CONESTOGA-ROVERS & ASSOCIATES

www.CRAworld.com



Remedial Investigation and Feasibility Study Report

Prepared for: Washington Department of Ecology Under Agreement with Phillips 66 Company and Atlantic Richfield Company

Conestoga-Rovers & Associates
20818 44th Ave. West, Suite 190
Lynnwood, Washington 98036

a l·NŎK 201p • 070496 • Report No. 26

Partners in Sustainability

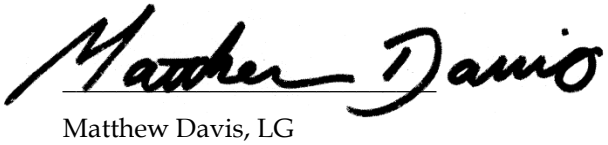
REMEDIAL INVESTIGATION AND FEASIBILITY STUDY REPORT

PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

AGREED ORDER NO. DE 7882
DEPARTMENT OF ECOLOGY FACILITY SITE NO. 2070

Prepared For:

PHILLIPS 66 COMPANY
ATLANTIC RICHFIELD COMPANY



Matthew Davis, LG



Edwin Turner, LG

Prepared by:
Conestoga-Rovers & Associates

1117 Tacoma Avenue South
Tacoma, Washington
U.S.A. 98402

Office: (253) 573-1218
Fax: (253) 573-1663
web: www.CRAworld.com

MARCH 2015
REF. NO. 070496 (26)
This report is printed on recycled paper.

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1
1.1 REGULATORY CONTEXT 1
1.2 OBJECTIVES 1

2.0 SITE IDENTIFICATION AND DESCRIPTION 3
2.1 SITE DISCOVERY AND REGULATORY STATUS 3
2.2 SITE DESCRIPTION 3
2.2.1 PROPERTY FACILITIES 4
2.2.2 SURROUNDING LAND USE 4
2.3 GEOLOGIC/HYDROGEOLOGIC SETTING 5
2.3.1 REGIONAL GEOLOGIC/HYDROGEOLOGIC SETTING 5
2.3.2 SITE-SPECIFIC GEOLOGIC/HYDROGEOLOGIC SETTING 5

3.0 REMEDIAL INVESTIGATION FIELD ACTIVITIES 7
3.1 LASER INDUCED FLOURESCENCE ACTIVITIES AND METHODOLOGY 7
3.1.1 LIF / UVOST SURVEY 7
3.1.2 SOIL CORE SAMPLING 9
3.1.3 CORE PHOTOGRAPHY 9
3.1.4 LABORATORY TESTING 10
3.1.5 LNAPL SATURATION AND RESIDUAL SATURATION TESTING 10
3.1.6 SOIL GRAIN SIZE ANALYSIS 11
3.1.7 CAPILLARY PRESSURE TESTING 11
3.1.8 LNAPL ANALYTICAL MODELING 12
3.2 SOIL SAMPLING 14
3.3 GROUNDWATER SAMPLING 16
3.4 HYDRAULIC MONITORING 18
3.5 SURFACE WATER SAMPLING 18
3.6 WETLANDS AND RETENTION BASIN SAMPLING 19
3.7 SURVEYING 20
3.8 ENGINEERING AND STABILITY ASSESSMENT OF CONTAINMENT DIKE 21
3.9 HYDRAULIC TESTING 21
3.9.1 SINGLE WELL RESPONSE TESTS 21
3.9.1.1 SLUG TESTING METHODOLOGY 21
3.9.2 PUMP TESTING 22
3.9.2.1 STEP DRAWDOWN TESTS 23
3.9.2.2 CONSTANT RATE TEST 24

4.0 RESULTS 25
4.1 LASER INDUCED FLOURESCENCE 25
4.1.1 LIF / UVOST SURVEY 25
4.1.2 CORE PHOTOGRAPHS 26

4.1.3 LNAPL SATURATION AND RESIDUAL SATURATION 27
4.1.4 GRAIN SIZE ANALYSIS 27
4.1.5 HYDRAULIC CONDUCTIVITY AND OTHER SOIL PROPERTIES/CHARACTERISTICS 27
4.1.6 ANALYTICAL MODELING 28
4.1.7 LNAPL MOBILITY/RECOVERABILITY 28
4.2 SOIL 29
4.3 GROUNDWATER 30
4.4 HYDRAULIC MONITORING 32
4.4.1 SHALLOW WELL ELEVATION DATA 33
4.4.2 INTERMEDIATE WELL ELEVATION DATA 33
4.4.3 DEEP WELL ELEVATION DATA 33
4.4.4 VERTICAL HYDRAULIC GRADIENTS 34
4.4.5 LNAPL THICKNESS DATA 34
4.5 SURFACE WATER 35
4.6 SOIL IN THE WETLAND AREA AND RETENTION BASIN 35
4.7 HYDRAULIC TESTING RESULTS 36
4.7.1 SLUG TESTING RESULTS 36
4.7.2 STEP DRAWDOWN TEST RESULTS 37
4.7.3 CONSTANT RATE TEST RESULTS 37

5.0 CONCEPTUAL SITE MODEL 39
5.1 PRIMARY SOURCES OF CONTAMINATION 39
5.2 CONTAMINANT FATE AND TRANSPORT 39
5.3 TYPES AND CONCENTRATIONS OF CONTAMINANTS 41
5.4 CONTAMINATED MEDIA 43
5.5 EXPOSURE SETTING 44
5.6 POTENTIAL EXPOSURE PATHWAYS 45
5.7 POTENTIAL RECEPTORS 46
5.8 POTENTIALLY COMPLETE EXPOSURE PATHWAYS 46
5.8.1 DERMAL ABSORPTION FROM DIRECT CONTACT 47
5.8.2 INGESTION 47
5.8.3 VAPOR INHALATION 47

6.0 GROUNDWATER MODELING 48

7.0 AS/SVE PILOT TESTING 53
7.1 AS/SVE PILOT TEST OBJECTIVES 53
7.2 PILOT TEST EQUIPMENT 53
7.3 PILOT TESTING WELLS 54
7.4 PILOT TEST PROCEDURE 54
7.4.1 SVE STEP TESTING 54
7.4.2 AS STEP TESTING 55
7.4.3 AS/SVE CONSTANT RATE TESTING 57
7.4.4 LABORATORY ANALYSIS 58
7.5 AS/SVE PILOT TEST RESULTS 58
7.5.1 STEP TEST RESULTS 58

7.5.2 AS/SVE CONSTANT RATE TEST RESULTS....61
7.5.3 SVE MASS REMOVAL....62
7.5.4 SVE RADIUS OF INFLUENCE....62
7.6 AS/SVE SUMMARY AND CONCLUSIONS....63

8.0 DPE PILOT TESTING....64
8.1 PILOT TEST OBJECTIVES....64
8.2 PILOT TEST EQUIPMENT....64
8.3 PILOT TEST PROCEDURE....65
8.4 PILOT TEST RESULTS....68
8.4.1 SPH DETECTION AND RECOVERY....68
8.4.2 GROUNDWATER EXTRACTION, DRAWDOWN, AND RECOVERY....69
8.4.3 VACUUM AND RECOVERED VAPOR FLOW....71
8.4.4 DISSOLVED CONSITUENT CHANGES IN GROUNDWATER AND MASS REMOVAL....74
8.4.5 VAPOR-PHASE MASS REMOVAL....75
8.4.6 VAPOR RECOVERY RADIUS OF INFLUENCE....76
8.4.7 METHANE INTERFERENCE....80
8.5 PILOT TEST SUMMARY AND CONCLUSIONS....80

9.0 REMEDIAL ALTERNATIVE EVALUATION....82
9.1 APPLICABLE CLEANUP GOALS....82
9.2 DUAL-PHASE EXTRACTION (DPE)....83
9.3 GROUNDWATER EXTRACTION....85
9.4 IN-SITU ENHANCED BIODEGRADATION (ISEB) WITH SURFACTANT PRE-TREATMENT AND LIMITED GROUNDWATER RECOVERY....87
9.5 DISPROPORTIONATE COST ANALYSIS....91

10.0 CONCLUSIONS AND ADDITIONAL WORK....93

11.0 REFERENCES....94

LIST OF FIGURES
(Following Text)

FIGURE 1	VICINITY MAP
FIGURE 2	SITE PLAN
FIGURE 3	SITE LAND USE MAP
FIGURE 4	SITE PLAN WITH SOIL BORING AND WELL LOCATIONS
FIGURE 5	SITE PLAN WITH SOIL ANALYTICAL DATA
FIGURE 6	CROSS-SECTION A-A′
FIGURE 7	CROSS-SECTION B-B′
FIGURE 8	CROSS-SECTION C-C′
FIGURE 9	SITE PLAN WITH GROUNDWATER ANALYTICAL DATA (JANUARY/FEBRUARY 2013)
FIGURE 10	SITE PLAN WITH ADDITIONAL GROUNDWATER ANALYTICAL DATA (JANUARY/FEBRUARY 2013)
FIGURE 11	GROUNDWATER ELEVATION CONTOURS – SHALLOW WELLS (JANUARY 2013)
FIGURE 12	GROUNDWATER ELEVATION CONTOURS – INTERMEDIATE WELLS (JANUARY 2013)
FIGURE 13	GROUNDWATER ELEVATION CONTOURS – DEEP WELLS (JANUARY 2013)
FIGURE 14	SITE PLAN WITH SURFACE WATER ANALYTICAL DATA
FIGURE 15	SITE PLAN WITH WETLAND AND RETENTION BASIN SOIL ANALYTICAL DATA
FIGURE 16	LIF MAXIMUM FLOURESCENCE
FIGURE 17	LIF 4DIM SCREEN CAPTURES
FIGURE 18	EXAMPLE LIF PROFILES AND AVERAGE WATER TABLE

FIGURE 19 G-18 CORE PHOTOGRAPHY

FIGURE 20 G-19 CORE PHOTOGRAPHY

FIGURE 21 G-23 CORE PHOTOGRAPHY

FIGURE 22 G-25 CORE PHOTOGRAPHY

FIGURE 23 G-30 CORE PHOTOGRAPHY

FIGURE 24 G-31 CORE PHOTOGRAPHY

FIGURE 25 G-35 CORE PHOTOGRAPHY

FIGURE 26 G-39 CORE PHOTOGRAPHY

FIGURE 27 G-42 CORE PHOTOGRAPHY

FIGURE 28 TPHG SOIL CHEMISTRY 4DIM SCREEN CAPTURES

FIGURE 29 TPHD SOIL CHEMISTRY 4DIM SCREEN CAPTURES

FIGURE 30 BENZENE SOIL CHEMISTRY 4DIM SCREEN CAPTURES

FIGURE 31 NAPHTHALENE SOIL CHEMISTRY 4DIM SCREEN CAPTURES

FIGURE 32 CONCEPTUAL SITE MODEL

FIGURE 33 SITE PLAN WITH SPH PLUME EXTENTS

FIGURE 34 GROUNDWATER DRAWDOWN VS. DISTANCE TO WELL EX-1

FIGURE 35 GROUNDWATER DRAWDOWN VS. DISTANCE TO WELL RWx-2

FIGURE 36 GROUNDWATER DRAWDOWN VS. DISTANCE TO WELL RWx-5

FIGURE 37 GROUNDWATER DRAWDOWN VS. DISTANCE TO WELL LAIx-5

FIGURE 38 GROUNDWATER DRAWDOWN VS. DISTANCE TO WELL LAIx-2

FIGURE 39 EX-1 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

FIGURE 40 RWx-2 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

FIGURE 41 HW-W WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

FIGURE 42 RWx-5 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

FIGURE 43 LAIx-5 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

FIGURE 44 LAIx-2 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

FIGURE 45 EX-1 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL

FIGURE 46 RWx-2 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL

FIGURE 47 HW-W VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL

FIGURE 48 RWx-5 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL

FIGURE 49 LAIx-5 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL

FIGURE 50 LAIx-2 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL

LIST OF TABLES
(Following Figures)

TABLE 1 SOIL ANALYTICAL DATA

TABLE 2 SITE-WIDE GROUNDWATER MONITORING WELL NETWORK

TABLE 3 GROUNDWATER ANALYTICAL DATA

TABLE 4 ADDITIONAL GROUNDWATER ANALYTICAL DATA

TABLE 5 GROUNDWATER ELEVATION DATA

TABLE 6 SURFACE WATER ANALYTICAL DATA

TABLE 7 ADDITIONAL SURFACE WATER ANALYTICAL DATA

TABLE 8 WETLAND AND RETENTION BASIN SOIL ANALYTICAL DATA

TABLE 9 SITE-WIDE SURVEY DATA

TABLE 10 SUMMARY OF LASER-INDUCED FLOURESCENCE SURVEY RESULTS

TABLE 11 SUMMARY OF LABORATORY TEST PROGRAM AND LNAPL SATURATION RESULTS

TABLE 12 LNAPL VELOCITY ESTIMATES

TABLE 13 SUMMARY OF SLUG TEST HYDRAULIC CONDUCTIVITIES

TABLE 14 AS/SVE PILOT TEST MASS REMOVAL CALCULATIONS

TABLE 15 AS/SVE PILOT TEST RADIUS OF INFLUENCE CALCULATIONS

TABLE 16 GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA – EXTRACTION WELL EX-1

TABLE 17 GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA – EXTRACTION WELL RWx-2

TABLE 18 GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA – EXTRACTION WELL HW-W

TABLE 19 GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA – EXTRACTION WELL HW-N

TABLE 20 GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA – EXTRACTION WELL RWx-5

TABLE 21 GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA – EXTRACTION WELL LAIx-5

TABLE 22 GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA – EXTRACTION WELL LAIx-2

TABLE 23 GROUNDWATER OPERATIONAL AND MASS REMOVAL DATA

TABLE 24 VAPOR PHASE OPERATIONAL AND MASS REMOVAL DATA – INDIVIDUAL WELLS

TABLE 25 RADIUS OF INFLUENCE ESTIMATES

TABLE 26 PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES

TABLE 27 DISPROPORTIONATE COST ANALYSIS

LIST OF APPENDICES
(Following Tables)

APPENDIX A EXAMPLE LIF OUTPUT

APPENDIX B LNAPL EQUATIONS

APPENDIX C PREVIOUS INVESTIGATIONS SUMMARY

APPENDIX D STRATIGRAPHY LOGS

APPENDIX E ENGINEERING ASSESSMENT OF SECONDARY CONTAINMENT DIKES

APPENDIX F LIF 4-DIM FILES

APPENDIX G LIF RESULTS

APPENDIX H SOIL CORE PHOTOGRAPHY

APPENDIX I SOIL CORE PETROPHYSICAL RESULTS

APPENDIX J SOIL ANALYTICAL 4-DIM FILES

APPENDIX K DATA VALIDATION AND LABORATORY ANALYTICAL REPORTS

APPENDIX L PUMP TEST HYDROGRAPHS AND AQTESOLV™ REPORTS

APPENDIX M GROUNDWATER MODELING REPORT

APPENDIX N DPE PILOT TEST FIELD FORMS

APPENDIX O LNAPL FORENSICS

APPENDIX P TERRESTRIAL ECOLOGICAL EVALUATION FORMS

1.0 INTRODUCTION

This Remedial Investigation and Feasibility Study (RI/FS) Report presents a summary of field activities and data analysis for RI/FS activities completed at the Phillips 66 Renton Terminal located at 2423 Lind Avenue Southwest, Renton, Washington. A vicinity map is presented as Figure 1 and a Site Plan is presented as Figure 2. The RI/FS activities were conducted in accordance with the Remedial Investigation and Feasibility Study Work Plan (Work Plan) dated February 2011 and the Site Specific Health and Safety Plan (HASP).

1.1 REGULATORY CONTEXT

On August 5, 2010 ExxonMobil Oil Corporation (ExxonMobil), ConocoPhillips Risk Management and Remediation (ConocoPhillips) (now Phillips 66 company [P66]), and The Washington State Department of Ecology (Ecology) entered into an Agreed Order (Order No. DE 7882). The mutual objective of Ecology, ExxonMobil Oil Corporation, and Phillips 66 (P66) under the Agreed Order is to provide for remedial action at a facility where there has been a release of hazardous substances. The Agreed Order was issued pursuant to the Model Toxics Control Act (MTCA), RCW 70.105D.050(1). The Agreed Order requires ExxonMobil and P66 to complete a remedial investigation in accordance with Washington Administrative Code (WAC) 173-340 to determine the nature and extent of contamination associated with the Site and a feasibility study to determine the appropriate remedial action. The remedial investigation and feasibility study summarized in this report meets the requirements outlined in Exhibit B of the Agreed Order.

1.2 OBJECTIVES

The objectives of the remedial investigation and feasibility study outlined in Exhibit B of the Agreed Order and in Section 1.2 of the Work Plan are as follows:

i. Define the nature and extent of subsurface contamination at the Site. Include results of previous subsurface work employed to define the extent of subsurface impacts. Indicate requirements for further delineation if necessary to further define the extent of subsurface impacts.
ii. Design and implement a Site-wide groundwater monitoring network.

iii. Periodically assess the effectiveness of the interim remedial action.

iv. Identify risk pathways and receptors for contaminants of potential concern.

v. Ensure the existing remedial systems are sufficiently preventing off-Property migration of the hydrocarbon plume.

vi. Assess soil and surface water in the adjacent wetland to the west and northwest of the Property.

vii. Assess potential impacts to the adjacent wetland and stormwater retention basin.

viii. Complete an engineering and stability assessment of the containment dike surrounding the main tank farm area and the surface water containment dike in the southwest corner of the storm water retention basin.

ix. Complete a Site conceptual model based on historical data.

x. Indicate any evidence of contamination coming from off-Property.

xi. Computer modeling may be used to predict groundwater migration of contaminants. Results of modeling could be used to predict the effectiveness of the remediation system.

xii. Pilot and/or bench scale tests may be implemented to evaluate the effectiveness of potential remedial alternatives.

xiii. Preparation of a feasibility study to evaluate cleanup action alternatives per MTCA WAC 173-340-360.

Objectives ii, iii and v are addressed in the quarterly groundwater monitoring and remediation progress reports. All other objectives are addressed in this report.

2.0 SITE IDENTIFICATION AND DESCRIPTION

2.1 SITE DISCOVERY AND REGULATORY STATUS

Four separate releases have been documented. The first release was documented in 1986 in the vicinity of the current loading racks on the northern portion of the Site. Additional suspected releases were documented in 1990 and 1991 in the vicinity of the loading racks but were never confirmed to be separate from the original release. In 2002, a confirmed release from above ground storage tank (AST) #2 was documented. Additional information regarding the four documented releases is available in the Remedial Investigation and Feasibility Study Work Plan.

Mobil (the predecessor to ExxonMobil) began terminal operations in 1968 and operated the facility until 1988 when the Property was sold to British Petroleum Exploration & Oil (BP). Tosco Corporation (predecessor to ConocoPhillips now Phillips 66) purchased the Property from BP in 1993 and P66 is the current owner/operator.

Following the discovery of the initial release in 1986, ExxonMobil began investigation and cleanup activities under Enforcement Order DE 87-N301 issued by Ecology on October 14, 1987. Cleanup activities consisted of the operation of a groundwater extraction system equipped with two recovery trenches. Following the discovery of the 2002 release, ConocoPhillips began investigation and cleanup activities associated with the 2002 release under Ecology's Voluntary Cleanup Program (VCP). Cleanup activities consisted of product recovery from wells using a vacuum truck and operation of a dual phase extraction system. Additional information regarding the two remediation systems is available in the quarterly remediation progress reports for the Site.

Both the ExxonMobil/BP and P66 systems continued to be operated independently by the two parties. On August 5, 2010, Ecology, ExxonMobil, and ConocoPhillips (now P66) entered into an Agreed Order (DE 722), effectively combining both contaminated areas into one Site. The purpose of the agreed order is to facilitate completion of a Site-wide remedial investigation and implementation of a final remedial action.

2.2 SITE DESCRIPTION

The Property is an active bulk petroleum distribution terminal located at 2423 Lind Avenue Southwest in Renton, Washington (Figures 1 and 2 show the Property location and layout, respectively). The Property occupies approximately 7 acres and is situated at

the northwest corner of the intersection of Lind Avenue Southwest and Southwest 27th Street.

The Property is located in King County in the northwest quarter of section 30; Township 23 North; Range 5 East. The eastern portion of the parcel is occupied by the terminal facility and the western portion of the parcel is a wetland (King County Tax Parcel Number 3023059086).

2.2.1 PROPERTY FACILITIES

The following description is based on observations and details provided in the Property's Stormwater Pollution Prevention Plan (SWPP) dated November 22, 2004.

The facility receives, stores, loads and dispatches bulk petroleum products including gasoline, diesel fuel, kerosene, ethanol, and additives.

The facility is constructed on fill material surrounded by undeveloped land. The Property contains an earthen tank farm that stores refined petroleum products, one truck rack for loading/unloading products with a spill collection system, an office building and an associated fuel dispensing facility for vehicles.

The tank farm consists of seven primary refined product ASTs with a combined nominal capacity of 248,805 unit barrels of oil (bbls), and four ASTs storing additives. Figure 2 shows the Property layout.

Each AST is surrounded by concrete block walls approximately 3 feet in height. The entire AST tank farm area is surrounded by an earthen containment berm which provides secondary containment.

2.2.2 SURROUNDING LAND USE

The area consists of mixed commercial businesses and vacant undeveloped land. Figure 3 shows the surrounding land use;

- North: Olympic Pipeline Renton Terminal (2319 Lind Avenue Southwest)
- South: Southwest 27th Street, beyond Southwest 27th Street is undeveloped wetland (2705 Lind Avenue Southwest) owned by The City of Renton

- East: Lind Avenue Southwest, beyond Lind Avenue Southwest is an undeveloped wetland (2600 Lind Avenue Southwest) owned by BIT Holdings Twenty Two, Inc.
- West: AllPak Container Corporation (800 SW 27th Street) occupies the property to the west of the on-Property wetland

2.3 GEOLOGIC/HYDROGEOLOGIC SETTING

2.3.1 REGIONAL GEOLOGIC/HYDROGEOLOGIC SETTING

The Site lies near the mouth of the Duwamish-Green River valley. Geologic deposition in the Duwamish-Green River Valley consists primarily of alluvial sand, silts, and gravels up to 600 feet thick at the south end of the valley and gradually taper out toward the north end of the valley. The alluvial deposits are underlain by Pleistocene deposits consisting of primarily glacial till and outwash. The Pleistocene deposits are underlain by igneous intrusive and volcanic bedrock. Thin, shallow peat and swamp deposits are present in some areas where closed depressions are present. Groundwater is typically present in significant capacity in the alluvial material deposited throughout the Duwamish-Green River Valley. Regional groundwater flow is to the northwest and typical depth to groundwater in the alluvial deposits is between 10 and 20 feet below ground surface (bgs). (source: J. E. Luzier, Geology and Groundwater Resources of Southwestern King County, 1969)

2.3.2 SITE-SPECIFIC GEOLOGIC/HYDROGEOLOGIC SETTING

The Site lies on the northern end of the Duwamish-Green River valley. Historically, the Site was primarily wetlands. When the Site was developed sometime between 1964 and 1968, a portion of the wetlands were filled in and the Terminal built on it. Wetlands are still present surrounding the property. Current stratigraphy at the Site consists of 7 to 10 feet of structural fill (primarily silty sand with varying amounts of gravel). The fill is underlain by a 1 to 7-foot thick highly organic silt material, which are likely wetland deposits. The organic silt layer appears to be thickest in the area just west of the loading racks and tends to thin out to the east. The organic material is underlain by alluvial sand and silt deposits. The total thickness of the alluvial deposits has not been investigated at the Site. A well 1,600 feet west of the property indicates alluvial material to a maximum explored depth of 100 feet bgs. Groundwater at the Site consists of a shallow perched water bearing zone in the porous backfill material overlying the silty,

less porous native silt layer. The perched water bearing zone appears to be primarily recharged by infiltration in the earthen tank farm area at the Site. Groundwater tends to flow radially from this recharge area with often steep horizontal gradients and likely discharges to the wetlands, the stormwater retention basin in the southeast corner of the property, and to extraction wells located at the Site. Vertical gradients at the Site are downward indicating that a portion of the groundwater in the perched water bearing zone likely trends downward and recharges the deep aquifer. The deep aquifer has a very shallow gradient and flows to the west-northwest. The Site-specific geology is derived from a review of historical subsurface investigations completed between 1986 and 2012.

3.0 REMEDIAL INVESTIGATION FIELD ACTIVITIES

3.1 LASER INDUCED FLOURESCENCE ACTIVITIES AND METHODOLOGY

The following field activities were conducted to complete the light non-aqueous phase liquid (LNAPL) delineation and mobility/recoverability evaluation:

- Utilized laser induced fluorescence (LIF) survey data to further characterize and define the lateral and vertical extents of the LNAPL impacts and select locations for the collection of soil core samples
- Collected relatively undisturbed soil cores to represent the overall impacted area spatially, all apparently unique LNAPL-soil type pairs, and including the areas of highest/worst-case impacts (i.e., highest LNAPL saturations)
- Submitted the soil cores for laboratory photography, petrophysical and geotechnical testing to estimate LNAPL mobility/recoverability potential

The methodology used to evaluate the LIF data, collect soil cores and complete the laboratory testing is presented below. The LIF survey data and laboratory test results are presented in Section 4.1.

3.1.1 LIF/UVOST SURVEY

The LIF survey was performed by Matrix Environmental LLC of Osseo, Minnesota using the Ultra-Violet Optical Screening Tool (UVOST) system. The UVOST survey was completed with the oversight of CRA in September 2011.

The LIF technology detects LNAPL by screening for the presence of polycyclic aromatic hydrocarbons (PAHs) present in petroleum fuels during the advancement of a specialized direct-push probe. The LIF probe is equipped with a sapphire window through which a laser is directed. The laser light is absorbed by PAH molecules in contact with the window as the probe is advanced. This addition of energy (photons) to the PAHs causes them to fluoresce as they return to ground state after excitation. A portion of the fluorescence emitted from any encountered PAHs is returned through the sapphire window and conveyed by a fiber optic cable to a detection system at the surface. The emission data from the pulsed laser light is averaged into one reading per one-second intervals and is recorded continuously. The emission data is reported as percent of the fluorescence intensity of a "reference emitter" (%RE). The %RE is

quantified with reference to the fluorescence produced by a standard proprietary hydrocarbon liquid mixture used to calibrate the equipment. For example, an LIF location producing a reading of 100%RE is fluorescing at exactly the same intensity as the standard hydrocarbon mixture. Other things being equal, LIF response is proportional to the amount of aromatic hydrocarbon present. More specifically, LIF response is proportional to LNAPL saturation (i.e., percent of the pore space that is filled with LNAPL). In addition, the LIF instrumentation measures the intensities of four different wavelengths of light produced when a given LNAPL fluoresces. The proportions of each wavelength that comprise the overall fluorescence response are unique to a given petroleum product type, allowing the real-time identification of LNAPL types in the field.

In short, an LIF survey can:

- Provide definitive delineation of LNAPL/free product impacts vertically and laterally both above and below the water table
- Identify areas of a plume with the highest mobility/recoverability potential by determining the relative intensity of impacts across the plume (i.e., a location producing an LIF response of 300%RE will generally represent a higher LNAPL saturation and greater potential for mobile and/or recoverable LNAPL than a location producing an LIF response of 100%RE)
- Provide an indication of LNAPL type

LIF survey results, by themselves, cannot:

- Specifically quantify LNAPL saturation or mobility (without follow-up targeted well installation and/or soil core testing to "calibrate" LIF responses)
- Detect dissolved or vapor phase contamination – only product phase concentrations are detected

The main features of a typical LIF result are explained in the sample output included as Appendix A. The UVOST investigation was conducted at a total of 26 locations (G-18 through G-43) to a depth ranging from 15 to 20 feet bgs.

