1	0.00	24.3	24.1	1.6
12 / 14 / 2011	SEM	17 : 16	1	2	0.30	24.3	24.1	1.6
12 / 14 / 2011	SEM	17 : 22	6	8	0.90	24.3	24.0	1.7
12 / 14 / 2011	SEM	17 : 55	33	41	1.61	24.2	24.0	1.8
12 / 14 / 2011	SEM	18 : 43	48	89	1.95	24.2	24.0	1.8
12 / 15 / 2011	SEM	10 : 33	950	1039	3.02	24.3	24.1	1.6

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7794_PM
SAMPLE No.:	0397-010	EQUIPMENT No.:	7A
TEST DATE:	12/12/2011		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7794_PM
SAMPLE No.:	0397-010	EQUIPMENT No.:	7A
TEST DATE:	12/12/2011		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
12 / 15 / 11	SEM	11 : 9		0.0	25.0	20.0	55.0	45.0	45.0
12 / 15 / 11	SEM	11 : 52	43	0.5	24.5	20.0	55.0	45.0	45.0
12 / 15 / 11	SEM	12 : 46	54	1.1	23.9	20.0	55.0	45.0	45.0
12 / 15 / 11	SEM	14 : 30	104	2.1	22.9	20.0	55.0	45.0	45.0
12 / 15 / 11	SEM	16 : 7	97	3.0	22.0	20.0	55.0	45.0	45.0
12 / 15 / 11	SEM	17 : 45	98	3.8	21.2	20.0	55.0	45.0	45.0
12 / 16 / 11	SEM	9 : 42	957	8.8	16.2	20.0	55.0	45.0	45.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7794_PM
SAMPLE No.:	0397-010	EQUIPMENT No.:	7A
TEST DATE:	12/12/2011		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				6.063		
43	0.5	0.5	1.00	5.821	7.28E-07	7.32E-07
54	0.6	0.6	1.00	5.530	7.29E-07	7.32E-07
104	1.0	1.0	1.00	5.045	6.77E-07	6.80E-07
97	0.9	0.9	1.00	4.608	7.16E-07	7.19E-07
98	0.8	0.8	1.00	4.220	6.89E-07	6.92E-07
957	5.0	5.0	1.00	1.795	6.85E-07	6.88E-07

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7794_PM
SAMPLE No.:	0397-010	EQUIPMENT No.:	7A
TEST DATE:	12/12/2011		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	123.9 lb/ft³	124.3 lb/ft³
DRY UNIT WEIGHT	98.9 lb/ft³	99.2 lb/ft³
MOISTURE CONTENT	25.2 %	25.3 %
PERMEABILITY @ 20°C	7.1E-07 cm/sec	

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7795_PM
SAMPLE No.:	0397-016	EQUIPMENT No.:	7B
TEST DATE:	12/12/2011		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	0397-016	0397-016
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	231.54 ***g***
3. WT WET SOIL + TARE	531.06 ***g***	767.10 ***g***
4. WT DRY SOIL + TARE	381.16 ***g***	612.70 ***g***
5. WT WATER, Ww	149.90 g	154.40 g
6. WT DRY SOIL, Ws	381.16 g	381.16 g
7. MOISTURE CONTENT, W	39.33 %	40.51 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.97 in.***	***2.64 in.***	***2.64 in.***
No. 2	***2.97 in.***	***2.97 in.***	***2.65 in.***	***2.65 in.***
No. 3	***2.98 in.***	***2.97 in.***	***2.64 in.***	***2.65 in.***
Average	2.97 in.	2.97 in.	2.64 in.	2.65 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***531.06 g***	***535.61 g***
Area, Ao	6.94 in^2	6.93 in^2
Volume, Vo	18.35 in^3	18.34 in^3
Bulk Unit Weight	110.2 lb/ft^3	111.3 lb/ft^3
Dry Unit Weight	79.1 lb/ft^3	79.2 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7795_PM
SAMPLE No.:	0397-016	EQUIPMENT No.:	7B
TEST DATE:	12/12/2011		

TEST	*TIME*	*TESTED*	*TEST PRESSURES (psi)*						
			APPLIED		*PORE*		*PRESSURE CHANGE*		
DATE	*(military)*	*BY*	*CELL*	*BACK*	*SAT.*	*TEST*	*CELL*	*PORE*	*B-Value*
12/13/11	14 : 14	SEM	7.0	5.0	6.2				
12/14/11	9 : 45	SEM	17.0	15.0	18.1	12.8	10.0	6.6	0.66
12/14/11	11 : 47	SEM	27.0	25.0	27.2	25.7	10.0	7.6	0.76
12/14/11	13 : 14	SEM	37.0	35.0	36.4	34.4	10.0	7.2	0.72
12/14/11	15 : 17	SEM	47.0	45.0	46.3	45.5	10.0	9.1	0.91
12/14/11	17 : 16	SEM	57.0	55.0	*	55.8	10.0	9.5	0.95
12/14/11	17 : 17	SEM	47.0	45.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	Longview		SEM
PROJECT No.:	SE-0397		7795_PM
SAMPLE No.:	0397-016		7B
TEST DATE:	12/12/2011		

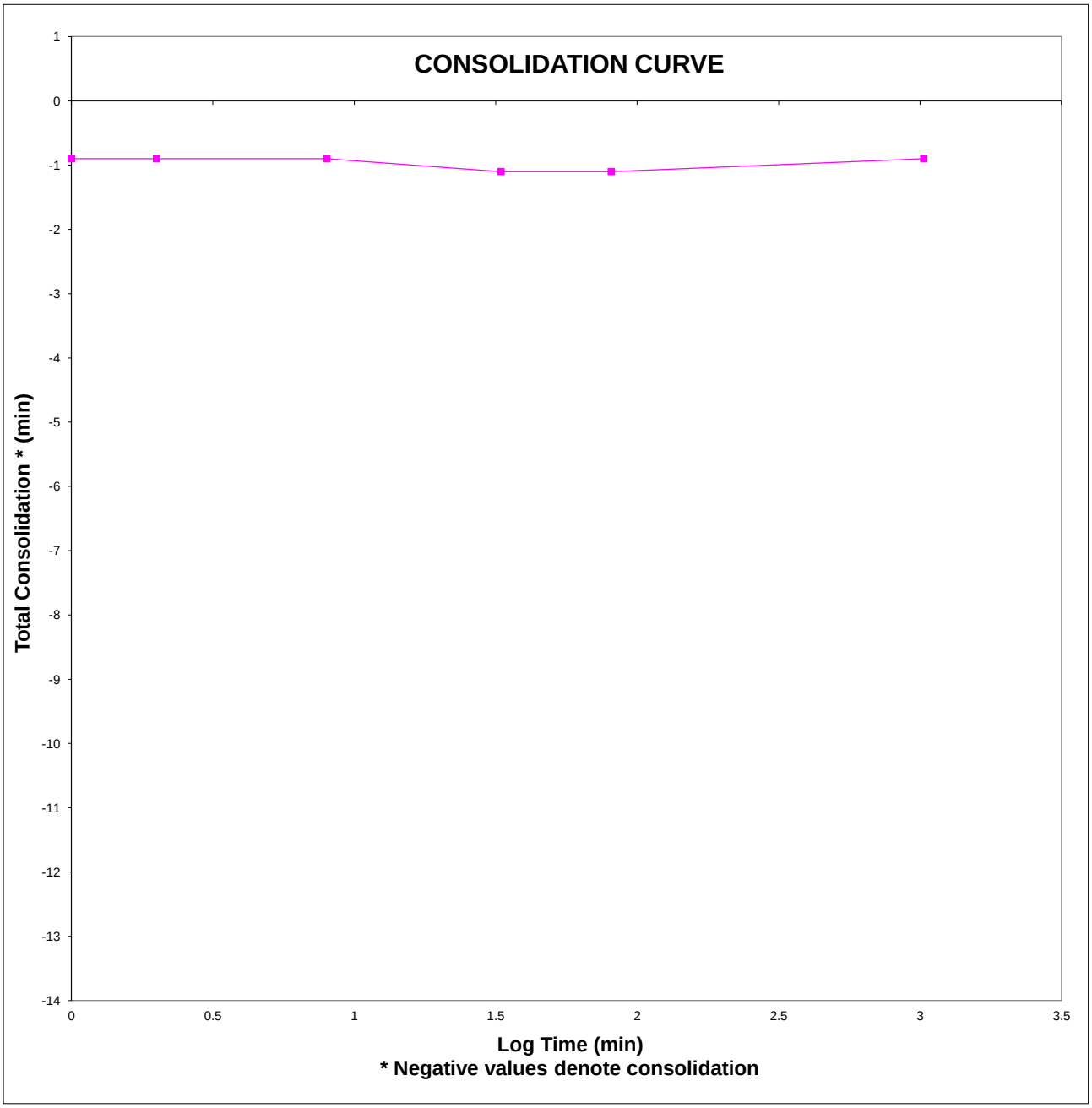
CELL PRESSURE: 55 psi **BACK PRESSURE:** 45 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)* READING *BOTTOM*	*TOP*	*ACTUAL TOTAL (Ct)*
12 / 14 / 2011	SEM	17 : 22				25.0	25.0	0.0
12 / 14 / 2011	SEM	17 : 23	1	1	0.00	24.6	24.5	0.9
12 / 14 / 2011	SEM	17 : 24	1	2	0.30	24.6	24.5	0.9
12 / 14 / 2011	SEM	17 : 30	6	8	0.90	24.6	24.5	0.9
12 / 14 / 2011	SEM	17 : 55	25	33	1.52	24.5	24.4	1.1
12 / 14 / 2011	SEM	18 : 43	48	81	1.91	24.5	24.4	1.1
12 / 15 / 2011	SEM	10 : 33	950	1031	3.01	24.6	24.5	0.9

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7795_PM
SAMPLE No.:	0397-016	EQUIPMENT No.:	7B
TEST DATE:	12/12/2011		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7795_PM
SAMPLE No.:	0397-016	EQUIPMENT No.:	7B
TEST DATE:	12/12/2011		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
12 / 15 / 11	SEM	11 : 16		0.0	25.0	20.0	55.0	45.0	45.0
12 / 15 / 11	SEM	14 : 54	218	0.0	25.0	20.0	55.0	45.0	45.0
12 / 15 / 11	SEM	15 : 0	RESET	0.0	25.0	20.0	55.0	47.0	45.0
12 / 16 / 11	SEM	10 : 6	RESET	0.0	25.0	20.0	55.0	48.0	45.0
12 / 16 / 11	SEM	12 : 40	154	0.5	24.5	20.0	55.0	48.0	45.0
12 / 16 / 11	SEM	15 : 23	163	1.1	23.9	20.0	55.0	48.0	45.0
12 / 17 / 11	SEM	10 : 0	1117	4.2	20.8	20.0	55.0	48.0	45.0
12 / 18 / 11	SEM	7 : 45	1305	7.6	17.4	20.0	55.0	48.0	45.0
12 / 19 / 11	SEM	9 : 23	1538	11.0	14.0	20.0	55.0	48.0	45.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7795_PM
SAMPLE No.:	0397-016	EQUIPMENT No.:	7B
TEST DATE:	12/12/2011		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.724		
218	0.0	0.0	#DIV/0!	3.724	0.00E+00	0.00E+00
RESET				24.677		
RESET				35.153		
154	0.5	0.5	1.00	35.004	3.44E-08	3.46E-08
163	0.6	0.6	1.00	34.825	3.92E-08	3.94E-08
1117	3.1	3.1	1.00	33.902	3.00E-08	3.02E-08
1305	3.4	3.4	1.00	32.889	2.90E-08	2.92E-08
1538	3.4	3.4	1.00	31.876	2.54E-08	2.55E-08

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7795_PM
SAMPLE No.:	0397-016	EQUIPMENT No.:	7B
TEST DATE:	12/12/2011		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	110.2 lb/ft³	111.3 lb/ft³
DRY UNIT WEIGHT	79.1 lb/ft³	79.2 lb/ft³
MOISTURE CONTENT	39.3 %	40.5 %
PERMEABILITY @ 20°C	3.2E-08 cm/sec	

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7796_PM
SAMPLE No.:	0397-017	EQUIPMENT No.:	7
TEST DATE:	12/12/2011		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	0397-017	0397-017
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	231.87 ***g***
3. WT WET SOIL + TARE	407.75 ***g***	645.20 ***g***
4. WT DRY SOIL + TARE	285.86 ***g***	517.73 ***g***
5. WT WATER, Ww	121.89 g	127.47 g
6. WT DRY SOIL, Ws	285.86 g	285.86 g
7. MOISTURE CONTENT, W	42.64 %	44.59 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.98 in.***	***2.98 in.***	***2.09 in.***	***2.09 in.***
No. 2	***2.99 in.***	***2.99 in.***	***2.09 in.***	***2.09 in.***
No. 3	***3.01 in.***	***3.00 in.***	***2.10 in.***	***2.09 in.***
Average	2.99 in.	2.99 in.	2.09 in.	2.09 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***407.75 g***	***413.39 g***
Area, Ao	7.04 in^2	7.02 in^2
Volume, Vo	14.73 in^3	14.68 in^3
Bulk Unit Weight	105.4 lb/ft^3	107.3 lb/ft^3
Dry Unit Weight	73.9 lb/ft^3	74.2 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7796_PM
SAMPLE No.:	0397-017	EQUIPMENT No.:	7
TEST DATE:	12/12/2011		

TEST	TIME	TESTED	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
DATE	(military)	BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
12/13/11	14 : 20	SEM	7.0	5.0	5.6				
12/14/11	9 : 48	SEM	17.0	15.0	15.6	10.0	10.0	4.4	0.44
12/14/11	11 : 55	SEM	27.0	25.0	25.7	21.8	10.0	6.2	0.62
12/14/11	13 : 16	SEM	37.0	35.0	35.8	33.5	10.0	7.8	0.78
12/14/11	15 : 23	SEM	47.0	45.0	45.7	44.2	10.0	8.4	0.84
12/14/11	17 : 4	SEM	57.0	55.0	55.7	54.6	10.0	8.9	0.89
12/14/11	18 : 1	SEM	67.0	65.0	65.7	64.9	10.0	9.2	0.92
12/15/11	10 : 45	SEM	77.0	75.0	*	75.3	10.0	9.6	0.96
12/15/11	10 : 46	SEM	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	Longview	SEM
PROJECT No.:	SE-0397	7796_PM
SAMPLE No.:	0397-017	7
TEST DATE:	12/12/2011	

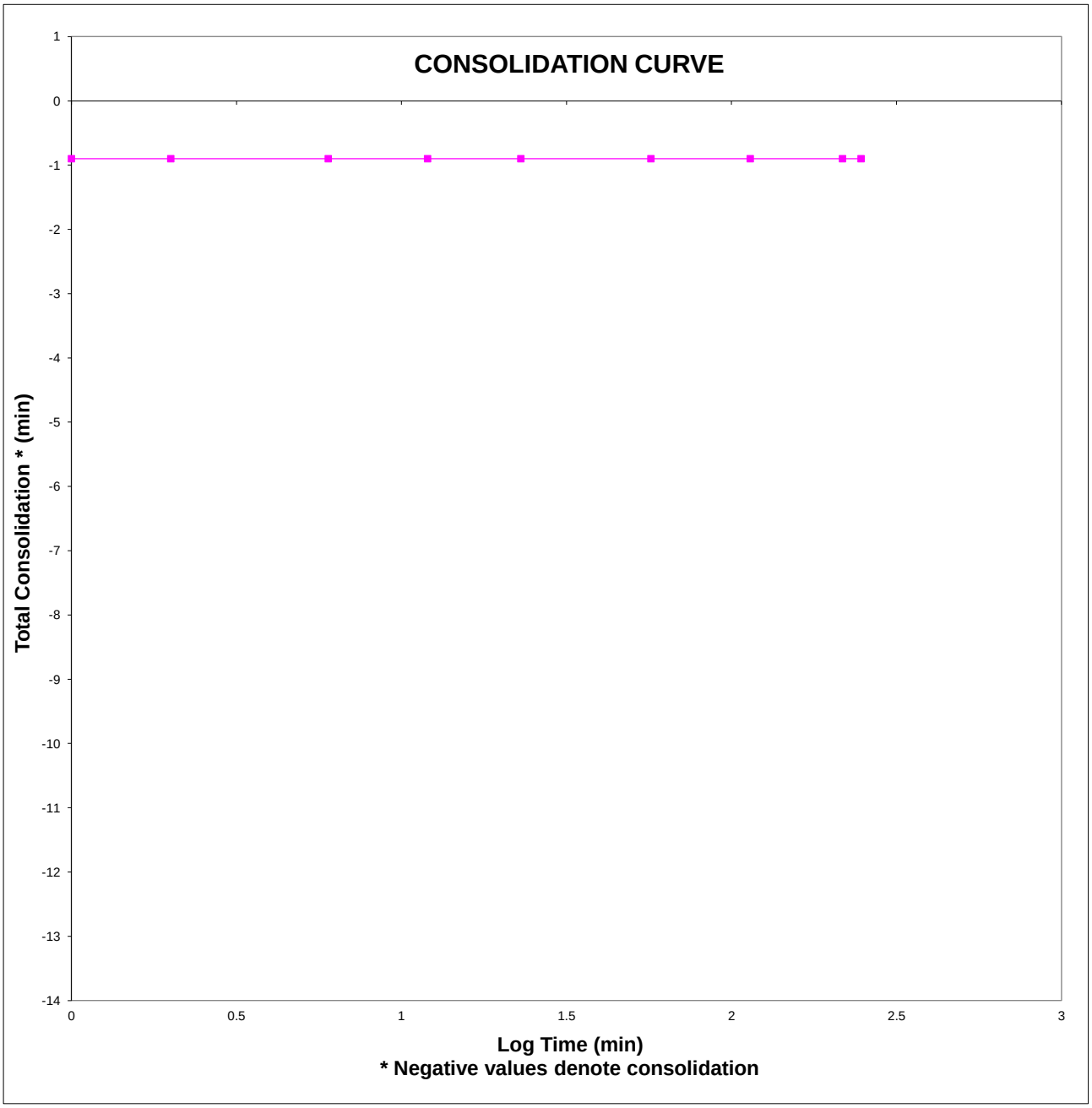
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
12 / 15 / 2011	SEM	10 : 53				25.0	25.0	0.0
12 / 15 / 2011	SEM	10 : 54	1	1	0.00	24.6	24.5	0.9
12 / 15 / 2011	SEM	10 : 55	1	2	0.30	24.6	24.5	0.9
12 / 15 / 2011	SEM	10 : 59	4	6	0.78	24.6	24.5	0.9
12 / 15 / 2011	SEM	11 : 5	6	12	1.08	24.6	24.5	0.9
12 / 15 / 2011	SEM	11 : 16	11	23	1.36	24.6	24.5	0.9
12 / 15 / 2011	SEM	11 : 50	34	57	1.76	24.6	24.5	0.9
12 / 15 / 2011	SEM	12 : 47	57	114	2.06	24.6	24.5	0.9
12 / 15 / 2011	SEM	14 : 30	103	217	2.34	24.6	24.5	0.9
12 / 15 / 2011	SEM	15 : 0	30	247	2.39	24.6	24.5	0.9