3.1.2 SOIL CORE SAMPLING

CRA collected relatively undisturbed soil cores in select locations in the LNAPL-impacted soil zones based on the LIF results. The results of the LIF survey were used to select sample locations and sample intervals to represent the range of impacts identified by the LIF survey. More specifically, locations were selected based on the following considerations:

- LIF response intensities
- LNAPL types (inferred from LIF results)
- Areal coverage of soil cores across the area

Boreholes were advanced at strategic locations using Geoprobe drilling and sampling methods. Soil cores were collected from a total of 13 locations. Once at the appropriate depth below ground surface, soil cores were collected using the Geoprobe Macrocore sampling system. Macrocore samples were collected in 2-inch diameter, 5-foot long, clear acetate liners. Sample intervals were selected based on the vertical extent of the LNAPL impacted zone identified by the corresponding LIF profile. Upon retrieval from the ground, the cores were sealed at each end to prevent fluid loss, stored on dry ice to freeze the cores and preserve the pore fluids, and shipped to PTS Laboratories (PTS) in Santa Fe Springs, California for soil core photography and subsequent petrophysical/mobility testing.

3.1.3 CORE PHOTOGRAPHY

Core photography was performed consistent with American Society for Testing and Materials International (ASTM) D5079. More specifically, frozen soil cores were cut open along the vertical length of the sample tube to enable photographs to be taken of the soil cores. Soil cores were allowed to partially thaw along the surface prior to photographing. The partial thawing was allowed to enable LNAPL, where present, to pool to the surface of the profile. Photographs were taken in both white light and ultraviolet (UV) light. The white light photographs displayed the natural state (color, texture) of the soil profile including any pooled LNAPL, where applicable. The UV photos were used to identify LNAPL by the same principal described with respect to the LIF/UVOST technology. As previously mentioned, LNAPL tends to fluoresce when exposed to UV light. For a given pairing of LNAPL and LNAPL-impacted soil type, the intensity of fluorescence is proportional to the amount of LNAPL, with higher intensities

corresponding to greater LNAPL saturations. UV photos also provide qualitative information regarding the type of LNAPL. Generally speaking, lighter end petroleum compounds, such as gasoline or kerosene, tend to fluoresce white or blue; middle distillates including diesel and No. 2 fuel oil tend to fluoresce blue, yellow or gold; and heavier end compounds such as oils and coal tars tend to fluoresce red or brown.

Core photographs were provided by the laboratory to CRA to enable the identification of discrete (two tenths of a foot) intervals of maximum UV fluorescence. Select intervals were then designated for laboratory testing of mobility parameters.

3.1.4 LABORATORY TESTING

Discrete soil intervals of maximum UV fluorescence were determined qualitatively from the core photography. Core photography of the soil in the core under white light was also considered to evaluate the pore structure and gradation of the soil samples in the respective sample zones for maximum porosity. These locations in the core soil samples were selected for one or more of the following laboratory tests (with methods shown in parentheses where applicable):

- Grain size analysis (ASTM D422/D4464M)
- Soil bulk density, grain density, total and air-filled porosity, hydraulic conductivity measurements (various)
- Initial pore fluid (water and LNAPL) saturations (American Petroleum Institute [API] RP40)
- Initial and final LNAPL saturations using the Water Drive method (Proprietary/API RP40)
- Residual water saturation and van Genuchten parameters (ASTM D6836)

Some of the key laboratory test methods are further described below.

3.1.5 LNAPL SATURATION AND RESIDUAL SATURATION TESTING

Select soil core subsamples were subjected to initial and residual LNAPL saturation testing via the Water Drive method. This test is considered to yield a LNAPL residual saturation value that is more representative of LNAPL mobility and recoverability conditions under realistic pressure gradients and drainage conditions than other

available tests (i.e., 1,000 g centrifugal method or water/LNAPL drainage/imbibition capillary pressure testing). An additional subsample was selected for the determination of pore fluid saturations (i.e., initial LNAPL and water saturations) for certain locations with more than one discrete interval of comparable fluorescence. This was conducted to ensure that the zones of maximum LNAPL impacts were tested to allow a conservative evaluation of LNAPL mobility/recoverability. For each location, the discrete soil interval(s) of maximum UV fluorescence were selected for the respective testing.

LNAPL saturations in soil were determined by the laboratory using the API RP40 Method (via a Dean-Stark extraction procedure). Initial LNAPL saturations were determined either from the Pore Fluids Saturation test or the Residual Saturation by Water Drive test. Subsamples selected for the Water Drive test were additionally driven to residual LNAPL saturation by flushing the sample with multiple pore volumes of water under 25 psi confining pressure.

The potential for LNAPL mobility/recoverability was evaluated by comparing laboratory-measured initial LNAPL saturations to residual saturations. Any locations having initial LNAPL saturations that exceeded the corresponding residual LNAPL saturations (i.e., LNAPL was released from the soil sample during the Water Drive) were deemed to be potentially mobile, and therefore potentially recoverable. In addition to providing a direct line of evidence regarding the potential mobility/recoverability of the LNAPL, the results of this testing also provided inputs for the analytical modeling discussed in Section 3.1.8.

3.1.6 SOIL GRAIN SIZE ANALYSIS

Select soil core subsamples were submitted to the laboratory for grain size analysis. The subsamples were selected to represent the range of impacted soil types observed in the results of the core photography. Soil grain size was evaluated to confirm impacted soil types.

3.1.7 CAPILLARY PRESSURE TESTING

Subsamples were selected from certain soil cores and subjected to air/water drainage capillary pressure testing to determine the irreducible (residual) water saturations, hydraulic conductivities, soil bulk and grain densities, total and air-filled porosities. Curve fitting was also conducted for each of the moisture retention curves developed

during the air/water capillary testing to determine the respective van Genuchten parameters and estimate the residual/irreducible water saturations. These curve fitting parameters describe the drainage characteristics of the soil and are key inputs in LNAPL analytical modeling.

3.1.8 LNAPL ANALYTICAL MODELING

LNAPL saturation is continuously variable across the vertical LNAPL impacted zone, both above and below the water table. In order to perform a conservative evaluation of the potential mobility and recoverability of the LNAPL, maximum LNAPL relative permeability, conductivity, and saturation values can be utilized to approximate an upper limit for potential LNAPL mobility. The maximum LNAPL saturation may be obtained through calculation or a combination of field and laboratory techniques. This maximum saturation may then be used to calculate the maximum (or most conservative estimate of) LNAPL relative permeability and mobility potential (through the estimation of LNAPL velocity). A discussion of the analytical equations used to describe LNAPL occurrence, behavior and migration at the water table upon which the modeling is based is presented in Appendix B. This methodology was derived from API (2003) and is discussed more recently as part of the Interstate Technology and Regulatory Council's (ITRC) web-based LNAPL training (Part 2, 2009).

As stated previously, CRA selected the areas of maximum fluorescence from the core photography results, with consideration given to different LNAPL and/or impacted soil types, to determine the corresponding laboratory-measured 'maximum' LNAPL saturations. These 'maximum' LNAPL saturations were then used as the primary inputs to determine corresponding LNAPL relative permeability, conductivity, mobility and velocity values using capillary pressure principles and analytical modeling techniques consistent with API methodology. Consequently, CRA carried out the analytical modeling calculations in the most conservative/worst-case manner. Any calculated LNAPL velocity values exceeding a de minimis value of 10^{-6} centimeters per second (cm/s) (ASTM, 2007) were deemed to be potentially mobile, and therefore potentially recoverable.

CRA used the laboratory-measured 'maximum' LNAPL saturations and the methodology outlined in Appendix B to generate an assumed maximum LNAPL relative permeability value for each of the tested soil core sub-samples. CRA then used the calculated relative permeability values and other Site-specific inputs to calculate

maximum LNAPL conductivity, mobility and velocity values at each soil core location. Specifically, CRA:

- Obtained assumed maximum LNAPL saturation values for each soil core from lab results
- Calculated maximum LNAPL relative permeability values using Equations 4.10 through 4.13 (Appendix B)
- Calculated maximum LNAPL conductivity values using Equations 4.7, 4.8 and 4.9 (Appendix B)
- Calculated maximum LNAPL mobility values using Equation 4.6 (Appendix B)
- Calculated maximum LNAPL velocity values using Equation 4.26 (Appendix B)

As previously mentioned, the calculation inputs were selected to provide the most conservative site-specific mobility calculations. More specifically, the calculation inputs were selected as follows:

- LNAPL Saturation (S_o): Laboratory values for each respective subsample
- Water Saturation (S_w): Laboratory values for each respective subsample
- Irreducible Water Saturation (S_{wr}): The minimum value from the laboratory-generated water retention curve fitting (i.e., from air/water drainage capillary pressure testing) that was less than each subsample's water saturation was utilized
- van Genuchten N (N): The maximum value was utilized from all calculated values from the laboratory-generated water retention curves (i.e., from air/water drainage capillary pressure testing)
- LNAPL Density (ρ_o): Typical literature value (API, 2004) for the most dense LNAPL type detected at the Site was used (i.e., diesel LNAPL-type)
- LNAPL Viscosity (μ_o): Typical literature value (API, 2004) for the least viscous LNAPL type detected at the Site was used (i.e., gasoline LNAPL-type)
- Total Soil Porosity (Φ): Lowest of the laboratory-generated values was used
- Hydraulic Gradient (i_w): Typical value from historic Site data for wells screened in the LNAPL-impacted soil zone
- Hydraulic Conductivity (K_w): The maximum laboratory value generated during air/water drainage capillary pressure testing was used

3.2 SOIL SAMPLING

Numerous soil investigations have been completed prior to the implementation of the agreed order. Details regarding previous investigations are summarized in Appendix C. Following implementation of the agreed order, soil sampling activities were completed between October 4 and October 13, 2011, December 1, 2011, between July 9 and July 11, 2012, and on March 22, 2013. Two additional soil samples were collected from an excavation to install product piping in the southeast corner of the loading racks on April 30, 2012.

October and December, 2011 Investigations

CRA oversaw the installation of 22 soil borings to delineate the vertical and lateral extent of contaminants at the Site. All 22 soil borings were completed as 2-inch PVC monitoring wells. The drilling and installation details are as follows:

- Fifteen soil borings (MW-1 through MW-10, MW-14, MW-15, D-1R, D-4R, and D-5R) were advanced to 20 feet bgs using a limited access sonic rig. Borings were completed as 2-inch PVC monitoring wells screened from 5 to 20 feet bgs.
- Four soil borings (MW-11, MW-12, MW13, and MW-16) were advanced to 20 feet bgs using a direct push drill rig. The borings were then over-drilled with a hollow stem auger rig and completed as 2-inch PVC monitoring wells screened from 5 to 20 feet bgs.
- Three soil borings (DW-1, DW-2, and DW-3) were advanced to 40 feet bgs using a limited access sonic rig. Borings were completed as 2-inch PVC monitoring wells screened from 20 to 40 feet bgs.

April 2012 Excavation Sampling

During installation of product piping being completed by terminal operations, CRA collected soil samples from a small excavation located in the southwest corner of the loading racks, just south of the underground process tanks.

July 2012 Investigation

CRA oversaw the installation of 2 soil borings (MW-17 and DW-4) to further delineate the vertical and lateral extent of contaminants to the north, 8 soil borings (TW-1 through TW-8) for pump testing purposes, and one soil boring (AS-1) for air sparge pilot testing. All soil borings were completed as groundwater monitoring or pilot testing wells. The drilling and well installation details are as follows:

- One boring (MW-17) was advanced to 20 feet bgs using a direct push drill rig. The boring was then over-drilled with a hollow stem auger rig and completed as a 2-inch PVC monitoring well screened from 5 to 20 feet bgs.
- One boring (DW-4) was advanced to 40 feet bgs using a direct push drill rig. The boring was then over-drilled with a hollow stem auger rig and completed as a 2-inch PVC monitoring well screened from 20 to 40 feet bgs.
- Three borings (TW-4, TW-6, and TW-8) were advanced to 10.5 feet bgs using a direct push drill rig. The borings were completed as 2-inch PVC shallow observation wells with a prepacked screen from 4 to 9 feet bgs.
- Three borings (TW-3, TW-5, and TW-7) were advanced to 40 feet bgs using a direct push drill rig. The borings were completed as 2-inch PVC deep observation wells with a prepacked screen from 20 to 30 feet bgs.
- One boring (TW-1) was advanced to 40 feet bgs using a direct push drill rig. The boring was then over-drilled with a hollow stem auger rig and completed as a 4-inch stainless steel test well screened from 20 to 40 feet bgs.
- One boring (TW-2) was advanced to 10.5 feet bgs using a direct push drill rig. The boring was then over-drilled with a hollow stem auger rig and completed as a 4-inch stainless steel test well screened from 4 to 9 feet bgs.
- One boring (AS-1) was advanced to 30 feet using a hollow stem auger rig and completed as a 2-inch PVC air sparge pilot test well screened from 25 to 30 feet bgs.

March 2013 Well Installation

CRA oversaw the installation of 3 soil borings (EX-1, P-1 and P-2) for dual phase extraction pilot testing purposes. All soil borings were completed as pilot testing wells. The drilling and well installation details are as follows:

- One boring (EX-1) was advanced to 20 feet bgs using a hollow stem auger drill rig and completed as a 6-inch PVC monitoring well screened from 8 to 15 feet bgs. The well screen was constructed of 6-inch, .020 slot, PVC V-Wire wrapped screen.
- Two borings (P-1 and P-2) were advanced to 15 feet bgs using a hollow stem auger drill rig and completed as 2-inch PVC monitoring wells with .010 slotted screen from 8 to 15 feet bgs.

Soil samples were collected from each soil boring based on field screening using a photo-ionization detector (PID). Soil samples were typically selected from the highest

PID reading(s) and near the bottom of each boring or where field screening indicates clean soil. Soil samples collected during the event were placed immediately on ice and transported to Pace Analytical Laboratories via courier under chain of custody. Sample analyses included total petroleum hydrocarbons (TPH) in the gasoline range (TPHg) per Ecology Method NWTPH-Gx; TPH in the Diesel (TPHd) and oil (TPHo) ranges per Ecology Method NWTPH-Dx; benzene, toluene, ethylbenzene, xylene (BTEX), and Methyl-Tertiary Butyl Ether (MTBE) per EPA Method 8260B, Semi-volatiles per EPA Method 8270, and total lead and arsenic per EPA Method 6020. Soil samples collected from EX-1 were analyzed for extractable petroleum hydrocarbons (EPH) per Method WA NWEPH and volatile petroleum hydrocarbons per Method WA NWVPH.

The locations of the soil borings/wells are presented on Figure 4. Stratigraphy and well completion logs are presented in Appendix D. Soil sampling depths and analytical data are presented on Table 1 and Figure 5. Cross sections depicting soil stratigraphy and analytical results are presented on Figures 6 through 8.

3.3 GROUNDWATER SAMPLING

Groundwater throughout the Site, prior to implementation of the agreed order, has historically been monitored with two separate monitoring well networks consisting of:

- A monitoring well network associated with the 1986 loading rack release
- A monitoring well network associated with the AST #2 release

The loading rack release well network was monitored from the early 1990s until 2008 by Hart Crowser, Kleinfelder and AME. The AST #2 release well network was regularly monitored by Landau and SECOR / Stantec from 2003 until 2009. Both networks consist of monitoring wells screened in the perched groundwater zone at depths of between 5 and 10 feet.

The pre-existing monitoring wells associated with 1986 loading rack release consist of:

- B-1 through B-6
- HA-1 through 14
- D-1 through D-8
- W-1 through W-4

- R-1 through R-2

The pre-existing monitoring wells associated with the 2002 AST #2 release consist of:

- RW-1 through RW-7
- HA-15 through HA-20
- LAI-1 through LAI-16
- HWx-1E and HWx-1W

Coordination of monitoring events between the two parties began in 2009. Quarterly monitoring of all wells as a Site-wide monitoring well network began in February 2011.

Additional monitoring wells were installed as part of the remedial investigation activities discussed in Section 3.2. The purpose of the additional monitoring wells is to determine the lateral and vertical extent of the groundwater contaminant plume and to replace several monitoring wells that were not functioning properly or had been destroyed. The new monitoring wells and their purpose are as follows:

- MW-1 through MW-17 – Installed to determine the lateral extent of contamination to the north, south, east, and west
- D-1R, D-4R, and D-5R – Installed to replace pre-existing wells that had been destroyed or were not functioning properly
- DW-1 through DW-4 – Installed to determine the lateral and vertical extent of contamination beneath the Site

A table listing the wells included in the Site-wide groundwater monitoring network, the sampling schedule, and analytical requirements is presented in Table 2. The locations of the wells in the monitoring network are present on Figure 4.

Site-wide groundwater sampling activities have been completed quarterly since February 2011. Groundwater samples are collected using low-flow sampling procedures when possible. Samples collected during each event were placed immediately on ice and transported to Pace Analytical Laboratories via courier under chain of custody. Sample analyses included TPHg per Ecology Method NWTPH-Gx; TPHd and TPHo ranges per Ecology Method NWTPH-Dx; BTEX, and MTBE per EPA Method 8260B. In addition, samples collected from select wells, based on historical data,

were analyzed for the full list of volatile organic compounds (VOC) per EPA Method 8260, Semi-volatiles per EPA Method 8270, and total lead and arsenic per EPA Method 6020. Historical groundwater analytical results are presented in Tables 3 and 4. Current analytical results are presented on Figures 9 and 10.

3.4 HYDRAULIC MONITORING

Hydraulic monitoring of the Site-wide monitoring well network has been completed quarterly since February 2011. The purpose of the hydraulic monitoring is to evaluate groundwater flow direction(s) and gradient(s) throughout the Site to aid in the evaluation of contaminant transport and contaminant plume capture by the existing groundwater extraction systems and to monitor LNAPL thickness, if present, in the monitoring wells. Prior to the implementation of the agreed order, monitoring wells at the Site were primarily screened in the upper perched water bearing zone. As part of the remedial investigation activities described in Section 3.2, 20 new monitoring wells (MW-1 through MW-17, D-1R, D-4R, and D-5R) were installed with a screened interval from 5 to 20 feet bgs. Additionally, four new monitoring wells (DW-1 through DW-4) were installed with a screened interval from 20 to 40 feet bgs. Hydraulic monitoring data from these new wells presented slightly different groundwater flow directions and gradients than data from pre-existing wells collected during the same event. To demonstrate the observed differences in groundwater flow directions and gradients based on depth, wells are grouped as follows:

- Shallow – Wells screened in the fill material in the top 10 feet bgs
- Intermediate – Wells screened from 5 to 20 feet bgs
- Deep – Wells screened from 20 to 40 feet bgs

Groundwater elevation data and the wells use in hydraulic monitoring are presented in Table 5 and Figures 11, 12, and 13.

3.5 SURFACE WATER SAMPLING

Prior to implementation of the agreed order, three surface water samples had been collected from the southwest corner of the stormwater retention basin located in the southeast corner of the Site. As part of the remedial investigation, additional surface

water samples were collected from the stormwater retention basin and surrounding wetlands to better assess potential impacts to surface water.

On March 22, 2012, CRA collected 4 surface water samples (SW-1 through SW-4). The rationale for the locations of the surface water samples is as follows:

- SW-1 – Located to the north of monitoring well HA-11. HA-11 has consistently shown groundwater impacts in the shallow water bearing zone that may be discharging to the wetlands.
- SW-2 – Located west of monitoring well MW-10. MW-10 has shown groundwater impacts along the perimeter of the wetlands, west of the office building.
- SW-3 – Located in the southwest corner of the southeast retention basin southeast of monitoring well HA-19 and extraction well LAIx-7. Monitoring well HA-19 and extraction well LAIx-7 have shown groundwater impacts along the perimeter of the stormwater retention basin. Historical impacts to surface water have been seen in this location as recent as 2007.
- SW-4 – Located in the stormwater retention basin east of monitoring well HA-14. Monitoring well HA-14 has shown groundwater impacts along the western perimeter of the stormwater retention basin.

Surface water samples were collected directly into the sample containers from the surface. Samples collected during the event were placed immediately on ice and transported to Pace Analytical Laboratories via courier under chain of custody. Sample analyses included TPHg per Ecology Method NWTPH-Gx; TPHd and TPHo ranges per Ecology Method NWTPH-Dx; volatile organic compounds (VOCs) per EPA Method 8260B; Semi-volatiles per EPA Method 8270, and total lead and arsenic per EPA Method 6020. Surface water analytical results are presented in Tables 6 and 7. The locations of the surface water samples are presented on Figure 14.

3.6 WETLANDS AND RETENTION BASIN SAMPLING

As part of the remedial investigation, soil samples were collected from the stormwater retention basin and surrounding wetlands to better assess potential impacts in these areas.

On April 25 and 26, 2012, CRA collected 19 soil samples (SE-1 through SE-18, and BG-1). The rationale for the locations of the samples is as follows:

- SE-1 through SE-5 – Located to the west of monitoring wells HA-10 and HA-11. Recent and historical soil analytical data have indicated soil impacts adjacent to the wetlands as far north as monitoring well MW-11.
- SE-6 through SE-9 – Located west of monitoring well MW-10. Soil analytical data from boring MW-10 indicated soil impacts adjacent to the wetlands, west of the office building.
- SE-10 through SE-18 – Located along the western perimeter of the stormwater retention basin. Analytical data from soil borings indicate soil impacts adjacent to the southwest corner of the retention basin. Monitoring wells HA-14 and HA-19 have shown groundwater impacts along the perimeter of the stormwater retention basin.
- BG-1 – Located in the wetlands west of the Site. BG-1 provides background data for soil samples collected in the wetlands.

Soil samples were collected directly into the sample containers from 6 inches below the surface using a hand auger. Samples collected during the event were placed immediately on ice and transported to Pace Analytical Laboratories via courier under chain of custody. Sample analyses included TPHg per Ecology Method NWTPH-Gx; TPHd and TPHo ranges per Ecology Method NWTPH-Dx; VOCs per EPA Method 8260B; Semi-volatiles per EPA Method 8270, total lead and arsenic per EPA Method 6020, and total organic carbon (TOC) per EPA Method 9060. Soil analytical results are presented in Table 8. The locations of the samples are presented on Figure 15.

3.7 SURVEYING

Evaluation of hydraulic data as well as soil and groundwater analytical data requires each well and boring to be surveyed to a common horizontal and vertical datum. Prior to implementation of the agreed order, existing soil borings and monitoring well ground surface elevations had not been surveyed.

On January 23 and 24, 2012 and July 23 and 24, 2012, CRA oversaw the surveying all pre-existing and new borings, monitoring wells, wetland and retention basin soil sample locations, surface water sample locations and surface water gauge locations by a licensed surveyor. The X and Y values were established using a GPS receiver. The Z values were established using differential leveling, accurate to within 0.01 foot. The

horizontal datum used was Nad 83 Washington North State Plane coordinates. The vertical datum used was NAVD 88. The results of the survey are presented in Table 9.

3.8 ENGINEERING AND STABILITY ASSESSMENT OF CONTAINMENT DIKE

On July 21, 2011, a geotechnical investigation of the existing soil berm surrounding the P66 Renton Terminals tank farm was conducted by Stantec Corporation. The purpose of the investigation was to identify the existing soil composition of the secondary containment berm and conduct slope stability analyses of the berm. The results of the engineering analysis include slope stability calculations under static and seismic conditions. The results from this investigation are included in Appendix E.

3.9 HYDRAULIC TESTING

Hydraulic testing was completed to determine hydraulic parameters to aid in completion of a computer groundwater model. Hydraulic testing consisted of single well response tests (i.e., slug tests) and pump testing.

3.9.1 SINGLE WELL RESPONSE TESTS

Between March 8 and 14, 2012, CRA conducted single well response tests on 36 monitoring wells (MW-1 through MW-16, D-1R, D-4R, D-5R, DW-1 through DW-3, B-2, B-5, B-6, D-7, HA-1, HA-16, LAIx-2, LAI-10, LAI-12, LAI-14, LAI-15, RW-3, RW-6, RWx-5) throughout the Site. The slug test method was utilized for the single well response tests.

3.9.1.1 SLUG TESTING METHODOLOGY

Using a slug of known volume attached to well-dedicated rope, the water level within the well is instantaneously raised. The return of the water level to static is monitored by use of a pressure transducer system for continuous measurement. Following return of the water level to static, the slug is quickly removed from the well lowering the water level. The return of the water level to static is again monitored. Equipment is decontaminated between wells.

During the first 10 seconds of slug testing, data points are recorded at a minimum of 1-second intervals. Test duration including data recording is extended to include at a minimum the timeframe necessary for the well to recover to 90 percent of its original static water level. Wells which have slug test recovery time of 10 seconds or less are slug tested again using a slug increased in length by 100 percent and increased in diameter to the maximum diameter which can be installed in the well. The length of the slug is not allowed to exceed 8 feet.

Data from the slug tests is evaluated using the Bouwer and Rice Method, "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells", Water Resources Research, Volume 12, No. 3, 1976, pp. 423-428. Each slug test event is performed in accordance with the above procedure, and consists of three rising head and three falling head slug tests. An estimated hydraulic conductivity coefficient (K) will be calculated from each test using the following equation:

$$GM = \sqrt[n]{K_1, K_2, \ldots K_n}$$

Where:
GM = geometric mean hydraulic conductivity
K_n = hydraulic conductivity calculated from the nth slug test
n = number of slug tests (=6)

3.9.2 PUMP TESTING

Pump testing was completed at the Site in the area north of the loading racks. The purpose of the pump testing is as follows:

- Determine the maximum sustainable pumping rate
- Determine the radius of influence while pumping
- Calculate a hydraulic conductivity value for the deep aquifer below the native silt layer

3.9.2.1 STEP DRAWDOWN TESTS

A step drawdown test was completed for test well TW-1 on August 15, 2012. For the pump test, observation wells DW-2 (5 feet west), TW-3 (15 feet north), TW-5 (20 feet east), and TW-7 (10 feet south). Additionally, monitoring wells MW-8 and MW-9 were utilized as background wells to monitor background hydraulic activity. Stratigraphy logs with well completion details for each well are included in Appendix D.

Transducer Setup – A pressure transducer was installed in the extraction well and each observation well. The transducer in the extraction well was installed above the intake of the extraction pump. The transducer was installed far enough above the intake to not be influenced by the inflow of water. The exact elevation of the transducer was measured and recorded prior to starting the test.

The transducers in the observation wells were installed at or near the bottom of the screen interval. The exact elevations of the transducers were measured and recorded prior to starting the test.

Each transducer was programmed to record in 0.5-second intervals for the duration of the step drawdown tests.

Extraction Pump Setup – The extraction pump consisted of a Grundfos Redi-flo III. The pump effluent was fitted with an inline electronic flow meter/totalizer to maintain a constant pumping rate. The extraction pump was installed at the lowest practical elevation in the extraction well. The effluent line from the pump was fitted with a one way check valve at the pump head and was routed to the ExxonMobil/BP remediation system for treatment and discharge.

The step drawdown tests began at 4 gallons per minute (gpm) and ran for approximately 5 hours. Water levels were monitored manually in the test well and observation wells hourly. Due to time constraints, the first step was not allowed to continue to state of equilibrium. The pumping rate was increased to 8 gpm to determine if the well could sustain a higher flow rate. After 10 minutes of pumping at 8 gpm the well went dry. The pump was shut off and the well was allowed to recover. The water levels during recovery were measured and recorded using the installed transducers.

3.9.2.2 CONSTANT RATE TEST

A constant rate pump test was completed on test well TW-1 on August 16 and 17, 2012. Observation and background well setup for the constant rate test was the same as with the step test discussed in the previous section. During the step test, the test well did not reach equilibrium at 4 gpm due to time constraints. Drawdown trends indicated that equilibrium was likely achievable, given enough time. For this reason, 4 gpm was chosen as the flow rate for the constant rate pump test. The constant rate test ran at 4 gpm for 7 hours. At 4 gpm, the water level in the test well was drawing down faster than was noted during the step test and the water level was getting close to the intake of the pump. The flow rate was lowered to 3 gpm to see if equilibrium could be achieved. The test ran at 3 gpm for 7 hours and water levels continued to drop. The flow rate was lowered to 2 gpm for the remainder of the test. Shortly after the flow rate was lowered to 2 gpm, the water level in the test well rebounded approximately 9 feet after which it slowly began decreasing. The test ran at 2 gpm for 23 hours and was stopped after 3 hours of consistent water levels. The well was allowed to recover and the recovery water levels were recorded with the installed transducers.

4.0 RESULTS

4.1 LASER INDUCED FLOURESCENCE

The LIF survey, soil core photography and laboratory test results are discussed in the following sections.

4.1.1 LIF / UVOST SURVEY

A total of 26 LIF locations were completed during the LIF survey. The locations of the 26 LIF survey points are identified in Figure 16 (denoted as G-18, -19, -20…). A Three dimensional model of the LIF results was created to depict the spatial distribution of the observed LNAPL. Screen shots of the 3D LIF model are present on Figure 17. A copy of the 4dim electronic file and associated software are provided as Appendix F. The individual LIF results for each location (vertical profile graphs of relative fluorescence response against depth below ground surface) are provided as Appendix G.

The results of the LIF survey event are summarized in Table 10 and Figure 16. In general, the LIF results indicate that two main LNAPL types are observed at the Site: a diesel-range product, and what appears to be heavier oil (via the LIF spectral fingerprint). However, it is noted that the LNAPL types at the Site have been consistently indicated through other means (e.g., groundwater sampling, release history, etc) to be diesel and gasoline. It is also noted that gasoline can appear as completely different product types via LIF as it weathers/degrades. This is likely due to the fact that gasoline initially has a low PAH fraction when fresh, but the PAH fraction increases over time as the more volatile constituents are lost and the PAHs constitute a progressively larger fraction of what remains of the gasoline. In short, gasoline chemically becomes more like heavier fuel types over time, which is reflected in the LIF results (Dakota Technologies, 2012). Consequently, the LNAPL type that appears as heavier oil in the LIF results is likely reflecting a mixture of weathered gasoline and diesel.

Based on the LIF spectral fingerprint, the LNAPL prevalent in the southern portion of the Site appears to be diesel. Since the release in this area of the Site has been confirmed to unleaded gasoline, the LIF spectral fingerprint is more likely to be that of weathered gasoline. Diesel and weathered gasoline are both observed in the area north of the tank farm. In most cases, the different product types appear to be commingled where they are found together at a given location. There are a small number of locations where the

product types appear to be co-located at distinct depths; the best example of which is G-40 (see Appendix F).

Maximum LIF response levels varied from 19.00 %RE at G-24 to 429.50 %RE at G-25. The depths of the maximum response levels were as shallow as 5.10 feet bgs (G-35) and as deep as 12.10 feet bgs (G-33). The maximum depths of LNAPL impacts were observed to fluctuate from 7.5 to 13.7 feet bgs. In order to establish the spatial distribution of the LNAPL impacts with respect to current water table elevations, the LIF results were cross-referenced with well level monitoring data. Examples of this comparison are provided in Figure 18. As can be seen in Figure 18, the majority of the LNAPL impacts are observed beneath the water table during seasonal high water tables. This suggests the LNAPL does not possess a significant potential for mobility given that more impacts are not noted in the vicinity of the high water table elevation (i.e., the presence of a significant mobile fraction should result in the upward movement of some fraction of the LNAPL with the water table). It is also noted that the LNAPL may be trapped below the silty layer located beneath the upper fill material in portions of the Site to the north and west of the loading racks.

4.1.2 CORE PHOTOGRAPHS

Soil core sampling was performed at most of the LIF locations. The resulting soil core photographs are provided in Appendix H. The photos indicate that much of the LNAPL impacts are distributed in a sporadic/discontinuous fashion. Locations/intervals where LNAPL appears to be somewhat continuous (i.e., potentially mobile/recoverable) were limited. The color of the fluorescence noted in the photographs is consistent with what is typical for the diesel and weathered gasoline LNAPL types.

CRA reviewed the photographs and identified discrete intervals of UV fluorescence and corresponding soil types for each sample location. In addition, CRA identified the zone(s) of maximum UV fluorescence for each sample location where impacts were noted. Where possible, the zones of maximum fluorescence from the core photos were then compared with the corresponding LIF data to confirm that the results from the different datasets were in general agreement. The core photography results for the locations selected for subsequent petrophysical testing are shown in Figures 19 through 27. A summary of the zones/subsamples of maximum fluorescence for each location from the core photography selected for laboratory testing is provided in Table 11.

4.1.3 LNAPL SATURATION AND RESIDUAL SATURATION

Pore fluid saturation tests were conducted on four soil core subsamples. Water Drive residual saturation testing was conducted on five soil core subsamples (corresponding to five locations). The LNAPL saturation and residual saturation test results are provided in Appendix I and summarized in Table 11.

The initial LNAPL saturation results obtained from the above testing indicate that LNAPL saturations across the body vary from 3.2 to 10.1 percent. With respect to the subsamples subjected to Water Drive testing, LNAPL was not released from any of the soil core subsamples during the testing. This generally indicates that the LNAPL at the Site is present at saturations less than residual levels (i.e., effectively immobile) and that the fraction of the in-place LNAPL that might be recoverable is likely to be negligible.

4.1.4 GRAIN SIZE ANALYSIS

The soil grain size analysis results are provided in Appendix I and summarized in Table 11.

The grain size analyses indicate that the mean grain size descriptions for the impacted soils were fine and coarse sands. The percentages of fine-grained material (silt/clay) were in the 6.5 to 15 percent range.

4.1.5 HYDRAULIC CONDUCTIVITY AND OTHER SOIL PROPERTIES/CHARACTERISTICS

Laboratory-generated hydraulic conductivity values, soil bulk and grain densities, porosities, and van Genuchten curve-fitting results are provided in Appendix I.

Laboratory-generated hydraulic conductivity values for the tested location, G-18 and G-43, were 2.36×10^{-5} cm/s and 1.01×10^{-3} cm/s, respectively. Average soil bulk and grain densities were 1.88 g/cm^3 and 2.71 g/cm^3, respectively. Total soil porosity results were in the range of 21.2 to 41.5 percent.

The results of the soil drainage (air/water capillary pressure test) and subsequent curve fitting identified the following:

- van Genuchten α : 6.930 x 10^{-3} and 2.304 x 10^{-2}
- van Genuchten N: 1.688 to 2.115
- Irreducible water saturation: 11.1 to 39.1 percent

These data were utilized as Site-specific inputs for the LNAPL mobility analytical modeling calculations discussed in the following section.

4.1.6 ANALYTICAL MODELING

As outlined in Section 3.1.5, CRA used the 'maximum' laboratory-generated LNAPL saturation values and the methodology outlined in Appendix B to develop LNAPL velocity estimates for each location. The model inputs and calculation results are provided in Table 12.

The modeling results indicate that the estimated LNAPL velocities at the test locations are less than the de minimis velocity value of 1 x 10^{-6} cm/s (ASTM, 2007). Therefore, this calculation methodology provides a second line of evidence that the LNAPL at the respective locations is effectively immobile and unrecoverable.

4.1.7 LNAPL MOBILITY/RECOVERABILITY

The lines of evidence presented in this section are consistent in indicating that the LNAPL at the test locations (G-18 and G-43) is considered to be effectively immobile. Given the immobility of the LNAPL, it can also be concluded that the LNAPL is stable, or not expanding/migrating over time (i.e., LNAPL must be mobile to migrate). It is noted that this conclusion assumes that no new releases will occur that might generate sufficient LNAPL head to destabilize the LNAPL body.

The recoverability of the LNAPL is directly tied to its mobility potential (i.e., weathered and non-volatile LNAPL types must be able to efficiently move to a well to be efficiently recovered). On this basis, it can be concluded that the LNAPL at the test locations is effectively unrecoverable. However, the observation of LNAPL in wells does indicate that some mobile/recoverable fraction exists at the Site. Wells EX-1, P-1, and P-2 installed in March 2013 as part of the feasibility study, contained significant quantities of measurable LNAPL. LNAPL mobility/recoverability testing was not performed on samples from these locations but the presence of LNAPL in the wells indicates LNAPL

may be recoverable in this area. In the two test locations (G-18 and G-43), any LNAPL recovery efforts are likely to have a negligible impact on the residual LNAPL body and, if considered, the limited potential benefit of such activities should be scrutinized against the potential costs (financial and otherwise).

4.2 SOIL

The purpose of the soil investigations completed following the implementation of the agreed order was to further determine the nature and extent of soil impacts at the Site. Prior to the agreed order, significant soil data had been collected in areas of known contamination near the loading racks and around AST #2. The lateral and vertical extent of the contamination had not been determined. All soil analytical data collected at the Site to date is presented in Table 1 and Figure 5. A Three dimensional model of the soil analytical results was created to depict the spatial distribution of the observed soil contamination. Screen shots of the 3D soil data model for TPHg, TPHd, Benzene, and naphthalene are presented on Figures 28 to 31, respectively. A copy of the 4dim electronic files and associated software are provided as Appendix J. The data validation and laboratory analytical reports for the most recent soil investigations are included in Appendix K.

Laboratory analytical results from the recent soil investigations indicate concentrations of one or more analyzed constituents were above MTCA Method A cleanup levels for the following:

- ***TPHg*** – Borings DW-2 (9 feet and 11 feet), MW-7 (8 feet and 11 feet), MW-8 (8 feet and 11 feet), MW-14 (5.5 feet), MW-11 (6 feet), DW-4 (5 feet), TW-1 (7 feet and 12 feet), TW-3 (15 feet), TW-5 (8.5 feet and 11 feet), TW-7 (8.5 feet and 13 feet), and bottom (3 feet) and north (1.5 feet) excavation samples
- ***TPHd*** – Borings MW-7 (11 feet), TW-7 (8.5 feet and 11 feet), and north excavation sample (1.5 feet)
- ***TPHo*** – Boring MW-11 (6 feet)
- ***BTEX*** – DW-1 (9.5 feet), DW-2 (9 feet, 11 feet, 19 feet), MW-7 (8 feet and 11 feet), MW-8 (8 feet and 11 feet), MW-9 (10 feet), MW-14 (5.5 feet), TW-1 (7 feet and 12 feet), TW-3 (15 feet), TW-5 (8.5 feet and 11 feet), TW-7 (8.5 feet and 13 feet), north excavation sample (1.5 feet), and EX-1 (6 feet and 15 feet)
- ***Naphthalenes*** – DW-2 (11 feet), MW-7 (8 feet and 11 feet), MW-8 (11 feet), MW-14 (5.5 feet), TW-1 (7 feet and 12 feet), TW-3 (15 feet), TW-5 (8.5 feet and 11 feet), TW-7

(8.5 feet and 13 feet), bottom (3 feet) and north (1.5 feet) excavation samples, and EX-1 (15 feet)

- ***cPAHs –*** MW-7 (8 feet), MW-8 (8 feet), MW-11 (6 feet), DW-4 (5 feet), TW-3 (15 feet), TW-5 (8.5 feet and 11 feet)

No other analyzed constituents were detected above MTCA Method A cleanup levels in all soil samples analyzed.

The results of historic and recent soil investigations indicate significant soil contamination is present in shallow soil beneath the Site. On the northern portion of the Site, soil contamination appears to be primarily above the native silt layer in the shallow fill material to the west of the loading racks. To the north and east of the loading racks, soil contamination is present above and below the native silt layer. On the southern portion of the Site, soil contamination is primarily present above the native silt layer in the shallow fill material.

4.3 GROUNDWATER

The purpose of the groundwater monitoring is to monitor concentration trends in the contaminant source areas and along the perimeter of the contaminant plume. Historical groundwater quality data is presented on Tables 3 and 4. Groundwater quality data from the January/February 2013 sampling event is presented on Figures 9 and 10. The data validation and laboratory analytical reports for the January/February 2013 groundwater investigation will be submitted to Ecology for review at a later date as part of the quarterly monitoring report for first quarter 2013.

Laboratory analytical results from first quarter 2013 event indicate concentrations of one or more analyzed constituents were above MTCA Method A cleanup levels for the following:

- ***TPHg –*** Wells W-1, W-2, B-2, B-3A, B-4, B-5, B-6, HA-2, HA-6, HA-7, HA-9, HA-11,HA-16, LAI-1, LAIx-2, LAIx-3, MW-7, MW-8, and MW-14
- ***TPHd –*** Wells W-1, W-2, B-1, B-2, B-3A, B-4, B-5, B-6, HA-2, HA-6, HA-7, HA-9, HA-16, LAI-1, RW-3, MW-7, MW-8, and MW-14
- ***TPHo –*** Wells RW-3 and MW-8

- ***BTEX –*** Wells W-1, , W-2, B-1, B-2, B-3A, B-4, B-5, B-6, D-7, HA-2, HA-3, HA-6, HA-7, HA-9, HA-11, HA-16, HA-20, LAI-1, LAIx-2, LAIx-3, MW-7, MW-8, MW-9, MW-14, MW-15, and DW-2
- ***Naphthalenes*** – Wells W-1, W-2, B-3A, B-4, B-6, HA-2, HA-6, HA-9, MW-7, MW-8, and MW-14
- ***cPAHs*** – Wells B-5 and B-6
- ***Arsenic*** – Wells W-1, W-2, B-3A, B-4, B-5, D-4R, D-5R, HA-1, HA-2, HA-6, HA-7, HA-16, MW-1, MW-5, MW-6, MW-7, MW-8, MW-9, MW-14, MW-15, MW-17, DW-2, and DW-3
- ***Lead*** – Wells B-5, B-6, HA-2, HA-6, MW-9, DW-2
- ***Vinyl Chloride*** – Well D-6

None of the other wells sampled contained concentrations above MTCA Method A cleanup levels.

The current groundwater quality data were compared to historical groundwater quality data to assess whether concentration trends have changed over time. Decreasing concentration trends near the source areas indicate a decrease in contaminant mass in the groundwater. Decreasing concentration trends along the perimeter of the plume indicate capture of the contaminant plume (i.e. absence of plume migration).

The concentrations in the majority of the samples collected from pre-existing wells near the source have decreased gradually or have remained stable since remediation began. Trends in pre-existing wells near the source areas indicate mass removal of contamination is slowly occurring with the current remedial approach. Data from newly installed monitoring wells, MW-7, MW-8, MW-14, MW-9, and DW-2 indicate a larger source area than had originally been known. Many of the pre-existing wells are only installed in the top 10 feet and do not intersect the majority of the contamination. The new wells provide a better estimation of the plume size. The new wells in the source areas will continue to be monitored quarterly to determine concentration trends.

Monitoring wells MW-3 through MW-6, D-4R, and D-5R were installed along the eastern perimeter to delineate the eastern boundary of the plume and to determine if migration of contaminants is occurring. The concentrations in samples collected from these wells were below MTCA Method A cleanup levels. These wells will continue to be monitored to determine concentration trends.

The concentrations in the sample collected from wells LAI-10 and newly installed wells, MW-1 and MW-2, along the southern perimeter, were below MTCA Method A cleanup levels indicating plume migration is not likely to be occurring to the south.

The concentrations in samples collected from wells LAI-10, LAI-12, D-1R, and historically LAI-11, LAI-13, LAI-14, LAI-15, remain below MTCA Method A cleanup levels or are consistent with historical data indicating significant plume migration is not likely to be occurring to the west in the vicinity of those wells. Newly installed well, MW-10, located along the western perimeter of the Site, has contained concentrations of benzene above MTCA Method A cleanup levels in previous quarters. Surface water and soil samples collected in the wetlands immediately west of MW-10 and HA-11 suggest impacted groundwater is not discharging to the wetlands near MW-10 and HA-11. Well MW-10 and HA-11 will continue to be monitored to determine concentration trends.

To the north, wells DW-4, MW-11, MW-12, MW-13, MW-16, and MW-17 remain below MTCA Method A cleanup levels indicating migration of dissolved contaminants to the vicinity of these wells has not occurred.

Deep wells, DW-1 and DW-2, were placed in areas of known shallow contamination to determine if downward migration of contaminants has or is occurring. Concentrations in the sample collected from well DW-1 were below MTCA Method A cleanup levels in January/February 2013. Concentrations in the sample collected from well DW-2 were above MTCA Method A cleanup levels. The dissolved phase contamination in well DW-2 is likely from soil contamination below the silt layer to the west and north of the truck loading racks. Both wells will continue to be monitored to determine any concentration trends that may be present.

4.4 HYDRAULIC MONITORING

The purpose of the hydraulic monitoring is to evaluate groundwater flow direction(s) and gradient(s) while the two groundwater extraction systems are operating and to monitor the presence and changing thicknesses of LNAPL on the water table. Historical groundwater elevation data and LNAPL thicknesses are presented on Table 5.

Groundwater flow direction(s) and gradient(s) are evaluated using groundwater elevation contours. Groundwater elevations described in the section below are from the most recent sampling event in January 2013 but representative of typical contours seen at the Site. Groundwater elevation contours for the shallow monitoring wells are

presented on Figure 11. Groundwater elevation contours for the intermediate monitoring wells are presented on Figure 12. Groundwater elevation contours for the deep monitoring wells are presented on Figure 13.

4.4.1 SHALLOW WELL ELEVATION DATA

Groundwater elevation contours for the shallow wells (Figure 11) indicate groundwater in the northern portion of the Site tends to flow inward from the east, west, and south toward extraction trenches R-1 and R-2. Groundwater gradients in the northern portion range from 0.011 to 0.042 foot/foot with the steepest gradient being to the north towards extraction well R-2. Groundwater in the southern portion of the Site tends to mound near AST #2 and flow radially in all directions with the steepest gradients primarily to the south. The groundwater gradient to the south from the source area near AST #2 is 0.023 foot/foot. The groundwater flow pattern in the southern portion of the Site is likely caused by the two operating extraction systems causing groundwater to flow south to extraction wells located south of AST #2 and north to extraction trench R-1. Recharge from precipitation may also cause mounding of the water table to occur in the tank farm area.

4.4.2 INTERMEDIATE WELL ELEVATION DATA

Groundwater elevation contours for the intermediate wells (Figure 12) indicate a flow direction to the west for most of the Site. The groundwater gradient is 0.004 foot/foot. Groundwater gradients from the intermediate monitoring wells are relatively shallow compared to gradients from the shallow wells. The groundwater flow pattern appears to be primarily influenced by regional groundwater flow.

4.4.3 DEEP WELL ELEVATION DATA

Groundwater elevation contours for the deep wells (Figure 13) indicate a flow direction to the north-northwest. The groundwater gradient on the northern portion of the Site was 0.0025 feet/foot. The groundwater gradient on the southern portion of the Site was 0.0007 foot/foot. Groundwater gradients from the deep monitoring wells are relatively shallower than gradients from the intermediate wells. The extraction trenches R-1 and R-2 and the extraction wells around AST #2 do not appear to influence groundwater flow in the deep wells that are screened from 20 to 40 feet bgs.

4.4.4 VERTICAL HYDRAULIC GRADIENTS

Groundwater elevation data were used to determine vertical hydraulic gradients between the four deep wells (DW-1, DW-2, DW-3, and DW-4) and nearby shallow monitoring wells screened in the top 10 feet, when available. Groundwater elevation data from well MW-11, an intermediate well, was paired with well DW-4 since shallow groundwater data was unavailable in the vicinity of DW-4. Groundwater elevation data from wells DW-3 and LAI-14 were paired. For wells, DW-1 and DW-2, no pre-existing shallow wells were close enough to use in a direct comparison. Groundwater elevation data from the pre-existing shallow wells were used to create an elevation grid using Golden Software's Surfer computer software. The "shallow" groundwater elevations at the locations, DW-1 and DW-2, were determined from the elevation grid. The Environmental Protection Agency's (EPA) online vertical gradient calculator was used to determine a range of vertical gradients based on various points along the saturated portion of the screen intervals. For the purposes of this report, the center of the saturated portion of the screen interval(s) will be used for data analysis. Groundwater elevation data indicate downward vertical gradients of 0.1238 (DW-1), 0.2135 (DW-2), and 0.1519 (DW-3) and 0.01897 foot/foot (DW-4).

4.4.5 LNAPL THICKNESS DATA

During the January 2013 sampling event, LNAPL was not observed in any of the monitoring well that were gauged. Significant amounts of LNAPL have not been observed in the monitoring wells west of the loading racks since December 2010 when operation of extraction trench R-1 was resumed after being off for nearly a year. In March 2013, three new wells (EX-1, P-1, and P-2) were installed for pilot testing activities directly north of the loading racks. The screen intervals for these wells target the contaminated zone directly beneath the native silt layer. The presence of LNAPL in this area had previously been confirmed using LIF technology but no wells had been installed in the area. During the pilot testing activities in April 2013, LNAPL was observed in all three monitoring wells up to 2.5 feet in thickness. In general, in-well LNAPL gauging provides relatively little in the way of technically valid indications of LNAPL conditions in the subsurface other than to confirm its presence and mobility. The absence of LNAPL in many of the wells is most likely attributable to seasonal fluctuations in water levels, the LNAPL being trapped in the soil at saturations less than residual levels, or the wells not being screened across the entire smear zone.

4.5 SURFACE WATER

Surface water samples were collected from 4 locations to evaluate potential impacts to surface water surrounding the Site. All surface water analytical data collected at the Site to date is presented in Tables 6 and 7 and on Figure 14. The data validation and laboratory analytical report for the most recent surface water investigation is included in Appendix K.

Laboratory analytical results from the recent surface water investigation indicate concentrations of TPHg, benzene, toluene, and total xylenes were above MTCA Method A cleanup levels in sample SW-3, collected in the southwest corner of the retention basin. No other analyzed constituents were detected above laboratory reporting limits for all other samples.

The stormwater retention basin in the southeast corner of the Site, although it does contain water above ground surface during part of the year, is not categorized as surface water due to the fact that the retention basin is a manmade structure to retain surface water runoff during rain events. It only contains water during the wet season following rain events. There is no outlet to a natural surface water body. Water in the retention basin infiltrates to groundwater. Additionally, the retention basin does not contain benthic organisms typical of natural surface water bodies. Although it is not technically considered surface water, for the purposes of the conceptual site model, it is treated as a separate contaminated media and is referred to as surface water.

Results indicate concentrations have decreased in the southwest corner of the retention basin but are still significantly higher than cleanup levels. Samples collected from surface water in the wetlands to the north and west of the Site do not indicate impacts.

4.6 SOIL IN THE WETLAND AREA AND RETENTION BASIN

Soil samples were collected from 18 locations in surrounding wetlands and the retention basin to evaluate potential impacts to these areas surrounding the Site. All soil analytical data from samples collected in the wetlands at the Site to date are presented in Table 8 and on Figure 15. The data validation and laboratory analytical report for the wetlands and retention basin investigation are included in Appendix K.

Laboratory analytical results from the wetlands and retention basin investigation did not indicate concentrations above MTCA Method A cleanup levels for any of the collected samples with the exception of arsenic in samples SE-6 (20.2 mg/kg) and SE-7 (22.5 mg/kg) and benzene (0.0549 mg/kg). These concentrations are slightly above the MTCA Method A Soil cleanup level of 20 mg/kg (arsenic) and 0.03 mg/kg (benzene) for industrial properties. Arsenic has been detected at low levels randomly in both soil and groundwater throughout the Site and does not appear to be concentrated to a likely source area. Historical activities at the Site are well documented and do not indicate any potential onsite sources. The arsenic is likely due to naturally occurring arsenic in the soil. Organic-rich wetland areas commonly have higher natural background concentrations of arsenic in soil. The benzene exceedence in sample SE-7 is likely to due benzene concentrations in groundwater. Well MW-10, immediately upland and upgradient, has had levels of benzene above MTCA Method A in recent sampling events.

A Simplified Terrestrial Ecological Evaluation (TEE) form was completed for the Site indicating no risk to ecological receptors from the release(s) at the site exists based on the fact that concentrations in wetland and retention basin samples do not exceed the compliance criteria for industrial sites in MTCA Table 749-2. The TEE form(s) are included in Appendix P.

Results indicate minor impacts in the wetlands to the west of the site and in the southwest corner of the retention basin. Samples collected from soil in the wetlands to the north of the Site and in the northern portion of the retention basin do not indicate impacts. The arsenic impacts identified in samples SE-6 and SE-7 appear to be caused by natural background concentrations in soil and will not be addressed as part of the final remedial action. The benzene impacts identified in sample SE-7 will be remediated by treatment of the groundwater immediately upgradient. The identified impacts in the retention basin will be excavated to depths where clean soil is encountered or until Site infrastructure prohibits further excavation and are not considered further in the feasibility study evaluations presented below.

4.7 HYDRAULIC TESTING RESULTS

4.7.1 SLUG TESTING RESULTS

Slug testing was completed on 36 different wells from the shallow fill horizon (<10 feet bgs), an intermediate horizon (5 to 20 feet bgs), and a deep horizon (20 to 30 feet bgs).

The geometric mean for hydraulic conductivity values from each horizon are 1.92E-04 (shallow), 4.27E-04 (intermediate), and 2.75E-3 (deep). A summary of the calculated hydraulic conductivity values is presented on Table 13.

4.7.2 STEP DRAWDOWN TEST RESULTS

The step drawdown test was run at 4 gpm for approximately 5 hours. Water levels collected from the test well indicate equilibrium was not achieved during the step testing. Time constraints did not allow the step test to continue to equilibrium. Based on drawdown trends, equilibrium may have been achievable if given enough time. At a pumping rate of 8 gpm, the well was pumped dry within 10 minutes. Water levels collected from the observation wells indicate a drawdown was present in all observation wells. Below is a summary of the step drawdown data:

STEP 1 (4 gpm)

Well	*Distance from TW-1 (feet)*	*Maximum Drawdown (feet)*
TW-1	0	14.13
DW-2	5	0.63
TW-3	15	0.41
TW-5	20	0.43
TW-7	10	0.45

4.7.3 CONSTANT RATE TEST RESULTS

The constant rate test began at 4 gpm and was lowered to 3 gpm then 2 gpm to avoid dewatering the well. The constant rate test ran at 2 gpm for approximately 23 hours and was ended when water levels in the test well were stable for 3 hours. Below is a summary of the drawdown data:

Constant Rate Test (2 gpm)

Well	*Distance from TW-1 (feet)*	*Maximum Drawdown (feet)*
TW-1	0	21.65

DW-2	5	0.6
TW-3	15	0.39
TW-5	20	0.36
TW-7	10	0.44

Drawdown data indicate the radius of influence (ROI) extends beyond 20 feet (TW-5). Insufficient data exists to further define the ROI.

When testing was complete, the well was allowed to recover. Water levels during recovery were recorded with the installed transducers. Hydrographs for the test well and each observation well are provided in Appendix L.

Transducer and flow data were used to determine hydraulic conductivity values for each observation well. Hydraulic conductivity values were calculated for both pumping and recovery conditions using the Theis (1935) type curve and residual drawdown solutions. Hydrosolv, Inc's Aqtesolv™ software was utilized to complete the calculations. The Aqtesolv™ reports for each calculation are provided in Appendix L. Below is a summary of the hydraulic conductivity values for each observation well:

Hydraulic Conductivity Values

Well	***Hydraulic Conductivity Pumping (cm/sec)***	***Hydraulic Conductivity Recovery (cm/sec)***
DW-2	4.58E-03	1.11E-03
TW-3	3.45E-03	1.67E-03
TW-5	3.45E-03	1.72E-03
TW-7	3.25E-03	1.25E-03

5.0 CONCEPTUAL SITE MODEL

This Conceptual Site Model (CSM) describes the contaminant occurrence, fate and transport, and potential receptors at the P66 Renton Terminal. The purpose of the CSM is to provide a general, or conceptual, understanding of the Site. The CSM will be a guide for future Site characterization and remedial efforts. The CSM is based on historical data obtained from recent and historical investigations as previously described in this report.