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7796_PM
SAMPLE No.:	0397-017	EQUIPMENT No.:	7
TEST DATE:	12/12/2011		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7796_PM
SAMPLE No.:	0397-017	EQUIPMENT No.:	7
TEST DATE:	12/12/2011		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
12 / 15 / 11	SEM	15 : 3		0.0	25.0	20.0	75.0	65.0	65.0
12 / 15 / 11	SEM	16 : 33	90	0.1	24.9	20.0	75.0	65.0	65.0
12 / 15 / 11	SEM	16 : 38	RESET	0.0	25.0	20.0	75.0	67.0	65.0
12 / 15 / 11	SEM	18 : 35	117	0.5	24.5	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	9 : 46	911	3.0	22.0	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	12 : 42	176	3.5	21.5	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	16 : 5	203	4.0	21.0	20.0	75.0	67.0	65.0
12 / 17 / 11	SEM	10 : 0	1075	6.4	18.6	20.0	75.0	67.0	65.0
12 / 18 / 11	SEM	7 : 45	1305	8.8	16.2	20.0	75.0	67.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7796_PM
SAMPLE No.:	0397-017	EQUIPMENT No.:	7
TEST DATE:	12/12/2011		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				4.702		
90	0.1	0.1	1.00	4.664	8.71E-08	8.75E-08
RESET				31.160		
117	0.5	0.5	1.00	30.972	5.05E-08	5.07E-08
911	2.5	2.5	1.00	30.032	3.30E-08	3.32E-08
176	0.5	0.5	1.00	29.844	3.48E-08	3.50E-08
203	0.5	0.5	1.00	29.655	3.04E-08	3.05E-08
1075	2.4	2.4	1.00	28.753	2.81E-08	2.82E-08
1305	2.4	2.4	1.00	27.850	2.39E-08	2.40E-08

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7796_PM
SAMPLE No.:	0397-017	EQUIPMENT No.:	7
TEST DATE:	12/12/2011		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	105.4 lb/ft³	107.3 lb/ft³
DRY UNIT WEIGHT	73.9 lb/ft³	74.2 lb/ft³
MOISTURE CONTENT	42.6 %	44.6 %
PERMEABILITY @ 20°C	3.0E-08 cm/sec	

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7797_PM
SAMPLE No.:	0397-019	EQUIPMENT No.:	6A
TEST DATE:	12/12/2011		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	0397-019	0397-019
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	231.88 ***g***
3. WT WET SOIL + TARE	456.98 ***g***	695.20 ***g***
4. WT DRY SOIL + TARE	325.94 ***g***	557.82 ***g***
5. WT WATER, Ww	131.04 g	137.38 g
6. WT DRY SOIL, Ws	325.94 g	325.94 g
7. MOISTURE CONTENT, W	40.20 %	42.15 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.97 in.***	***2.30 in.***	***2.30 in.***
No. 2	***2.98 in.***	***2.97 in.***	***2.30 in.***	***2.30 in.***
No. 3	***2.98 in.***	***2.98 in.***	***2.29 in.***	***2.29 in.***
Average	2.98 in.	2.97 in.	2.30 in.	2.30 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***456.98 g***	***463.41 g***
Area, Ao	6.96 in^2	6.94 in^2
Volume, Vo	15.98 in^3	15.95 in^3
Bulk Unit Weight	108.9 lb/ft^3	110.7 lb/ft^3
Dry Unit Weight	77.7 lb/ft^3	77.9 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7797_PM
SAMPLE No.:	0397-019	EQUIPMENT No.:	6A
TEST DATE:	12/12/2011		

			TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
TEST DATE	TIME (military)	TESTED BY	CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
12/13/11	14 : 26	SEM	7.0	5.0	5.9				
12/14/11	9 : 51	SEM	17.0	15.0	15.8	9.7	10.0	3.8	0.38
12/14/11	12 : 7	SEM	27.0	25.0	25.9	21.2	10.0	5.4	0.54
12/14/11	13 : 18	SEM	37.0	35.0	35.9	33.4	10.0	7.5	0.75
12/14/11	15 : 25	SEM	47.0	45.0	45.9	44.2	10.0	8.3	0.83
12/14/11	17 : 0	SEM	57.0	55.0	55.9	54.8	10.0	8.9	0.89
12/14/11	18 : 4	SEM	67.0	65.0	65.9	65.1	10.0	9.2	0.92
12/15/11	10 : 54	SEM	77.0	75.0	*	75.4	10.0	9.5	0.95
12/15/11	10 : 55	SEM	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	Longview	SEM
PROJECT No.:	SE-0397	7797_PM
SAMPLE No.:	0397-019	6A
TEST DATE:	12/12/2011	

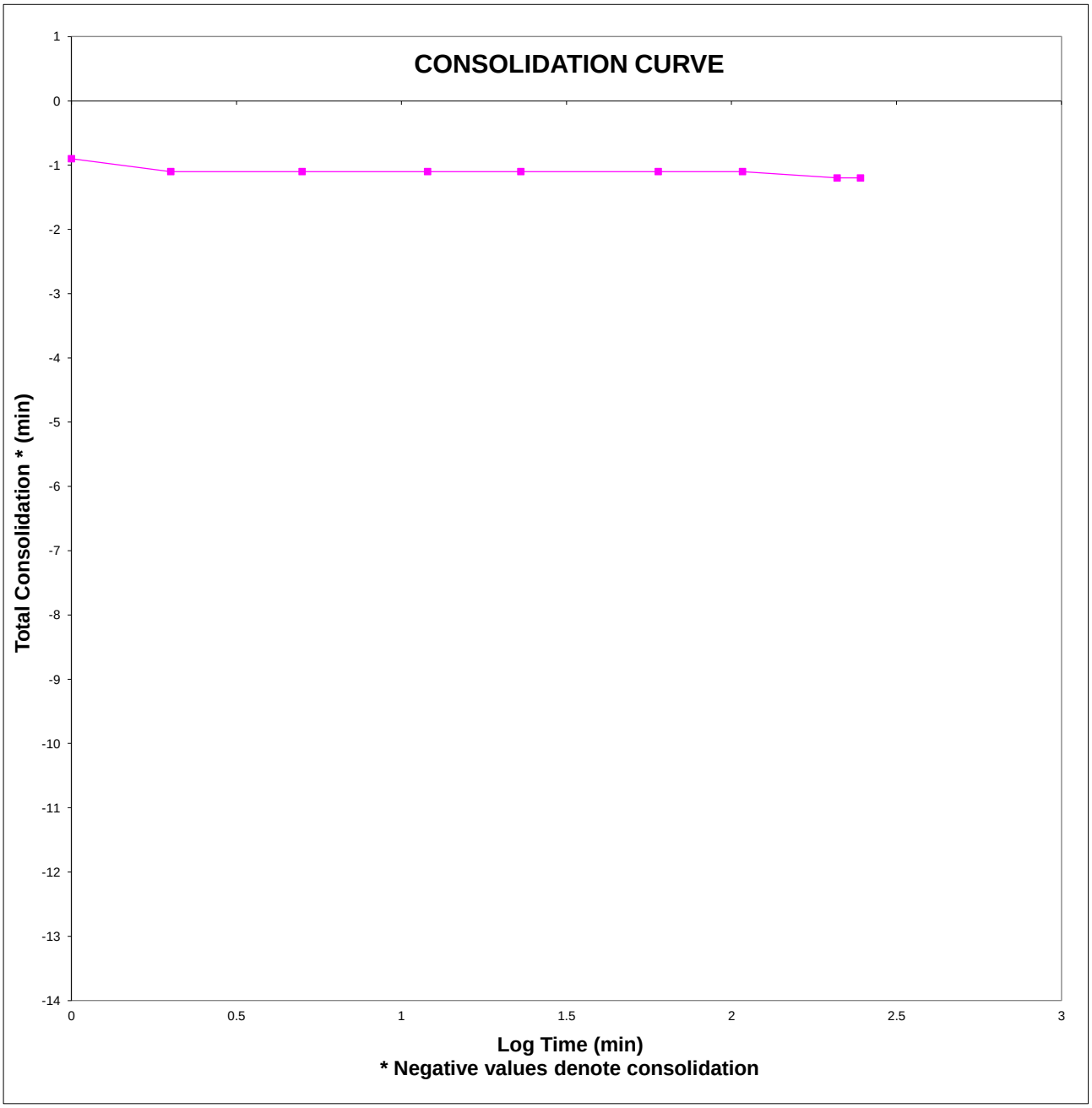
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
12 / 15 / 2011	SEM	10 : 59				25.0	25.0	0.0
12 / 15 / 2011	SEM	11 : 0	1	1	0.00	24.6	24.5	0.9
12 / 15 / 2011	SEM	11 : 1	1	2	0.30	24.5	24.4	1.1
12 / 15 / 2011	SEM	11 : 4	3	5	0.70	24.5	24.4	1.1
12 / 15 / 2011	SEM	11 : 11	7	12	1.08	24.5	24.4	1.1
12 / 15 / 2011	SEM	11 : 22	11	23	1.36	24.5	24.4	1.1
12 / 15 / 2011	SEM	11 : 59	37	60	1.78	24.5	24.4	1.1
12 / 15 / 2011	SEM	12 : 47	48	108	2.03	24.5	24.4	1.1
12 / 15 / 2011	SEM	14 : 28	101	209	2.32	24.4	24.4	1.2
12 / 15 / 2011	SEM	15 : 5	37	246	2.39	24.4	24.4	1.2

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7797_PM
SAMPLE No.:	0397-019	EQUIPMENT No.:	6A
TEST DATE:	12/12/2011		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7797_PM
SAMPLE No.:	0397-019	EQUIPMENT No.:	6A
TEST DATE:	12/12/2011		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
12 / 15 / 11	SEM	15 : 10		0.0	25.0	20.0	75.0	65.0	65.0
12 / 15 / 11	SEM	16 : 6	56	0.5	24.5	20.0	75.0	65.0	65.0
12 / 15 / 11	SEM	17 : 12	66	1.0	24.0	20.0	75.0	65.0	65.0
12 / 15 / 11	SEM	18 : 18	66	1.5	23.5	20.0	75.0	65.0	65.0
12 / 16 / 11	SEM	9 : 46	928	6.6	18.4	20.0	75.0	65.0	65.0
12 / 16 / 11	SEM	11 : 58	132	7.1	17.9	20.0	75.0	65.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7797_PM
SAMPLE No.:	0397-019	EQUIPMENT No.:	6A
TEST DATE:	12/12/2011		

ELAPSED TIME (minutes)	***HYDRAULIC HEAD DIFFERENCE (cm)***		***EFFLUENT - INFLUENT RATIO***	***HYDRAULIC GRADIENT (cm/cm)***	***HYDRAULIC CONDUCTIVITY (cm/sec)***	
	INFLUENT	***EFFLUENT***			***@ Temp.***	***@ 20° C***
RESET				4.286		
56	0.5	0.5	1.00	4.114	7.89E-07	7.93E-07
66	0.5	0.5	1.00	3.943	6.98E-07	7.01E-07
66	0.5	0.5	1.00	3.771	7.29E-07	7.33E-07
928	5.1	5.1	1.00	2.023	7.27E-07	7.30E-07
132	0.5	0.5	1.00	1.851	7.26E-07	7.30E-07

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7797_PM
SAMPLE No.:	0397-019	EQUIPMENT No.:	6A
TEST DATE:	12/12/2011		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	108.9 lb/ft³	110.7 lb/ft³
DRY UNIT WEIGHT	77.7 lb/ft³	77.9 lb/ft³
MOISTURE CONTENT	40.2 %	42.1 %
PERMEABILITY @ 20°C	7.4E-07 cm/sec	

PERMEABILITY ASTM D5084

SPECIMEN CONDITIONS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7798_PM
SAMPLE No.:	0397-024	EQUIPMENT No.:	6B
TEST DATE:	12/12/2011		

MOISTURE CONTENT (Dry Basis)	***INITIAL***	***FINAL***
1. MOISTURE TIN NO.	0397-024	0397-024
2. WT MOISTURE TIN (tare weight)	0.00 ***g***	227.73 ***g***
3. WT WET SOIL + TARE	523.91 ***g***	766.90 ***g***
4. WT DRY SOIL + TARE	377.71 ***g***	605.44 ***g***
5. WT WATER, Ww	146.20 g	161.46 g
6. WT DRY SOIL, Ws	377.71 g	377.71 g
7. MOISTURE CONTENT, W	38.71 %	42.75 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	***DIAMETER***		***HEIGHT***	
ANALYSES	***INITIAL***	***FINAL***	***INITIAL***	***FINAL***
No. 1	***2.97 in.***	***2.97 in.***	***2.68 in.***	***2.68 in.***
No. 2	***2.98 in.***	***2.98 in.***	***2.68 in.***	***2.68 in.***
No. 3	***2.99 in.***	***2.99 in.***	***2.69 in.***	***2.69 in.***
Average	2.98 in.	2.98 in.	2.68 in.	2.68 in.

SPECIMEN CONDITIONS	***INITIAL***	***FINAL***
Specimen WT, Wo	***523.91 g***	***539.24 g***
Area, Ao	6.97 in^2	6.97 in^2
Volume, Vo	18.72 in^3	18.72 in^3
Bulk Unit Weight	106.6 lb/ft^3	109.8 lb/ft^3
Dry Unit Weight	76.9 lb/ft^3	76.9 lb/ft^3

PERMEABILITY ASTM D5084

BACK-PRESSURE SATURATION

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7798_PM
SAMPLE No.:	0397-024	EQUIPMENT No.:	6B
TEST DATE:	12/12/2011		

			TEST PRESSURES (psi)						
TEST	*TIME*	*TESTED*	*APPLIED*		*PORE*		*PRESSURE CHANGE*		
DATE	*(military)*	*BY*	*CELL*	*BACK*	*SAT.*	*TEST*	*CELL*	*PORE*	*B-Value*
12/13/11	14 : 31	SEM	7.0	5.0	5.9				
12/14/11	9 : 55	SEM	17.0	15.0	15.8	8.1	10.0	2.2	0.22
12/14/11	12 : 12	SEM	27.0	25.0	25.9	19.7	10.0	3.9	0.39
12/14/11	13 : 21	SEM	37.0	35.0	35.9	32.1	10.0	6.2	0.62
12/14/11	15 : 27	SEM	47.0	45.0	45.9	42.9	10.0	7.0	0.70
12/14/11	16 : 57	SEM	57.0	55.0	55.9	54.2	10.0	8.3	0.83
12/14/11	18 : 7	SEM	67.0	65.0	65.8	64.8	10.0	8.9	0.89
12/15/11	11 : 1	SEM	77.0	75.0	*	75.4	10.0	9.6	0.96
12/15/11	11 : 2	SEM	67.0	65.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY ASTM D5084

SPECIMEN CONSOLIDATION

PROJECT:	Longview	SEM
PROJECT No.:	SE-0397	7798_PM
SAMPLE No.:	0397-024	6B
TEST DATE:	12/12/2011	

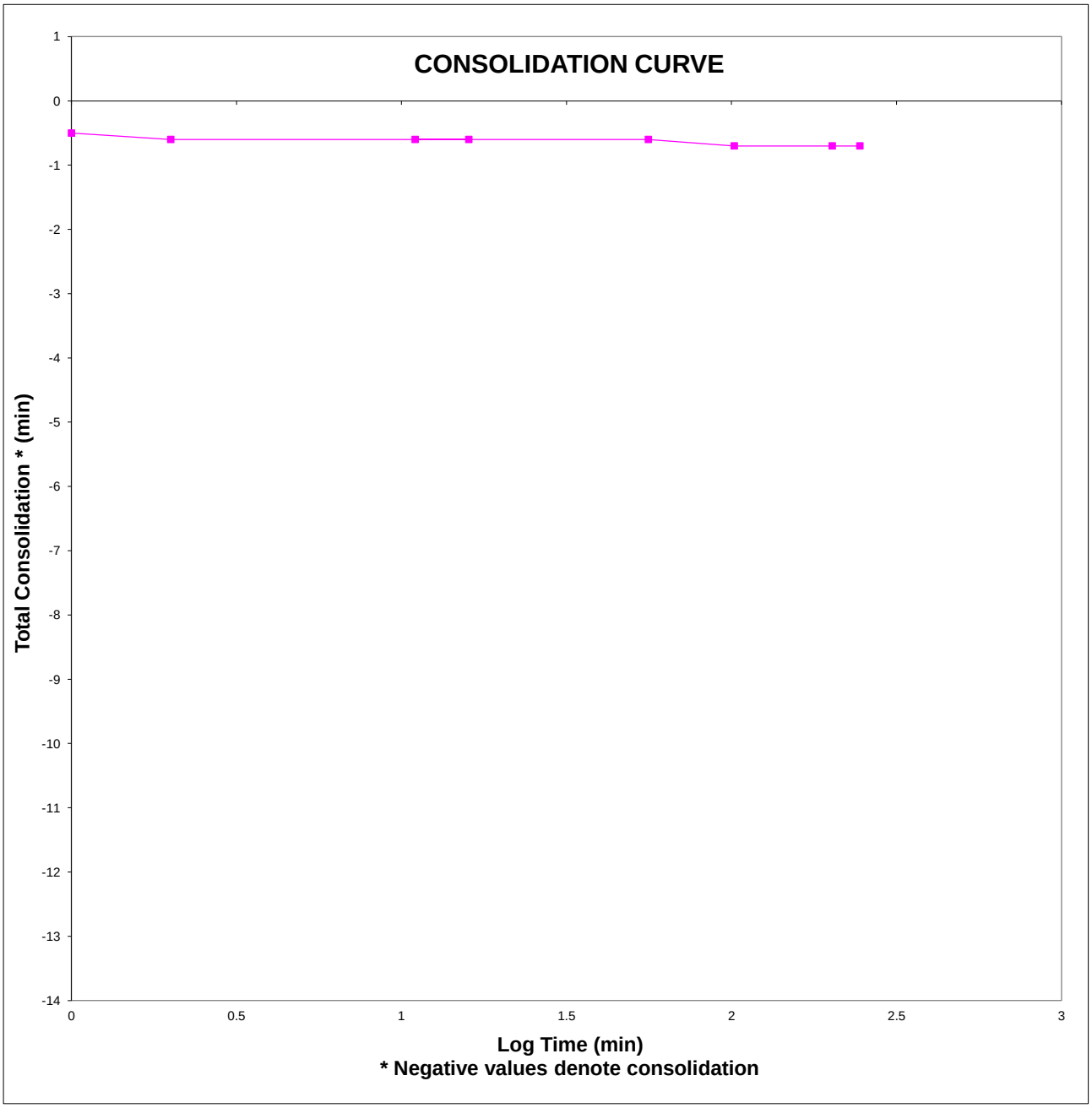
CELL PRESSURE: 75 psi **BACK PRESSURE:** 65 psi **EFFECTIVE STRESS:** 10 psi