5.1 PRIMARY SOURCES OF CONTAMINATION

Petroleum hydrocarbons were released to the subsurface from two areas of concern. In 1986, a release was discovered and determined to have occurred from cracks in the loading rack spill containment system located in the north-central portion of the Property. The exact timeframe of the release is unknown but it is likely to have occurred over a long period of time. Two additional suspected releases were documented in 1990 and 1991 but were never confirmed to be separate from the original release. Recent investigation indicates the presence of LNAPL in the shallow subsurface in the vicinity of the truck loading rack (north) and underground process tank adjacent (west) to the loading racks. The process tank is also considered a potential historical source.

In November 2002, a release was discovered and determined to have occurred from a bottom failure of AST #2. Approximately 14,000 gallons of product (unleaded gasoline) was released. Smaller releases have been suspected from the tank farm area but have not been confirmed.

5.2 CONTAMINANT FATE AND TRANSPORT

Petroleum product released from the primary sources migrated downward through the vadose zone to the groundwater table (and into the saturated zone) spreading out radially with a downgradient preference. The pre-1986 release likely occurred over a long period of time. Additional LNAPL head would have been generated, which would have driven the expansion of the LNAPL body as additional product was released. To the west of the loading racks, a native silt layer under the fill material appears to have impeded the vertical migration of LNAPL. Under the loading racks and to the north and east of the loading racks, the native silt layer is thinner and shallower and may be discontinuous in some areas. LNAPL is present above and below the native silt layer in

these areas. LNAPL and groundwater recovery immediately to the west and northwest of the loading racks began in 1987 via two interceptor recovery trenches. A significant amount of LNAPL has been recovered to date. Recent investigation of the LNAPL indicates much of the LNAPL body is trapped under the water table except during the dry season and does not appear to be mobile throughout most of the Site. Due to the immobility, LNAPL is no longer being recovered by the two receptor trenches. Recent investigation indicates a significant portion of the LNAPL body is located north-northeast of the loading racks and is not within the influence of the current recovery trenches. Monitoring wells to the north of the loading racks indicate LNAPL is present in this area and may potentially be mobile.

The 2002 release occurred over a short period of time and recovery of released product started immediately minimizing lateral and vertical migration of LNAPL in the subsurface. Much of the LNAPL has been recovered from the 2002 release. The LNAPL that hasn't been recovered is located within soil above the native silt layer and appears to be immobile.

As LNAPL came in contact with groundwater contaminants dissolved in the groundwater; dissolved contaminants migrated along the groundwater flow by dispersion and dilution. Product in the smear zone appears to be immobile but continues to provide a source of dissolved contaminants in groundwater.

Significant concentrations of dissolved phase contaminants are present in groundwater beneath the Site and continue to migrate downgradient. Both product recovery systems have since been converted to groundwater extraction systems to capture dissolved phase contaminants and slow the migration of contaminants.

Dissolved phase contaminants have, historically, migrated to a nearby stormwater retention basin in the southeast corner of the property. A recent surface water investigation indicates dissolved phase contaminants are still present in surface water in the southwest corner of the retention basin. All other surface water including the northern portion of the retention basin and the wetlands to the west and northwest of the Site are not impacted.

Recent soil sampling indicates a minor amount of contamination to the west of well MW-10 and in the southwest corner of the retention basin. All other areas sampled including the northern portion of the retention basin and the wetlands to the northwest of the Site are not impacted.

5.3 TYPES AND CONCENTRATIONS OF CONTAMINANTS

The 2002 release is known to be super-unleaded gasoline. The release discovered in 1986 is believed to be primarily gasoline and diesel but due to the nature of the release, other types of contaminants may have been released. The contaminants of concern (COCs) associated with gasoline, diesel, and unknown releases per MTCA Table 830-1 are presented in the table below.

Analyte	*Present in Soil?*	*Present in Groundwater?*	*Present in Surface Water?*	*Present in Wetland or Retention Basin Soil?*	*Maximum Recent Concentration*			
					soil (mg/kg)	*Groundwater (µg/L)*	*Surface water (µg/L)*	*Wetland and Retention basin Soil (mg/kg)*
Benzene	Yes	Yes	Yes	Yes	931 (TW-5, 2012)	41,400 (B-3A, 2011)	194 (SW-3, 2012)	0.0549 (SE-7, 2012)
Toluene	Yes	Yes	Yes	Yes	3,100 (TW-5, 2012)	48,000 (B-3A, 2010)	1,770 (SW-3, 2012)	0.0383 (SE-10, 2012)
Ethylbenzene	Yes	Yes	Yes	Yes	1,100 (TW-5, 2012)	4,010 B-3A, 2012)	181 (SW-3, 2012)	0.0664 (SE-11, 2012)
Xylenes	Yes	Yes	Yes	Yes	6,570 (TW-5, 2012)	41,600 (W-1, 2012)	1,550 (SW-3, 2012)	0.209 (SE-11, 2012)
n-hexane	No Data	No Data	No Data	- -	- -	- -	- -	- -
EDB	No	No	No	No	- -	- -	- -	- -
EDC	No	Yes	No	No	- -	58.4 (HA-2, 2011)	- -	- -
MTBE	No	Yes	Yes	No	- -	94.2 (B-3A, 2010)	- -	- -
Lead	Yes	Yes	Yes	Yes	36.4 (DW-4, 2012)	158 (B-1, 2012)	3.8 (SW-4, 2012)	71.9 (SE-3, 2012)
cPAHs	Yes	Yes	No	No	6.0348 (TW-5, 2012)	51.79 (B-6, 2011)	- -	- -
PCBs	No Data	No	No Data	No Data	- -	- -	- -	- -
Methylene Chloride	No Data	Yes	No	No	- -	34.8 (HA-6, 2011)	- -	- -
Trichloroethylene	No Data	Yes	No	No	- -	3.7 (W-1, 2011)	- -	- -
Vinyl Chloride	No Data	Yes	No	No	- -	4.5 (D-6, 2011)	- -	- -
Arsenic	No Data	Yes	Yes	Yes	- -	91.8 (MW-3, 2012)	2.5 (SW-1, 2012)	22.5 (SE-7, 2012)

Naphthalenes	No Data	Yes	Yes	Yes	- -	3,388 (B-4, 2011)	55.6 (SW-3, 2012)	76.524 (SE-11, 2012)
TPHg	Yes	Yes	Yes	Yes	49,200 (TW-5, 2012)	179,000 (W-1, 2012)	13,300 (SW-3, 2012)	9 (SE-11, 2012)
TPHd	Yes	Yes	Yes	Yes	29,100 (TW-5, 2012)	184,000 (W-1, 2011)	140 (SW-3, 2012)	53.2 (SE-3, 2012)
TPHo	Yes	Yes	Yes	No	3020 (MW-11, 2012)	3,530 (W-2, 2011)	140 (2007)	- -

The maximum concentrations were compared to MTCA Method A cleanup levels for soil, groundwater, and surface water and the following were determined to be Site Specific COCs:

- Benzene
- Toluene
- Ethylbenzene
- Total Xylenes
- EDC
- MTBE
- Lead
- cPAHs
- Methylene Chloride
- Vinyl Chloride
- Arsenic
- Naphthalenes
- TPHg
- TPHd
- TPHo

The extent of each Site-specific COC has been delineated for each media with the exception of arsenic and lead in groundwater. Arsenic has been detected in wells throughout the Site and does not appear to be concentrated to a likely source area. Historical activities at the Site do not indicate any onsite sources. The arsenic may be due to naturally occurring arsenic in the soil. Lead was detected in monitoring well MW-3 along the eastern perimeter of the Site but does not appear to be from an onsite source. Therefore, remediation of dissolved phase metals will not be included for

further analysis under the feasibility study section of this report, especially since these items will likely be self-resolving when the Redox potential of the groundwater changes during active remediation. These metals will continue to be monitored during future compliance monitoring activities to verify this assumption.

5.4 CONTAMINATED MEDIA

Soil - Based on historic and recent investigations, petroleum contaminated soil (PCS) is present at the Site. Shallow PCS in the vadose zone is present near the source area associated with the 1986 loading rack release. A soil vapor extraction (SVE) system has operated to treat vadose zone PCS in the source area associated with the 2002 AST #2 release and has treated the majority of the vadose zone PCS in that area. The horizontal extent of vadose zone PCS has been established.

PCS in the smear zone is present throughout much of the Site extending near MW-7 to the east, LAIx-3 to the south, D-7 to the west, and MW-11 to the north. The area of thickest smear zone PCS is under and in the immediate vicinity of the loading racks. PCS extends as deep as 17 feet bgs just north of the loading racks. The horizontal and vertical extent of smear zone PCS has been established.

Groundwater – Based on recent groundwater sampling events, dissolved phase petroleum contamination in groundwater is present throughout much of the Site. Dissolved phase contaminants have been detected in wells HA-10, and MW-14 to the north, well HA-14 to the east, wells LAIx-3 and LAI-1 to the south, and wells MW-10 and MW-15 to the west. The areas with the highest concentrations are located in the vicinity of the two source areas. The horizontal and vertical extent of petroleum contaminated groundwater has been established. Surface water sampling in the wetlands indicates contaminated groundwater is not discharging to the wetlands.

Surface Water – The following surface water features are present at or near the Site:

- Stormwater retention basin in the southeast corner of the property
- Pond located directly across Lind Avenue Southwest to the east of the property
- Wetlands located directly across Southwest 27th Street to the south of the property
- Wetlands located on the western half property boundary
- Wetlands located directly across Lind Avenue Southwest. to the east of the property

The stormwater retention basin in the southeast corner of the Site, although it does contain water above ground surface during part of the year, is not categorized as surface water due to the fact that the retention basin is a manmade structure to retain surface water runoff during rain events. It only contains water during the wet season following rain events. There is no outlet to a natural surface water body. Water in the retention basin infiltrates to groundwater. Additionally, the retention basin does not contain benthic organisms typical of natural surface water bodies. Although it is not technically considered surface water, for the purposes of the conceptual site model, it is treated as a separate contaminated media and is referred to as surface water.

LNAPL was found in the southwest corner of the stormwater retention basin in 2003 shortly after the 2002 AST #2 release was discovered. LNAPL recovery efforts were undertaken and since then, LNAPL has not been present in the pond. Surface water samples collected in 2004, 2006, 2007, and 2012 indicate dissolved phase contamination is present in surface water in the southwest corner of the retention basin. Surface water samples and wells between source areas and surface water indicate no other areas of surface water are impacted.

The extent of petroleum contamination in surface water has been established.

Wetland and Retention basin Soil – Based on the recent soil investigation in these areas, contamination is minimal and is confined to the west of well MW-10 and the southwest corner of the retention basin. The extent of the petroleum contamination in these areas has been established.

5.5 EXPOSURE SETTING

Potential exposure pathways are determined through an evaluation of the physical setting of the Site and the potentially exposed receptors. A detailed description of the physical setting of the Site is presented in Section 2.2. The consideration of site-specific factors related to land usage is important in the development of realistic current and future exposure scenarios. The current and future potential land uses that are reasonably expected for the Site determine what receptors may potentially be exposed.

Current Land Use – The current land use at the Site and in the immediate vicinity of the Site is primarily industrial. The property operates as a bulk fuel distribution facility. Immediately to the north is Olympic Pipeline's Terminal and administrative offices.

Immediately to the south and west of the Site are undeveloped wetlands. Immediately to the east is an industrial warehouse facility.

Future Land Use – The Site will likely continue to be used for industrial purposes for the foreseeable future. It is possible that future development of the Site may necessitate below grade excavation and construction activity.

Surface Cover - Surface cover at the Site consists of the following:

- Asphalt in the loading rack area, along the entry way, and behind the station building
- Gravel and sand fill material in and around the tank farm area
- Landscaped bark material and vegetation in a strip between the entry way and the loading rack area and along 27th Street and Lind Avenue Southwest between the streets and the Property
- Mixed gravel and concrete/asphalt parking lot to the north on the Olympic Pipeline property
- Surface water and dense vegetation in and around the stormwater retention basin beginning in the southwest corner of the Property extending north along Lind Avenue Southwest
- Wetlands immediately south of 27th Street, immediately east of Lind Avenue Southwest, and immediately west of the Property consisting of dense vegetation and seasonal surface water

5.6 POTENTIAL EXPOSURE PATHWAYS

An exposure pathway describes a mechanism by which humans may come into contact with Site-specific COCs. An exposure pathway is complete (i.e., it could result in a receptor contacting a COC) if all of the following four elements are present:

1. A source or a release from a source (e.g., COC released to soil or groundwater during historical operations)
2. A probable environmental migration route of a Site-specific COC (e.g., leaching or partitioning from one medium to another)
3. An exposure point where a receptor may come in contact with a Site-specific COC (e.g., surface and subsurface soil or groundwater)

4. A route by which a Site-specific COC may enter a potential receptor's body (e.g., ingestion, dermal contact, or inhalation)

If any of these four elements are not present, then the exposure pathway is considered incomplete and would not contribute to the total exposure from the Site.

The following are considered potential exposure pathways at the Site:

- Dermal absorption from direct contact of contaminated soil, groundwater, or surface water
- Ingestion of contaminated soil, groundwater, or surface water
- Vapor Inhalation of volatilized contaminants in building and ambient air

5.7 POTENTIAL RECEPTORS

Based on review of current and future exposure settings, the following are considered potential receptors:

- Commercial Workers
- Industrial Workers
- Construction Workers
- Soil Biota
- Plants
- Animals

5.8 POTENTIALLY COMPLETE EXPOSURE PATHWAYS

Based on an understanding of the four components of an exposure pathway, Site contaminant distribution, and current/future exposure settings, each exposure pathway has been evaluated to determine potential completion. A schematic CSM identifying the sources, transport mechanisms, exposure pathways, and potential receptors is presented on Figure 32.

5.8.1 DERMAL ABSORPTION FROM DIRECT CONTACT

Direct contact with contaminated soil and groundwater is considered potentially complete for a construction/utility worker involved in ground-intrusive activities during general construction activities. Direct contact with contaminated surface water is considered potentially complete for a commercial/industrial/construction worker and animals involved in activities around the stormwater retention basin.

5.8.2 INGESTION

Incidental Ingestion of contaminated soil and groundwater is considered potentially complete for a construction/utility worker involved in ground-intrusive activities during general construction activities. Incidental ingestion of contaminated surface water and wetland and retention basin soil is considered potentially complete for commercial/industrial/construction workers, soil biota, plants and animals.

5.8.3 VAPOR INHALATION

Inhalation of volatilized contaminants from soil, groundwater, and surface water is considered potentially complete for commercial/industrial /construction workers, soil biota, and animals.

6.0 GROUNDWATER MODELING

The purpose of this section is to provide a summary of the development of the numerical groundwater flow model to represent the existing hydrologic, geologic, and hydrogeologic conditions observed at the Site and surrounding area. The purpose of the groundwater flow model is to provide a reasonable representation of the observed groundwater flow conditions currently observed at the Site with the operation of the on Site remediation systems for wet and dry season monitoring events. Appendix M of this report provides a detailed documentation of CRA's development of the site conceptual model and the numerical groundwater flow model.

MODFLOW-2000 was selected to simulate groundwater flow for this study. MODFLOW allows for the specification of flows associated with wells, areal groundwater recharge, rivers, drains, streams, and other sources/sinks. The calibration of the groundwater flow model was aided through the use of the parameter estimation program PEST. PEST serves to convey input parameters at variable values within their bounds collectively to MODFLOW for the purpose of establishing optimal input parameter values for the specific groundwater model under development. The graphical user interface Groundwater Vistas Version 6.20 (Rumbaugh, 2005) was used as the interface between the assembled hydrogeologic data and the required MODFLOW-2000.

The regional and Site hydrologic, geologic, and hydrogeologic conditions were evaluated for the development of the 3D groundwater flow model based on the available regional and Site-specific information. Appendix M provides a detailed discussion of the hydrogeologic characteristics and available data. The hydrogeologic characteristics are briefly summarized as follows:

- Soil materials beneath the Site are mainly composed of three soil types: surficial fill material consisting of silty sand and gravel, native wetland organic clayey silt deposits, and buried silty sand composing the deeper regional aquifer system that spans the Duwamish-Green River Valley.
- Although based on available Site data the native wetland organic clayey silt deposits appear to be thickest towards the southwestern area of the Site and thin toward the northeastern area of the Site, regional data indicates that the distribution of the native wetland organic clayey silt deposits is regionally extensive.
- Hydraulic conductivities collected at the Site indicate that of three generalized soil types, the deep silty sand regional aquifer is the most permissive to groundwater flow and has a geometric mean hydraulic conductivity value of 6.64 feet/day. The

native wetland organic clayey silt is the least permissive to groundwater flow and has a geometric mean hydraulic conductivity value of 0.02 feet/day.

- The surficial fill material used in Site construction, which was deposited on top of the native wetland organic clayey silt material, has created a mounding condition that results in radial groundwater flow away from the Site.
- The radial flow condition from the Tank Farm area is further intensified during precipitation events when water ponds within the berm-enclosed Tank Farm area and slowly enters the subsurface as shallow groundwater recharge.
- The native wetland organic clayey silt material acts to provide hydraulic separation between the two flow systems.
- The current Site remediation systems influence mainly the shallow groundwater flow system and do not influence the deeper regional groundwater flow system.
- The shallow groundwater flow system discharges to the adjacent wetlands west and south of the Site, Springbrook Creek, remediation system extraction wells, the stormwater retention basin at the southeast corner of the Site, and as leakage through the native wetland deposits into the deeper regional aquifer system.
- The deeper groundwater flow system has a west to north-west regional groundwater flow direction and discharges to the Green River.
- The main sources of groundwater recharge at the Site include precipitation events and lateral groundwater flow from upgradient areas.

The selected model domain extends 6,095 feet in the north-south direction and 8,560 feet in the west-east direction. The model domain is aligned in the north direction and is not rotated. Horizontally, the model domain is discretized into rows and columns. A uniform finite-difference grid spacing of 10 feet by 10 feet was applied over the model domain covering the Site area. The grid spacing is expanded to a maximum of 200 feet beyond the Site toward the model domain boundaries. Horizontally, the model domain is discretized into 175 rows and 154 columns.

Since the bottom of the regional silty sand aquifer can potentially be up to 600 feet in thickness and the bottom of the aquifer has not been identified within the Site vicinity, a reasonable model depth was selected to represent the deep silty sand regional aquifer. Vertically the model domain extends from ground surface to approximately 70 feet BGS or -50 feet AMSL and a general head boundary condition was applied to represent the groundwater flow exchange across the deep regional silty sand aquifer. The model domain is vertically subdivided into a total of 27 model layers. The top model layer is of

variable thickness and is meant to represent the varied ground surface throughout the model domain and Site. All model layers below model layer 1 were assigned to be flat with finer vertical discretization near ground surface and increasing in thickness toward the bottom of the model domain.

The boundary conditions assigned in the model are summarized as follows:

- Constant head boundary conditions applied to represent the major regional surface water bodies surrounding the Site (i.e., Green River) in the shallow model layers and applied to the north and south to reflect the regional groundwater flow system in deeper model layers
- River boundary conditions assigned to represent Springbrook Creek west of the Site
- Drain boundary conditions to represent surface water features near the Site such as the groundwater pumping components of the remediation system, the wetlands near the Site, and the stormwater retention basins located on Site and across Lind Ave Southwest
- Recharge over the top of the model
- No-flow boundary conditions applied along the western limits of the model domain representing a natural flow divide
- No-flow boundary conditions applied along the eastern limits of the model domain representing the eastern sandstone and till bluffs
- General head boundary condition applied at the bottom of the model domain to represent the exchange of groundwater flow within the deeper aquifer system

As described in Appendix M, a 3D indicator kriged geologic model was created based on site boring logs to represent the three main soil types identified at the Site. The 3D geologic model was then used in the groundwater flow model to assign model cell hydraulic conductivities based on the kriged locations of the three soil types within the Site area. Beyond the limits of the 3D geological model domain, hydraulic conductivity values were assigned based on the layer geometric mean average of effective hydraulic conductivity values that were specified within the extent of the 3D geological model. Subsurface utilities in contact with groundwater have the potential to act as preferential pathways for groundwater flow and need to be adequately represented in the groundwater flow model. As described in more detail in Appendix M, identified utilities surrounding the Site were represented in the groundwater flow model through elevated hydraulic conductivity values relative to the surrounding media.

A steady-state model calibration was completed using both the February and August 2012 groundwater elevation measurements as calibration targets to represent the wet and dry conditions, respectively. The wet conditions comprised of 62 groundwater elevation targets and 60 targets were used to compare groundwater elevations under dry conditions.

Model calibration was performed in an iterative manner by manually adjusting the distribution and values of hydraulic conductivity, horizontal to vertical hydraulic conductivity anisotropy ratios, recharge rates, and boundary conditions. PEST was applied to optimize the input parameters. Calibrated model input parameters are presented and discussed in Section 6 of Appendix M.

The model calibration was evaluated both qualitatively and quantitatively. Qualitative evaluations were conducted for wet and dry steady-state calibrations by visually comparing the simulated versus observed groundwater elevations and flow directions. This comparison provided a qualitative measure of the spatial distribution of calibration error and a measure to judge whether the calibrated model could reasonably represent the observed conditions.

The quantitative assessment of the calibration was conducted by examining the calibration target errors, or residuals. Residuals were calculated by subtracting the simulated groundwater elevations from the observed groundwater elevations. The mean residual, absolute mean residual, and residual sum of square statistics, standard deviation, normalized error, etc., were calculated to quantify the discrepancy between observed and simulated groundwater elevations provided by the calibrated model. The objective of the model calibration was to minimize this discrepancy.

A second quantitative measure of the calibration was provided by the simulated volumetric water budget reported by MODFLOW-2000 indicating the quantities of flow into and out of the model domain via the groundwater flow components specified in the model. The volumetric budget was reviewed to ensure that the total inflows and outflows were consistent with the conceptual hydrogeologic model. The volumetric water budget also provided a percent discrepancy between the total simulated inflows and outflows; a discrepancy of less than 0.1 percent indicates a satisfactory numerical convergence.

The wet condition calibrated model provides a residual mean of 0.05 foot, an absolute residual mean of 0.48 foot, a residual sum of squares of 35.12 square feet (ft^2), and a

residual standard deviation of 0.75 foot. The residual standard deviation is 13 percent of the head range in the February 2012 measured groundwater elevations. Spitz and Moreno (1996) suggest that the residual standard deviation should normally be less than about 10 percent of the observed head range. However, the range of heads observed at the Site is as small as only 5.68 feet, confounding efforts to get a smaller value for the percentage of standard deviation over the observed head range. Since other statistic errors, such as the residual mean, the absolute residual mean, the standard deviation, and the residual sum of squares, are all reasonably small, the model calibration results are generally acceptable.

The dry condition calibrated model provides a residual mean of 0.06 foot, an absolute residual mean of 0.35 foot, a residual sum of squares of 19.08 ft^2, and a residual standard deviation of 0.56 foot. The residual standard deviation is 12 percent of the head range in the August 2012 measured groundwater elevations.

The volumetric water budget for the wet and dry condition calibrated models was examined. A discrepancy of zero percent occurs in the budget between the simulated inflows and outflows for both models, demonstrating that a good numerical convergence was achieved throughout the model domain.

7.0 AS/SVE PILOT TESTING

7.1 AS/SVE PILOT TEST OBJECTIVES

The air sparge/soil vapor extraction (AS/SVE) pilot test objectives were to determine:

- The optimal SVE vacuum and extracted soil vapor flow from the wells
- The optimal AS pressure and flow rates to the wells
- The radius of influence (ROI) for both SVE and AS
- The hydrocarbon concentrations in extracted soil vapor and associated hydrocarbon mass removal rates
- If the native silt layer at the Site will inhibit the flow of sparged air to the vadose zone
- If short-circuiting will occur due to the presence of preferential pathways for soil vapor/air flow
- If AS/SVE is a practical, viable, and cost-effective remedial measure

7.2 PILOT TEST EQUIPMENT

An H2Oil Recovery Equipment, trailer mounted, AS/SVE pilot test unit was used for conducting the pilot test. The unit consisted of a Gast model 6066 rotary vane oil-less compressor direct coupled to a 5 horsepower motor to supply compressed air for air sparging and a Rotron model EN707 regenerative blower with a 5 horsepower motor to supply a vacuum for soil vapor extraction. Extracted air was routed through an air-water separator prior to discharging to the atmosphere. A diesel powered generator was used to supply power to the pilot test unit. A MiniRae 3000 PID was used to field screen effluent vapors during pilot testing. A Dwyer digital thermal anemometer was used to measure air sparging and vapor extraction flow rates and temperatures. A Heron interface probe/water level meter was used to monitor water levels in the observation wells. Solinst levelogger pressure transducers were installed in the observation wells to continually monitor waters/pressures during pilot testing. A Dwyer digital manometer was used to measure vacuums and pressures in the observation wells during pilot testing.

7.3 PILOT TESTING WELLS

Pilot testing was conducted on wells located north of the loading racks. Test well TW-2 was used as the soil vapor extraction well. Well TW-2 is a 4-inch diameter well with .010 slot, PVC screen from 4 to 9 feet bgs. Test well AS-1 was used as the air sparge well. Well AS-1 is a 2-inch diameter well with a .020 slot screen from 25 to 30 feet bgs. Observation wells TW-4, TW-6, and TW-8 (screened from 4 to 9 feet bgs) were used to monitor vacuum/pressure in the vadose zone during pilot testing. Observation wells TW-3, TW-5, TW-7, and DW-2 (screened from 20 to 30 feet bgs) were used to monitor water level/pressure in the saturated zone during pilot testing. Monitoring wells MW-8 and MW-9 were used as background wells during pilot testing. The locations of the test, observation, and background wells are presented on Figure 4. Stratigraphy logs with soil descriptions and well completion information are provided in Appendix D.

7.4 PILOT TEST PROCEDURE

The Pilot testing was broken up into 3 parts as follows:

i) SVE step testing – Systematically increasing the flow rate and vacuum applied to the SVE well to determine the optimal flow rate and vacuum;

ii) AS step testing – Systematically increasing the applied flow rate and pressure to the air sparge wells to determine the optimal flow rate and pressure; and

iii) AS/SVE testing - Run both AS and SVE simultaneously at the optimal flows and pressure/vacuums determined from steps i and ii.

The SVE step testing was completed on October 10, 2012. The AS step testing was completed on October 11, 2012. The AS/SVE final testing was completed on October 12, 2012. The procedures for each test are presented in the following sections.

7.4.1 SVE STEP TESTING

A soil vapor extraction (SVE) test was completed on monitoring well TW-2, screened in the shallow, unsaturated zone from 4 to 9 feet bgs. For the SVE test, shallow monitoring wells TW-4, TW-6, and TW-8 were utilized as observation wells to monitor vacuum responses during SVE testing. Additionally, monitoring wells MW-8 and MW-9 were utilized as background wells to monitor background vacuum levels, if present.

Observation Well Setup – A sealed cap fitted with a ball valve and barbed fitting was installed at each observation well. The barbed fitting and ball valve allowed for easy connection and disconnection of a vacuum gauge during the SVE testing.

Extraction Well Setup – The SVE vacuum pump consisted of a positive displacement blower capable of providing a continuous vacuum 70 in. water column and a continuous flow of 100 scfm. The SVE vacuum blower pulled air from the well and through an air/water separator. The vacuum pump discharge was routed to a discharge stack and vented directly to the atmosphere. The vacuum side of the pump was fitted with a port for measuring flow, temperature, and vacuum. The positive side of the blower was fitted with an air sample port.