TEST DATE	*TESTED BY*	*TIME (Military)*	*ELAPSED TIME (minutes)*	*TOTAL TIME (minutes)*	*TOTAL TIME (Log)*	*SPECIMEN CONSOLIDATION (ML)*		
						READING		*ACTUAL*
						BOTTOM	*TOP*	*TOTAL (Ct)*
12 / 15 / 2011	SEM	11 : 5				24.6	25.0	0.0
12 / 15 / 2011	SEM	11 : 6	1	1	0.00	24.5	24.6	0.5
12 / 15 / 2011	SEM	11 : 7	1	2	0.30	24.5	24.5	0.6
12 / 15 / 2011	SEM	11 : 21	14	16	1.20	24.5	24.5	0.6
12 / 15 / 2011	SEM	11 : 16	-5	11	1.04	24.5	24.5	0.6
12 / 15 / 2011	SEM	12 : 1	45	56	1.75	24.5	24.5	0.6
12 / 15 / 2011	SEM	12 : 47	46	102	2.01	24.4	24.5	0.7
12 / 15 / 2011	SEM	14 : 27	100	202	2.31	24.4	24.5	0.7
12 / 15 / 2011	SEM	15 : 10	43	245	2.39	24.4	24.5	0.7

PERMEABILITY ASTM D5084

CONSOLIDATION CURVE

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7798_PM
SAMPLE No.:	0397-024	EQUIPMENT No.:	6B
TEST DATE:	12/12/2011		



PERMEABILITY ASTM D5084

TEST DATA

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7798_PM
SAMPLE No.:	0397-024	EQUIPMENT No.:	6B
TEST DATE:	12/12/2011		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		TEMP. C°	GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT		CELL	INFLUENT	EFFLUENT
12 / 15 / 11	SEM	15 : 13		0.0	25.0	20.0	75.0	65.0	65.0
12 / 15 / 11	SEM	16 : 40	87	0.3	24.7	20.0	75.0	65.0	65.0
12 / 15 / 11	SEM	16 : 45	RESET	0.0	25.0	20.0	75.0	67.0	65.0
12 / 15 / 11	SEM	17 : 11	26	0.6	24.4	20.0	75.0	67.0	65.0
12 / 15 / 11	SEM	17 : 43	32	1.3	23.7	20.0	75.0	67.0	65.0
12 / 15 / 11	SEM	18 : 9	26	1.8	23.2	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	9 : 46	937	18.2	6.8	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	9 : 52	RESET	0.0	25.0	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	10 : 19	27	0.5	24.5	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	10 : 46	27	1.0	24.0	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	11 : 30	44	1.8	23.2	20.0	75.0	67.0	65.0
12 / 16 / 11	SEM	12 : 59	89	3.4	21.6	20.0	75.0	67.0	65.0

PERMEABILITY ASTM D5084

TEST DATA (continued)

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7798_PM
SAMPLE No.:	0397-024	EQUIPMENT No.:	6B
TEST DATE:	12/12/2011		

ELAPSED TIME (minutes)	*HYDRAULIC HEAD DIFFERENCE (cm)*		*EFFLUENT - INFLUENT RATIO*	*HYDRAULIC GRADIENT (cm/cm)*	*HYDRAULIC CONDUCTIVITY (cm/sec)*	
	INFLUENT	*EFFLUENT*			*@ Temp.*	*@ 20° C*
RESET				3.668		
87	0.3	0.3	1.00	3.580	3.52E-07	3.54E-07
RESET				24.309		
26	0.6	0.6	1.00	24.133	3.53E-07	3.55E-07
32	0.7	0.7	1.00	23.927	3.37E-07	3.39E-07
26	0.5	0.5	1.00	23.781	2.99E-07	3.00E-07
937	16.4	16.4	1.00	18.968	3.05E-07	3.06E-07
RESET				24.309		
27	0.5	0.5	1.00	24.162	2.83E-07	2.84E-07
27	0.5	0.5	1.00	24.015	2.85E-07	2.86E-07
44	0.8	0.8	1.00	23.781	2.82E-07	2.83E-07
89	1.6	1.6	1.00	23.311	2.83E-07	2.84E-07

PERMEABILITY ASTM D5084

SUMMARY OF RESULTS

PROJECT:	Longview	TESTED BY:	SEM
PROJECT No.:	SE-0397	TRACKING CODE:	7798_PM
SAMPLE No.:	0397-024	EQUIPMENT No.:	6B
TEST DATE:	12/12/2011		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	106.6 lb/ft³	109.8 lb/ft³
DRY UNIT WEIGHT	76.9 lb/ft³	76.9 lb/ft³
MOISTURE CONTENT	38.7 %	42.7 %
PERMEABILITY @ 20°C	3.0E-07 cm/sec	

APPENDIX F

ANS 16.1 LEACHABILITY DATA SHEETS

ANS 16.1 LEACHABILITY

SAMPLE PREPARATION

PROJECT:	Longview	TESTED BY:	JGS
PROJECT No.:	SE0397	TRACKING CODE:	7912_ANS
SAMPLE No.:	0397-016		
TEST DATE:	2/13/2012		

MOISTURE CONTENT (Dry Basis)	***RESULTS***	
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)		***g***
3. WT WET SOIL + TARE		***g***
4. WT DRY SOIL + TARE		***g***
5. WT WATER, Ww	0.00	g
6. WT DRY SOIL, Ws	0.00	g
7. MOISTURE CONTENT, W	#DIV/0!	%

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE ANALYSES	***DIAMETER RESULTS***		***LENGTH RESULTS***	
No. 1	***2.00***	***in.***	***3.75***	***in.***
No. 2	***2.00***	***in.***	***3.78***	***in.***
No. 3	***1.99***	***in.***	***3.76***	***in.***
Average	2.00	in.	3.76	in.

SPECIMEN CONDITIONS	***INITIAL***	
Specimen WT, Wo	***337.32***	***g***
Area, Ao	3.13	in^2
Volume, Vo	11.78	in^3
Bulk Unit Weight	109.1	pcf
Dry Unit Weight	#DIV/0!	pcf

ANS 16.1 LEACHABILITY

TESTING DATA

PROJECT:	Longview
PROJECT NO.:	SE0397
SAMPLE NO:	0397-016
START DATE:	2/13/2012
TRACKING CODE:	7912_ANS

LEACH INTERVAL	TESTED BY	DATE		TIME		VOLUME LEACHATE (ml)	TEMP (°C)	PID (ppm)	Conduct. (mS/cm³)	pH (s.u.)	OBSERVATIONS
		IN	OUT	IN	OUT						
Initial	JGS					1930	20.00	-	0.002	6.99	
1	JGS	02/13/12	02/13/12	10:05	12:05	1930	19.29	-	0.057	9.74	2 hour
2	JGS	02/13/12	02/13/12	12:05	17:05	1930	21.15	-	0.065	9.64	7 hour
3	JGS	02/13/12	02/14/12	17:05	10:05	1930	21.17	-	0.092	9.88	24 hour
4	JGS	02/14/12	02/15/12	10:05	10:05	1930	21.44	-	0.111	9.87	48 hour
5	SEM	02/15/12	02/16/12	10:05	10:05	1930	20.44	-	0.113	9.90	3 day
6	JGS	02/16/12	02/17/12	10:05	10:05	1930	20.87	-	0.056	9.50	4 day
7	SEM	02/17/12	02/18/12	10:05	10:05	1930	20.48	-	0.068	9.88	5 day
8											
9											
10											

ANS 16.1 LEACHABILITY

SAMPLE PREPARATION

PROJECT:	Longview	TESTED BY:	JGS
PROJECT No.:	SE0397	TRACKING CODE:	7913_ANS
SAMPLE No.:	0397-017A		
TEST DATE:	2/13/2012		

MOISTURE CONTENT (Dry Basis)	***RESULTS***	
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)		***g***
3. WT WET SOIL + TARE		***g***
4. WT DRY SOIL + TARE		***g***
5. WT WATER, Ww	0.00	g
6. WT DRY SOIL, Ws	0.00	g
7. MOISTURE CONTENT, W	#DIV/0!	%

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE ANALYSES	***DIAMETER RESULTS***		***LENGTH RESULTS***	
No. 1	***2.02***	***in.***	***3.73***	***in.***
No. 2	***2.01***	***in.***	***3.74***	***in.***
No. 3	***1.99***	***in.***	***3.71***	***in.***
Average	2.01	in.	3.73	in.

SPECIMEN CONDITIONS	***INITIAL***	
Specimen WT, Wo	***357.27***	***g***
Area, Ao	3.16	in^2
Volume, Vo	11.79	in^3
Bulk Unit Weight	115.5	pcf
Dry Unit Weight	#DIV/0!	pcf

ANS 16.1 LEACHABILITY

TESTING DATA

Sheet 2 of 2

PROJECT:	Longview
PROJECT NO.:	SE0397
SAMPLE NO:	0397-017A
START DATE:	2/13/2012
TRACKING CODE:	7913_ANS

LEACH INTERVAL	TESTED BY	DATE		TIME		VOLUME LEACHATE (ml)	TEMP (°C)	PID (ppm)	Conduct. (mS/cm³)	pH (s.u.)	OBSERVATIONS
		IN	OUT	IN	OUT						
Initial	JGS					1929	20.00	-	0.002	6.99	one end of the sample crumbled when it was placed in water*
1	JGS	02/13/12	02/13/12	10:10	12:10	1929	17.71	-	0.105	9.21	
2	JGS	02/13/12	02/13/12	12:10	17:10	1929	21.07	-	0.059	9.59	7 hour
3	JGS	02/13/12	02/14/12	17:10	10:10	1929	20.93	-	0.156	10.15	24 hour
4	JGS	02/14/12	02/15/12	10:10	10:10	1929	21.28	-	0.158	10.09	48 hour
5	SEM	02/15/12	02/16/12	10:10	10:10	1929	20.29	-	0.193	10.15	3 day
6	JGS	02/16/12	02/17/12	10:10	10:10	1929	20.86	-	0.096	9.82	4 day
7	SEM	02/17/12	02/18/12	10:10	10:10	1929	20.73	-	0.091	9.68	5 day
8											
9											
10											

* filtered leachate through a 0.45-micron filter before sampling for PAH and TPH-DRO

ANS 16.1 LEACHABILITY

SAMPLE PREPARATION

PROJECT:	Longview	TESTED BY:	JGS
PROJECT No.:	SE0397	TRACKING CODE:	7914_ANS
SAMPLE No.:	0397-017 DUP		
TEST DATE:	2/13/2012		

MOISTURE CONTENT (Dry Basis)	***RESULTS***	
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)		***g***
3. WT WET SOIL + TARE		***g***
4. WT DRY SOIL + TARE		***g***
5. WT WATER, Ww	0.00	g
6. WT DRY SOIL, Ws	0.00	g
7. MOISTURE CONTENT, W	#DIV/0!	%

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE ANALYSES	***DIAMETER RESULTS***		***LENGTH RESULTS***	
No. 1	***2.02***	***in.***	***3.84***	***in.***
No. 2	***2.01***	***in.***	***3.86***	***in.***
No. 3	***1.99***	***in.***	***3.84***	***in.***
Average	2.01	in.	3.85	in.

SPECIMEN CONDITIONS	***INITIAL***	
Specimen WT, Wo	***341.43***	***g***
Area, Ao	3.16	in^2
Volume, Vo	12.17	in^3
Bulk Unit Weight	106.9	pcf
Dry Unit Weight	#DIV/0!	pcf

ANS 16.1 LEACHABILITY

TESTING DATA

PROJECT:	Longview
PROJECT NO.:	SE0397
SAMPLE NO:	0397-017 DUP
START DATE:	2/13/2012
TRACKING CODE:	7914_ANS

LEACH INTERVAL	TESTED BY	DATE		TIME		VOLUME LEACHATE (ml)	TEMP (°C)	PID (ppm)	Conduct. (mS/cm³)	pH (s.u.)	OBSERVATIONS
		IN	OUT	IN	OUT						
Initial	JGS					1978	20.00	-	0.002	6.99	
1	JGS	02/13/12	02/13/12	10:15	12:15	1978	18.70	-	0.044	8.22	2 hour
2	JGS	02/13/12	02/13/12	12:15	17:15	1978	20.97	-	0.073	9.61	7 hour
3	JGS	02/13/12	02/14/12	17:15	10:15	1978	20.93	-	0.082	9.69	24 hour
4	JGS	02/14/12	02/15/12	10:15	10:15	1978	21.35	-	0.117	9.93	48 hour
5	SEM	02/15/12	02/16/12	10:15	10:15	1978	20.21	-	0.179	10.17	3 day
6	JGS	02/16/12	02/17/12	10:15	10:15	1978	20.86	-	0.067	9.46	4 day
7	SEM	02/17/12	02/18/12	10:15	10:15	1978	20.40	-	0.118	9.78	5 day
8											
9											
10											

APPENDIX G

ANS 16.1 LEACHABILITY ANALYTICAL REPORTS

Provided in Clients Report

Appendix H

Vendor Supplied ISS Material Safety Data Sheets

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Portland Cement (cement)

Product Identifiers: Cement, Portland Cement, Hydraulic Cement, Oil Well Cement, Trinity® White Cement, Antique White Cement, Portland Cement Type I, IA, IE, II, I/II, IIA, II L.A., III, IIIA, IV, IVA, V, VA, 10, 20, 30, 40, 50, GU, MS, MH, HE, LH, HS, OWH, OWG Cement, OW Class G HSR

Manufacturer:
Lafarge North America Inc.
12950 Worldgate Drive, Suite 500
Herndon, VA 20170

Information Telephone Number:
703-480-3600 (9am to 5pm EST)
Emergency Telephone Number:
1-800-451-8346 (3E Hotline)

Product Use: Cement is used as a binder in concrete and mortars that are widely used in construction. Cement is distributed in bags, totes and bulk shipment.

Note: This MSDS covers many types of Portland cement. Individual composition of hazardous constituents will vary between types of Portland cement.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Portland Cement*	100	65997-15-1	15 (T); 5 (R)	10 (R)	NA	NA
Calcium Sulfate*	2-10	13397-24-5	15 (T); 5 (R)	10 (T)	NA	NA
Calcium Carbonate*	0-5	1317-65-3	15 (T); 5 (R)	10 (T)	NA	NA
Calcium Oxide	0-5	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Magnesium Oxide	0-4	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	0-0.2	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Cement is made from materials mined from the earth and is processed using energy provided by fuels. Trace amounts of chemicals may be detected during chemical analysis. For example, cement may contain trace amounts of calcium oxide (also known as free lime or quick lime), free magnesium oxide, potassium and sodium sulfate compounds, chromium compounds, nickel compounds, and other trace compounds.

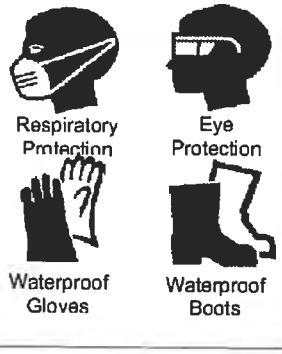
Section 3: HAZARD IDENTIFICATION

WARNING

Corrosive - Causes severe burns.
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.



Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Blended Cement (cement)

Product Identifiers: Pozzolan Cement, Sulfate Resistant Cement, MaxCem®, SF™ Cement, Silica Fume Cement, TerraCem™, Tercem 3000™, Performance Cement, Blended Hydraulic Cement, PozzMod Plus™, Portland Fly Ash Blended Cement, Type IS, S, P, IP, I(PM), I(SM), GUb, HEb, MSb, HSb, MHb, LHb, 10S, 10SM, 10F, 10FM, 50S Cement

Manufacturer:

Lafarge North America Inc.
12950 Worldgate Drive, Suite 500
Herndon, VA 20170

Information Telephone Number:

703-480-3600 (9am to 5pm EST)

Emergency Telephone Number:

1-800-451-8346 (3E Hotline)

Product Use: Cement is used as a binder in concrete and mortars that are widely used in construction. Cement is distributed in bags, totes and bulk shipment.

Note: This MSDS covers many types of Cement. Individual composition of hazardous constituents will vary between types of Cement.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Portland Cement*	5-95	65997-15-1	15 (T); 5 (R)	10 (R)	NA	NA
Calcium Carbonate* (Limestone)	5-50	1317-65-3	15 (T); 5 (R)	10 (T)	NA	NA
Calcium Oxide	0-30	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Calcium Sulfate* (Gypsum)	1-10	13397-24-5	15 (T); 5 (R)	10 (T)	NA	NA
Silica Fume (Amorphous Silica)	0-10	69012-64-2	NA	2 (R)	NA	NA
Magnesium Oxide	0-10	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	0-10	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Cement is made from materials mined from the earth and is processed using energy provided by fuels. Trace amounts of chemicals may be detected during chemical analysis. For example, cement may contain trace amounts of titanium oxide, potassium and sodium sulfate compounds, chromium compounds, nickel compounds, arsenic compounds and other trace compounds.

Section 3: HAZARD IDENTIFICATION

WARNING

Corrosive - Causes severe burns.
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Slag

Product Identifiers: NewCem®, Ground Granulated Blast Furnace Slag (GGBFS), Blast Furnace Slag, Steel Slag, Granulated Slag, Pelletized Slag, Metallic Slag, Air Cooled Slag, Non-metallic Slag, Slag Cement, Hydraulic Slag Cement, Slag

Manufacturer:
Lafarge North America Inc.
12950 Worldgate Drive, Suite 500
Herndon, VA 20170

Information Telephone Number:
703-480-3600 (9am to 5pm EST)
Emergency Telephone Number:
1-800-451-8346 (3E Hotline)

Product Use: Slag is used as a supplementary cementitious material for cement, concrete and concrete products. It is also used in soil stabilization and as filler in asphalt and other products that are widely used in construction.

Note: This MSDS covers many types of slag. Individual composition of hazardous constituents will vary between slag types.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Slag	100	65996-69-2	NA	NA	NA	NA
Calcium Oxide	30-50	1305-78-8	5 (T)	2 (T)	3059 mg/kg	NA
Magnesium Oxide	0-20	1309-48-4	15 (T)	10 (T)	NA	NA
Crystalline Silica	< 1	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA
Particulate Not Otherwise Regulated	-	NA	5 (R) 15 (T)	3 (R) 10 (T)	NA	NA

Note: Exposure limits for components noted with an * contain no asbestos and <1% crystalline silica

Slag is a nonmetallic byproduct from the production of iron. Trace amounts of chemicals may be detected during chemical analysis. For example, slag may contain trace amounts of manganese oxide, titanium oxide, chromium compounds, sulfur compounds, and other trace compounds.

Section 3: HAZARD IDENTIFICATION

WARNING

Irritant: Causes eye, skin and inhalation irritation
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.


Respiratory Protection


Eye Protection


Waterproof Gloves


Waterproof Boots

Material Safety Data Sheet

Section 1: PRODUCT AND COMPANY INFORMATION

Product Name(s): Lafarge Fly Ash and Bottom Ash (Ash)

Product Identifiers: Coal Fly Ash, Class F Fly Ash, Class C Fly Ash, Type CI Fly Ash, Type CH Fly Ash, Type F Fly Ash, Lignite Coal Fly Ash, Subbituminous Coal Fly Ash, Anthracite Coal Fly Ash, Bituminous Coal Fly Ash, Bottom Ash, Ash

Manufacturer:

Lafarge North America Inc.
12950 Worldgate Drive, Suite 500
Herndon, VA 20170

Information Telephone Number:

703-480-3600 (9am to 5pm EST)

Emergency Telephone Number:

1-800-451-8346 (3E Hotline)

Product Use: Fly Ash and Bottom Ash are used as a supplementary cementitious or pozzolanic material for cement, concrete and concrete products. It is also used in soil stabilization and as filler in asphalt and other products that are widely used in construction.

Note: This MSDS covers many types of ash. Individual composition of hazardous constituents will vary between types of ash.

Section 2: COMPOSITION/INFORMATION ON INGREDIENTS

Component	Percent (By Weight)	CAS Number	OSHA PEL -TWA (mg/m^3)	ACGIH TLV-TWA (mg/m^3)	LD_{50} (mouse, intraperitoneal)	LC_{50}
Fly Ash	<100	68131-74-8	NA	NA	NA	NA
Crystalline Silica	0-10	14808-60-7	[(10) / (%SiO_2+2)] (R); [(30) / (%SiO_2+2)] (T)	0.025 (R)	NA	NA
Particulate Not Otherwise Regulated	-	NA	5 (R) 15 (T)	3 (R) 10 (T)	NA	NA

Note: Fly ash and bottom ash are byproducts from the combustion of coal. Trace amounts of chemicals may be detected during chemical analysis. For example the chemicals identified can include carbon and complex silicates or oxides of aluminum (Al), calcium (Ca), magnesium (Mg), sodium (Na), sulfur (S), potassium (K), titanium (Ti), iron (Fe) and phosphorus (P). Chemical identity: $M_xO_y \bullet SiO_2$ (M = Al, Ca, Mg and other minor metal, with bound silica (SiO_2)).

Chemical analysis of fly ash and bottom ash also indicate the presence of trace amounts of metals, such as: Arsenic (As), Barium (Ba), Beryllium (Be), Cobalt (Co), Lead (Pb), and Manganese (Mn).

Section 3: HAZARD IDENTIFICATION

WARNING

Irritant: Causes eye, skin and inhalation irritation
Toxic - Harmful by inhalation.
(Contains crystalline silica)

Use proper engineering controls, work practices, and personal protective equipment to prevent exposure to wet or dry product.

Read MSDS for details.

CETCO® SOLIDIFICATION/STABILIZATION PRODUCTS

Additive Product Reference Chart

	Organoclay® PM-199	Organoclay® SS-199	Quik-Solid®	Quik-Solid® 50	Sorbond® UG	Sorbond® UP
Product Use	Organic Adsorption Media	Organic Adsorption Media	Water Super Absorbent	Water and Organic Sorptive Media	S/S Agent	S/S Agent
Composition	Granular - Modified Bentonite Clay	Powder - Organoclay	Granular -Cross-linked Polyacrylate	Granular - Cross-linked Polyacrylate and Organoclay	Granular - Sodium Bentonite	Powder - Sodium Bentonite
Bulk Density	44-56 lbs/ft³	45-60 lb/ft³	30-37 lbs/ft³	30-37 lbs/ft³	65 lbs/ft³	54 lbs/ft³
Characteristics	Adsorb:Oils, greases, NAPL, low soluble organics	Adsorb:Oils, greases, NAPL, low soluble organics	Absorb: Water w/ little increase in volume	Absorb: Water, oils, greases, NAPL, low soluble organics	Absorb aqueous matter; low hydraulic conductivity	Absorb aqueous matter; low hydraulic conductivity
Typical Property	Oil ~ 0.5 lb/lb media	Oil ~ 0.5 lb/lb media	Water ~300-350 x weight	Water ~75 x weight Oil ~ 0.35 lb/lb media	Aqueous - 9 x weight $k = 5 \times 10^{-9}$ cm/s	Aqueous - 9 x weight $k = 5 \times 10^{-9}$ cm/s
Pass Paint Filter			✓	✓	✓	✓
Reduce Organic Leaching	✓	✓		✓		
Reduce Permeability	✓	✓			✓	✓
Increase Comprehensive Strength	✓	✓				
Comments	Pretreat to cement S/S when NAPL/high PAH concentrations are present. Use 2-step process allowing organoclay to adsorb organics for a minimum of six hours before adding cement.		Helps to pass Paint Filter Test without significant change in volume	Helps to pass Paint Filter Test when organics are also present.	Help to pass Paint Filter Test or as admix to cement S/S; can help decrease hydraulic conductivity.	

Pre-Blended Product Reference Chart

	Sorbond® LPC II	Sorbond® LOC 20
Product Use	S/S Agent	S/S Agent
Composition	Powder - Proprietary Pozzolanic Formulation	Powder - Proprietary Organoclay + Pozzolanic Formulation
Bulk Density	74 lbs/ft³	58 lbs/ft³
Characteristics	Low hydraulic conductivity; high compressive strength	Adsorb NAPL and organics; low hydraulic conductivity; high compressive strength
Typical Property	$k \leq 10^{-6}$ cm/s; UCS ≥ 50 psi	$k \leq 10^{-6}$ cm/s; UCS ≥ 50 psi
Pass Paint Filter	✓	✓
Reduce Organic Leaching		✓
Reduce Permeability	✓	✓
Increase Comprehensive Strength	✓	
Comments	Pozzolanic reaction	Premix product for pozzolanic reaction when organics are present

REMEDIATION TECHNOLOGIES
800.527.9948 cetco.com/RTG
*Samples available upon request

CETCO®

GRAYMONT

Lime and Limestone products
GRAYMONT Western US INC. 3950 South 700 East, Suite 301, Salt Lake City, UT 84107 (801) 262-3942 Fax: (801) 264-8039

TYPICAL ANALYSIS SHEET

PRODUCT : **HIGH CALCIUM HYDRATED LIME**

PRODUCTION FACILITY : Tacoma Plant – Tacoma, Washington

PRODUCT DESCRIPTION :

A fine white powder made by reacting quicklime with sufficient water to convert the calcium oxide (CaO) to calcium hydroxide ($Ca(OH)_2$).

COMPOSITION AND TYPICAL CHEMICAL PROPERTIES : (ASTM C 25, C 1271, C 1301)

Available lime index as calcium hydroxide ($Ca(OH)_2$), (%)	95.5
Total calcium as calcium oxide (CaO), (%)	73.5
Available lime index as calcium oxide (CaO), (%)	72.3
Magnesium oxide (MgO), (%)	0.8
Silica (SiO_2), (%)	0.9
Ferric oxide (Fe_2O_3), (%)	0.1
Alumina (Al_2O_3), (%)	0.1
Total sulfur (S), (%)	0.01
Loss on ignition, (%)	24.4
Carbonates, ($CaCO_3$), (%)	2.5
Moisture (H_20), (%)	0.4
Neutralizing value ($CaCO_3$ = 100), (%)	132

TYPICAL PHYSICAL PROPERTIES :

Bulk Density (ASTM C 110),	(kg/m^3)	430 – 670
	(lbs/ft^3)	27 – 42

CLASSICAL REFERENCE DATA : (CRC Handbook of Chemistry and Physics)

Specific Gravity	2.24
Solubility in Water (0 °C), (g/l)	1.85
pH (saturated solution) (25 °C)	12.454

SIZE DISTRIBUTION :

SIEVE (mm.)	SIEVE (U.S.A.)	% PASSING
0.600	N° 30	97 – 100
0.150	N° 100	90 – 100
0.075	N° 200	75 – 100
0.045	N° 325	70 – 95

NOTICE :

* The test data herein is based on average results on production samples. Product shipments are subject to normal variation. Accordingly, test data can not be taken as establishing maximum or minimum specifications.

CLASSIFIED UL WATER QUALITY

ANSI / NSF 60
DRINKING WATER TREATMENT ADDITIVES
< 8 N 63 >
MAXIMUM USE LEVEL: 650 mg/l.

GRAYMONT

Lime and Limestone products
GRAYMONT Western US INC. 3950 South 700 East, Suite 301, Salt Lake City, UT 84107 (801) 262-3942 Fax: (801) 264-8039

TYPICAL ANALYSIS SHEET

PRODUCT : **HIGH CALCIUM LIME KILN DUST**

Nominal size: 0 – 1.25 mm

PRODUCTION FACILITY : Tacoma Plant – Tacoma, Washington

PRODUCT DESCRIPTION :

Co-product from the calcination of high-purity limestone. It is composed essentially of calcium carbonate ($CaCO_3$), calcium oxide (CaO) and silica (SiO_2).

COMPOSITION AND TYPICAL CHEMICAL PROPERTIES :

Calcium Carbonate ($CaCO_3$), (%)	32.9
Total Calcium as Calcium Oxide (CaO), (%)	69.7
Total Calcium as Calcium (Ca), (%)	49.8
Available Lime Index as Calcium Oxide (CaO), (%)	44.5
Total Magnesium as Magnesium Oxide (MgO), (%)	0.6
Total Magnesium (Mg), (%)	0.4
Silica (SiO_2), (%)	8.8
Ferric Oxide (Fe_2O_3), (%)	0.8
Alumina (Al_2O_3), (%)	2.4
Total Sulphur (S), (%)	0.5
Total Carbon (C), (%)	4.0
Loss on Ignition, (%)	15.3
Neutralizing Value ($CaCO_3$ = 100), (%)	119.4

TYPICAL PHYSICAL PROPERTIES :

Nominal size (mm)		**0 – 1.25**
Bulk Density (ASTM C 110),	(kg/m^3)	1000 – 1400
	(lbs/ft^3)	62 – 87

CLASSICAL REFERENCE DATA : (CRC Handbook of Chemistry and Physics, Lime and Limestone by J.A.H. Oates)

Specific Gravity	2.7 – 3.4
Solubility in Water (10 °C), (g/l)	1.31
pH (saturated solution) (25 °C)	12.454

SIZE DISTRIBUTION :

SIEVE (mm.)	SIEVE (U.S.A.)	% PASSING
2.00	No. 10	100
1.25	No. 16	100
0.600	No. 30	99 – 100
0.150	No. 100	75 – 100
0.075	No. 200	60 – 100
0.045	No. 325	40 – 90

NOTICE :

* The test data herein is based on average results on production samples. Product shipments are subject to normal variation. Accordingly, test data can not be taken as establishing maximum or minimum specifications.

GRAYMONT

Lime and Limestone products
GRAYMONT Western US INC. 3950 South 700 East, Suite 301, Salt Lake City, UT 84107 (801) 262-3942 Fax: (801) 264-8039

TYPICAL ANALYSIS SHEET

PRODUCT : **HIGH CALCIUM QUICKLIME**

Nominal sizes: 0 – 0.150, 0 – 5, 0 – 10 & 5 – 20 mm

PRODUCTION FACILITY : Tacoma Plant – Tacoma, Washington

PRODUCT DESCRIPTION :

A white porous solid obtained by the calcination of high-purity limestone ($CaCO_3$) and composed essentially of calcium oxide (CaO).

COMPOSITION AND TYPICAL CHEMICAL PROPERTIES : (ASTM C 25, C 1271, C 1301)

Total calcium as calcium oxide (CaO), (%)	95.2
Available lime index as calcium oxide (CaO), (%)	94.2
Magnesium oxide (MgO), (%)	0.6
Silica (SiO_2), (%)	1.4
Ferric oxide (Fe_2O_3), (%)	0.2
Alumina (Al_2O_3), (%)	0.2
Total sulfur (S), (%)	0.02
Loss on ignition, (%)	1.9
Carbonates, ($CaCO_3$), (%)	3.4

TYPICAL PHYSICAL PROPERTIES :	Pulverized	Fines	Crushed	Pebble
Bulk Density (ASTM C 110), (kg/m^3)	910 – 1010	1135 – 1235	945 – 1040	945 – 1040
(lbs/ft^3)	57 – 63	71 – 77	59 – 65	59 – 65
Slaking Rate (ASTM C 110, AWWA B202) :				
1. Temperature Rise in 30 seconds, (°C).		48		
2. Temperature Rise in 3 minutes, (°C).		54		
3. Total Temperature Rise, (°C).		55		
4. Total Active Slaking Time, (minutes)		3		

CLASSICAL REFERENCE DATA : (CRC Handbook of Chemistry and Physics)

Specific Gravity	3.25 – 3.38
Solubility in Water (10 °C), (g/l)	1.31
pH (saturated solution) (25 °C)	12.454

SIZE DISTRIBUTION :	0 – 0.150 mm	0 – 5 mm	0 – 10 mm	5 – 20 mm
SIEVE (mm.) / SIEVE (U.S.A.)	% PASSING			
25 / 1"				100
20 / 3/4"			100	85 – 100
10 / 3/8"		100	60 – 90	
5 / No. 4		95 – 100		0 – 10
2.5 / No. 8		65 – 90		
0.630 / No. 30	100			
0.080 / No. 200	70 – 100			

NOTICE :

* The test data herein is based on average results on production samples. Product shipments are subject to normal variation. Accordingly, test data can not be taken as establishing maximum or minimum specifications.

CLASSIFIED UL EPH

ANSI / NSF 60
DRINKING WATER TREATMENT ADDITIVES
< 8 N 63 >
MAXIMUM USE LEVEL : 500 mg/l

FORMOSA PLASTICS CORPORATION

4F,201, TUNG HWA NORTH ROAD, TAIPEI, TAIWAN
SALES DEPARTMENT, PLASTICS DIVISION
TEL:886-2-2712-2211 FAX:886-2-2713-7012

99% CAUSTIC SODA MICRO-PEARL SPECIFICATION

ITEM	UNIT	LIMITATION
Appearance	-	White granular
Sodium Hydroxide (NaOH)	%	Min 99.0 %
Sodium Carbonate (Na2CO3)	%	Max 0.7 %
Sodium Chloride (NaCL)	ppm	Max 300 ppm
Sodium Sulfate (Na2SO4)	ppm	Max 60 ppm
Iron (Fe)	ppm	Max 20 ppm
Nickel (Ni)	ppm	Max 10 ppm
Lead (Pb)	ppm	Max 5 ppm
Calcium (Ca)	ppm	Max 5 ppm
Magnesium (Mg)	ppm	Max 5 ppm
Arsenic (As)	ppm	Max 0.4 ppm
Mercury (Hg)	ppm	Max 0.05 ppm
Size(dia.)	mm	0.25~1.3 ; 0.50~1.10 (70%)

Appendix I

ISTR Treatability Study Laboratory Report – Global Remediation Solutions

GLOBAL REMEDIATION SOLUTIONS, LLC.
A DIVISION OF PNE CORP.
1081 Columbia Blvd., Longview, WA 98632
(360) 423-2245 / Fax (360) 423-2272 / Toll Free 1-800-533-2867
www.pnecorp.com

May 6, 2013 Confidential and Proprietary

Mr. Paul Kalina
URS Corporation
1301 4th Avenue, Suite 1400
Seattle, WA 98101

RE: ISTR Bench Scale Study - Creosote Site in Washington State (Version 2.1)

Dear Paul:

Global Remediation Solutions (GRS) performed a bench scale study on materials from a former wood preservative site in Washington State. Site soil and groundwater are known to be impacted by diesel range organics (DROs) and the polycyclic aromatic hydrocarbons (PAHs) associated with creosote coal-tar. Dense non-aqueous phase liquids (DNAPLs) have been recovered from the subsurface.

The purpose of the study was to evaluate the use of *in situ* thermal remediation (ISTR) to treat site soil and, by reducing contaminant mass in the known source areas, lower impact to site groundwater.

Executive Summary

Tests were conducted to examine the physical characteristics of site materials at boiling temperatures and to measured the reductions in contaminant concentrations achievable by dry heating or steaming site soil over 5, 15 and 25-day periods. The following are key results from the study. The present concentration reductions referenced are averages from dry heating of impacted soil.

- Site DNAPL transitioned to a light non-aqueous phase liquid (LNAPL) upon heating and remained a LNAPL upon cooling. These results indicate that NAPL can be removed from the site subsurface using heat-enhanced multi-phase extraction (MPE).
- Vapors and condensate extracted at temperature did not crystalize or solidify upon cooling, and an ISTR system design for the site will not have to include provisions for these phenomena.
- Average Diesel concentrations decreased by 82% after 25-days of dry heating.
- Average Lube oil concentrations only dropped 27% with 25-days of dry heating.
- Average PAH levels were lowered by 55% in 5-days of dry heating and by 60% after 25-days.
- The average Total Toxicity Equivalent Concentration (TTEC) of PAHs was reduced by 22% after 15-days of dry heating and 23% after 15-days of steaming.
- Average benzo(a)pyrene levels fell by 9% in 5-days of dry heating and by 22% after 25-days.
- The average TTEC of benzo(a)pyrene was reduced by 38% after 15-days of dry heating and by 32% after 15-days of steaming.
- Average Naphthalene levels were reduced by 86% in 5-days of dry heating.

These key results indicate that ISTR coupled with subsurface hydration and multi-phase extraction (MPE) systems is a viable option to meet the proposed cleanup standards for vadose zone soil at the site.

Site Background

The *in situ* remediation of creosote is challenging. Free phase creosote is a viscous liquid that tends to sink and pool below the groundwater table. The chemicals comprising creosote are only moderately soluble and have high vapor pressures, making them difficult to remove from the environment. The more soluble components of creosote often produce downgradient groundwater plumes which significantly enlarge the volume of impacted subsurface. ISTR can remove NAPL, and the more soluble components of creosote coal-tar from the subsurface soil matrix, and these efforts have been shown to significantly reduce groundwater impact at wood preservative sites.

The former wood treatment facility is impacted with PAHs from creosote coal-tar, heavy and diesel range petroleum organics, and naphthalene. Subsurface concentrations of the contaminants of concern (COCs) are summarized in Table 1, which also includes current site-specific target cleanup levels.