SVE Test Procedures – The SVE testing procedures were as follows:

i) Collect and record water levels from the extraction well and the monitoring wells to determine the amount of exposed screen in the vadose zone.

ii) Install well seals on all observation and background wells.

iii) Program barometric data logger to record in 5-minute intervals

iv) Collect initial vacuum readings from each monitoring well and background well to check for ambient vacuum.

v) Once initial readings have been taken and barologger begins recording, start vacuum blower at a vacuum of 32 inches of water column (in WC).

vi) Once the desired vacuum is set, collect and record the flow rate, temperature, and applied vacuum from the extraction well. Collect and record the observed vacuum from the observation wells. Collect a PID reading from the sample point on the vacuum side of the blower.

vii) All readings are collected every 15 minutes. Once the applied and observed vacuums and flow rates have stabilized, or after 2 hours if not stable, collect air sample for laboratory analysis and increase vacuum to 55 in WC.

viii) Repeat steps 6 and 7, increasing to 70 in WC for the third and final step

7.4.2 AS STEP TESTING

An AS test was completed on monitoring well AS-1, screened in the saturated zone from 25 to 30 feet bgs. For the AS test, shallow observation wells TW-2, TW-4, TW-6, and TW-8 were utilized as observation wells to monitor pressure increases in the vadose

zone. Deep observation wells DW-2, TW-3, TW-5, and TW-7 were utilized to monitor pressures in the saturated zone. Additionally, monitoring wells MW-8 and MW-9 were utilized as background wells to monitor background pressures, if present.

Observation Well Setup – A sealed cap fitted with a ball valve and barbed fitting was installed at each observation well. The barbed fitting and ball valve allowed for easy connection and disconnection of a pressure gauge during the AS testing. A pressure transducer was installed in each of the deep observation wells and the background wells. The transducers in the observation wells were installed a minimum of 5 feet below the water table.

Sparge Well Setup – The AS compressor consisted of a rotary vane compressor capable of providing a continuous 20 scfm at 20 psi. The AS blower pulled air from atmosphere and injected it into the wellhead. The pressure side of the blower was fitted with a port to measure flow, temperature, and pressure.

Air Sparge Test Procedures – The air sparge test procedures were as follows:

i) Collect and record water levels from the sparge well and the observation wells to determine the amount of water column above the screen interval.

ii) Collect initial dissolved oxygen readings from the deep observation wells by lowering a Horiba U-22 parameter meter into the screened interval of well.

iii) Program transducers to start recording at a specified time.

iv) Transducers should be set to record at 1 minute intervals.

v) Program barometric data logger to record in 5-minute intervals

vi) Collect initial vacuum readings from each shallow observation well and pressure readings from each deep observation well and background well.

vii) Once the specified transducer start time has occurred, begin sparging at 5 scfm.

viii) Once the desired flow rate is set, collect and record the flow rate, temperature, and applied pressure from the air sparge well. Collect and record the pressure from the observation wells.

ix) All readings are collected every 15 minutes. Once the applied pressure and observed pressures have stabilized, or after 2 hours if not stable, increase flow rate to 10 scfm.

x) Repeat steps 8 and 9, increasing to 20 scfm for the third and final step.

xi) Once the air sparging is complete, download data from the transducers and barologger. Collect dissolved oxygen readings from the deep observation wells.

xii) Evaluate transducer data and SVE data to determine the optimal AS and SVE flowrates.

7.4.3 AS/SVE CONSTANT RATE TESTING

An AS/SVE constant rate test was completed simultaneously to evaluate vapor removal rates during air sparging. For the AS/SVE test, shallow observation wells TW-2, TW-4, TW-6, and TW-8 were utilized to monitor pressures/vacuums in the vadose zone. Deep observation wells DW-2, TW-3, TW-5, and TW-7 were utilized to monitor the pressures in the saturated zone. Additionally, monitoring wells MW-8 and MW-9 were utilized as background wells to monitor background pressures, if present.

Observation Well Setup – A sealed cap fitted with a ball valve and barbed fitting was installed at each observation well. The barbed fitting and ball valve allowed for easy connection and disconnection of a pressure/vacuum gauge during the AS/SVE testing. A pressure transducer was installed in each of the deep observation wells and the background wells. The transducers in the observation wells were installed a minimum of 5 feet below the water table.

Air Sparge / Soil Vapor Extraction Test Procedures – The AS/SVE test procedures were as follows:

i) Collect and record water levels from the extraction well, sparge well and the observation wells to determine the amount of exposed screen in the vadose zone or water column above the screened interval.

ii) Collect initial dissolved oxygen readings from the deep observation wells by lowering a Horiba U-22 parameter meter into the screened interval of well.

iii) Program transducers to start recording at a specified time.

iv) Transducers should be set to record at 1 minute intervals.

v) Program barometric data logger to record in 5-minute intervals.

vi) Collect initial vacuum/pressure readings from each observation well and background wells.

vii) Once the specified transducer start time has occurred, begin sparging and vapor extraction at the optimal rates determined from the individual tests.

viii) Once the desired flow rates are set, collect and record the flow rates, temperatures, and applied pressure from the air sparge well and vacuum from the extraction well. Collect and record the observed vacuum/pressure from the observation wells. Collect a PID reading from the sample point on the vacuum side of the SVE pump.

ix) All readings should be collected every 15 minutes.

x) Allow test to run for 6 hours.

xi) Before shutting down equipment, collect an air sample for laboratory analysis.

xii) Once the air sparging is complete, download data from the transducers and barologger. Collect dissolved oxygen readings from the deep observation wells.

7.4.4 LABORATORY ANALYSIS

All collected vapor samples were submitted under chain of custody to Pace Analytical Services, Inc. The soil vapor samples were analyzed for TPHg and BTEX by Method TO-15.

7.5 AS/SVE PILOT TEST RESULTS

7.5.1 STEP TEST RESULTS

SVE Step Testing

During SVE step testing, a vacuum of 32, 55, and 70 in WC and corresponding flows of 10, 20, and 25 acfm were applied to well TW-2. Each step was run for approximately 1 hour. Vacuum readings in the observation wells stabilized relatively quickly. The temperature of the extracted vapor remained consistent throughout the SVE step test.

Below is summary of the SVE step test data:

STEP 1 (32 in WC)

Well	*Distance from TW-2 (feet)*	*Average vacuum* (in WC)*	*Percent of applied vacuum*
TW-4	17	2.07	6.5
TW-6	17	2.03	6.3
TW-8	10	3.16	9.9
MW-8	132	0.0	0.0
MW-9	145	0.0	0.0

STEP 2 (55 in WC)

Well	*Distance from TW-2 (feet)*	*Average vacuum* (in WC)*	*Percent of applied vacuum*
TW-4	17	4.25	7.7
TW-6	17	4.07	7.4
TW-8	10	6.35	11.5
MW-8	132	0.18	0.3
MW-9	145	0.17	0.3

STEP 3 (70 in WC)

Well	*Distance from TW-2 (feet)*	*Average vacuum* (in WC)*	*Percent of applied vacuum*
TW-4	17	5.59	8.0
TW-6	17	5.37	7.7
TW-8	10	8.28	11.8
MW-8	132	0.18	0.26
MW-9	145	0.15	0.21

*Average taken from last three vacuum readings

Effluent PID readings were taken each time readings were collected. The PID readings did not vary significantly throughout the step tests and were generally between 200 and 230 ppmV. Soil vapor samples were collected at the end of each step. Laboratory analytical data for each sample are as follows:

Sample	*TPHg (ppmV)*	*Benzene (ppmV)*	*Toluene (ppmV)*	*Ethylbenzene (ppmV)*	*Total Xylenes (ppmV)*
STEP 1	31,900	488	405	69.2	290.3
STEP 2	38,800	561	471	88.9	373
STEP 3	46,000	713	625	141	587

Laboratory analytical data indicate that the concentrations were well outside the range of the PID explaining why the PID readings did not vary significantly and were relatively low. Concentrations indicate an increasing trend with each step. Based on the laboratory analytical data and the field parameters collected during the SVE step tests, a vacuum of 70 in WC was chosen for the constant rate test.

AS Step Testing

During the AS step testing, a pressure of 10 PSI and corresponding flow rate of 5 acfm was applied to well AS-1. Step 1 was run for approximately 2 hours. An increase to 15 PSI was attempted but was stopped when the cap on nearby well TW-1 popped off and water began flowing out of the well head.

Below is a summary of the AS step test data:

STEP 1 (10 PSI)

Well	*Distance from AS-1 (feet)*	*Average pressure* (psi)*	*Percent of applied pressure*	*Initial DO (mg/L)*	*Final DO (mg/L)*
TW-3	14	0.35	3.5	0.0	4.45
TW-5	18	0.029	0.29	0.0	2.03
TW-7	14	0.0	0.0	0.0	0.0
DW-2	6	0.09	0.9	0.0	5.02
MW-8	135	0.0	0.0	--	--
MW-9	145	0.0	0.0	--	--

*Average taken from last three pressure readings

Based on the results of the AS step test, it appears that the injected air is not dispersing unilaterally. This may likely be caused by the native silt layer at the Site inhibiting the upward flow of air to the vadose zone. As air is sparged, it begins to form air pockets below the silt layer. The air pockets would likely rise to the highest point, in this case toward the north. The upwelling of water observed in DW-2 is likely caused by the buildup of pressure below the silt layer when the pressure was incrementally increased

for step 2. It should be noted that a significant increase in dissolved oxygen was observed in all wells except TW-7, which did not indicate any influence from the air sparging. Although AS did not appear to be a viable alternative at the Site due to the stratigraphy, a pressure of 10 psi was chosen for the constant rate AS/SVE test to determine if air sparging does aid in the volatization of contaminants.

7.5.2 AS/SVE CONSTANT RATE TEST RESULTS

During the AS/SVE constant rate test, a pressure of 10 PSI and flow of 5 acfm was applied to well AS-1. A vacuum of 70 in WC and flow of 20 acfm was applied to well TW-2. The test was run for about 5.5 hours. Vacuum readings in wells TW-4, TW-6, and TW-8 stabilized within a half hour. Pressures in well TW-3 gradually increased throughout the test and dropped off quickly in the last 40 minutes of the test. Pressures in well TW-5 gradually increased throughout the test and increased quickly during the last 40 minutes of the test. Pressures in well DW-2 increased quickly after the first 2 hours of testing and remained consistent throughout the remainder of the test. A consistent vacuum was present in well TW-7 throughout the test, despite the well being screened below the water table.

Below is a summary of the AS/SVE constant rate test data:

Constant Rate (10 PSI AS / 60 in WC SVE)

Well	*Distance from Well (feet)*	*Average pressure* (psi)*	*Percent of applied pressure*	*Average Vacuum (in WC)*	*Percent of applied vacuum*
TW-3	14	0.22	2.2	--	--
TW-5	18	0.63	6.3	--	--
TW-7	14	--	--	.98	1.6
DW-2	6	7.33	73.3	--	--
TW-4	17	--	--	4.58	7.63
TW-6	17	--	--	4.58	7.63
TW-8	10	--	--	7.41	12.35
MW-8	135	0.0	0.0	0.0	0.0
MW-9	145	0.0	0.0	0.0	0.0

*Average taken from last three readings

Effluent PID readings were taken each time readings were collected. The PID readings did not very significantly throughout the test and were generally between 225 and 265 ppmV. Soil vapor samples were collected 2 hours after starting the test and each hour thereafter. Laboratory analytical data for each sample are as follows:

Sample	*TPHg (ppmV)*	*Benzene (ppmV)*	*Toluene (ppmV)*	*Ethylbenzene (ppmV)*	*Total Xylenes (ppmV)*
1	70,000	1,110	969	162	699
2	117,000	2,160	1,840	333	1,412
3	75,900	1,030	1,030	204	910
4	142,000	2,660	2,480	467	2,052

Laboratory analytical data indicate that the concentrations were well outside the range of the PID. Concentrations were significantly higher than those seen during the SVE step test, indicating AS does aid in the volatization of contaminants at the Site.

7.5.3 SVE MASS REMOVAL

Laboratory analytical data were used determine mass removal rates for TPHg and BTEX. The mass removal calculations are present on Table 14. Removal rates increased for each step test ranging from 109 to 354 pounds per day (lbs/day) for TPHg. Removal rates increased significantly during the constant rate test ranging from 444 to 900 lbs/day for TPHg. During pilot test activities, total mass removed for TPHg, Benzene, toluene, ethylbenzene, and total xylenes were 170, 2.20, 2.32, 0.49, and 2.13 lbs, respectively.

7.5.4 SVE RADIUS OF INFLUENCE

Theoretical effective radius of influence (ROI) for vapor recovery was estimated by graphing and utilizing the Johnson-Kemblowski equation. During the AS/SVE testing on well TW-2, vacuum influence was noted in the adjoining wells TW-4 (7.63 percent), TW-6 (7.63 percent), and TW-8 (12.35 percent). An effective radius of influence considered to be 1 percent of the applied vacuum. Projecting the trend noted in the observation wells, an estimate radius of influence at 60 in WC vacuum is 34 feet. The ROI calculations are provided on Table 15.

7.6 AS/SVE SUMMARY AND CONCLUSIONS

The results of the AS/SVE pilot testing indicate the following:

- SVE is a viable alternative to capture contaminated soil vapor in the vadose zone. An effective ROI of 34 feet at a vacuum of 60 in WC was determined. A TPHg removal rate of up to 354 lbs per day at 17 scfm.
- Air sparging did result in a significant increase in recovered vapor concentrations. AS does not appear to be a viable alternative due to the native silt layer inhibiting the flow of the sparged air to the vadose zone. Without the ability to migrate quickly to the vadose zone, the sparged air would be forced to migrate outward in an uncontrolled manner potentially mobilizing contaminants in the process.

8.0 DPE PILOT TESTING

8.1 PILOT TEST OBJECTIVES

The pilot test objectives were to determine:

- The optimal vacuum and extracted soil vapor flow from the wells
- If saturated soils can be adequately dewatered to expose residual hydrocarbons within the saturated soil to soil vapor extraction (SVE)
- The radius of influence (ROI) for both SVE and groundwater extraction (GWE)
- Sustained groundwater and soil vapor removal rates
- The hydrocarbon and oxygenate concentrations in extracted soil vapor and groundwater, and associated hydrocarbon mass recovery
- If short-circuiting will occur due to the presence of preferential pathways for soil vapor/air flow
- If DPE is a practical, viable, and cost-effective remedial measure

8.2 PILOT TEST EQUIPMENT

The critical components for the DPE pilot test work included groundwater and vapor extraction devices and recovered groundwater storage and/or treatment. QED pneumatic submersible pumps were used to extract groundwater from the extraction well undergoing DPE testing. An aboveground diaphragm pump was used to extract SPH from EX-1 prior to the DPE test. During extraction from EX-1, the extracted water was discharged into a temporary above grade holding tank. During extraction from RWX-2, RWX-5, LAIX-5, and LAIX-2, the extracted water was processed through the on-site remediation system for treatment and discharged to the sewer. A Newterra RTS096 model trailer-mounted blower unit was used for conducting the SVE portion of the DPE test. The unit was equipped with a high-vacuum rotary claw vacuum blower, capable of 160 actual cubic feet per minute (acfm) at 25 inches of mercury (in. Hg). This mobile unit was equipped with a vapor-liquid separator to remove entrained liquid from the vapor stream. Separated liquid contents were processed through the on-site remediation system for treatment and discharged to the sewer. The QED pneumatic submersible pumps were powered by a mobile air-compressor while extracting on EX-1, and the existing on-site treatment system air compressor during extraction on RWX-2,

RWX-5, LAIX-5, and LAIX-2. A diesel-powered generator provided power for the DPE equipment.

A MiniRae 3000 PID and a Horiba MEXA-554-JU, calibrated to hexane and propane, respectively, were used to field measure hydrocarbon vapor concentrations from the extraction wells. Vapor samples were collected in one-liter Tedlar™ bags using a Gast rotary-vane sample pump. Magnehelic gauges were used to measure the vacuum applied at the extraction wellhead and induced vacuum in the observation wells. A Dwyer digital manometer was used to confirm the vacuum applied at the extraction wellhead and induced vacuum in the observation wells periodically throughout the test. A TSI thermal anemometer was used to measure vapor flow rates and temperature. Groundwater and SPH levels, if any, were monitored periodically in the extraction and observation wells with a Solinst interface level meter. A flow totalizing meter was used to continuously measure extracted groundwater volume.

8.3 PILOT TEST PROCEDURE

Prior to the performance of the pilot test, the new extraction well EX-1 and observation wells P-1 and P-2 were developed; and the four existing wells planned for extraction were redeveloped. On April 4, 2013, during and following development of EX-1, approximately 1.5 feet of SPH presence was detected in the well and approximately 20 gallons of SPH were recovered. On April 19, 2013, 1.28 feet of SPH was present in EX-1 and a total of approximately 25 gallons of SPH were recovered from well EX-1. On April 22, 2013, prior to commencement of the DPE pilot test, CRA observed 1.67 feet of SPH in EX-1 and extracted approximately 31 gallons of SPH. The recovered SPH was placed into DOT-approved 55 gallon drums and stored on-site for future off-site disposal/recycling.

The original scope of work included DPE application to wells EX-1, RWX-2, RWX-5, LAIX-5, and LAIX-2. In addition, "SVE only" was performed using horizontal wells HW-W and HW-N1, due to their lack of "sumps" in the horizontal wells to facilitate GWE. Existing wells P-1, P-2, TW-2, TW-4, TW-6, TW-8, MW-7, MW-8, RW-1, RW-3, RW-4, RWX-7, HW-W, HW-N1 (west end of horizontal well), HW-N2 (east end of horizontal well), HW-E, HWX-1W, LAI-1, LAIX-3, LAIX-4, LAIX-6, LAIX-7, LAIX-8, LAIX-9, and LAI-10 were used as observation wells for groundwater elevations and induced vacuum, when DPE was applied to wells in their proximity. RWX-2, RWX-5, and LAIX-5 were used as observation wells for groundwater elevations and induced vacuum, when not being used for extraction.

CRA initiated DPE on the selected extraction well by commencing operation of a pneumatic submersible pump for dewatering the extraction well. Once dewatered, the SVE portion of the test was commenced. A stepped application of SVE (i.e. vacuum and corresponding extracted soil vapor flow) was applied to each well to determine the optimum applied vacuum and corresponding vapor flow rate that would yield the highest mass removal rate. This field determined optimum vacuum/vapor flow rate was then utilized for an extended duration test to determine maintenance ability for extracted vapor concentrations. During SVE application on the two horizontal wells (HW-W and HW-N1), the vacuum was applied to these wells in accordance with the optimum applied vacuum for the DPE application to nearby well RWX-2. Similarly, during DPE application on LAIX-5, the optimum applied vacuum on DPE application to RWX-5 was applied to LAIX-5. In both situations, the vacuum applied was the maximum vacuum and corresponding vapor flow that could be afforded from the testing equipment. A suitable step test and extended duration test could not be applied to well LAIX-2 due to issues with dewatering the well: the significant amount of silt recovery as part of GWE initially resulted in fouling of the pneumatic pump, and later resulted in plugging of the discharge lines, which extended from the test well to the existing DPE equipment compound located to the northeast of the ASTs.

From April 22 to 23, 2013, CRA performed a DPE step-test followed by an extended DPE test (with a total duration of approximately 23 hours) on well EX-1. CRA then performed a similar step and extended DPE test on well RWX-2 for a total duration of approximately 10 hours from April 23 to 24, 2013. CRA then performed a SVE test on horizontal wells (HW-W and HW-N1) for approximately 1 hour each on April 24, 2013. CRA then performed similar step and extended DPE test on well RWX-5 for a duration of approximately 14 hours from April 24 to 25, 2013. On April 25, 2013, an approximate 2.5-hour DPE test was performed on LAIX-5 under the maximum vacuum/flow rate available from the testing equipment. This maximum vacuum/flow rate was utilized in lieu of a step-test due to the testing results experienced on wells RWX-2 and RWX-5. On April 25, 2013, CRA attempted a step test and extended duration test on well LAIX-2 for a total duration of approximately 7 hours.

Data Collection and Sampling: Data was collected on prepared field forms. A copy of the completed forms is provided in Appendix N. SPH thicknesses (if present) and depth to groundwater were measured in each well to determine the initial groundwater levels prior to the commencement of DPE activities.

During the DPE pilot test work, CRA personnel measured the groundwater extraction flow rate and total volume extracted; applied wellhead vacuum; volatile organic compound (VOC) concentration levels and flow rates of the extracted soil vapor; and induced vacuum and water levels (and SPH thicknesses, as applicable) in the observation wells. These measurements were recorded at various intervals ranging from 2 to 45 minutes during the mini-step and step vacuum testing, respectively; and at approximate 60 minute intervals during the long-term DPE application testing.

Vapor samples were collected from wells EX-1, RWX-2, RWX-5, LAIX-5, and LAIX-2 in Tedlar® bags during each step test and, as a minimum, at the beginning and end of each long-term DPE application test. However, during the constant rate/extended duration testing on well RWX-2, equipment malfunctions either prevented sample collection, or the collected samples were "lost" (Tedlar® bag failure) in transport. Only one sample collected from RWX-2 was available for analysis. No vapor samples were collected during SVE application on well HW-N1 because the vacuum was extracting a moisture-laden vapor that was unsuitable for collection/analyses. Vapor samples were collected during the second step on RWX-5, but both samples were "lost" in transit (Tedlar® bag failure). The mass removal for the step test portion of DPE was calculated by averaging the concentrations taken during the first and third step tests. A vapor sample was not taken during the "mini" step test on LAIX-2 due to the short duration of the test. A total of 21 vapor samples were collected (18 for hydrocarbon and oxygenate analyses, and 3 for methane analyses) and analyzed from the various wells undergoing s during the DPE/SVE pilot test work. Groundwater samples were collected from the water being extracted from the individual wells undergoing DPE, after initial dewatering of the well had occurred. Groundwater samples were also collected post-DPE testing on each well that underwent DPE application.

Laboratory Analyses: All collected vapor and water samples were analyzed by Pace Analytical Services, Inc. The soil vapor samples were analyzed for TPHg, BTEX, MTBE, and Methane by analytical Method TO-3 Air. The groundwater samples were analyzed for TPHd and TPHg by analytical Methods NWTPH-Dx and NWTPH-Gx, respectively. The groundwater samples were also analyzed for BTEX and MTBE by EPA Method 8260B.

8.4 PILOT TEST RESULTS

8.4.1 SPH DETECTION AND RECOVERY

As previously mentioned, approximately 1.67 feet of SPH presence was detected in well EX-1 prior to DPE testing. Upon completion of DPE from well EX-1, SPH was detected at a thickness of 1.10 feet. SPH presence was also detected in observation wells P-1, P-2, TW-2, TW-4, and TW-6 before, during and after DPE on EX-1, as summarized in the table below:

WELL	*SPH THICKNESS (feet)*		
	Prior to DPE on EX-1	*During DPE on EX-1*	*Post-DPE on EX-1*
EX-1	1.67	--	1.10
P-1	0.01	0.05 to 0.48	0.02
P-2	0.68	0.90 to 1.31	0.52
TW-2	0.60	0.43 to 0.63	0.40
TW-4	0.17	0.00 to 0.01	0.00
TW-6	0.81	0.00 to 0.47	0.00

An estimated total of approximately 630 gallons of SPH was recovered during DPE application on well EX-1. A summary of recorded SPH thicknesses during DPE application on well EX-1 is provided in Table 16.

A sample of the SPH was collected and analyzed to determine the hydrocarbon fingerprint and complete an age analysis. The sample was delivered to Pace Analytical laboratories. Pace subcontracted Friedman and Bruya, Inc. to perform the analyses. The sample was analyzed for compounds Paraffins, Isoparaffins, Aromatics, Naphthenes, and Olefins (PIANO), oxygenates (which includes n-butane, MTBE, TAME, DIPE, TBA, Ethanol, ETBE), organic lead, manganese, and by Gas Chromatography/Flame Ionization Detector (GC/FID) to determine the hydrocarbon fingerprint. The laboratory analytical reports are included in Appendix O.

A detailed review of the laboratory data was completed to evaluate the SPH type and approximate age of the SPH. A memo detailing the evaluation is provided in Appendix O. The PIANO composition and BTEX ratios determined by the laboratory analysis indicate that the sample was gasoline. A review of the gas chromatogram and ratios of various constituents indicates that the sample had not weathered significantly

but a significant amount of benzene and toluene had dissolved in the groundwater. The current understanding of the Site history and stratigraphy correlate well with this data. It is known that prior releases had been primarily gasoline in nature and since the SPH in question is primarily trapped under a semi-confining silt/clay layer, it is likely that very little weathering has occurred.

A review of the laboratory data for common gasoline additives indicates the presence of organic lead. Based on the concentration of lead in the sample and the ratio of toluene to octane, the SPH was likely manufactured between 1985-1987.

8.4.2 GROUNDWATER EXTRACTION, DRAWDOWN, AND RECOVERY

During DPE testing, the groundwater extraction rate averaged 2.0 gallons per minute (gpm) from well EX-1 (a 6-inch-diameter well constructed with 0.020 slot screen); 3.0 gpm from well RWX-2 (a 4-inch-diameter well constructed with 0.010 slot screen); 1.4 gpm from well RWX-5 (a 4-inch-diameter well constructed with 0.010 slot screen); 1.8 gpm from well LAIX-5 (a 4-inch-diameter well constructed with 0.010 slot screen); and 0.4 gpm from well LAIX-2 (a 4-inch-diameter well constructed with 0.010 slot screen). The groundwater extraction volumes recovered and estimated extraction rates are summarized in Table 24. During DPE application, a total of approximately 2,799 gallons of groundwater were recovered from well EX-1; a total of 1,585, 1,187, 271, and 125 gallons of groundwater was recovered as part of the DPE testing work performed on wells RWX-2, RWX-5, LAIX-5, and LAIX-2, respectively. The groundwater extraction volumes recovered and estimated extraction rates are summarized in Table 24.

A summary of groundwater elevation drawdown as measured in the associated observations wells for DPE application on wells EX-1, RWX-2, RWX-5, LAIx-5, and LAIX-2 are provided in Tables 16 through 22. The drawdown in the extraction and observation wells are presented in and Figures 34 through 38. As summarized in the various tables, induced groundwater drawdown during the DPE test was noted as follows:

- From 0.18 feet (in MW-8) to 5.0 feet (in P-1) while extracting from EX-1
- From 0.060 feet (in LAIX-5) to 0.94 feet (in RW-1), while extracting from RWX-2
- From 0.040 feet (in LAIX-5) to 0.74 feet (in RW-4), while extracting from RWX-5
- From 0.00 feet (in LAIX-4) to 0.60 feet (in LAIX-7), while extracting from LAIX-5

- From 0.060 feet (in LAIX-9) to 0.49 feet (in HWX-1W), while extracting from LAIX-2

The water levels in the well that underwent DPE application, and the associated observation wells were measured after approximately 1 hour post-DPE application, with the following noted percent recoveries (as measured from the last reading during DPE application) compared to original static level:

DPE from Well EX-1:

- EX-1: 13 percent
- P-1: 57 percent
- P-2: 56 percent
- TW-2: 100 percent
- TW-4: 0 percent No recovery noted
- TW-6: 114 percent Recovered higher than initial static water level
- TW-8: 15 percent

DPE from Well RWX-2:

- RWX-2: 76 percent
- LAIX-4: Demonstrated decreasing depth through test
- LAIX-5: 33 percent, continued to go deeper after test
- RW-1: 2 percent, continued to go deeper after test
- RWX-5: 5 percent

DPE from Well RWX-5:

- RWX-5: 27 percent
- HW-E: 14 percent
- LAIX-5: Demonstrated decreasing depth through test
- LAIX-6: 14 percent Continued to go deeper after test
- RW-3: Demonstrated decreasing depth through test
- RW-4: 28 percent
- RWX-2: Increasing to decreasing depth through test

- RWX-7: 17 percent, continued to go deeper after test

DPE from Well LAIX-5:

- LAIX-5: 39 percent
- LAIX-4: No change during test; went deeper after test
- LAIX-6: Demonstrated decreasing depth through test
- LAIX-7: 37 percent
- LAIX-9: 62 percent
- RWX-2: 38 percent Continued to go deeper after test

DPE from Well LAIX-2:

- LAIX-2: 79 percent
- LAI-1: 35 percent
- LAI-10: 400 percent, continued to go deeper after test
- LAIX-3: 200 percent, continued to go deeper after test
- HWX-11W: 14 percent

8.4.3 VACUUM AND RECOVERED VAPOR FLOW

Initially on well EX-1, a step test was first applied to determine the optimal vacuum at which to operate the extended DPE test. During the step test, applied vacuum increased from 7.0 to 23.0 inches of mercury (in. Hg), with recovered vapor flow rates increasing from 41 to 77 standard cubic feet per minute (scfm). From the step-test, the optimum applied vacuum rate was determined to be approximately 21.0 in. Hg, with a corresponding recovered vapor flow rate of approximately 76 scfm. For the long-term duration test, the applied casing vacuum was initially set at approximately 21.0 in. Hg. Halfway through the long-term DPE test, the applied vacuum was increased to 25.0 in. Hg to find out whether or not the increase in vacuum would affect the recovered flow and mass removal rates. The corresponding flow rates did not illustrate a significant increase in flow rates during the remainder of the DPE application, and actually illustrated a slight decline as the result of an increase in vapor temperature (not inferred to be related to the increase in applied vacuum). However, a noted increasing trend in

field measured VOC and laboratory detected hydrocarbon concentrations were noted as the result of the increase in vacuum application.