Table 1. Soil and Groundwater Contaminant Concentrations

Analyte	Impacted Media	Maximum Concentration	Mean Concentration	Expected Cleanup Target [1]
DRO	Soil	26,000 mg/kg	2,638 mg/kg	2,000 mg/kg
Naphthalene	Soil	4,500 mg/kg	446 mg/kg	9,700 µg/kg
PAHs	Soil	19,840 µg/kg	3,561 µg/kg	2,300 µg/kg [2]
DRO	Groundwater	5,000 µg/L	2,183 µg/L	500 µg/L
Naphthalene	Groundwater	17 µg/L	6 µg/L	350 µg/L
PAH[1]	Groundwater	0.2 µg/L	0.1 µg/L	0.12 µg/L

1. Based upon Washington State Department of Ecology (WDOE) requirements to be protective of groundwater.
2. Total Toxicity Equivalent Concentration (TTEC).

Site soil is described as fine to medium grained sand with traces of silt. The vadose zone (Upper Sand) extends to approximately 10 to15-feet below grade (bg) where the Upper Silt lens is encountered. The Upper Silts act as a 3 to 5-foot thick confining layer for the underlying Lower Sand Aquifer. Groundwater impact in the Lower Sand Aquifer extends to 34-feet bg. It is estimated that approximately 9,000 cubic yards (yd^3) of vadose zone and 77,700 yd^3 of saturated zone have been impacted.

The presence of NAPL has been reported only in isolated parts of the vadose zone, which is also known to contain areas of perched groundwater. Historically, NAPL has been seen at thicknesses ranging from sheen to 8-inches in monitoring wells screened in the Upper Sands.

ISTR Test Matrix

The goals of the bench study were to answer basic questions concerning how the subsurface and the COCs will react to *in situ* heating and to provide site-specific insight into the following issues:

- The use of heat-enhanced MPE and bubble floatation as contaminant removal mechanisms.
- The effectiveness of *in situ* heating in reducing contaminant concentrations.
- The physical characteristics that recovered contaminants will display as they are cooled during the removal and treatment process.

The test matrix shown in Table 2 was developed to accomplish the study goals. Test questions 1-4 were developed prior to starting the study, while test questions 5 and 6 were added during the study.

Table 2. ISTR Study - Test Matrix

Test Question	Test Method	Test Goal
1. Will DRO and PAHs transition off the soil matrix during heating?	Heating and visual observations.	Evaluate the effectiveness of bubble flotation and MPE.
2. If so, will a LNAPL or a DNAPL be produced?	Heating and visual observations.	Evaluate design options for contaminate extraction.
3. How much DRO and PAH can be boiled off the soil matrix?	Chemical analysis before and after heating.	Evaluate the effectiveness of steam stripping during ISTR.
4. Will recovered liquids and vapors solidify upon cooling?	Heating, extraction, and visual observations.	Evaluate options for system materials and construction.
5. Is site NAPL primarily lighter or denser than water?	Heating and visual observations.	Evaluate the effectiveness of MPE and bubble flotation.
6. Does the density of site NAPL change upon heating?	Heating and visual observations.	Evaluate the effectiveness of MPE and bubble flotation.

Test Materials

Test materials were produced from site soil, groundwater and NAPL collected during previous site investigation and sampling efforts. Soil used in the study was obtained from two 55-gallon DOT drums containing materials removed from shallow on-site trenches, while groundwater and NAPL represent materials collected over several groundwater sampling events.

To prepare soil for testing, the contents of the drums were emptied into large mixing containers and separated into three categories; soil showing no obvious signs of contaminant impact; soil showing signs of impact; and soil showing signs of impact approaching NAPL concentrations. The separation process relied upon visual examination and volatile organic carbon (VOC) readings obtained using a photo ionization detector (PID).

Examination of site soil revealed it to be predominantly fine to medium grain sand with very small traces of silt. The few small rocks and pieces of wood found were removed. Also, any pea-sized “tar balls” discovered were broken up by hand. No free NAPL was found in the soil samples. However, more impacted soil had noticeably higher moisture content and an obvious surface sheen. It was very easy to separate highly impacted soil from less impacted soil.

Non-impacted soil was re-drummed for proper disposal. Approximately 600 pounds of “Impacted” soil and 75 pounds of “Highly Impacted” soil were each thoroughly homogenized for use in the study. Homogenized materials were sampled for laboratory analysis of baseline conditions and then placed into separate sealed containers. Laboratory analysis consisted of the tests shown in Table 3. All analysis conducted during the study were performed by an independent laboratory.

Table 3. Soil Analytical Parameters and Methods

Analytical Parameter	Analytical Method
Heavy Petroleum Hydrocarbons (DRO)	Method NWTPH-Dx
Polycyclic Aromatic Hydrocarbons (PAHs)	Method EPA 8270M-SIM
Percent Dry Weight (Solids)	ASTM D2216-80

A mixture of approximately 2-gallons of site groundwater and 100 milliliters (ml) of NAPL was also obtained from the site. These materials were separated from each other and stored in sealed containers.

Test Methods - Overview

During ISTR, the removal of organic contaminant mass is accomplished by physical, chemical, and biological mechanisms. Heating can enhance efforts to physically recover NAPL by pumping or MPE. It also removes contaminants through vaporization, boiling, steam distillation, hydrolysis, oxidation, and pyrolysis. Pyrolysis is the thermochemical decomposition of compounds in the absence of oxygen. During site heat-up and cool-down, organic contaminants are often degraded by biological pathways.

To perform the studies, two separate test apparatus were deployed. One consisted of a 500-ml boiling flask with a water-cooled condenser. The second, of cells packed with test soil which could be heated to the boiling point of water. The boiling flask and condenser were used to visually observe the results of heating on the physical properties of site NAPL. The cells were used to study the overall effects of vaporization, boiling, steam distillation, hydrolysis, oxidation, pyrolysis, and biological reactions on impacted site soil without attempting to distinguish the contributions of each removal mechanism on the reduction of COC concentrations.

Test Methods – Boiling Flask Studies

The effects of heating upon site NAPL (Test Questions 1-2 and 4-6) were studied using a 500-ml boiling flask, a hot water bath, and a laboratory hot plate. One part of the study looked at the effects of heating on NAPL viscosity and density, while a second part examined if the vapors recovered from heating NAPL, and Highly Impacted Soil, would solidify or crystalize upon cooling. To observe the physical characterizes of recovered vapors upon cooling, a water-cooled condenser and vacuum source were attached to the boiling flask during an Impacted Soil heat-up and cool-down cycle.

In the first part of the study, the boiling flask was half filled with tap water and then placed in the hot water bath. Next, approximately 50-ml of NAPL was added to the flask and the water bath was brought to a boil. A type T thermocouple was used to monitor water temperature in the boiling flask and the physical characteristics of the NAPL were observed as temperature increased.

In the second half of the study, a layer of clear glass beads was placed in the bottom of the boiling flask and then it was half filled with Highly Impacted Soil. Tap water was added until the soil was saturated and about 1-inch of water was present above the soil line. The water-cooled condenser was attached to the boiling flask and a slight vacuum was applied to the top of the condenser. A Type T thermocouple was used to monitor temperature in the center of the soil layer. Again the hot water bath was brought to boiling and the physical characteristics of the system, including the condensate produced by heating, were observed as the temperature inside the flask was increased.

Test Results – Boiling Flask Studies

The groundwater/NAPL sample obtained from the site contained approximately 2-gallons of groundwater and 100-ml of NAPL in a 5-gallon plastic bucket. Upon opening the bucket, a slight sheen was observed on the groundwater and a black gooey NAPL was found at the bottom of the container. The groundwater was amber in color and the sheen on it was a darker shade of the same color.

In the first study, when site NAPL was added to ambient temperature tap water in the boiling flask, it immediately sank to the bottom of the flask. Within 10-minutes at ambient temperature, the water in the flask began to turn very slightly amber in color and an amber sheen started to develop on the water surface. However, all of the black NAPL remained at the bottom of the flask.

As the boiling flask was heated, the black DNAPL transitioned from a gooey and sticky consistency to a Jell-O like consistency at about 140 °F (60 °C). It was clear that the viscosity of the NAPL was rapidly decreasing. At approximately 190 °F (88 °C), bubble floatation was observed carrying small pieces of DNAPL from the bottom of the flask to the water surface, where they remained as floating solids.

At a temperature just under the boiling point of water, 212 °F (100 °C), all of the DNAPL in the bottom of the flask transitioned to the surface of the water. Until the water in the flask reached boiling, a small amount of this black NAPL transitioned back and forth between the surface of the water and the bottom of the flask. However, once boiling in the flask had been reached, all the NAPL remained on the water surface as a black colored LNAPL.

As the system was allowed to cool back to ambient temperature, the majority of the NAPL remained on the water surface as a black colored LNAPL rather than return to the flask bottom as a DNAPL or float between the water surface and cell bottom as neutral buoyancy NAPL.

In the second study, Highly Impacted Soil was added to the boiling flask on top of a layer of clear glass beads and submerged under tap water. At ambient temperature, a slightly amber discoloring of the water occurred, but no sheen was observed. Upon heating, the water became increasingly amber in color and an amber sheen began to develop on the water surface. At a temperature just under the boiling point of water, a thin (approximately 0.25-inch) layer of amber colored NAPL was observed on the water surface. There were no signs of NAPL migrating downward into the bed of glass beads.

During the second study, a water-cooled condenser was attached to the boiling flask and a vacuum was applied to the condenser. Condensate observed in the condenser was consistently clear and did not leave behind any crystals or other residue upon cooling. Additionally, as the entire system was allowed to cool to ambient temperature, the LNAPL layer on the surface of the water in the flask remained unchanged.

Test Methods – Soil Cell Studies

Soil cell studies were used to determine how much DRO and PAH can be removed from the soil matrix by heating (Test Question No. 3). During the study, twelve (12) cells were used to perform the three types of heating tests summarized in Table 4. Test cells were constructed of heat tolerant materials to allow air or water to be introduced at the bottom of the cell, a vacuum to be applied to the top of the cell, and a thermocouple to be inserted into the center of the cell. A schematic of a typical ISTR Test Cell is shown as Figure 1. Cells were heated using hot-oil baths.

Table 4. Summary of Cell Studies

Cell No.	Test Material	Heating Method	Days of Heating
C6	Impacted Soil	Dry Heating	5
C7	Impacted Soil	Dry Heating	5
C12	Impacted Soil	Dry Heating	5
C1	Impacted Soil	Dry Heating	15
C2	Impacted Soil	Dry Heating	15
C3	Impacted Soil	Dry Heating	25
C4	Impacted Soil	Dry Heating	25
C8	Highly Impacted Soil	Dry Heating	5
C9	Highly Impacted Soil	Dry Heating	5
C5	Highly Impacted Soil	Dry Heating	15
C10	Highly Impacted Soil	Steaming	5
C11	Highly Impacted Soil	Steaming	15

The body of each test cell measured 6-inches (15.2 cm) in length and 3-inches (7.6 cm) in diameter. Slightly concave caps were screwed to both ends of the cells. The concave bottom cap was filled with a layer of clear glass beads and a metal screen separated these beads from the soil filling the cell. The concave portion of the upper cap was not filled with beads or soil. This produced a soil-filled cell volume of approximately 42.4 cubic inches (695 cubic centimeters).

Approximately 1,100-grams of soil were placed into cells filled with Impacted Soil, while about 1,200 grams were placed into the cells filled with Highly Impacted Soil. The Impacted Soil had a starting moisture content of 12.6% on a dry weight basis, while the Highly Impacted Soil had a starting moisture content of 15.2%. This produced average dry weight bulk densities of 1.2 and 1.5 grams/cubic centimeter (g/cc) for the Impacted Soil and Highly Impacted Soil cells, respectively. During the cell filling process, a type T thermocouple was placed in the center of each cell.

Once filled with test materials, each cell was submerged to the bottom of the upper threaded cap in a vegetable-oil bath which had been heated to approximately 104 °C (220 °F). On all test cells, the outlet tube (Tube C on Figure 1) was connected to a vacuum source and subjected to a vacuum of approximately 5-inches of water column (0.4-inches of mercury). On the dry heating cells, the inlet tube (Tube A on Figure 1) was left open to the atmosphere. On the steaming cells, water was introduced to the cell bottom using the inlet tube. On all cells, the thermocouple tube (Tube B on Figure 1) was open to the atmosphere.

The inlet tubes on the steaming cells were connected to hanging water column systems that delivered tap water to the bottom of the cell. The pressure heads applied by the water columns were adjusted so that equilibrium was reached when the water levels in the cells were approximately one-half inch below the bottom of the upper threaded cap. In this manner, moisture content was maintained in the test cell without allowing water to flow through the cell. Moisture could only leave the cells as steam exiting the outlet or thermocouple tubes in the cell cap. The vacuum applied to the outlet tubes prevented steam from traveling up the thermocouple tubes. As steam left the cell top, it was replaced by ambient temperature tap water entering the cell bottom.

By filling from the bottom, it is easier to ensure that each steaming cell was fully and evenly saturated. The outlet tubes on these cells were connected to flasks that collected the steam condensate generated during heating. The volume of condensate was measured and compared to the loss of volume in the hanging water column system. In all cases, there was a match between the volume of water entering the cells and the volume of condensate removed from the cells. Condensate was visually inspected for signs of contaminant impact and sampled for laboratory analysis.

Once a cell had been in a hot-oil bath for the predetermined number of day, it was removed for sampling. Cells were taken from the oil baths and placed into a refrigerator where they were allowed to cool to ambient temperature before being opened. The thermocouples in the cells were used to determine that ambient temperature had been reached. Once a cell had been opened, the soil inside was removed, homogenized, and sampled for laboratory analysis of the parameters in Table 3.

Additionally, a sample of untreated Highly Impacted Soil and subsamples from the two 5-day dry heating studies run with that soil were subjected to the Synthetic Precipitate Leaching Process (SPLP). The SPLP is an EPA SW-846 analytical method (Method 1312) that can be used to quickly and inexpensively help determine the concentration of contaminant that will leach from impacted soil. Results from SPLP testing may be used in developing remediation criteria that will be protective of ground water at a specific site.

Test Results – Soil Cells and Dry Heating

Temperatures in the two hot-oil baths used to perform the soil cell studies were measured continuously using type T thermocouples and found to be stable over 24-hours to within plus or minus 2 °C of test set points. The low set point used was 104 °C (120 °F), while the high set point was 112 °C (235 °F).

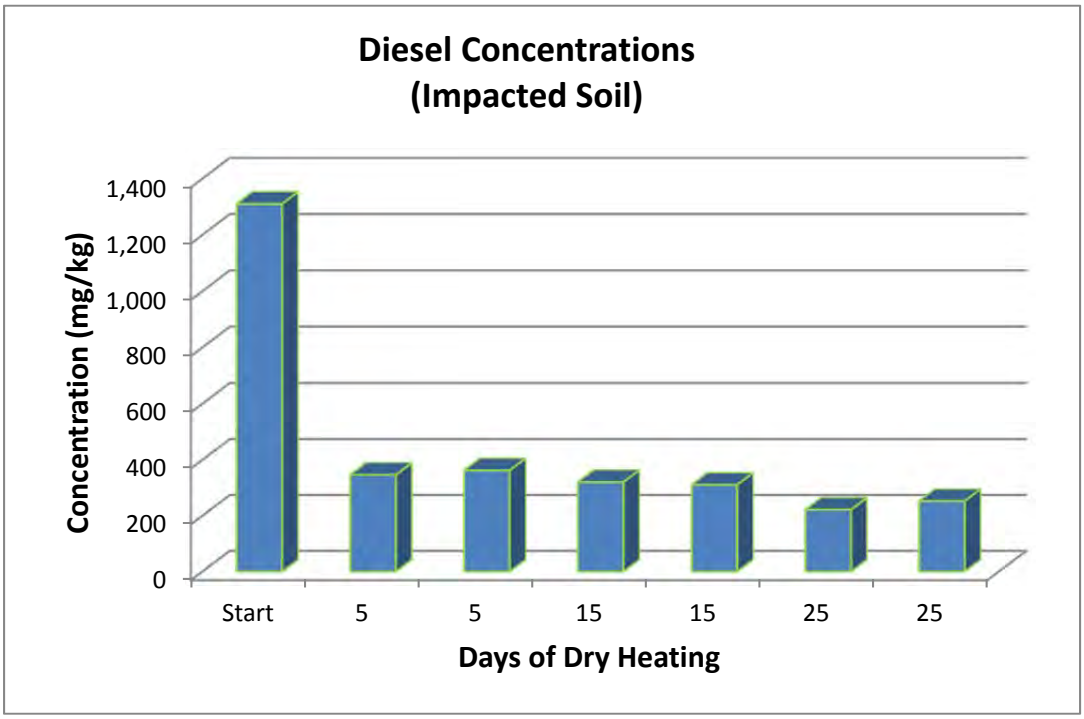
Baseline concentrations of DRO and PAHs in the homogenized Impacted Soil and the results of dry heating that material for 5, 15 and 25-days are presented in Appendix A, Table A-1. Initial baseline sampling and 5-day tests were performed in triplicate, while 15 and 25-day tests were run in duplicate. Average concentrations of diesel, benzo(a)pyrene, naphthalene, and total PAHs after heating are shown in Table 5, and the concentrations of diesel and total PAHs are presented on Graphs 1 and 2, respectively.

Cell C6 results were not used in this report because many post-heating PAH concentrations in that cell were higher than pre-heating baseline concentrations. This was attributed to the presence of a tar ball in Cell C6, which made it non-representative of baseline conditions. A new 5-day dry heating cell (Cell C12) was prepared from baseline soil and testing re-run.

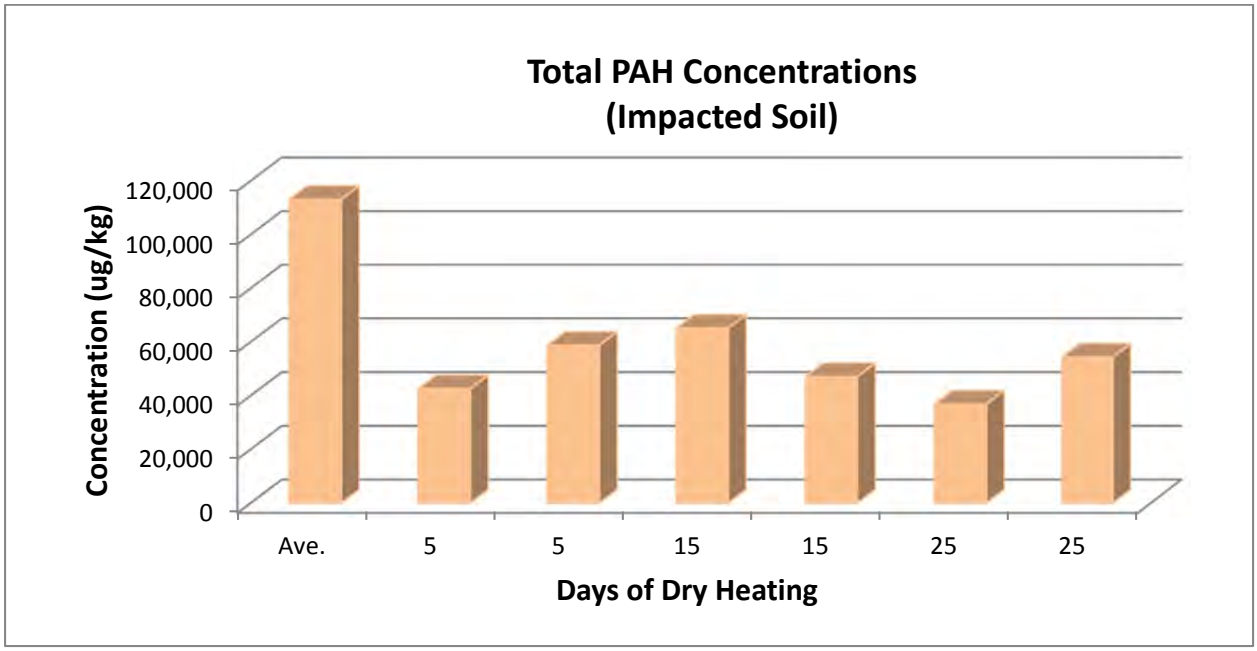
Table 5. Results of Dry Heating Impacted Soil

Analyte [1]	Baseline (Ave) [2]	5-Days [3]	15-Days [4]	25-Days [5]
Diesel	1,310 mg/kg	338 mg/kg	317 mg/kg	237 µg/kg
Lube Oil	1,180 mg/kg	845 mg/kg	908 mg/kg	857 mg/kg
Benzo(a)pyrene	4,423µg/kg	4,025 µg/kg	2,620 µg/kg	3,460 µg/kg
Naphthalene	2,810 µg/kg	383 µg/kg	246 µg/kg	375 µg/kg
Total PAHs	113,036 µg/kg	50,578 µg/kg	56,032 µg/kg	45,535 µg/kg

1. Analytical Methods: Diesel = NWTPH-Dx; PAHs = SW8270D.
2. Average results from baseline soil samples: BL1, BL2, and BL3.
3. Average results from Cells C7 and C12.
4. Average results from Cells C1 and C2.
5. Average results from Cells C3 and C4.



Graph 1. Diesel Concentrations with Dry Heating



Graph 2. Total PAH Concentrations with Dry Heating

Analytical results from dry heating Impacted Soil for the three time intervals are presented in Table A-3 of Appendix A. TTEC calculations are shown in Table A-4, while percentage reductions in all COCs are shown in Tables A-6 and A-7. Average percent reductions in diesel, lube oil, benzo(a)pyrene, naphthalene, and total PAH concentrations are presented in Table 6 for each dry-heating interval.

Table 6. Average Percent Concentration Reductions: Dry Heating of Impacted Soil

Analyte	5-Days [1]	15-Days [2]	25-Days [3]
Diesel	74.2%	75.8%	81.9%
Lube Oil	28.4%	23.1%	27.4%
Benzo(a)pyrene	9.0%	40.8%	21.8%
Naphthalene	86.4%	91.2%	86.7%
Total PAHs	55.3%	50.4%	59.7%

1. Average results from Cells C7 and C12.
2. Average results from Cells C1 and C2.
3. Average results from Cells C3 and C4.

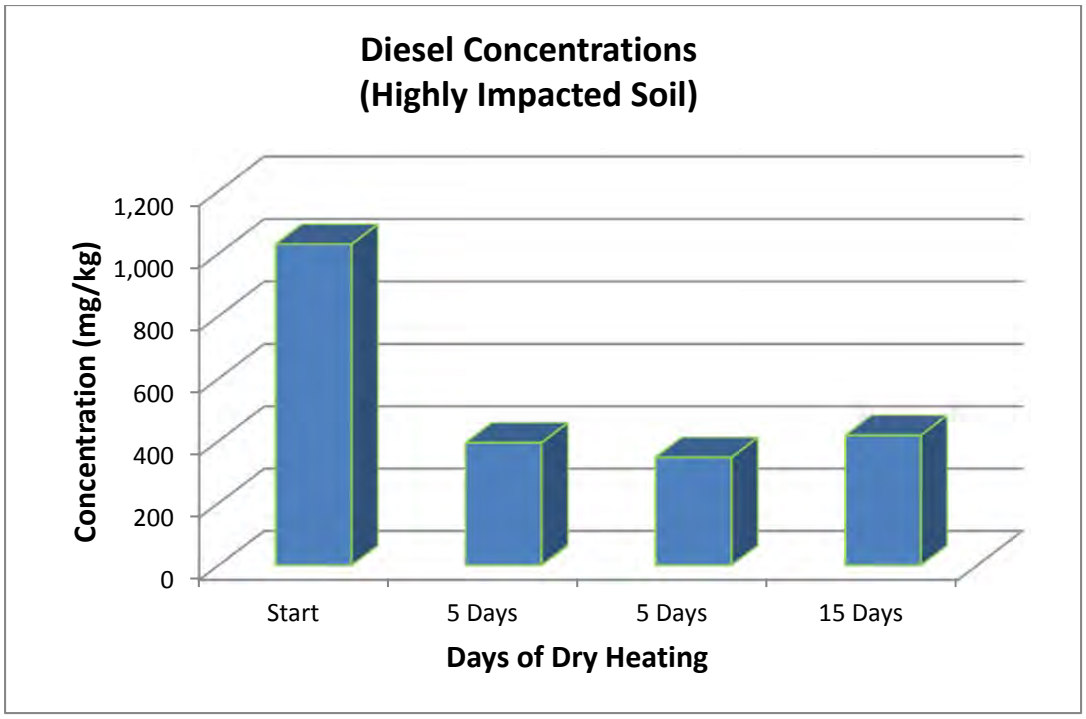
Baseline concentrations of DROs and PAHs in the homogenized Highly Impacted Soil, the concentrations of these COCs after dry heating for 5 and 15-days, and the percent COC reductions achieved with heating are shown in Tables B-1 and B-2 of Appendix B. The calculated TTECs achieved at each heating interval are contained in Table B-3, while the results of SPLP testing are shown in Table B-4.

Baseline concentrations and percent reductions in concentrations of diesel, lube oil, benzo(a)pyrene, naphthalene, and total PAHs obtained by dry heating Highly Impacted Soil for 5 and 15-days are presented in Table 7, while Graphs 3 and 4 display diesel and total PAH concentrations as a function of heating time. Baseline concentrations and 15-day heating results represent the analysis of single samples, while 5-day heating results represent the averages obtained from duplicate test cells.

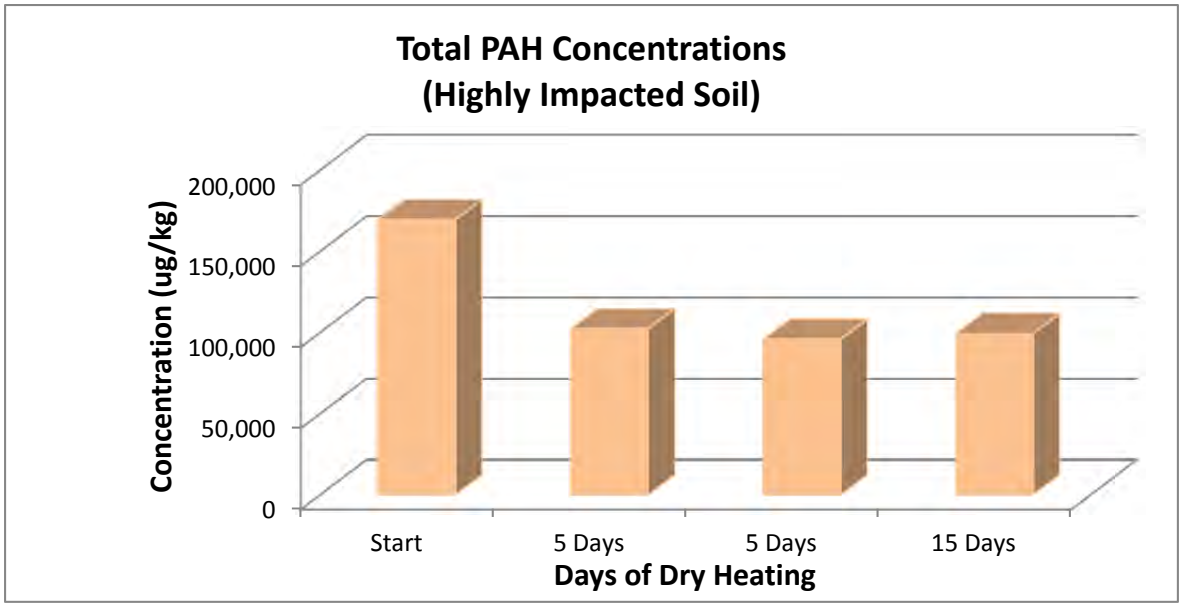
Table 7. Results of Dry Heating Highly Impacted Soil

Analyte [1]	Baseline (BL4)	5-Days (Ave. C8 & C9)	5-Days (% Reduction) [3]	15-Days (C5)	15-Days (% Reduction) [4]
Diesel	1,030 mg/kg	371 mg/kg	64.0%	418 µg/kg	59.4%
Lube Oil	933 mg/kg	855 mg/kg	8.4%	792 mg/kg	15.1%
Benzo(a)pyrene	4,990 µg/kg	3,160 µg/kg	36.7%	2,470 µg/kg	50.5%
Naphthalene	807 µg/kg	257 µg/kg	68.2%	127 µg/kg	84.3%
Total PAHs	169,337 µg/kg	98,907 µg/kg	41.6%	99,170 µg/kg	41.5%

1. Analytical Methods: Diesel = NWTPH-Dx; PAHs = SW8270D.



Graph 3. Diesel Concentrations with Dry Heating



Graph 4. Total PAH Concentrations with Dry Heating

Test Results – Soil Cells and Steaming

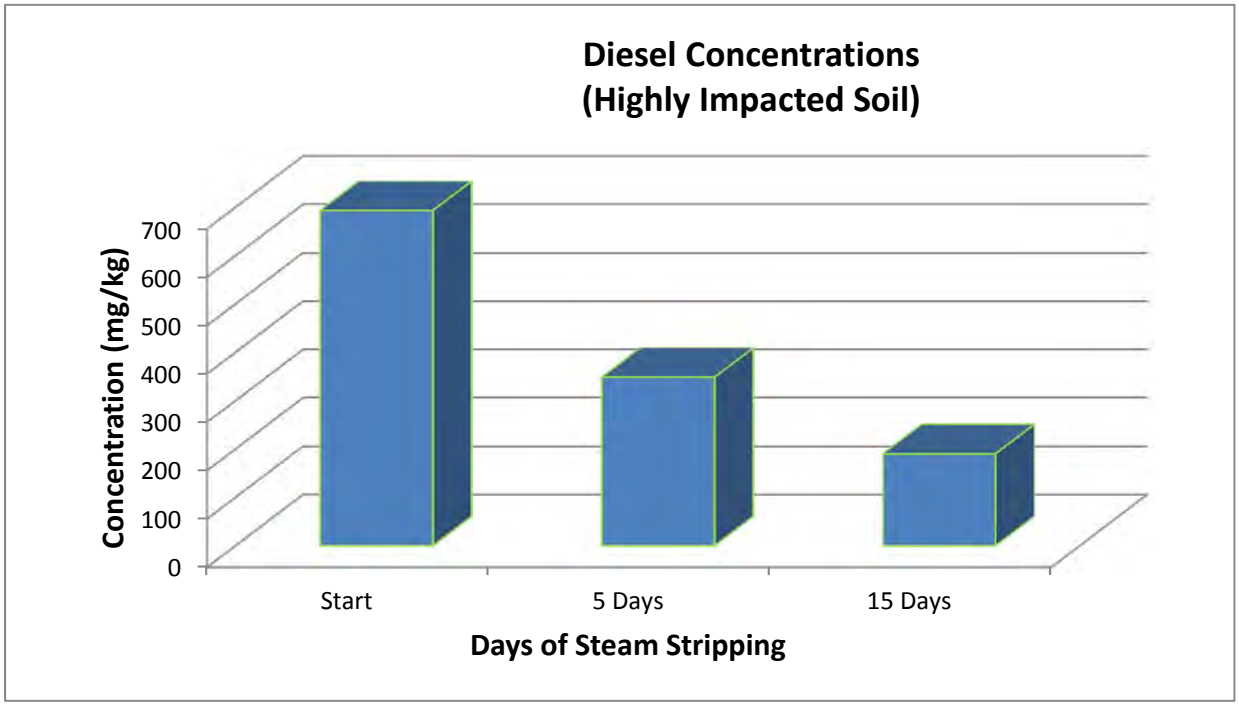
Steam heating studies were conducted using a new subset of Highly Impacted Soil, which was analyzed separately from the soil used to conduct the dry heating studies. Baseline COC levels, the resulting concentrations after heating, and the percent concentration reductions achieved after steaming for 5 and 15-days are presented in Table C-1 of Appendix C. The TTEC calculations for pre- and post-steam heating of Highly Impacted Soil are shown in Table C-2.

Analytical results and percent concentration reductions obtained for diesel, benzo(a)pyrene, naphthalene, and Total PAHs as the result of steam heating Highly Impacted Soil for 5 and 15-days are presented in Table 8, while Graphs 5-7 display the results for diesel, benzo(a)pyrene, and Total PAHs, respectively. All baseline and steam heating results represent the analysis of single samples.

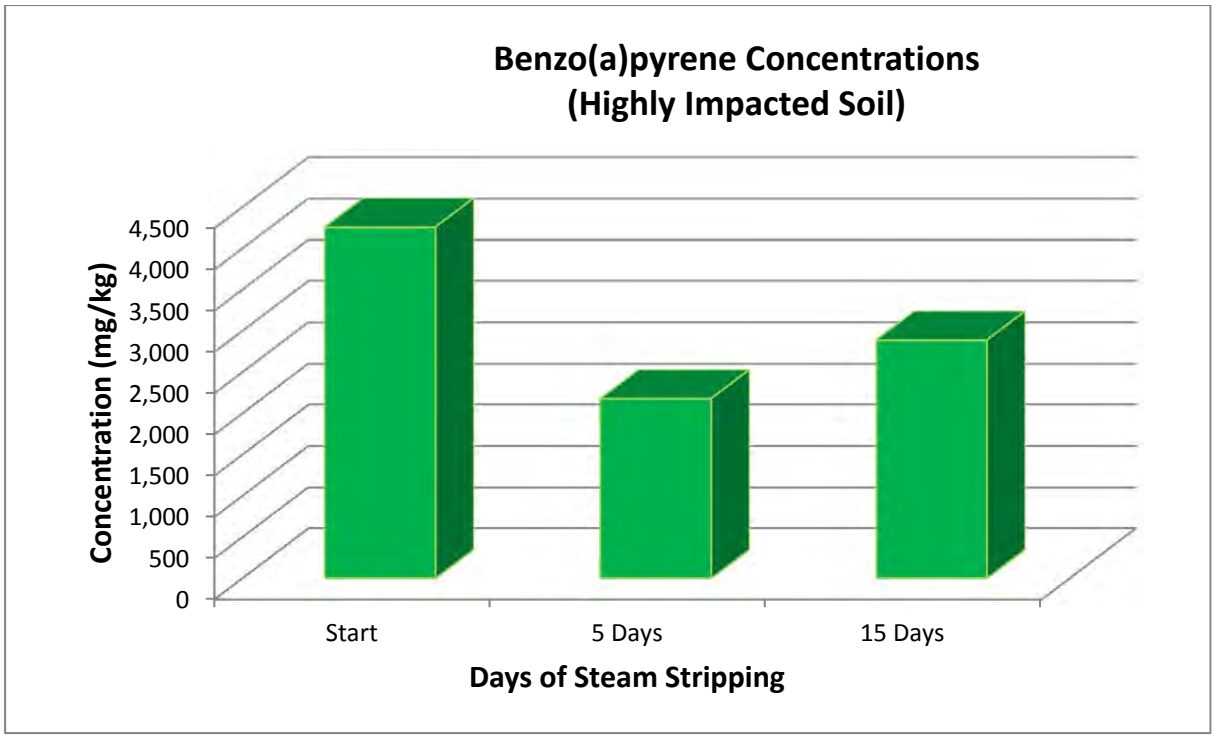
Table 8. Results of Steaming Highly Impacted Soil

Analyte [1]	Baseline (BL5)	5-Days (C10)	5-Days (% Reduction)	15-Days (C11)	15-Days (% Reduction)
Diesel	693 mg/kg	348 mg/kg	49.8%	190 mg/kg	72.6%
Lube Oil	880 mg/kg	806 mg/kg	8.4%	576 mg/kg	34.5%
Benzo(a)pyrene	4,260 µg/kg	2,180 µg/kg	48.8%	2,890 µg/kg	32.2%
Naphthalene	793 µg/kg	61 µg/kg	92.3%	48 µg/kg	93.9%
Total PAHs	105,253 µg/kg	58,394 µg/kg	44.5%	56,342 µg/kg	46.5%

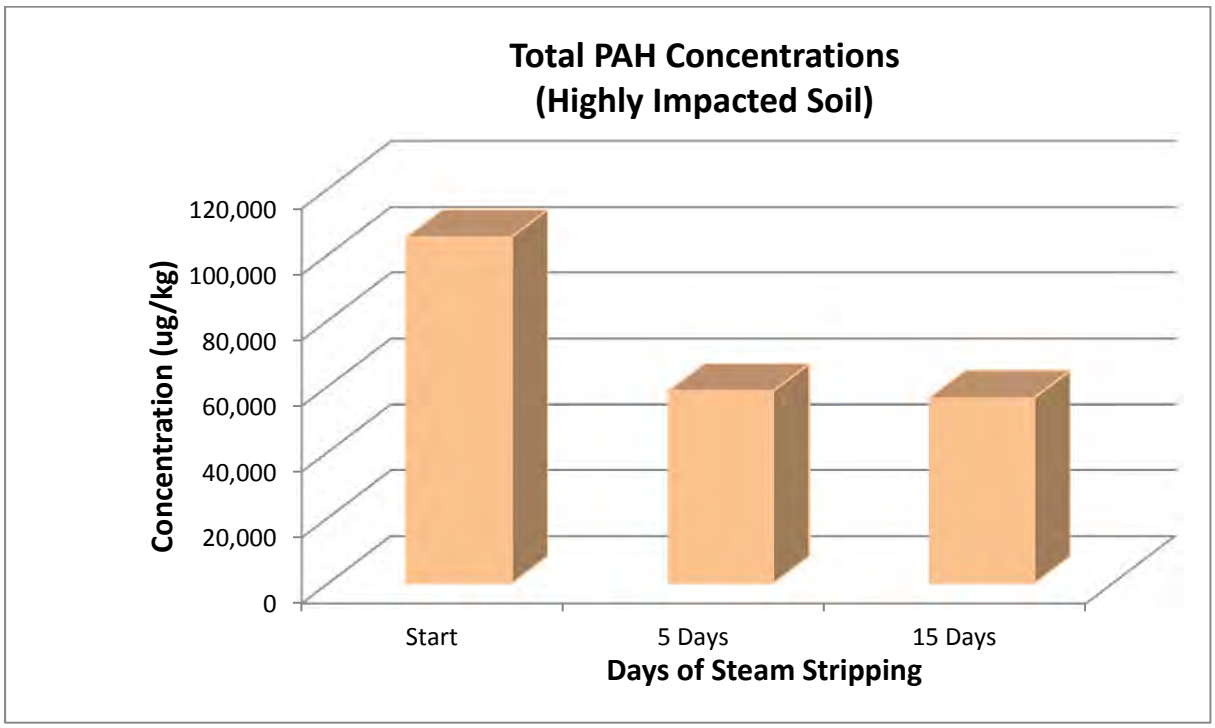
1. Analytical Methods: Diesel = NWTPH-DX; PAHs = SW8270D.