As noted, there was a significant change in recovered vapor temperature (ranging from 42 to 92 degrees Fahrenheit), which appeared to correspond with the ambient temperatures experienced during the duration of the test.

During the step test on well RWX-2, increasing vacuums from 7.5 to 23.0 in. Hg of vacuum were applied, with recovered vapor flow rates ranging from 86 to 109 scfm. The optimum applied vacuum rate was determined to be approximately 23.0 in. Hg with a corresponding air flow rate of approximately 109 scfm. For the long-term duration test, the applied casing vacuum was set at approximately 23.0 in. Hg. The flow rates during the long-term duration test ranged from 108 to 111 scfm, with an averaged flow of approximately 109 scfm. The flow rates generally stayed constant throughout the extended duration test.

A similar change in extracted vapor stream temperature experienced during the DPE testing on well RWX-2, which again seemed to correspond with ambient air temperatures occurring during the test. However, this also could have been the result of the extend length that the recovered vapor had to travel in exposed piping before it reached the sampling point.

SVE extraction on horizontal well HW-W yielded extracted vapor flow rates ranging from 96 to 103 scfm. Based on the optimum applied vacuums determined for well RWX-2, it was also assumed that the optimum vapor recovery would occur at the maximum potential applied vacuum of 23.0 in. Hg; however due to equipment limitations and the line loss experienced in the piping and hosing from the vacuum source to the well head, a maximum applied vacuum of approximately 22.5 in. Hg with a corresponding flow rate of approximately 100 scfm was applied, which did not fluctuate significantly during the approximate 1 hour of SVE testing. The test was terminated due to the low (negligible) VOC vapor concentrations being extracted from the well.

SVE extraction on horizontal well HW-N1 was attempted; however, no data was collected because the applied vacuum was pulling in high quantities of water and a very moist vapor stream. The test was terminated due to the inability to adequately dewater the line (due to the lack of a sump in the line). During the limited testing, only low,

negligible VOC concentrations were detected. A vapor sample could not be obtained due to the significant amount of entrained water in the vapor sample attempted.

During the step test on RWX-5, increasing vacuums from 7.9 to 22.5 in. Hg of vacuum were applied, with recovered vapor flow rates ranging from 73.5 to 119 scfm. The optimum applied vacuum rate was determined to be approximately 22.0 in. Hg with a corresponding air flow rate of approximately 119 scfm. For the long-term duration test, the applied casing vacuum was set at approximately 22.0 in. Hg. The flow rates during the long-term duration test ranged from 113 to 125 scfm, with an averaged flow of approximately 117 scfm. The flow rates stayed relatively constant throughout the extended duration test.

Initial DPE extraction on LAIX-5 resulted in fouling of the pneumatic pump installed due to high silt content in the extracted groundwater. There were also delays experienced in being able to dewater the well due to the high level of silt buildup in the existing groundwater discharge conveyance hosing (of the existing DPE remediation system) that was employed for the DPE tests conducted in the area of the ASTs. Due to the significant delays experienced in dewatering the well prior to SVE application, a field decision was made to forego the step test on well LAIX-5, and just utilize the maximum available vacuum (similar to what was experienced for DPE application on wells RWX-2 and RWX-5) which was initially 17 in. Hg, but was later increased to 23 in. Hg with repair of malfunctioning SVE equipment. The flow rate ranged from 115 to 118 scfm with the application of 17 in. Hg vacuum; and 107 to 108 scfm with the application of 23.0 in. Hg vaccum, with no notable change in vapor concentrations. The test was terminated after approximately 2.5 hours due to the relatively low VOC concentrations in the extracted vapor stream.

DPE application on well LAIX-2 was inhibited due to the silt buildup in the on-site treatment system lines; the significant amount of silt recovery in the well; the capacity limitation of the pneumatic pump utilized; and the resulting inability to sufficiently draw down the groundwater in the well to expose the screened interval of the well for SVE application. As previously mentioned, silt buildup in the groundwater lines to the on-site treatment created additional head pressure for the GWE pump to overcome. This resulted in the pump not being able to sufficiently drawdown the water in the well, with SVE application. During the shortened step test on LAIX-2, applied casing vacuum ranged from 11.0 to 14.0 in. Hg with corresponding vapor flow rates from 106 to 119 scfm. While trying to maintain a vacuum of 14.0 in. Hg, no flow rates were measured because there was too much water in the SVE line, which inhibited an

accurate vapor flow reading. To minimize the amount of water accumulated in the SVE line, the vacuum was lowered to 5.0 in. Hg for the extended duration test. During the extended duration test, the flow rate varied between 87.3 and 90.4 scfm. The test was terminated after only 6 hours due to the inability to draw down the water level significantly in the well and the low VOC concentrations noted in the extracted vapor stream.

The soil vapor extraction vacuum and flow data for the individual well tests are presented in Table 24 and Figures 39 through 44.

8.4.4 DISSOLVED CONSITUENT CHANGES IN GROUNDWATER AND MASS REMOVAL

Concentrations of dissolved phase TPHg and benzene typically increased from the beginning to end of the DPE testing on each well. The dissolved phase TPHg and benzene concentrations in the extracted groundwater samples collected prior to (pre-) and following (post-) DPE application to each well were as follows:

TPHg and Benzene Concentrations, Pre- and Post-DPE Application				
Well	***TPHg µg/L***		***Benzene µg/L***	
	Pre-DPE	***Post- DPE***	***Pre-DPE***	***Post- DPE***
EX-1	147,000	255,000	33,100	31,200
RWX-2	9,420	47,600	539	1,130
RWX-5	881	11,700	61.3	805
LAIX-5	33,600	172,000	2,660	12,600
LAIX-2	13,100	22,600	334	2,360

MTBE was detected only prior to DPE application in LAIX-2 at a concentration of 19.4 µg/L.

The total 5,967 gallons of groundwater recovered during DPE application resulted in recovery of approximately 5.3, 0.78, and 0.006 pounds of dissolved-phase TPHg, benzene, and MTBE mass, respectively. The groundwater extraction operational and mass removal data for the GWE and the individual DPE well tests are presented in Table 23.

8.4.5 VAPOR-PHASE MASS REMOVAL

Based on the observed flow rates, temperature, pressure, and laboratory analytical data, the mass removal rates for TPHg, BTEX, and MTBE were calculated and are summarized in Table 24. During DPE testing on well EX-1, a calculated total of 256 pounds of TPHg, 10.5 pounds of benzene, and 3.8 pounds of MTBE vapor-phase mass were removed, with averaged TPHg, benzene, and MTBE mass removal rates of 276, 10.9, and 3.9 pounds per day (ppd), respectively.

A calculated total of 0.35 pounds of TPHg and 0.008 pounds of benzene vapor-phase mass were removed during the DPE testing on well RWX-2, with averaged TPHg and benzene mass removal rates of 0.9 and 0.02 ppd, respectively. There was no detection of MTBE in the three vapor samples analyzed from well RWX-2.

During the short-duration SVE test on lateral line HW-W, a calculated total of 0.01 pound of TPHg and 0.0001 pound of benzene vapor-phase mass were removed, with averaged TPHg and benzene mass removal rates of 0.2 and 0.003 ppd, respectively. There was no detection of MTBE in the one vapor sample analyzed from well HW-W.

The total and averaged TPHg and benzene vapor-phase mass removal rate during extraction from HW-N1 could not be calculated due to the inability to take accurate readings and samples because of the entrained water in the SVE line.

A calculated total of 0.3 pounds of TPHg and 0.005 pounds of benzene vapor-phase mass were removed during the DPE testing on well RWX-5, with averaged TPHg and benzene mass removal rates of 0.5 and 0.008 ppd, respectively. There was no detection of MTBE in the four vapor samples analyzed from well RWX-5.

A calculated total of 3.5 pounds of TPHg and 0.03 pound of benzene vapor-phase mass were removed during the DPE testing on well LAIX-5, with averaged TPHg and benzene mass removal rates of 36.2 and 0.3 ppd, respectively. There was no detection of MTBE in the two vapor samples analyzed from well LAIX-5.

A calculated total of 0.3 pound of TPHg, 0.002 pound of benzene, and 0.002 pound of MTBE vapor-phase mass were removed during the DPE testing on well LAIX-2, with an averaged TPHg, benzene, and MTBE mass removal rate of 1.1, 0.006, and 0.007 ppd, respectively.

Approximately 270, 10.5, and 3.8 pounds of vapor-phase TPHg, benzene, and MTBE mass, respectively, were removed in total from the entire DPE test. The soil vapor extraction and vapor-phase hydrocarbon mass removal data for the individual well tests are summarized in Table 24. The vapor-phase mass removal rates and cumulative mass removal for EX-1, RWX-2, RWX-5, LAIX-5, and LAIX-2 (graphed over time) are presented in Figures 45 through 50.

8.4.6 VAPOR RECOVERY RADIUS OF INFLUENCE

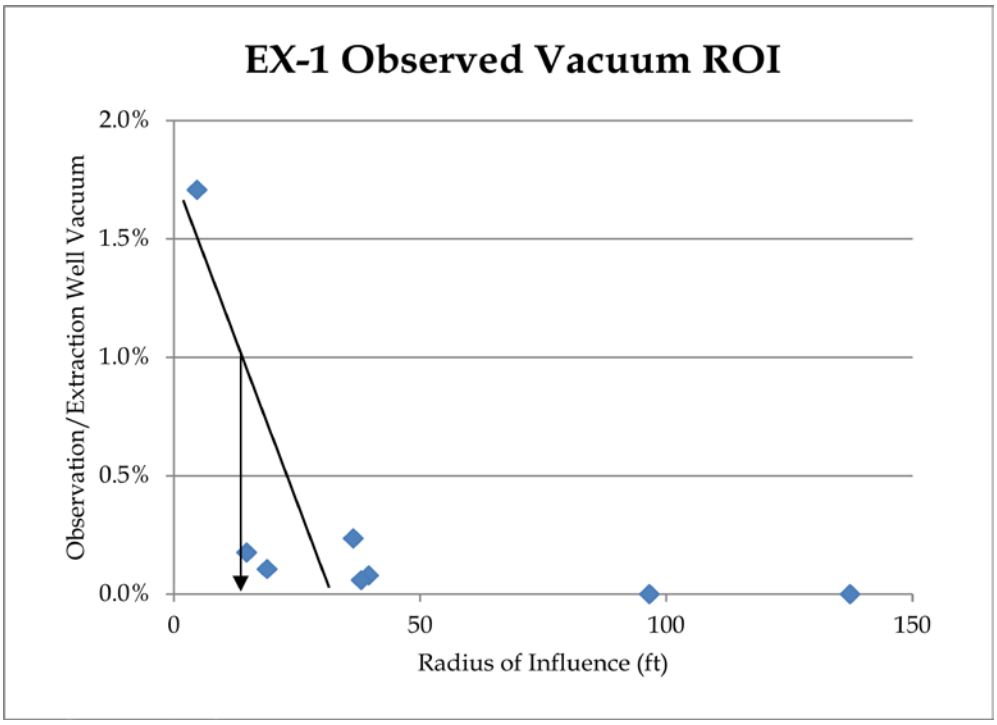
Theoretical effective radius of influence (ROI) for vapor recovery was estimated by graphing and utilizing the Johnson-Kemblowski equation. During the DPE testing on well EX-1, only a minimal amount of vacuum influence was noted in the adjoining wells: 5.8 inches of water (approximately 1.7 percent of the applied vacuum), in well P-1 located approximately 4.6 feet away from well EX-1; 0.6 inch of water (approximately 0.18 percent of the applied vacuum) in well P-2 located approximately 14.8 feet from well EX-1; and 0.8 inch of water (approximately 0.24 percent of the applied vacuum) in well TW-2 located approximately 36.2 feet from well EX-1.

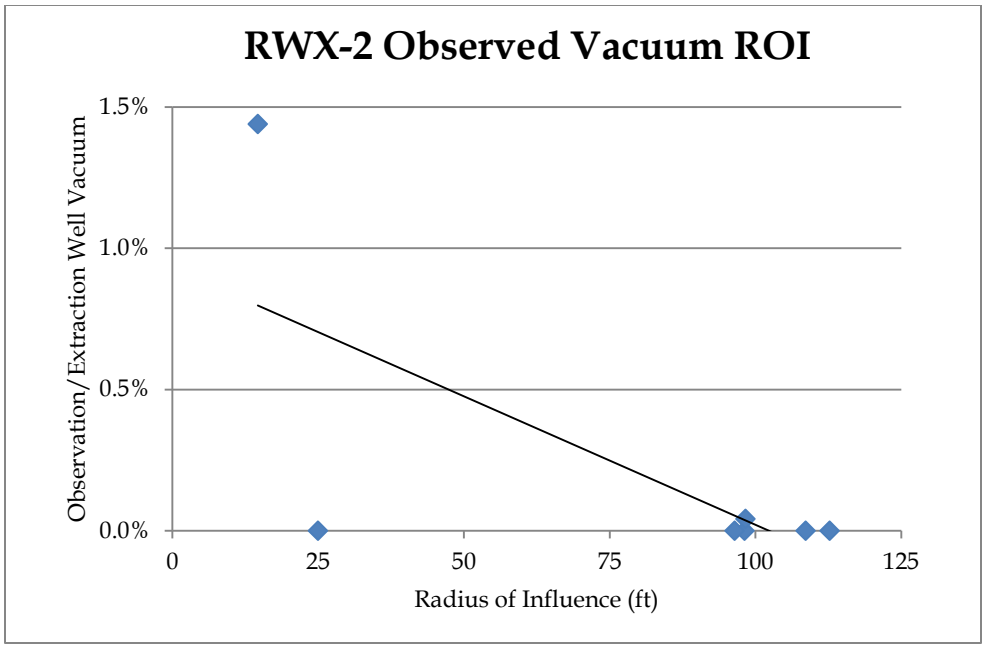
During the DPE application on well RWX-2, the vacuum influence was noted at: 4.5 inches of water (approximately 1.4 percent of the applied vacuum), in well RW-1 located approximately 14 feet away from well RWX-2; no other vacuum influence was noted in the other wells under observation.

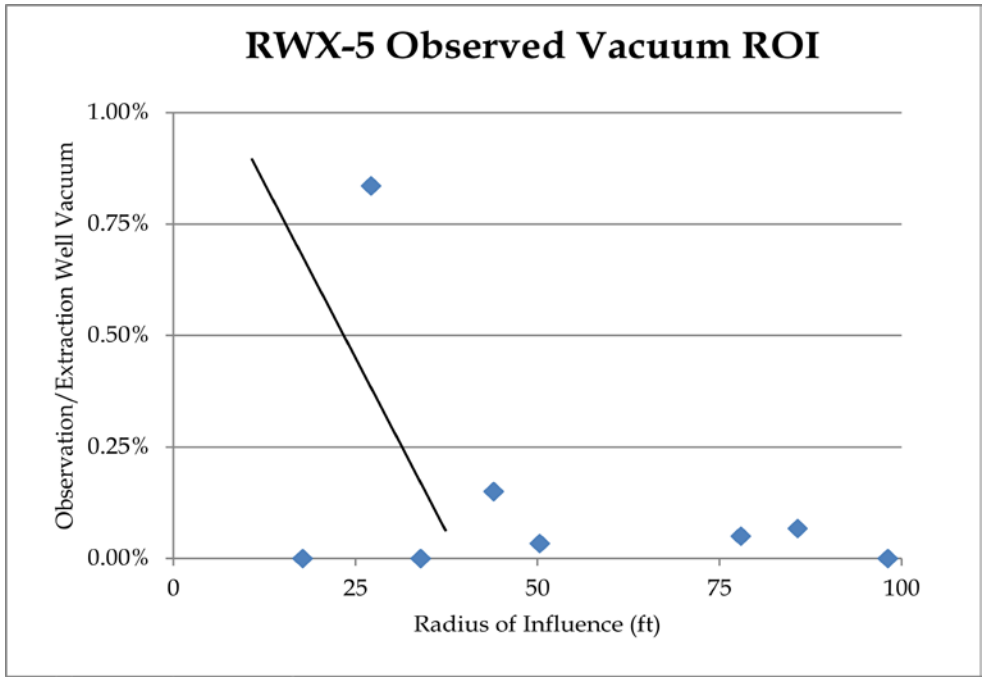
During the DPE application on well LAIX-5, the vacuum influence was noted at: 20 inches of water (approximately 6.4 percent of the applied vacuum), in well LAIX-9 located approximately 16 feet away from well LAIX-5; 10 inches of water (approximately 3.2 percent of the applied vacuum), in well LAIX-8 located approximately 33 feet away from well LAIX-5; and 8.3 inches of water (approximately 2.7 percent of the applied vacuum), in well LAIX-6 located approximately 29 feet away from well LAIX-5.

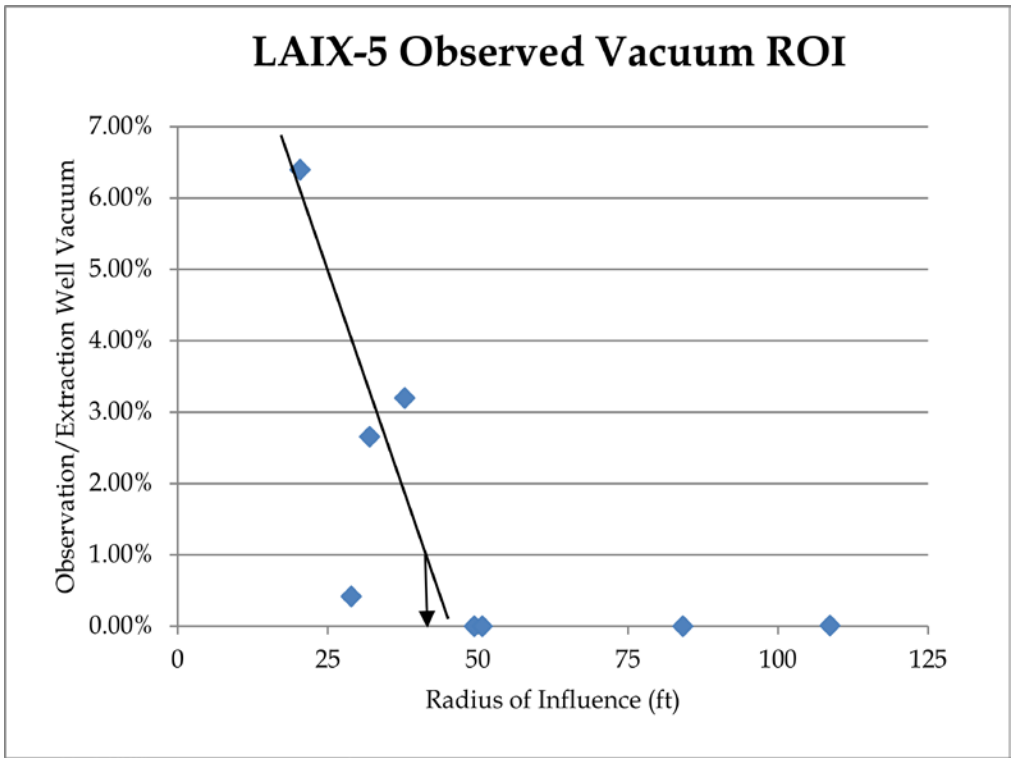
The calculated ROI for EX-1 and LAIX-5 are approximately 12.5 feet and 35 feet, respectively. During the DPE application on wells RWX-2, RWX-5, and LAIX-2, no appreciable radius of influence was noted. This is likely due to a significant amount of "preferential pathway" vapor flow indicated by higher extracted flow rates (100 to 120 scfm) when compared to well EX-1, with AST proximity wells being smaller in diameter with smaller slot size (0.010 compared 0.020 in well EX-1). Strong correlation of recovered vapor and ambient temperature readings also indicates preferential pathway vapor flow.

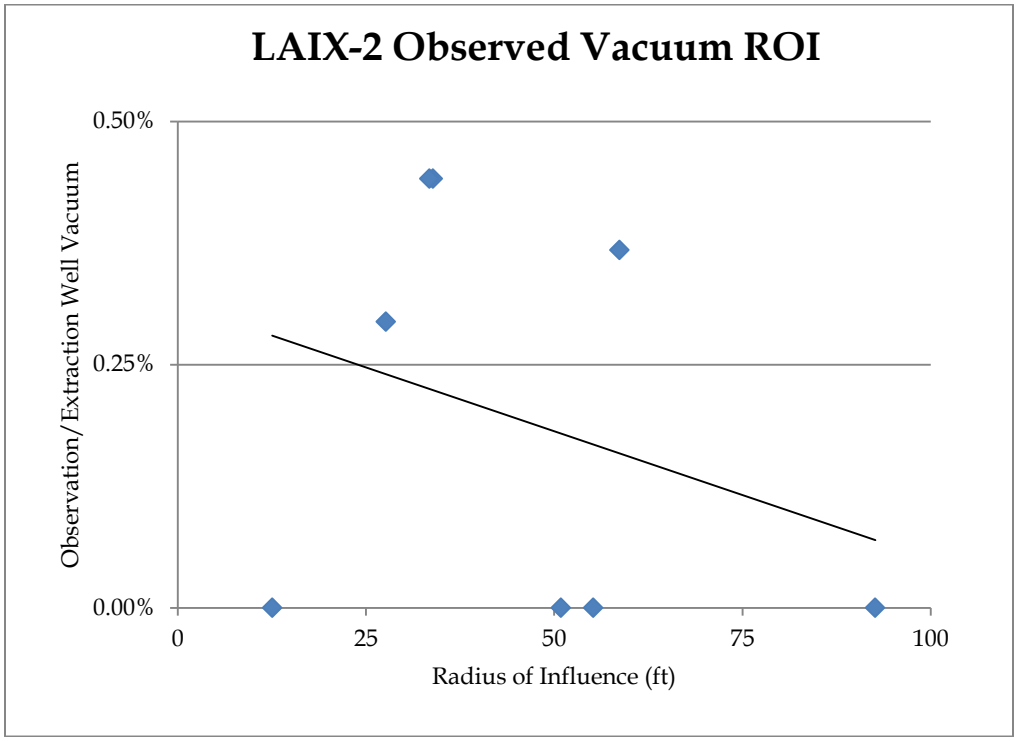
The calculated ROI's using the Johnson-Kemblowski equation are summarized in Table 25. A graphical representation of the ROI's noted during the DPE application to the various wells is provided in the graphs below. A summary of the observed vacuum readings is provided in Tables 16 through 22.




RWX-2 Observed Vacuum ROI
Observation/Extraction Well Vacuum
1.5%
1.0%
0.5%
0.0%
0
25
50
75
100
125
Radius of Influence (ft)


RWX-5 Observed Vacuum ROI
Observation/Extraction Well Vacuum
1.00%
0.75%
0.50%
0.25%
0.00%
0
25
50
75
100
Radius of Influence (ft)


LAIX-5 Observed Vacuum ROI
Observation/Extraction Well Vacuum
7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
0
25
50
75
100
125
Radius of Influence (ft)


LAIX-2 Observed Vacuum ROI
Observation/Extraction Well Vacuum
0.50%
0.25%
0.00%
0
25
50
75
100
Radius of Influence (ft)

8.4.7 METHANE INTERFERENCE

Vapor samples were collected from wells EX-1, RWX-5, and LAIX-5 during DPE application and were submitted for methane analysis. This analysis was performed to allow CRA to assess potential methane interference with thermal or catalytic destruction processes for the extracted vapor stream. The concentrations of methane detected in EX-1, RWX-5, and LAIX-5 were 22,100 parts per million by volume (ppmv), 34.4 ppmv, and 335 ppmv, respectively. The certified laboratory analytical reports for the methane analysis are included in Appendix K.

8.5 PILOT TEST SUMMARY AND CONCLUSIONS

The results of the DPE pilot test indicated the following:

- There is a significant SPH presence in proximity to wells EX-1 and P-2. The limits of this SPH plume around the truck loading racks as indicated on Figure 33.
- SPH analysis indicated that substantial degradation has not occurred to the SPH, the SPH is primarily gasoline, and the approximate date of the SPH is between 1985 and 1987.
- SPH recovery was enhanced by the application of high-vacuum DPE to the well, with approximately 630 gallons recovered over a 23-hour period.
- In reference to well EX-1, the formation in proximity to well EX-1 can be adequately dewatered with properly screened and spaced wells to facilitate DPE. Based on the drawdown experienced, well spacing of between 30 to 40 feet should be able to effectively dewater the impacted layer.
- The groundwater drawdown profile in well EX-1 indicates groundwater can be adequately drawn down to facilitate SPH and dissolved phase hydrocarbon removal; expose saturated impacted soil to SVE; and potentially mitigate further plume migration by applying hydraulic control Properly screened wells and longer duration pumping will likely increase the profile. Based on the drawdown experienced, well spacing of between 30 to 40 feet should be able to effectively dewater the impacted layer to facilitate SPH recovery and expose saturated soils for vapor phase mass removal.
- From well EX-1, good extracted vapor flow (70 to 80 scfm) and associated mass removal rates (approximately 276 ppd and 11 ppd, TPHg and benzene, respectively), but required significant vacuum (23 to 25 in. Hg) to facilitate.

- Extracted soil vapor flow/induced vacuum ROI is somewhat limited (between 10 to 15 feet) in proximity to well EX-1.
- In regards to wells in proximity to ASTs (with the exception of well LAIX-2), groundwater drawdown was erratic, with some wells actually reporting an increase in water elevations during DPE application, but most demonstrating generally good drawdown and slow recovery. Well LAIX-2 could not be adequately dewatered to facilitate DPE application due to siltation problems experienced with DPE application to the well; and potential recharge interference from the neighboring storm water retention basin.
- Significant amount of "preferential pathway" vapor flow indicated by higher extracted flow rates (100 to 120 scfm) when compared to well EX-1, with AST proximity wells being smaller in diameter with smaller slot size (0.010 compared 0.020 in well EX-1). Strong correlation of recovered vapor temperature and ambient air readings also indicates preferential pathway vapor flow.
- For wells RWX-2, HW-W, RWX-5, and LAIX-5: relatively low TPHg and benzene mass removal rates by DPE of 0.873, 0.202, 0.466, and 36.2 ppd, and 0.0180, 0.00297, 0.00818, and 0.329 ppd, respectively.
- Methane concentrations were detected during DPE testing in EX-1, RWX-5, and LAIX-5. The concentration levels observed in RWX-5 and LAIX-5 (less than 1,000 ppmv) should not pose an issue with thermal or catalytic destruction should vapor extraction be employed at the Site. However, the concentrations in EX-1, 22,100 ppmv, would necessitate the use of a thermal oxidizer, which could accommodate destruction of this level of methane concentrations and facilitate permitted discharge requirements.
- The relatively high level of methane concentrations in proximity to well EX-1 could either represent a certain level of on-going in-situ biodegradation, with the methane concentration possibly representing a byproduct of bacterial anaerobic degradation; natural occurring bio-degradation/methane production of the filled wetland on which the facility resides; or potential fugitive releases from underground natural gas distribution piping in proximity to or upon the site. The lack of methane detected in the wells in proximity to the ASTs could be the result of on-going low-vacuum DPE application from the subject wells in proximity to the ASTs.