Graph 5. Diesel Concentrations with Steaming



Graph 6. Benzo(a)pyrene Concentrations with Steaming



Graph 7. Total PAH Concentrations with Steaming

During the steam heating portion of the study, the condensate from the cells being heated was collected daily for measurement of volume and visual examination. Approximately 100 to 300-ml of condensate was collected from each cell every 24-hours and a good match was observed between the volume of tap water put into the cells and the volume of condensate removed from the cells. Assuming a porosity of 40%, this flux of water through the cells represents about one-third to one pore volume per day.

Daily visual examination of collected condensate showed it to be amber in color with sheen, or measurable thicknesses (0.1 to 0.24-inches) of amber LNAPL present. A condensate sample was obtained on the second day of the 5-day steaming study for laboratory analysis. Results of this analysis are presented in Table D-1 of Appendix D and are summarized in Table 9 for diesel, benzo(a)pyrene, naphthalene, and total PAHs. These results indicate that *in situ* steam stripping is a viable method for the removal of both DROs and PAHs from site soil.

Table 9. Condensate from Steaming Highly Impacted Soil

Diesel	Diesel	Benzo(a)pyrene	Naphthalene	Total PAHs
5.3 mg/L	4.2 mg/L	1.0 µg/L	2.3 µg/L	292 µg/L

Analytical Methods: Diesel = NWTPH-Dx; PAHs = SW8270D

Test Results – Abiotic Reactions

Abiotic degradation pathways are known to be part of the natural contaminant attenuation process at most sites impacted with organic hydrocarbons. Like biological degradation, abiotic reactions tend to be overlooked in evaluating site remediation options because they are typically very slow at ambient temperatures. However, every 10 °C increase in subsurface temperature doubles abiotic reaction rates. Thus, reaction rates that were insignificant at ambient temperature can become measureable at the temperatures achieved by ISTR.

Recently, research at monitored natural attenuation (MNA) and *in situ* heating sites have shown that available ferrous iron sources will act as active reductants for chlorinated volatile organic compounds (COVCs). Field data indicates that ferrous iron reacts with these compounds by mechanisms similar to those observed for zero valent iron (ZVA) based remediation technologies.

To investigate if abiotic reaction were occurring in the bench scale soil studies, samples of Impacted and Highly Impacted soil and a subsample from Cell C11, which was steamed for 15-days, were analyzed for available major anions and cations. The results of these analyses, which are summarized in Table 10, indicate that available iron was consumed during heating.

Table 10. Available Anions and Cations

Soil Type	NH_4-N	SO_4-S	Iron	Ph Units
Impacted	0.2 (mg/kg)	12 (mg/kg)	34 (mg/kg)	6.3
Highly Impacted	0.2 (mg/kg)	12 (mg/kg)	38 (mg/kg)	6.3
15-Days Steaming [1]	5.4 (mg/kg)	1.0 (mg/kg)	5 (mg/kg)	6.8

1. Steaming was performed on Highly Impacted Soil.

Study Conclusions

The following conclusions may be reached from the results of the boiling flask studies:

- *NAPL at the site exists primarily as a black viscous DNAPL which upon heating to the boiling point of water (212°F and 100°C) becomes a black LNAPL. While no direct measurements were made, visual observations indicate that the viscosity of this NAPL decreases significantly with increasing temperature.*

  These results indicate that heat enhanced MPE can be used to extract not only liquid phase petroleum hydrocarbons but also liquid phase PAHs from any saturated portion of the site. This includes sections of the vadose zone purposely saturated during the ISTR process. The extraction of liquid phase contaminants from the top of a water table is the most efficient and cost effective way to remove mass from the subsurface of any impacted site.

- *Once converted to a LNAPL by heating, site liquid phase PAHs did not revert back to DNAPL, or become a buoyant neutral NAPL, upon returning to ambient temperatures.*

  This observation indicates that it will not be necessary to hold areas of the subsurface at boiling temperatures for prolonged periods of time, or to re-heat them, in order to completely recover creosote tar LNAPL produced by heating.

- *Site soil heavily impacted with diesel and PAHs will produce an LNAPL rather than a DNAPL when heated.*

  These results indicate that liquid extraction can be an important remediation mechanism at this site, even within the vadose zone. Highly impacted source areas in the Upper Sands can be saturated and heated to release both diesel and PAHs as LNAPLs, which may then be extracted from the subsurface using MPE. There were no indications that heating PAH impacted soil at this site will produce DNAPLs.

- *Volatilization can effectively remove naphthalene and other low boiling point PAHs from subsurface soil.*

  In situ volatilization processes dropped the concentrations of several PAHs by over 50%. These included naphthalene, phenanthrene, fluorine, fluoranthene, pyrene, and acenaphthene.

- *In situ steam stripping may be used to reduce both DRO and PAH concentrations.*

  Results indicate that *in situ* steam stripping is a viable contaminant removal mechanism at the subject site. *In situ* steam stripping can clearly be used to reduce diesel concentrations in soil to levels approaching 80%. It can also be deployed to lower PAH concentrations, including concentrations of benzo(a)pyrene, beyond what can be achieved by volatilization alone.

- *Evidence was generated that in situ abiotic reactions were contributing to reductions in PAH concentrations.*

  It is possible that the closed system nature of the bench studies limited abiotic reactions in the test cells. Early results indicate that available ferrous iron was depleted during testing and that adding iron to the cells may have produced larger PAH concentration reductions

  .

- *Condensate and vapors produced from boiling site NAPL and steam stripping highly impacted site soil did not crystalize or solidify upon cooling to ambient temperatures.*

  These results indicate that it will not be necessary to use specialty construction materials and methods in the design of an ISTR system for this site. The headers for condensate and vapor collection systems at the site can be constructed of heat resistant plastics rather than steel and will not have to be heat traced. Additionally, there is not indication that system equipment will become overly fouled by materials extracted from the subsurface.

The cell studies provided data on the amount of COCs that can be removed from site soil by volatilization and steam stripping as well as biological and abiotic reactions. The following conclusions can be drawn from the results of these studies:

- *Heating was more effective in reducing average diesel concentrations than lube oil levels. Dry heating lowered average diesel concentrations by over 70%, but only dropped lube oil levels by a maximum of 28%. Steaming removed more lube oil, with a maximum reduction of 34.5% achieved after 15-days of steaming.*

  Using a vadose zone saturation system allows for a robust application of ERH without the worries of electrode dry-out. It also provides a mechanism to physically steam-strip heavier contaminants such as lube oils from the soil matrix in the most impacted portions of the site.

- *Dry heating lowered average Total PAH concentrations by about 55% and average naphthalene concentrations by over 80%. Average benzo(a)pyrene concentrations were reduced by 9.0%,, 40.8%, and 21.8% with 5, 15 and 25-days of dry heating, respectively.*

  These reductions in contaminant concentrations at creosote sites are often enough to stabilize the remaining constituents, which are composed of higher molecular weight PAHs, and stop them from leaching to groundwater.

- *Extended dry heating beyond 5-days did not produce significantly greater percentages of COC concentration reductions..*

  The estimates of design energy and operation periods for the application of ISTR at this site should not overestimate the beneficial effects of continued heating beyond what is necessary to achieve recovery of NAPL from the subsurface and produce initial reductions of COC concentrations. An exception to this conclusion would be the continued use of heating to achieve reductions in naphthalene concentrations greater than 95% to allow the site clean-up goals for this COC to be achieved.

- *Continued steaming can produce continued removal of DROs and PAHs.*

  Analysis of the condensate collected during the steaming of Highly Impacted soil, indicated that diesel, benzo(a)pyrene, naphthalene, and Total PAHs were being removed from the test cells as dissolved phase constituents of the condensate. Of the PAHs analyzed, the removal rate for naphthalene was by far the highest. Continued heating should produce continued reductions in naphthalene concentrations.

- *Evidence exists that abiotic reactions may be assisting COC reduction in the cell studies.*

  The depletion of available iron in heated site soil indicates that abiotic reactions are occurring at elevated temperature and may be responsible for the destruction of non-volatile site COCs with larger ring structures. It is possible that these reactions can be increased, and used as a remediation polishing mechanism, by ensuring the subsurface has a sufficient source of available iron to maximize all forms of *in situ* dechlorination.

Transferring Lab Results to Field Data

Study results were applied to actual field data from seventeen (17) onsite soil sampling locations. Soil at each of these locations is impacted at levels exceeding at least two of site clean-up criteria presented in Table 1. When the average percent COC reductions obtained during the dry-heating portion of the study are applied to actual site soil data, only four of the 17 site locations had Total PAH concentrations higher than the site clean-up goals. Concentrations of DRO over the clean-up goals would only be found in five of the 17 locations. And while naphthalene concentrations would be over the clean-up goals in 11 of the 17 site locations, increasing average naphthalene reduction from the 95% obtained in the study to 99% leaves only three locations over the clean-up levels.

Recommendations

Based upon the data collected during this ISTR Bench Scale Study, we recommend steam heating of the vadose zone to remove the maximum amount of heavy petroleum hydrocarbons and PAHs from the subsurface as possible. Stream heating can be performed by applying ERH combined with both a MPE and a soil saturation system. Together, these systems will remove NAPL from the soil matrix in the most impacted parts of the site and reduce the concentrations of the more soluble PAHs throughout the heated volume. These efforts can significantly reduce groundwater impact at the site.

Use of Report

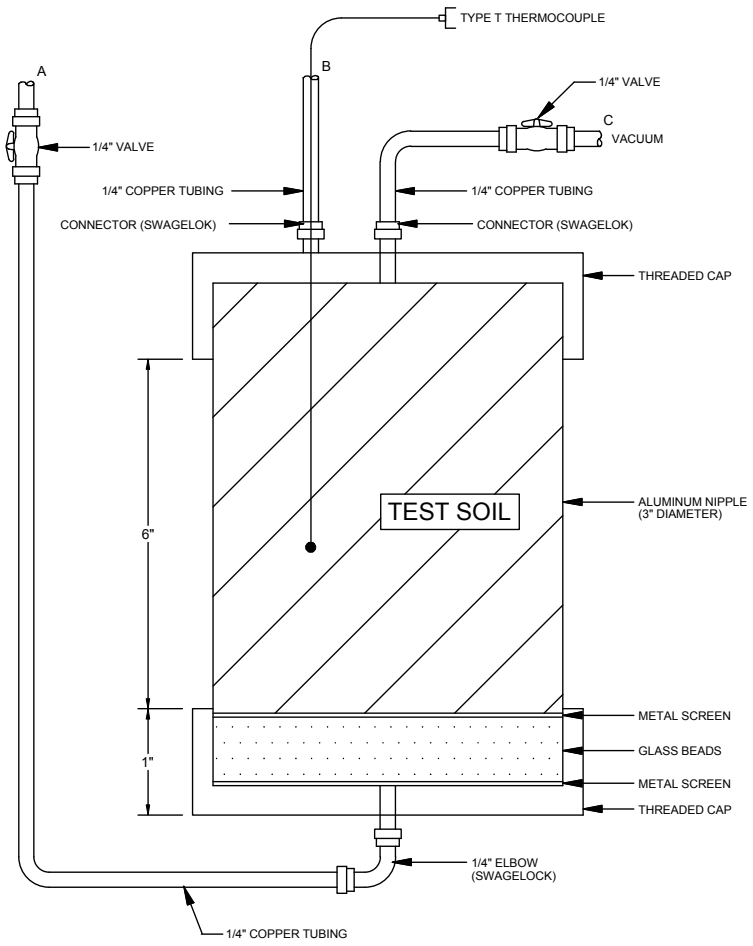
This report has been prepared to assist in the evaluation of GRS' application of ISTR at the subject site. The results are confidential and proprietary and shall only be used for other purposes with the expressed permission of GRS.

Should you have any questions concerning this bench study report, please do not hesitate to contact us.

Sincerely,
Global Remediation Solutions, LLC

Michael Dodson
Vice President

FIGURES



ISTR TEST CELLS

Project No. 3512011

Date: 08/01/12
Drawn by: W.D.J.
Approved: M.E.D.

Figure No. 1

Appendix A

Analytical Results

Dry Heating of Impacted Soil

Table A-1

Analytical Results - Baseline Impacted Soil

Analyte	Units	Baseline (BL1)	Baseline (BL2)	Baseline (BL3)	Average (BL1- BL3)
Percent Moisture	Dry wt%	12.3	12.6	12.8	12.6
Diesel	mg/kg	1,220	1,250	1,460	1,310
Lube Oil	mg/kg	1,100	1,180	1,260	1,180
Acenaphthene	µg/kg	5,020	5,000	5,240	5,087
Acenaphthylene	µg/kg	606	653	383	547
Anthracene	µg/kg	6,330	5,890	6,360	6,193
Benz(a)anthracene	µg/kg	5,060	6,060	3,900	5,007
Benzo(a)pyrene	µg/kg	3,560	4,450	5,260	4,423
Benzo(b)fluoranthene	µg/kg	5,630	4,890	6,350	5,623
Benzo(g,h,i)perylene	µg/kg	1,560	1,980	1,760	1,767
Benzo(k)fluoranthene	µg/kg	1,670	2,580	1,630	1,960
Chrysene	µg/kg	6,250	5,750	6,400	6,133
Dibenz(a,h)anthracene	µg/kg	723	930	823	825
Fluoranthene	µg/kg	34,500	34,100	40,500	36,367
Fluorene	µg/kg	3,600	4,910	3,550	4,020
Indeno(1,2,3-cd)pyrene	µg/kg	1,610	2,010	1,750	1,790
Naphthalene	µg/kg	2,770	3,370	2,290	2,810
Phenanthrene	µg/kg	9,570	9,880	13,800	11,083
Pyrene	µg/kg	18,600	17,700	21,900	19,400
Total PAHs	**µg/kg**	**107,059**	**110,153**	**121,896**	**113,035**

Analytical Methods = Percent Moisture (ASTM D2216); Diesel & Lube Oil (NWTPH-Dx); PAHs (SW827D).

Table A-2

TTEC Calculations – Baseline Impacted Soil, (µg/kg)

Analyte	TTEC Factor	BL1 (µg/kg)	BL2 (µg/kg)	BL3 (µg/kg)	Average BL (µg/kg)	Rings/ Rating
Benz(a)anthracene	0.1	506	606	390	501	4 / C
Benzo(a)pyrene	1.0	3,560	4,450	5,260	4,423	5 / SC
Benzo(b)fluoranthene	0.1	563	489	635	562	5 / C
Benzo(k)fluoranthene	0.1	167	258	163	196	5 / C
Chrysene	0.01	62	58	64	62	4 / WC
Dibenz(a,h)anthracene	0.1	72	93	82	82	5 / C
Indeno(1,2,3-cd)pyrene	0.1	161	201	175	179	6 / C
Total PAH	**-**	**5,091**	**6,155**	**6,769**	**6,005**	**-**

TTEC = Total Toxicity Equivalent Concentration.

Analytical Method = PAHs by SW827D.

Rings: Number of rings in compound structure.

Rating (Cancer): C = Carcinogenic; SC= Strongly Carcinogenic; WC = Weakly Carcinogenic.

Table A-3
Analytical Results - Dry Heating of Impacted Soil

Analyte	Units	Average (BL1-3)	5-Days (C6)	5-Days (C7)	5-Days (C12)	15-Days (C1)	15-Days (C2)	25-Days (C3)	25-Days (C4)
Percent Moisture	Dry wt%	12.6	0.3	0.23	-	-	-	-	-
Diesel	mg/kg	1,310	346	362	313	320	313	221	252
Lube Oil	mg/kg	1,180	777	777	912	918	897	954	759
Acenaphthene	µg/kg	5,087	181	165	43	105	54	37	63
Acenaphthylene	µg/kg	547	1,690	1,370	681	1,160	1,190	837	1,100
Anthracene	µg/kg	6,193	7,250	4,360	3,600	2,910	3,070	2,510	3,490
Benz(a)anthracene	µg/kg	5,007	9,080	2,420	1,550	4,060	2,510	2,060	2,370
Benzo(a)pyrene	µg/kg	4,423	6,680	4,830	3,220	2,730	2,510	2,910	4,010
Benzo(b)fluoranthene	µg/kg	5,623	12,900	9,400	6,280	9,720	8,220	8,250	10,400
Benzo(g,h,i)perylene	µg/kg	1,767	3,600	3,120	1,520	2,730	2,790	2,370	3,000
Benzo(k)fluoranthene	µg/kg	1,960	2,170	1,710	820	2,250	2,110	1,390	1,450
Chrysene	µg/kg	6,133	9,270	2,960	1,750	5,470	3,470	2,370	4,070
Dibenz(a,h)anthracene	µg/kg	825	1,730	1,400	761	1,220	1,260	1,130	1,270
Fluoranthene	µg/kg	36,367	49,000	13,600	9,600	17,000	9,920	6,130	11,700
Fluorene	µg/kg	4,020	883	616	395	926	477	357	451
Indeno(1,2,3-cd)pyrene	µg/kg	1,790	3,530	3,000	1,650	2,620	2,750	2,220	2,470
Naphthalene	µg/kg	2,810	669	629	137	253	239	181	568
Phenanthrene	µg/kg	11,083	3,890	2,560	5,290	2,030	1,850	1,870	2,240
Pyrene	µg/kg	19,400	22,600	6,520	5,200	9,830	4,630	2,110	5,650
Total PAHs	**µg/kg**	**113,036**	**135,123**	**58,660**	**42,497**	**65,014**	**47,050**	**36,768**	**54,302**

Methods: Percent Moisture by ASTM D2216; Diesel & Lube Oil by NWTPH-Dx; PAHs by SW827D.