9.0 REMEDIAL ALTERNATIVE EVALUATION

9.1 APPLICABLE CLEANUP GOALS

Typical remedial action objectives are to implement the most prudent, cost effective, and environmentally sustainable remediation approach to protect human health, groundwater quality, and other sensitive receptors. Given the Site-specific conditions, the remedial objectives are as follows:

- Remove SPH presence to the extent practicable
- Remediate soil and groundwater in proximity to the truck loading racks and Tank #2 using the most practicable and environmentally sustainable technology
- Obtain MTCA Method A or C screening/clean-up levels for any residual dissolved-phase petroleum hydrocarbon constituents of concern (COCs) on-site to:
    - Protect human health and the environment
    - Comply with cleanup standards
    - Comply with applicable state and federal laws
    - Provide for compliance monitoring
    - Provide a reasonable restoration timeframe
    - Use permanent solutions to the maximum extent practicable
    - Consider public concerns

The practical extent of the most cost effective remedial alternative may be reached before soil and water quality cleanup levels are achieved (i.e. reach an asymptotic level) at the entire Site; thus, it is anticipated that natural attenuation will be the final, most prudent, and environmentally sustainable remedial method implemented after a more "active" remediation alternative is employed, to achieve MTCA screening/clean-up levels within a reasonable timeframe. Since MTCA's commercial/industrial site cleanup levels will be employed, an Environmental Covenant will also be employed.

The COCs for soil and groundwater are TPHg, TPHd, TPHo, BTEX, naphthalene, and cPAHs. Concentrations of these COCs are stable and/or increasing in the majority of the wells.

Thus, the primary goal of remediation is to eliminate SPH presence and reduce hydrocarbon mass in the shallow soils and groundwater such that declining COC

concentration trends can be established, thereby providing protection for human health and the environment. The following seven remedial technologies have been evaluated to assess their ability to achieve the remediation objectives and this goal for the Site:

- Monitored natural attenuation (MNA)
- Groundwater extraction
- Excavation
- DPE
- In-situ enhanced biodegradation (ISEB) (with surfactant pre-treatment and limited groundwater recovery)
- Chemical oxidation
- Soil vapor extraction with air sparging (AS/SVE)

Table 26 summarizes the preliminary screening of these seven potential applicable remedial technologies using the following screening criteria: effectiveness, implementability, short-term risk, and cost. As demonstrated by the information in the table, MNA, excavation, chemical oxidization, and AS/SVE are not considered feasible technologies to achieve the cleanup objectives. DPE, plume containment, and ISEB are considered viable options to meet the goals and have been retained for further evaluation.

Each of the selected alternatives is described below, including a summary of the overall cost to implement each.

9.2 DUAL-PHASE EXTRACTION (DPE)

As previously discussed, DPE consists of the vacuum-enhanced extraction of groundwater performed simultaneously with SVE. The vacuum increases the SPH recovery and groundwater yield compared to standard GWE in low permeability formations. The extended dewatering of the saturated zone attained through GWE allows volatile constituents adsorbed to previously saturated soil to be removed in the vapor phase. In addition, the groundwater extraction component of DPE may provide hydraulic control of the chemical plume and reduce chemical migration as well as remove dissolved chemical mass.

At this Site, smaller scale DPE is currently being performed in the area of Tank #2 by using submersible pneumatic operated groundwater pumps to extract groundwater simultaneously using a vacuum blower to extract soil vapors, and activated carbon use for recovered vapor treatment. The proposed DPE system would include the use of specifically designed and constructed DPE wells (i.e. with screened intervals set to target the mass presence and minimize short-circuiting); recovered vapor and groundwater conveyance piping; a vapor/liquid separator; a vapor extraction and treatment device; and a recovered groundwater temporary storage and treatment system.

The existing DPE system's extraction device (blower) is currently undersized and would need to be sized based on the applied vacuum and vapor recovery rate noted during the pilot test work to facilitate effective mass recovery. Extracted VOCs are currently being treated by granulated activated carbon (GAC), but due to the concentration levels noted during recent pilot testing, the use of a thermal oxidizer (potentially followed by utilization of a catalytic oxidizer) will provide better cost-effective treatment and destruction of the recovered vapor stream. Extracted groundwater is currently being treated for sediment, SPH, and dissolved hydrocarbon/oxygenate removal (air stripping); the treated water is discharged to the local municipal sanitary sewer system by a permitted connection to the site's sanitary sewer lateral. A larger recovered water treatment system would need to be employed to treat the increased volume of groundwater recovered in application of a DPE system to address the area of impacts noted in Figure 33. In design of a larger water treatment system, the existing permitted discharge will need to be evaluated, and modified as warranted.

Design, permitting, and installation of a DPE system addressing the area of noted impacts illustrated on Figure 33 submerged source area on the site in proximity to the truck loading racks, Tank #2, and Tank #3 would cost an estimated $605,000 excluding DPE well installation costs. This estimate is based upon installing underground/aboveground piping, upgrading the treatment compound, and installation of the new equipment, including a new vacuum blower(s), thermal oxidizer, and larger SPH recovery and water treatment system.

Existing DPE well EX-1 would be utilized as a DPE well. In addition, CRA has assumed installation of approximately 50 additional DPE wells to provide coverage in the areas around the truck loading racks, Tank #2, and Tank #3 at an estimated cost of $367,000.

Operational cost of a DPE system for the first year is estimated at $367,000. Assuming 5 years of DPE operation for source area reduction to facilitate the remedial objective

established, and using the estimated average annual operational cost (including annual water disposal cost), the total DPE operational cost will be $1,835,000. As vapor concentrations decrease, a thermal oxidizer would be converted or switched out to a more fuel-efficient catalytic oxidizer. During design and permitting of the expanded water treatment system, CRA will evaluate other treated water disposal options (including surface water discharge under an NPDES permit) to potentially reduce disposal costs associated with the current discharge to the on-site sanitary sewer lateral.

Groundwater monitoring is estimated to cost approximately $128,000 per year. Assuming 1 year of groundwater monitoring during DPE design, permitting, and installation, 5 years of groundwater monitoring during DPE operation, and an additional year of groundwater monitoring after DPE system shutdown, the total cost for the 7 years of groundwater monitoring would be $896,000.

DPE system decommissioning is estimated at $55,000. DPE and monitoring well destructions are estimated at $98,000. The total estimated cost for this alternative is approximately $3,856,000.

9.3 GROUNDWATER EXTRACTION

Groundwater extraction (GWE) typically utilizes submersible pumps to extract groundwater from wells in order to remove aqueous-phase chemical mass. Extracted groundwater is typically routed to a treatment system utilizing granular-activated carbon (GAC) vessels, an air stripper, or other water treatment technology to remove chemicals from the water stream. The treated groundwater is typically discharged to the sanitary sewer, a storm drain, or to surface water after treatment. .At this site, a network of extraction wells would be installed (or existing monitoring wells converted into extraction wells) in the plume source, as well as at the boundaries of the plume adjacent to the offsite wetland areas. Total fluids (both groundwater and LNAPL) would be extracted to remove source mass, and groundwater would be extracted at the plume boundaries to mitigate dissolved hydrocarbon impacts to the wetlands.

GWE system components would be similar to the GWE components of a DPE system: appropriately constructed GWE wells, fluid conveyance piping, and LNAPL/groundwater treatment equipment. Pneumatic (air-driven) submersible groundwater extraction pumps would be utilized due to the presence of LNAPL in the plume core. An oil/water separator would likely be required to separate LNAPL from groundwater in the total fluids stream. Separated groundwater would typically be

treated by GAC, air stripping, or a combination of both to remove dissolved hydrocarbons. An air compressor to feed compressed air to the pneumatic submersible pumps would be sized based on the number of extraction wells and minimum pressure and flow delivery at the extraction wells.

Design, permitting, and installation of a GWE system addressing the area of noted impacts illustrated on Figure 33 would cost an estimated $305,000 excluding GWE well installation costs. This estimate is based upon installing underground/aboveground piping, upgrading the treatment compound, and installation of the new equipment, including pneumatic submersible pumps, an air compressor, oil/water separator, and a larger water treatment system.

Existing DPE well EX-1 would be utilized as a GWE well. In addition, CRA has assumed installation of approximately 50 additional GWE wells to provide coverage in the areas around the truck loading racks, Tank #2, and Tank #3 at an estimated cost of $367,000.

Operational cost of a GWE system for the first year is estimated at $150,000. Based on modeling described earlier in this document, it is estimated that approximately 50 years of groundwater extraction would be required to remove sufficient source to fully mitigate the risk of the hydrocarbon plume reaching the offsite wetlands receptors. Assuming 50 years of GWE operation for source area reduction to facilitate the remedial objective established, and using the estimated average annual operational cost (including annual water disposal cost), the total GWE operational cost will be $7,500,000. During design and permitting of the expanded water treatment system, CRA will evaluate other treated water disposal options (including surface water discharge under an NPDES permit) to potentially reduce disposal costs associated with the current discharge to the on-site sanitary sewer lateral.

Groundwater monitoring is estimated to cost approximately $128,000 per year. Assuming 1 year of groundwater monitoring during GWE design, permitting, and installation, 50 years of groundwater monitoring during GWE operation, and an additional year of groundwater monitoring after GWE system shutdown, the total cost for the 52 years of groundwater monitoring would be $6,656,000.

GWE system decommissioning is estimated at $45,000. GWE and monitoring well destructions are estimated at $98,000. The total estimated cost for this alternative is approximately $14,969,000.

9.4 IN-SITU ENHANCED BIODEGRADATION (ISEB) WITH SURFACTANT PRE-TREATMENT AND LIMITED GROUNDWATER RECOVERY

In-situ biodegradation (aerobic or anaerobic) is a treatment process whereby contaminants are metabolized into less toxic or non-toxic compounds by naturally occurring or injected supplemental microorganisms. The microorganisms utilize the hydrocarbons as a source of carbon and energy. In order to stimulate biological activity, biodegradation processes can be enhanced by the injection of oxygen (air or oxygen releasing compounds [ORC]), nutrients, microbial cultures, suitable electron acceptors, and carbon/energy sources. Site conditions can be manipulated to enhance in-situ biodegradation processes and speed up degradation rates of Site COCs. However, to facilitate effective ISEB application, SPH recovery should be performed first to the extent practicable. In addition, to ensure hydraulic control of the plume, a limited network of GWE wells would be operated to mitigate impacts to the offsite wetlands receptors.

SPH recovery would be facilitated by short-term duration DPE mass removal events (similar to what was performed during the pilot test work described in Section 7), only with longer duration application to each installed DPE well, aided by surfactant application, as warranted. Surfactants are chemical agents that greatly enhance the solubility of organic contaminants in the saturated zone. They are also able to reduce the interfacial tension (IFT) between the aqueous and organic contaminants in order to mobilize the organic contaminants. IFT is the force existing where two fluids meet that keeps them as separate fluids. The primary objective of surfactant flushing is to remove the maximum amount of contaminant with a minimum amount of chemicals and in a minimal time while maintaining hydraulic control over the injected surfactant and contaminant. The use of surfactants in a flooding configuration enhances the solubility and mobility of LNAPL trapped in pore spaces and greatly increases the hydrocarbon removal rate achievable with DPE application.

A pre-determined volume of food-grade, biodegradable surfactant would be injected directly into a well that either contains measurable SPH or is located in an area in which dissolved contaminant concentrations are indicative of residual SPH sorbed to soil. The mixture of groundwater, mobilized SPH, and surfactant would then be extracted from the well after a short period of equilibration, typically at least 24 hours, but not greater than 48 hours. Fluid removal would continue until LNAPL and surfactant can no longer be observed or measured in the fluid extracted from the well.

A typical surfactant solution consists of approximately 2 percent surfactant in water. Surfactants such as Biosolve are non-toxic, biodegradable, and engineered specifically based upon analysis of SPH samples.

Once SPH recovery has been performed to the extent practicable, in-situ biodegradation enhancement (ISEB) would be implemented. In this process, several techniques can be applied to enhance biodegradation of the COCs, such as:

- Injection of air, oxygen, or ORC to enhance biodegradation of the COCs under aerobic conditions
- Injection of an organic substrate such as soy-lactate or hydrogen release compound (HRC) to enhance biodegradation
- Nutrient supplementation with suitable sources of nitrogen and phosphorus to enhance biodegradation of contaminants by indigenous microbial populations under aerobic conditions
- Injection of nitrate and/or sulfate to enhance the biodegradation of hydrocarbons under anaerobic conditions by denitrification/sulfate reduction
- Bioaugmentation by injection of microbial cultures to improve the extent of the microbial populations in degrading the compounds of concern

One or a combination of these techniques can be applied.

Some technologies that are available for enhancing aerobic biodegration processes within the shallow soil horizon are ORC treatment and biosparging. Biosparging and ORC are both technologies that supplement oxygen to enhance aerobic biodegradation. The injected oxygen would enhance the growth and metabolic activity of COC degrading microorganisms, resulting in the oxidation of COCs to primarily carbon dioxide and water.

Typically, the affected media becomes nutrient deficient during enhanced biodegradation. Therefore, nutrient supplementation is typically warranted. Microbial augmentation is used when the natural microbial population has demonstrated to be in a stable or declining condition and need to be enhanced to facilitate continued biodegradation processes.

With adequate dispersion potential within the affected soil horizon (confirmed by in-situ pilot testing) the ISEB technology could be an effective remedial alternative for the site.

However, removal of the SPH is recommended before the initiation of ISEB treatment. Use of a surfactant "wash" would be considered to aide in SPH removal and recovery prior to implementing ISEB. ISEB is effective for the COCs present in the dissolved phase in the impacted groundwater areas of the site. The proposed implementation of ISEB technology at the Site would involve the enhancement of aerobic biodegradation conditions.

In-situ biosparging involves injection of pressurized oxygen or air into the subsurface at very low flow rates to enhance biodegradation activities. Injection of oxygen/air is controlled such that vapors are not significantly generated or accumulated in the vadose zone. Other non-gaseous nutrients can be injected as needed to stimulate bacterial growth and enhance biodegradation of the hydrocarbons in the groundwater and soil. The non-gaseous nutrient injection could be performed through the same injection wells used for air/oxygen introduction.

In-situ Submerged Oxygen Curtain (ISOC) is an innovative biosparging technique developed for oxygen injection that can be used to increase oxygen level in saturated soils. Super-saturated oxygen can be delivered to the subsurface at low flow rates such that the oxygen is infused into the groundwater without the formation of bubbles. A direct-push injection approach or fixed injection wells would be implemented at the site. A relatively high oxygen sparge rate and nutrient addition would be required to ensure that sufficiently enhanced aerobic conditions were achieved.

The in-situ biosparging or ISOC approach would be applied in up to 75 injection wells to provide coverage in an area encompassing then noted impact area highlighted on Figure 33 wells is proximity to the truck loading racks, Tank #2, and Tank #3.

For nutrient or microorganism augmentation, natural attenuation monitoring data would be required to be collected to assess the existing conditions, and determine what, if any, additional nutrients or microorganism augmentation would be required. A bio-parameter and microorganism analysis, and bench-scale and in-situ pilot testing would be required to determine feasibility and the amendment(s) required. Confirmation that an amendment could be adequately delivered and dispersed within the target area would also be required. A pilot test consisting of a pressurized potable water test, or direct amendment solution injection would be performed.

Pilot testing would be conducted to determine technical feasibility and effectiveness of surfactant "wash" to enhance SPH recovery at the site. The pilot test would determine

the required number and spacing of surfactant "wash" wells that could potentially double as amendment injection points and or DPE extraction wells for SPH recovery. Pilot testing is estimated to cost $30,000. Data obtained during the surfactant "wash" pilot test would be utilized in the full-scale surfactant "wash" design and implementation. Existing wells (EX-1, P-1, and P-2) would be utilized for implementation of surfactant "wash". Ten additional wells would be installed within the inferred SPH plume area (as illustrated on Figure 33) for surfactant application and SPH recovery through short-term DPE application. The estimated cost for the well installation is $59,000.

A conceptual cost for one 5-day surfactant "wash" and LNAPL removal event is estimated at $125,000. Assuming twelve surfactant wash and SPH removal events over a 2-year period (i.e. one every month transitioning to bimonthly, as warranted) for adequate SPH recovery and dissolved phase COC reduction, the total surfactant application and SPH recovery cost would be $1,500,000.

After SPH has been removed by the surfactant "wash", pilot testing would be conducted to determine technical feasibility and effectiveness of ISEB. Bench-scale and in-situ pilot testing is estimated to cost $45,000. The pilot test would determine the required number and spacing of biosparging/ISOC wells that could potentially double as amendment injection points. Data obtained during the ISEB and/or biosparging pilot test would be utilized in the full-scale ISEB and/or biosparging design and implementation.

Design, permitting, and installation of ISEB and/or biosparge equipment and underground piping addressing the potential source area of the property, including upgrades to the existing GWE system, would cost an estimated $325,000. Conceptual implementation of ISEB and/or biosparging would require the use of the ten surfactant "wash" wells and installation of up to 65 additional injection wells to provide coverage in the impact area noted on Figure 33 in proximity to the truck loading racks, Tank #2, and Tank #3 at a cost of $390,000.

A conceptual cost for one amendment injection event is estimated at $75,000. Assuming 40 amendment injection events over a 10-year period (i.e., one every calendar quarter, as needed) for adequate source mass and dissolved phase COC reduction, the total amendment application cost would be $3,000,000. Operation of the GWE system for plume control is estimated to cost $100,000 per year. Groundwater monitoring is estimated to cost approximately $158,000 per year, with an increase in cost to account for bio-parameter monitoring. The overall cost per year for monitoring and operation of the

GWE system is, therefore, $258,000. Assuming 2 years of groundwater monitoring during pilot testing and implementation of the SPH recovery/surfactant "wash" work, 11 years of groundwater monitoring during the design and implementation of ISEB and/or biosparging, and an additional 5 years of groundwater monitoring post ISEB application (while continuing GWE for plume control), the total cost for groundwater monitoring and GWE system operation is approximately $4,644,000. System demolition is estimated at $35,000. Well destructions are estimated at $110,000. The total estimated cost for this alternative is approximately $8,504,000.

9.5 DISPROPORTIONATE COST ANALYSIS

The MTCA disproportionate cost analysis (DCA) is used to evaluate which of the cleanup action alternatives that meet the threshold requirements are permanent to the maximum extent practicable. This analysis involves comparing the costs and benefits of the alternatives and selecting the alternative whose incremental costs are not disproportionate to the incremental benefits. The evaluation criteria for the DCA are specified in WAC 173-340-360(2) and (3), and include protectiveness, permanence, cost, long-term effectiveness, management of short-term risks, implementability, and consideration of public concerns. A summary of the DCA for the three selected potential remedies is presented in Table 27.

The DCA compares cleanup costs and benefits and allows selection of a cleanup action alternative that provides the greatest benefits relative to cost. The three potential remedies described above were evaluated based on the MTCA DCA criteria. The alternatives were ranked on a scale of 1 (lowest) to 10 (highest) for each of the DCA criteria. Each of the DCA criteria was assigned a weighting factor in accordance with Ecology's direction, that ranged between 10 percent and 30 percent (the sum of the weighting factors equaled 100 percent). Results of the DCA are as follows:

- DPE: 7.7 (out of 10) benefit ranking; estimated cleanup cost of $3,856,000
- GWE: 5.9 (out of 10) benefit ranking; estimated cleanup cost of $14,969,000
- ISEB: 4.4 (out of 10) benefit ranking; estimated cleanup cost of $8,504,000.

The high ranking of DPE is due to the higher level of contaminant mass removal achieved through direct removal of hydrocarbons in the vapor phase. GWE and ISEB have lower rankings than DPE due to the lower degree of immediate contaminant mass removal and uncertainty in short-term and long-term risks associated with these

treatment technologies. The cost information provided for each technology is for comparison purposes only and has not been validated because the design is not complete and the costs have not been fully researched. Overall, given the high relative ranking, and the lowest estimated cost to implement, DPE is the selected remedial technology.

9.6 PREFERRED ALTERNATIVE

CRA recommends DPE as the most prudent, cost-effective, and environmentally sustainable option relative to meeting the remedial objectives. Therefore, DPE followed by Institutional controls and monitored natural attenuation (MNA) will be presented in a Draft CAP for Ecology's review and approval. Upon demonstration that the dissolved-phase hydrocarbon plume is stable to shrinking and poses no threat to, institutional controls under MTCA will be developed. After cessation of mechanical remediation, natural attention processes would also be expected to continue to reduce any remaining residual hydrocarbon concentrations in to the future to meet MTCA cleanup requirements. Since we are utilizing MTCA's Industrial cleanup levels, we understand that an Environmental Covenant will be utilized. We also anticipate that the proposed Draft CAP will be implemented under a new Agreed Order to be negotiated with Ecology.

10.0 CONCLUSIONS AND ADDITIONAL WORK

The objectives of the agreed order are outlined in Exhibit B of the agreed order and in Section 1.2 of this report. The following tasks to meet these objectives have been completed and are described in this report:

- CRA has completed a remedial investigation to meet the objectives of defining the nature and extent of the LNAPL, contaminated soil, groundwater, and surface water
- P66 completed an engineering and stability assessment of the containment dike surrounding the tank farm area
- A conceptual Site model has been completed and identifies the sources of contamination, contaminant fate and transport, contaminants of concern, potential exposure pathways, and potential receptors
- A computer groundwater model has been completed to aid in the evaluation of remedial alternatives
- AS/SVE and DPE pilot tests have been completed at the Site to evaluate these technologies as potential remedial alternatives
- A feasibility study has been completed to evaluate remedial alternatives at the Site

The objectives to define a Site-wide groundwater monitoring network assess the effectiveness of the interim remedial action have been completed and are outlined in the quarterly groundwater monitoring and remediation progress reports.

CRA anticipates the following work to be completed:

- Complete and submit a Draft CAP (cleanup action plan).
- Negotiate new Agreed Order with Ecology for implementation of Draft CAP
- Implement the proposed actions identified in the cleanup action plan.

11.0 REFERENCES

CRA. 2011. Remedial Investigation and Feasibility Study Work Plan, ConocoPhillips Renton Terminal. April 2011.

Agreed Order DE-7882, August 2010, Washington State Department of Ecology

Model Toxics Control Act (MTCA). 2007. Washington State Department of Ecology. November 2007.

Luzier, J.E., 1969. Geology and Ground-Water Resources of Southwestern King County, Washington.

ITRC (Interstate Technology & Regulatory Council). 2009d. Part 2, LNAPL characterization and recoverability – improved analysis - do you know where the LNAPL is and can you recover it. Internet-Based Training 2 (IBT-2), LNAPLs Team, www.clu-in.org/live/archive.

ASTM (ASTM International). 2007. E 2531-06: Standard Guide for Development of Conceptual Site Models and Remediation Strategies for Light Nonaqueous-Phase Liquids Released to the Subsurface. ASTM Committee E50 on Environmental Assessment, Risk management and Corrective Action, ASTM International, West Conshohocken, PA, February 2007.

API (American Petroleum Institute). 2004. API Interactive LNAPL Guide, Version 2.0. American Petroleum Institute, Washington, District of Columbia, August 2004.

Dakota Technologies. 2012. LIF Training – Advanced Data Interpretation.

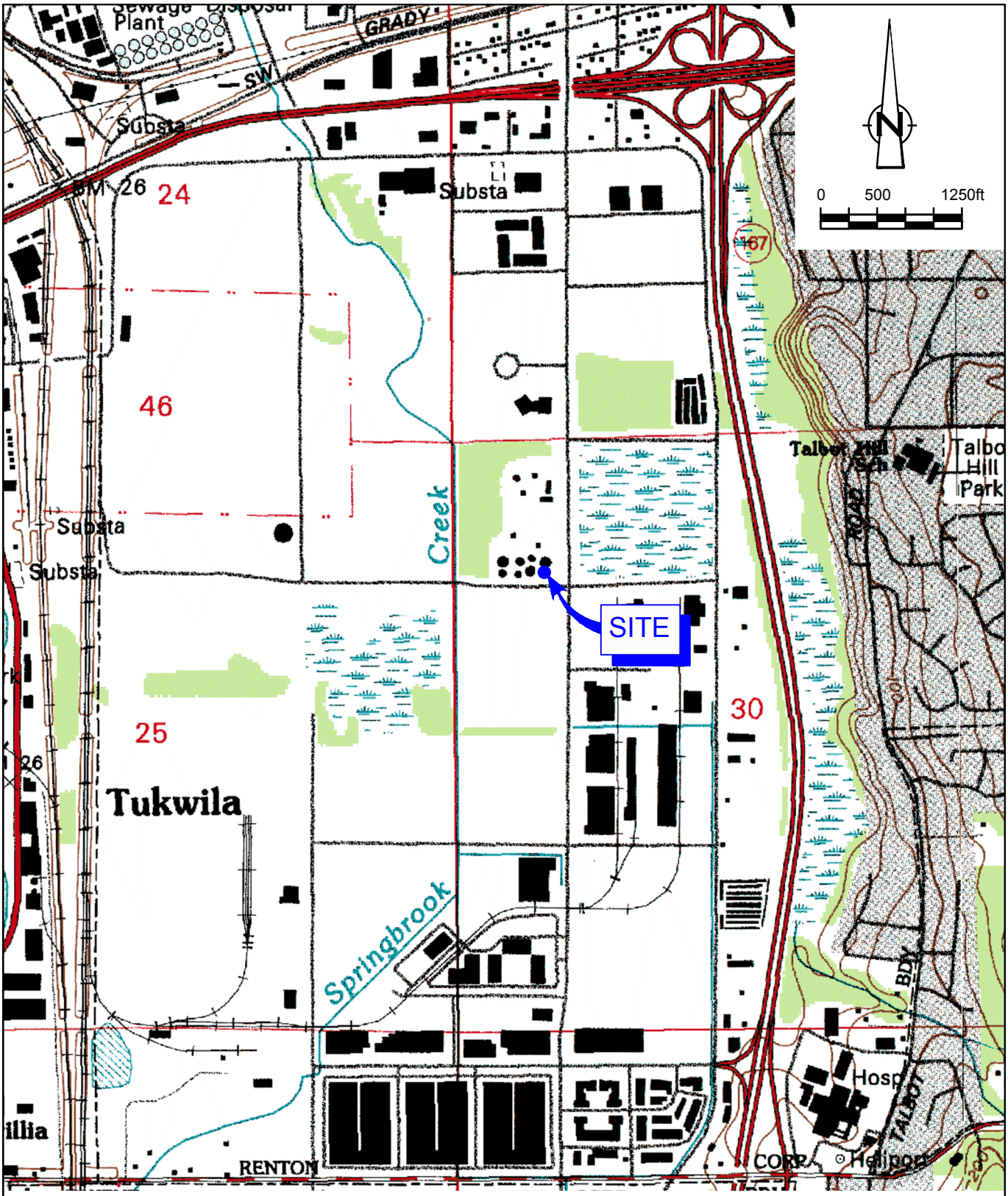
Bower and Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells", Water Resources Research, Volume 12, No. 3, 1976, pp. 423-428

Rumbaugh, J.O., 2005. Guide to Using Groundwater Vistas, Version 4.19, Environmental Simulations In, Herndon, Virginia.

Spitz, K., and J. Moreno, 1996. A Practical Guide to Groundwater and Solute Transport Modeling, John Wiley & Sons, Inc.