Table A-4
Average Analytical Results - Dry Heating of Impacted Soil

Analyte	Units	Baseline (BL1-3)	5-Days (C7 & C12)	15-Days (C1 & C2)	25-Days (C3 & C4)
Percent Moisture	Dry wt%	12.6	-	-	-
Diesel	mg/kg	1,310	338	317	237
Lube Oil	mg/kg	1,180	845	908	857
Acenaphthene	µg/kg	5,087	104	80	50
Acenaphthylene	µg/kg	547	1,026	1,175	987
Anthracene	µg/kg	6,193	3,980	2,990	3,000
Benz(a)anthracene	µg/kg	5,007	1,985	3,285	2,215
Benzo(a)pyrene	µg/kg	4,423	4,025	2,620	3,460
Benzo(b)fluoranthene	µg/kg	5,623	7,8400	8,970	9,325
Benzo(g,h,i)perylene	µg/kg	1,767	2,320	2,760	2,685
Benzo(k)fluoranthene	µg/kg	1,960	1,265	2,180	1,420
Chrysene	µg/kg	6,133	2,355	4,470	3,220
Dibenz(a,h)anthracene	µg/kg	825	1,081	1,240	1,200
Fluoranthene	µg/kg	36,367	11,600	13,460	8,915
Fluorene	µg/kg	4,020	506	702	404
Indeno(1,2,3-cd)pyrene	µg/kg	1,790	2,325	2,685	2,345
Naphthalene	µg/kg	2,810	383	246	375
Phenanthrene	µg/kg	11,083	3,925	1,940	2,055
Pyrene	µg/kg	19,400	5,860	7,230	3,880
Total PAHs	**µg/kg**	**113,036**	**50,578**	**56,032**	**45,535**

Methods: Percent Moisture by ASTM D2216; Diesel & Lube Oil by NWTPH-Dx; PAHs by SW827D.

Table A-5
TTEC Calculations – Dry Heating of Impacted Soil, (µg/kg)

Analyte [1]	TTEC Factor [2]	Start Ave. [3]	5-Days (C6)	5-Days (C7)	5-Days (C12)	15-Days (C1)	15-Days (C2)	25-Days (C3)	25-Days (C4)	Rings/ Rating [4]
Benz(a)anthracene	0.1	501	908	242	155	406	251	206	237	4 / C
Benzo(a)pyrene	1.0	4,423	6,680	4,830	3,220	2,730	2,730	2,910	4,010	5 / SC
Benzo(b)fluoranthene	0.1	562	1,290	940	628	972	972	822	825	5 / C
Benzo(k)fluoranthene	0.1	196	217	171	82	225	211	139	145	5 / C
Chrysene	0.01	62	93	30	18	55	35	24	41	4 / WC
Dibenz(a,h)anthracene	0.1	82	173	140	76	122	126	113	127	5 / C
Indeno(1,2,3-cd)pyrene	0.1	179	353	300	165	262	275	222	247	6 / C
Total PAH	**-**	**6,005**	**9,714**	**6,653**	**4,344**	**4,722**	**4,600**	**4,436**	**5,632**	**-**

1. Analytical Method: PAHs = SW827D.
2. TTEC = Total Toxicity Equivalent Concentration.
3. Average of baseline soil samples B1, B2 and B3.
4. Rings: Number of rings in compound structure.
   Rating (Cancer): C = Carcinogenic; SC= Strongly Carcinogenic; WC = Weakly Carcinogenic.

Table A-6
Percent Reductions In Concentrations
Dry Heating of Impacted Soil

Analyte	5-Days (C6)	5-Days (C7)	5-Days (C12)	15-Days (C1)	15-Days (C2)	25-Days (C3)	25-Days (C4)
Diesel	73.6%	72.4%	76.1%	75.6%	76.1%	83.1%	80.8%
Lube Oil	34.2%	34.2%	22.7%	22.2%	24.0%	19.2%	35.7%
Acenaphthene	96.4%	96.8%	99.2%	97.9%	98.9%	99.3%	98.8%
Acenaphthylene	-208.8%	-150.3%	-24.4%	-111.9%	-117.4%	-59.5%	-101.0%
Anthracene	-17.1%	29.6%	41.9%	53.0%	50.4%	59.5%	43.6%
Benz(a)anthracene	-81.4%	51.7%	69.0%	18.9%	49.9%	58.9%	52.7%
Benzo(a)pyrene	-51.0%	-9.2%	27.2%	38.3%	43.3%	34.2%	9.3%
Benzo(b)fluoranthene	-129.4%	-67.2%	-11.7%	-72.9%	-46.2%	-46.7%	-84.9%
Benzo(g,h,i)perylene	-103.8%	-76.6%	14.0%	-54.5%	-57.9%	-34.2%	-69.8%
Benzo(k)fluoranthene	-10.7%	12.8%	58.2%	-14.8%	-7.7%	29.1%	26.0%
Chrysene	-51.1%	51.7%	71.5%	10.8%	43.4%	61.4%	33.6%
Dibenz(a,h)anthracene	-109.6%	-69.6%	7.8%	-47.8%	-52.7%	-36.9%	-53.9%
Fluoranthene	-34.7%	62.6%	73.6%	53.3%	72.7%	83.1%	67.8%
Fluorene	78.0%	84.7%	90.2%	77.0%	88.1%	91.1%	88.8%
Indeno(1,2,3-cd)pyrene	-97.2%	-67.6%	7.8%	-46.4%	-53.6%	-24.0%	-38.0%
Naphthalene	76.2%	77.6%	95.1%	91.0%	91.5%	93.6%	79.8%
Phenanthrene	64.9%	76.9%	52.3%	81.7%	83.3%	83.1%	79.8%
Pyrene	-16.5%	66.4%	73.2%	49.3%	76.1%	89.1%	70.9%
Total PAHs	**-19.5%**	**48.1%**	**62.4%**	**42.5%**	**58.4%**	**67.5%**	**52.0%**

Methods = Percent Moisture by ASTM D2216; Diesel & Lube Oil by NWTPH-Dx; PAHs by SW827D.

Table A-7

Average Percent Reductions In Concentrations
Dry Heating of Impacted Soil

Analyte	5-Days (C7 & C12)	15-Days (C1 & C2)	25-Days (C3 & C4)
Diesel	74.2%	75.8%	81.9%
Lube Oil	28.4%	23.1%	27.4%
Acenaphthene	98.0%	98.4%	99.0%
Acenaphthylene	-87.4%	-114.7%	-80.2%
Anthracene	35.7%	51.7%	51.6%
Benz(a)anthracene	60.4%	34.4%	55.8%
Benzo(a)pyrene	9.0%	40.8%	21.8%
Benzo(b)fluoranthene	-39.4%	-59.5%	-65.8%
Benzo(g,h,i)perylene	-31.3%	-56.2%	-52.0%
Benzo(k)fluoranthene	35.5%	-11.2%	27.6%
Chrysene	61.6%	27.1%	47.5%
Dibenz(a,h)anthracene	-30.9%	-50.2%	-45.4%
Fluoranthene	68.1%	63.0%	75.5%
Fluorene	87.4%	82.5%	90.0%
Indeno(1,2,3-cd)pyrene	-29.9%	-50.0%	-31.0%
Naphthalene	86.4%	91.2%	86.7%
Phenanthrene	64.6%	82.5%	81.5%
Pyrene	69.8%	62.7%	80.0%
Total PAHs	**55.3%**	**50.4%**	**59.7%**

Methods = Percent Moisture by ASTM D2216; Diesel & Lube Oil by NWTPH-Dx; PAHs by SW827D.

Table A-8

Percent Reduction In TTEC Calculations
Dry Heating of Impacted Soil, (µg/kg)

Analyte [1]	Ave. Baseline [2]	Ave. 5-Days [3]	% Reduction	Ave. 15-Days [4]	% Reduction	Ave. 25-Days [5]	% Reduction
Benz(a)anthracene	501	199	60%	329	34%	222	56%
Benzo(a)pyrene	4,423	4,025	9%	2,730	38%	3,460	22%
Benzo(b)fluoranthene	562	784	-39%	972	-73%	824	-46%
Benzo(k)fluoranthene	196	127	35%	218	-11%	142	28%
Chrysene	62	24	61%	45	27%	32	47%
Dibenz(a,h)anthracene	82	108	-31%	124	-50%	120	-45%
Indeno(1,2,3-cd)pyrene	179	233	-30%	269	-50%	235	-31%
Total PAH	**6,005**	**5,498**	**8%**	**4,686**	**22%**	**5,034**	**16%**

1. Analytical Method: PAHs = SW827D.
2. Average of baseline soil samples B1, B2 and B3.
3. Average of Cells C7 and C12.
4. Average of Cells C1 and C2.
5. Average of Cells C3 and C4.

Appendix B

Analytical Results

Dry Heating of Highly Impacted Soil

Table B-1
Analytical Results and Percent Reductions in Concentrations
Dry Heating of Highly Impacted Soil

Analyte	Units	Start (BL4)	5-Days (C8)	5-Days (C9)	5-Day Ave.	% Reduction	15-Days (C5)	% Reduction
Diesel	mg/kg	1,030	394	347	371	64.0%	418	59.4%
Lube Oil	mg/kg	933	877	833	855	8.4%	792	15.1%
Acenaphthene	µg/kg	12,100	167	140	154	98.7%	107	99.1%
Acenaphthylene	µg/kg	1,530	833	900	867	43.4%	713	53.4%
Anthracene	µg/kg	13,200	3,500	4,110	3,805	71.2%	2,550	80.7%
Benz(a)anthracene	µg/kg	7,530	5,850	5,680	5,765	23.4%	5,110	32.1%
Benzo(a)pyrene	µg/kg	4,990	3,190	3,130	3,160	36.7%	2,470	50.5%
Benzo(b)fluoranthene	µg/kg	7,530	7,670	7,930	7,800	-3.6%	7,160	4.9%
Benzo(g,h,i)perylene	µg/kg	2,090	2,490	2,500	2,495	-19.4%	2,170	-3.8%
Benzo(k)fluoranthene	µg/kg	2,310	1,910	2,300	2,105	8.9%	1,790	22.5%
Chrysene	µg/kg	7,280	6,550	6,650	6,600	9.3%	5,910	18.8%
Dibenz(a,h)anthracene	µg/kg	1,030	1,110	1,180	1,145	-11.2%	1,050	-1.9%
Fluoranthene	µg/kg	44,800	39,600	37,700	36,650	13.7%	38,900	13.2%
Fluorene	µg/kg	8,790	927	853	890	89.9%	753	91.4%
Indeno(1,2,3-cd)pyrene	µg/kg	2,090	2,260	2,390	2,325	-11.2%	2,060	1.4%
Naphthalene	µg/kg	807	253	260	257	68.2%	127	84.3%
Phenanthrene	µg/kg	26,900	7,090	6,690	6,890	74.4%	10,100	62.5%
Pyrene	µg/kg	26,400	18,700	13,300	16,000	39.4%	18,200	31.1%
Total PAHs	**µg/kg**	**169,377**	**102,100**	**95,713**	**98,907**	**41.6%**	**99,170**	**41.5%**

Methods: Percent Moisture by ASTM D2216; Diesel & Lube Oil by NWTPH-Dx; PAHs by SW827D.

Table B-2
TTEC Calculations
Dry Heating of Highly Impacted Soil, (µg/kg)

Analyte	TTEC Factor	Start (BL4)	5-Days (C8)	5-Days (C9)	5-Days Ave.	15-Days (C5)	Rings/ Rating
Benz(a)anthracene	0.1	753	585	568	577	511	4 / C
Benzo(a)pyrene	1.0	4,990	3,190	3,130	3,160	2,470	5 / SC
Benzo(b)fluoranthene	0.1	753	767	793	780	716	5 / C
Benzo(k)fluoranthene	0.1	231	191	230	211	179	5 / C
Chrysene	0.01	73	66	67	66	59	4 / WC
Dibenz(a,h)anthracene	0.1	103	111	118	115	105	5 / C
Indeno(1,2,3-cd)pyrene	0.1	209	226	239	233	206	6 / C
Total PAH	**-**	**7,112**	**5,136**	**5,145**	**5,140**	**4,246**	-

TTEC = Total Toxicity Equivalent Concentration.
Analytical Method = PAHs by SW827D.
Rings: Number of rings in compound structure.
Rating (Cancer): C = Carcinogenic; SC= Strongly Carcinogenic; WC = Weakly Carcinogenic.

Table B-3
Percent Reduction In TTEC Calculations
Dry Heating of Highly Impacted Soil

Analyte [1]	5-Days (C8)	5-Days (C9)	15-Days (C15)
Benz(a)anthracene	22%	25%	32%
Benzo(a)pyrene	36%	37%	51%
Benzo(b)fluoranthene	-2%	-5%	5%
Benzo(k)fluoranthene	17%	0%	23%
Chrysene	10%	9%	19%
Dibenz(a,h)anthracene	-8%	-15%	-2%
Indeno(1,2,3-cd)pyrene	-8%	-14%	1%
Total PAH	**28%**	**28%**	**40%**

1. Analytical Method: PAHs = SW827D.

Table B-4
SPLP Results
Dry Heating of Highly Impacted Soil

Analyte	Units	Start (BL4)	5-Days (C8)	5-Days (C9)	15-Days (C5)
Diesel	mg/L	5.9	2.1	1.7	4.3
Lube Oil	mg/L	3.9	1.1	1.2	4.2
Acenaphthene	µg/L	58	2.0	2.0	1.5
Acenaphthylene	µg/L	2.6	0.78	1.4	0.70
Anthracene	µg/L	9.2	5.6	8.1	5.0
Benz(a)anthracene	µg/L	3.5	2.5	4.0	1.0
Benzo(a)pyrene	µg/L	1.9	0.75	1.8	0.2
Benzo(b)fluoranthene	µg/L	3.0	1.7	4.4	0.69
Benzo(g,h,i)perylene	µg/L	0.96	0.35	1.1	0.12
Benzo(k)fluoranthene	µg/L	0.95	0.53	1.1	0.20
Chrysene	µg/L	3.2	2.7	4.4	0.96
Dibenz(a,h)anthracene	µg/L	0.47	0.13	0.58	0.09
Fluoranthene	µg/L	37	34	42	16
Fluorene	µg/L	26	4.7	5.1	4.4
Indeno(1,2,3-cd)pyrene	µg/L	0.89	0.25	1.0	0.12
Naphthalene	µg/L	0.52	0.46	0.58	0.41
Phenanthrene	µg/L	43	15	19	19
Pyrene	µg/L	18	12	16	6.1
Total PAHs	**µg/L**	**209**	**83**	**113**	**56**

SPLP = Synthetic Precipitate Leaching Process.
Methods = Percent Moisture (ASTM D2216); Diesel & Lube Oil (NWTPH-Dx); PAHs (SW827D).

Appendix C

Analytical Results

Steaming of Highly Impacted Soil

Table C-1
Analytical Results and Percent Concentration Reductions
Steaming of Highly Impacted Soil

Analyte	Units	Start (BL5)	5-Days (C10)	% Reduction	15-Days (C11)	% Reduction
Percent Moisture	wt%	15.2	4.51	70.3%	9.3	38.6%
Diesel	mg/kg	693	348	49.8%	190	72.6%
Lube Oil	mg/kg	880	806	8.4%	576	34.5%
Acenaphthene	µg/kg	5,340	21	99.6%	35	99.4%
Acenaphthylene	µg/kg	847	561	33.8%	989	-16.8%
Anthracene	µg/kg	4,390	2,720	38.0%	2,390	45.6%
Benz(a)anthracene	µg/kg	6,180	3,660	40.8%	4,370	29.3%
Benzo(a)pyrene	µg/kg	4,260	2,180	48.8%	2,890	32.2%
Benzo(b)fluoranthene	µg/kg	5,900	5,360	9.2%	6,880	-16.6%
Benzo(g,h,i)perylene	µg/kg	1,400	1,170	16.4%	1,720	-22.9%
Benzo(k)fluoranthene	µg/kg	2,070	1,330	35.7%	2,500	-20.8%
Chrysene	µg/kg	7,700	4,620	40.0%	5,470	29.0%
Dibenz(a,h)anthracene	µg/kg	753	659	12.5%	957	-27.1%
Fluoranthene	µg/kg	36,900	21,700	41.2%	16,500	55.3%
Fluorene	µg/kg	1,430	171	88.0%	309	78.4%
Indeno(1,2,3-cd)pyrene	µg/kg	1,540	1,310	14.9%	1,900	-23.4%
Naphthalene	µg/kg	793	61	92.3%	48	93.9%
Phenanthrene	µg/kg	3,550	2,900	18.3%	264	92.6%
Pyrene	µg/kg	22,200	9,970	55.1%	9,120	58.9%
Total PAHs	**µg/kg**	**105,253**	**58,394**	**44.5%**	**56,342**	**46.5%**

Methods = Percent Moisture by ASTM D2216; Diesel & Lube Oil by NWTPH-Dx; PAHs by SW827D.

Table C-2
TTEC Calculations and Percent Reductions
Steaming of Highly Impacted Soil, (µg/kg)

Analyte	TTEC Factor	Start (BL5)	5-Days (C10)	% Reduction	15-Days (C11)	% Reduction	Rings/ Rating
Benz(a)anthracene	0.1	618	366	41%	437	29%	4 / C
Benzo(a)pyrene	1.0	4,260	2,180	49%	2,890	32%	5 / SC
Benzo(b)fluoranthene	0.1	590	536	9%	688	-17%	5 / C
Benzo(k)fluoranthene	0.1	207	133	36%	250	-21%	5 / C
Chrysene	0.01	77	46	40%	55	29%	4 / WC
Dibenz(a,h)anthracene	0.1	75	66	12%	96	-27%	5 / C
Indeno(1,2,3-cd)pyrene	0.1	154	131	15%	190	-23%	6 / C
Total PAH	-	**5,981**	**3,458**	**42%**	**4,605**	**23%**	-

TTEC = Total Toxicity Equivalent Concentration. Analytical Method = PAHs by SW827D.
Rings: Number of rings in compound structure.
Rating (Cancer): C = Carcinogenic; SC= Strongly Carcinogenic; WC = Weakly Carcinogenic.

Appendix D

Analytical Results

Condensate from Steaming of Highly Impacted Soil

Table D-1
Analytical Results
Condensate from Steaming of Highly Impacted Soil

Analyte	Units	Concentration
Diesel	mg/L	5.3
Lube Oil	mg/L	4.2
Acenaphthene	µg/L	46.60
Acenaphthylene	µg/L	2.90
Anthracene	µg/L	5.96
Benz(a)anthracene	µg/L	0.99
Benzo(a)pyrene	µg/L	1.52
Benzo(b)fluoranthene	µg/L	0.37
Benzo(g,h,i)perylene	µg/L	0.53
Benzo(k)fluoranthene	µg/L	1.21
Chrysene	µg/L	1.30
Dibenz(a,h)anthracene	µg/L	0.22
Fluoranthene	µg/L	21.40
Fluorene	µg/L	6.49
Indeno(1,2,3-cd)pyrene	µg/L	0.47
Naphthalene	µg/L	2.27
Phenanthrene	µg/L	7.27
Pyrene	µg/L	10.70
Total PAHs	**µg/L**	**110.20**

Methods: = Diesel & Lube Oil by NWTPH-Dx; PAHs by SW827D.