Wiedemeier, T.H., Rifai, H.S., Newell, C.J., Wilson, J.T., 1999, Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface, John Wiley and Sons.

Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophys. Union Trans., vol. 16, pp. 519-524.



SOURCE: USGS QUADRANGLE MAP:
RENTON, WASHINGTON

figure 1

VICINITY MAP
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



WASHINGTON

70496-RI00(026)GN-WA001 MAY 23/2013

0 50 100ft

LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 2

SITE PLAN
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

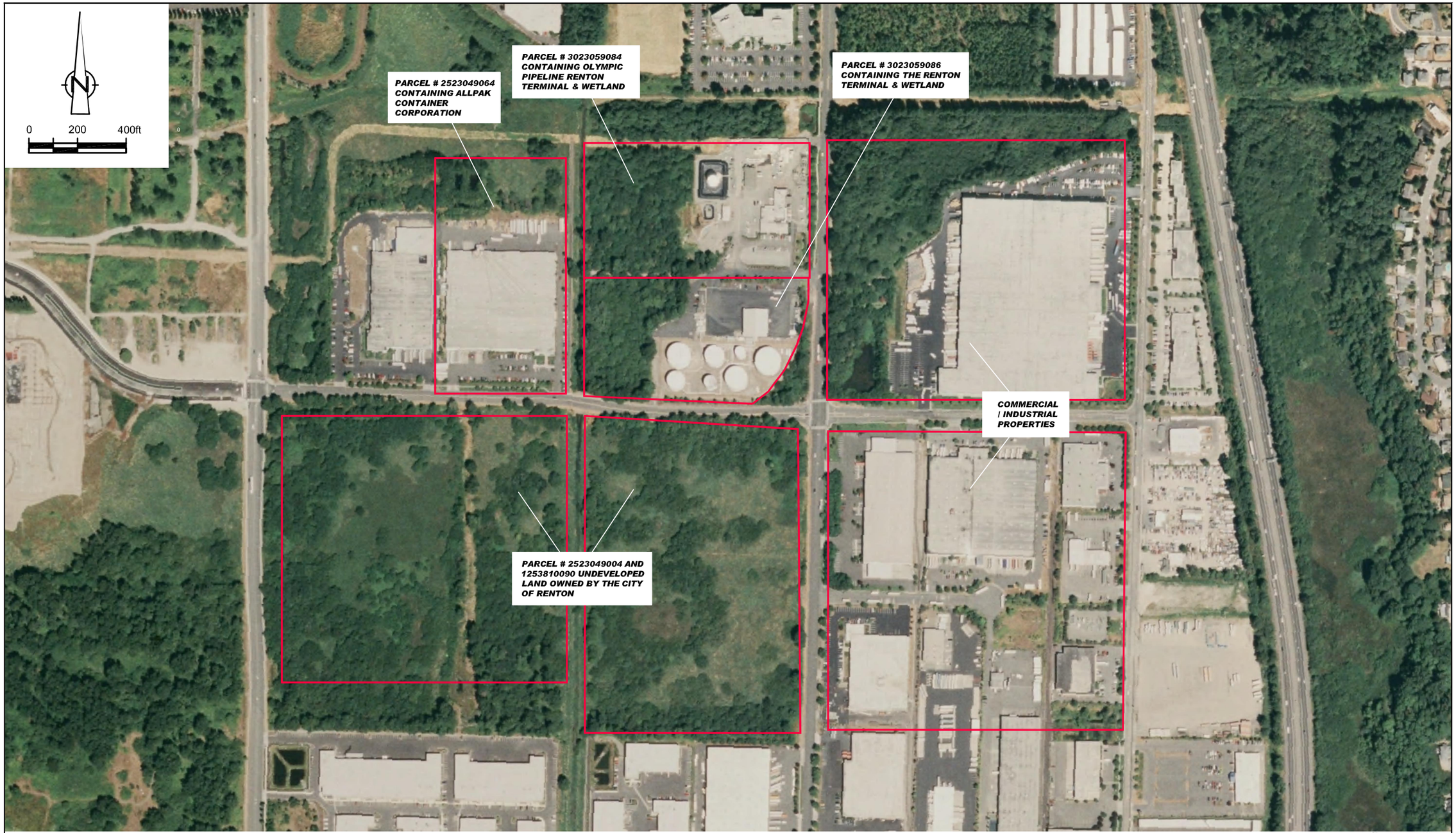
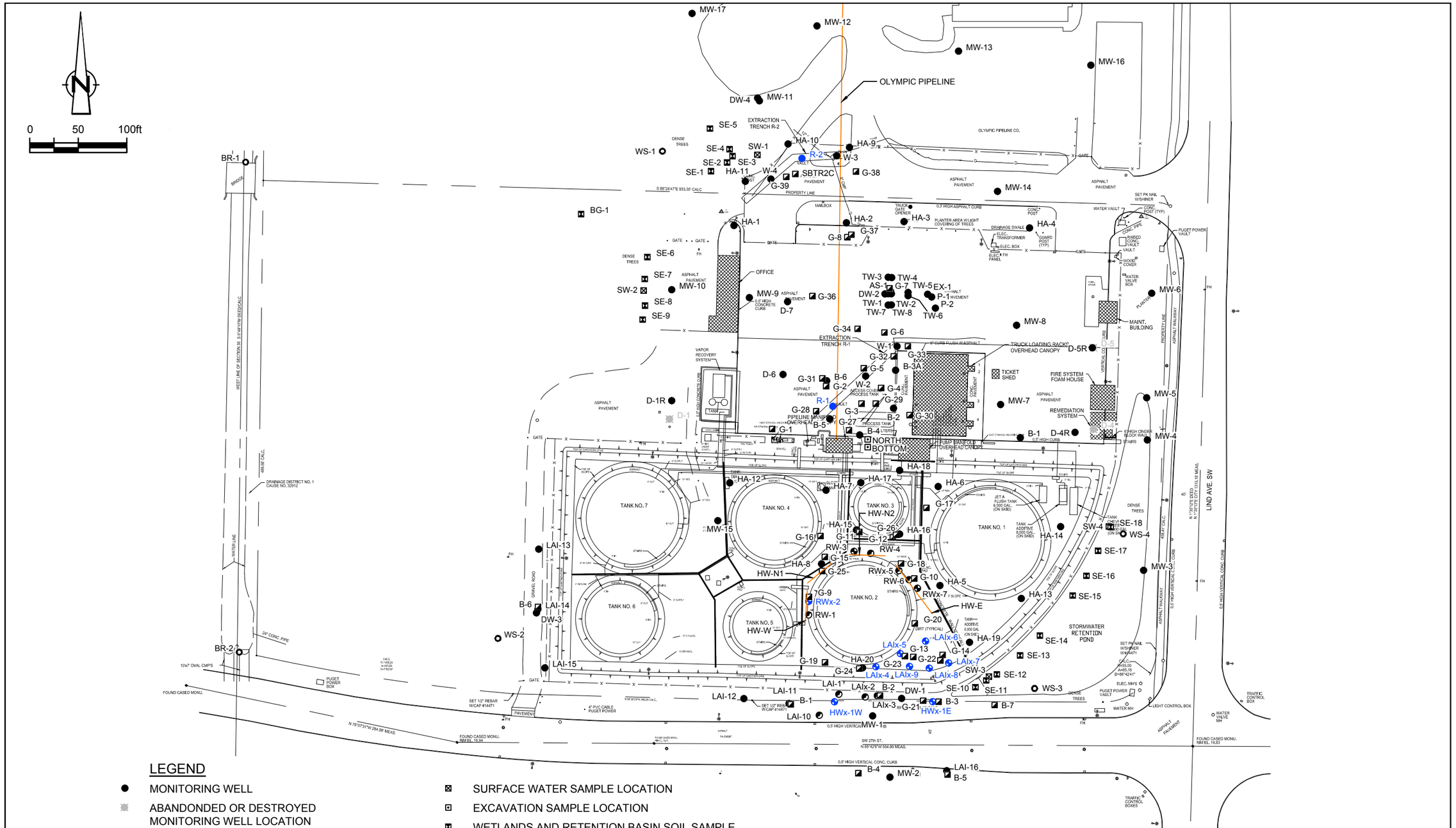


figure 3

SITE LAND USE MAP
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

SOURCE: STANTEC, FIGURE 2, SITE PLAN, DATED 08/26/2010. & NAIP, 2006.

70496-RI00(026)GN-WA003 MAY 23/2013



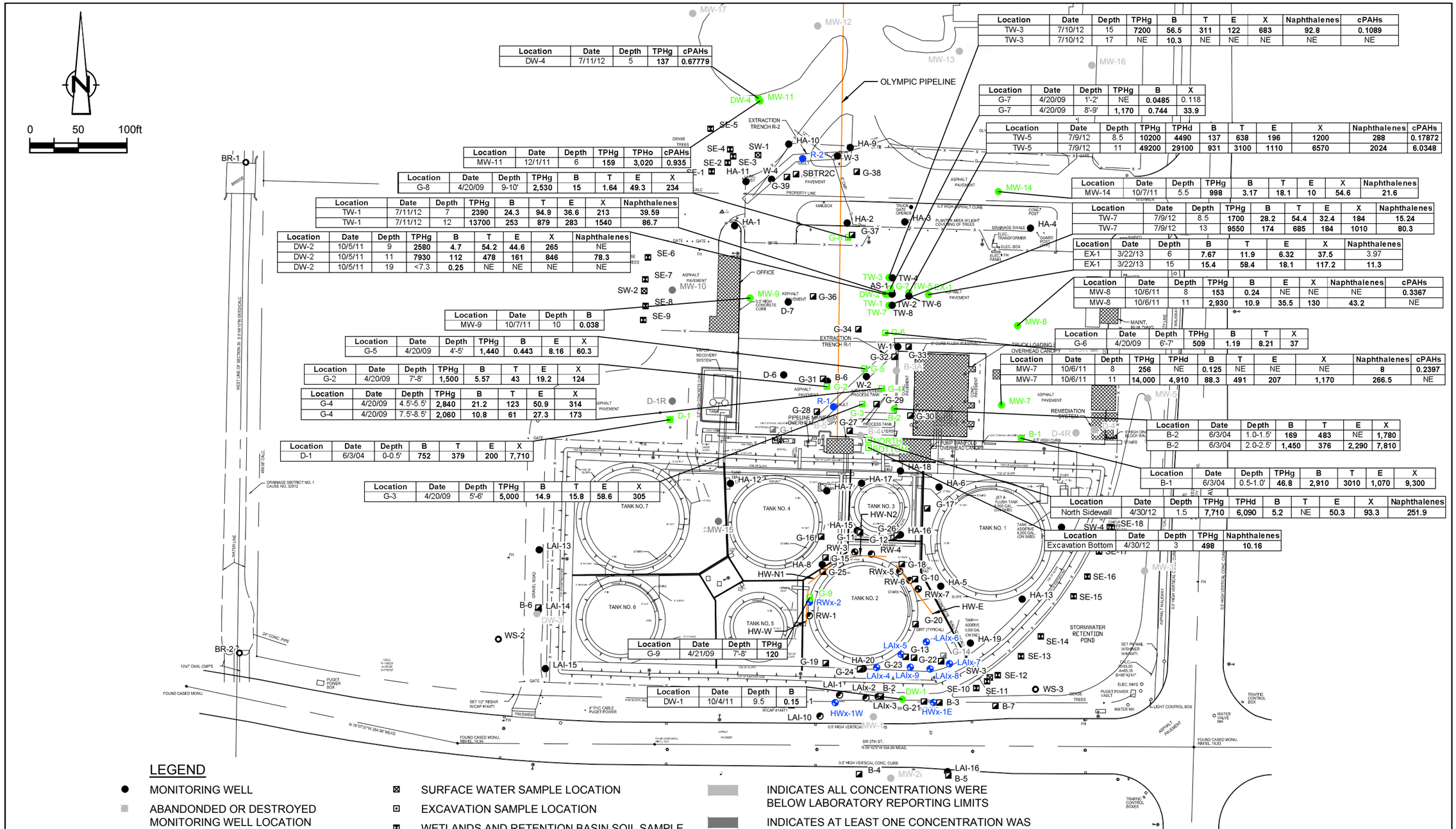
LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- SURFACE WATER SAMPLE LOCATION
- EXCAVATION SAMPLE LOCATION
- WETLANDS AND RETENTION BASIN SOIL SAMPLE
- STAFF GAUGE LOCATION
- SOIL BORING LOCATION

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 4

SITE PLAN WITH SOIL BORING AND WELL LOCATIONS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



Location	Date	Depth	TPHg	cPAHs
DW-4	7/11/12	5	137	0.67779

Location	Date	Depth	TPHg	TPHo	cPAHs
MW-11	12/1/11	6	159	3,020	0.935

Location	Date	Depth	TPHg	B	T	E	X
G-8	4/20/09	9-10'	2,530	15	1.64	49.3	234

Location	Date	Depth	TPHg	B	T	E	X	Naphthalenes
TW-1	7/11/12	7	2390	24.3	94.9	36.6	213	39.59
TW-1	7/11/12	12	13700	253	879	283	1540	86.7

Location	Date	Depth	TPHg	B	T	E	X	Naphthalenes
DW-2	10/5/11	9	2580	4.7	54.2	44.6	265	NE
DW-2	10/5/11	11	7930	112	478	161	846	78.3
DW-2	10/5/11	19	<7.3	0.25	NE	NE	NE	NE

Location	Date	Depth	B
MW-9	10/7/11	10	0.038

Location	Date	Depth	TPHg	B	E	X
G-5	4/20/09	4'-5'	1,440	0.443	8.16	60.3

Location	Date	Depth	TPHg	B	T	E	X
G-2	4/20/09	7'-8'	1,500	5.57	43	19.2	124

Location	Date	Depth	TPHg	B	T	E	X
G-4	4/20/09	4.5'-5.5'	2,840	21.2	123	50.9	314
G-4	4/20/09	7.5'-8.5'	2,060	10.8	61	27.3	173

Location	Date	Depth	B	T	E	X
D-1	6/3/04	0-0.5'	752	379	200	7,710

Location	Date	Depth	TPHg	B	T	E	X
G-3	4/20/09	5'-6'	5,000	14.9	15.8	58.6	305

Location	Date	Depth	TPHg	B	T	E	X
G-9	4/21/09	7'-8'	120				

Location	Date	Depth	B
DW-1	10/4/11	9.5	0.15

Location	Date	Depth	TPHg	B	T	E	X	Naphthalenes	cPAHs
TW-3	7/10/12	15	7200	56.5	311	122	683	92.8	0.1089
TW-3	7/10/12	17	NE	10.3	NE	NE	NE	NE	NE

Location	Date	Depth	TPHg	B	X
G-7	4/20/09	1'-2'	NE	0.0485	0.118
G-7	4/20/09	8'-9'	1,170	0.744	33.9

Location	Date	Depth	TPHg	TPHd	B	T	E	X	Naphthalenes	cPAHs
TW-5	7/9/12	8.5	10200	4490	137	638	196	1200	288	0.17872
TW-5	7/9/12	11	49200	29100	931	3100	1110	6570	2024	6.0348

Location	Date	Depth	TPHg	B	T	E	X	Naphthalenes
MW-14	10/7/11	5.5	998	3.17	18.1	10	54.6	21.6

Location	Date	Depth	TPHg	B	T	E	X	Naphthalenes
TW-7	7/9/12	8.5	1700	28.2	54.4	32.4	184	15.24
TW-7	7/9/12	13	9550	174	685	184	1010	80.3

Location	Date	Depth	B	T	E	X	Naphthalenes
EX-1	3/22/13	6	7.67	11.9	6.32	37.5	3.97
EX-1	3/22/13	15	15.4	58.4	18.1	117.2	11.3

Location	Date	Depth	TPHg	B	E	X	Naphthalenes	cPAHs
MW-8	10/6/11	8	153	0.24	NE	NE	NE	0.3367
MW-8	10/6/11	11	2,930	10.9	35.5	130	43.2	NE

Location	Date	Depth	TPHg	B	T	X
G-6	4/20/09	6'-7'	509	1.19	8.21	37

Location	Date	Depth	TPHg	TPHd	B	T	E	X	Naphthalenes	cPAHs
MW-7	10/6/11	8	256	NE	0.125	NE	NE	NE	8	0.2397
MW-7	10/6/11	11	14,000	4,910	88.3	491	207	1,170	266.5	NE

Location	Date	Depth	B	T	E	X
B-2	6/3/04	1.0-1.5'	169	483	NE	1,780
B-2	6/3/04	2.0-2.5'	1,450	376	2,290	7,810

Location	Date	Depth	TPHg	B	T	E	X
B-1	6/3/04	0.5-1.0'	46.8	2,910	3010	1,070	9,300

Location	Date	Depth	TPHg	TPHd	B	T	E	X	Naphthalenes
North Sidewall	4/30/12	1.5	7,710	6,090	5.2	NE	50.3	93.3	251.9

Location	Date	Depth	TPHg	Naphthalenes
Excavation Bottom	4/30/12	3	498	10.16

LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- SURFACE WATER SAMPLE LOCATION
- EXCAVATION SAMPLE LOCATION
- WETLANDS AND RETENTION BASIN SOIL SAMPLE
- STAFF GAUGE LOCATION
- SOIL BORING LOCATION

INDICATES ALL CONCENTRATIONS WERE BELOW LABORATORY REPORTING LIMITS

INDICATES AT LEAST ONE CONCENTRATION WAS DETECTED ABOVE THE LABORATORY REPORTING LIMITS, BUT NO CONCENTRATION EXCEEDED

INDICATES AT LEAST ONE CONCENTRATION EXCEEDED MTCA METHOD A CLEANUP LEVELS

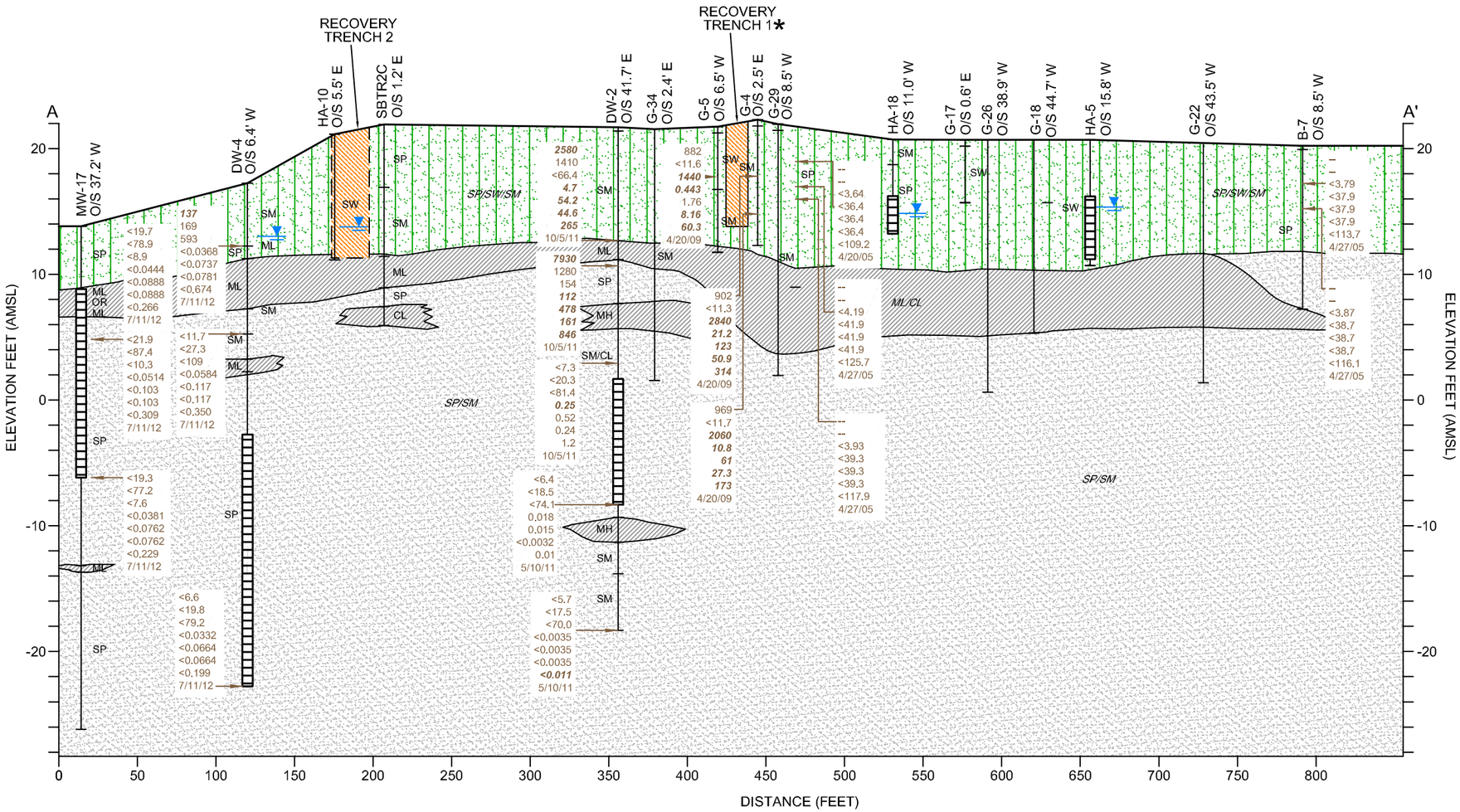
NOTE:

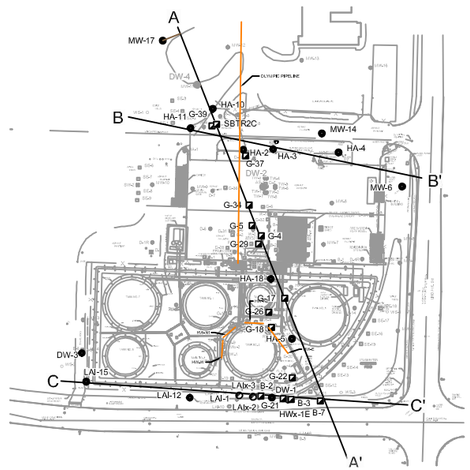
ALL CONCENTRATIONS ARE IN MILLIGRAMS PER KILOGRAM.

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 5

SITE PLAN WITH SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington





1" = 300'

LEGEND

- MW-15 / O/S 1.1' — WELL DESIGNATION; O/S OFFSET (FT)
- GROUND SURFACE
- OBSERVATION WELL INSTALLATION
- STRATIGRAPHIC BOUNDARY
- CL — TYPICAL SOIL CLASSIFICATION
- SCREENED INTERVAL
- BOTTOM OF BORING
- GROUNDWATER DEPTH

NOTE: BORINGS G-18 THROUGH G-42 WERE LOGGED USING LIF. STRATOGRAPHY IS BASED ON CONDUCTIVITY READINGS.

AMSL	ABOVE MEAN SEA LEVEL
*	CONSTRUCTION DETAILS ARE UNAVAILABLE; DEPTH IS ASSUMED
FILL	FILL
SP/SW/SM	SAND, GRAVELLY SAND - SILTY SAND MIXTURES, SOME CLAY
SP/SM	SAND, SILTY SAND
MC/CL	CLAYEY SILT, SILTY CLAY

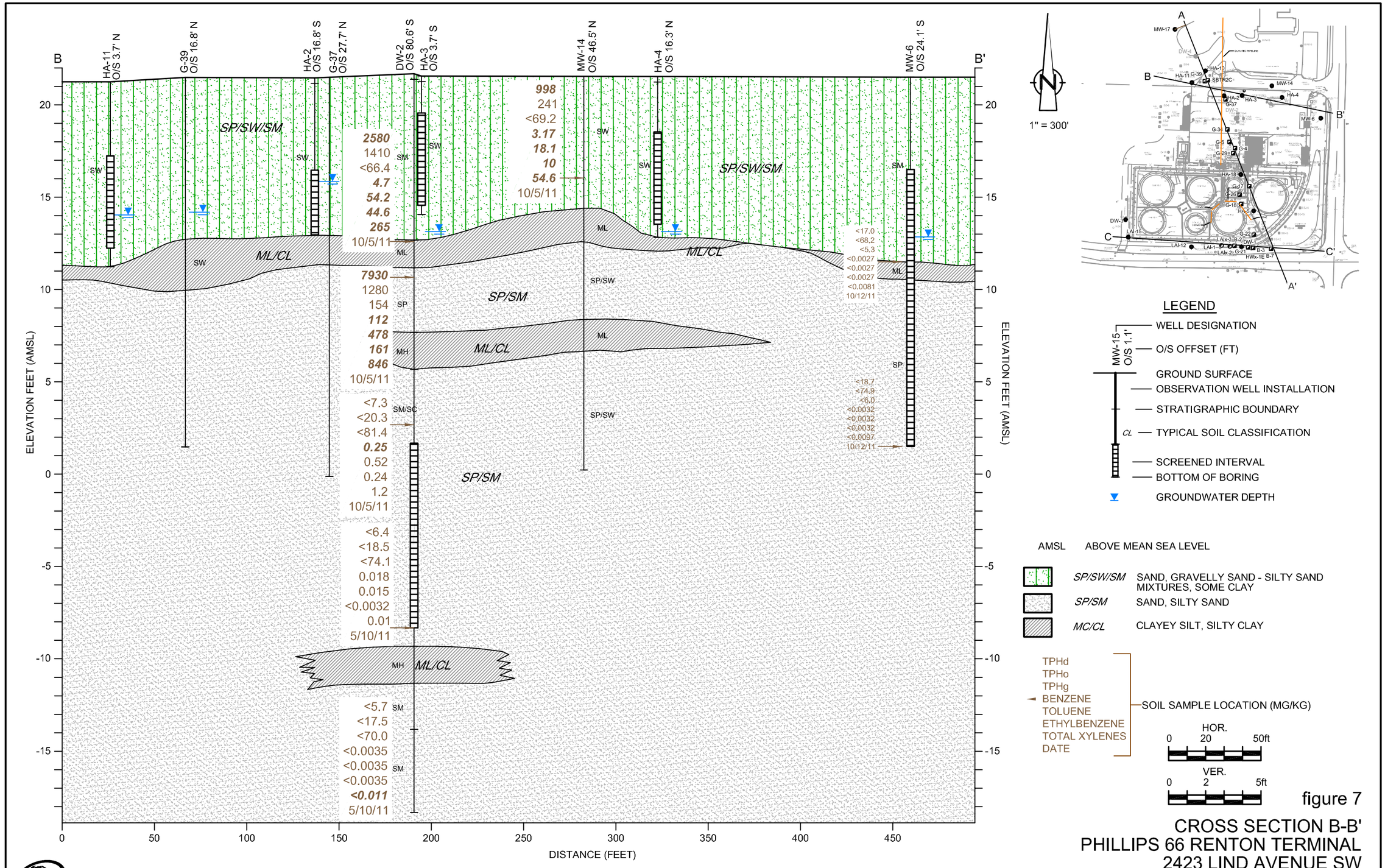
TPHd
TPHo
TPHg
BENZENE
TOLUENE
ETHYLBENZENE
TOTAL XYLENES
DATE
— SOIL SAMPLE LOCATION (MG/KG)

HOR. 0 40 80ft

VER. 0 5 10ft

figure 6

CROSS SECTION A-A'
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



1" = 300'

LEGEND

MW-15 O/S 1.1'

- WELL DESIGNATION
- O/S OFFSET (FT)
- GROUND SURFACE
- OBSERVATION WELL INSTALLATION
- STRATIGRAPHIC BOUNDARY
- CL — TYPICAL SOIL CLASSIFICATION
- SCREENED INTERVAL
- BOTTOM OF BORING
- GROUNDWATER DEPTH

AMSL ABOVE MEAN SEA LEVEL

- *SP/SW/SM* SAND, GRAVELLY SAND - SILTY SAND MIXTURES, SOME CLAY
- *SP/SM* SAND, SILTY SAND
- *MC/CL* CLAYEY SILT, SILTY CLAY

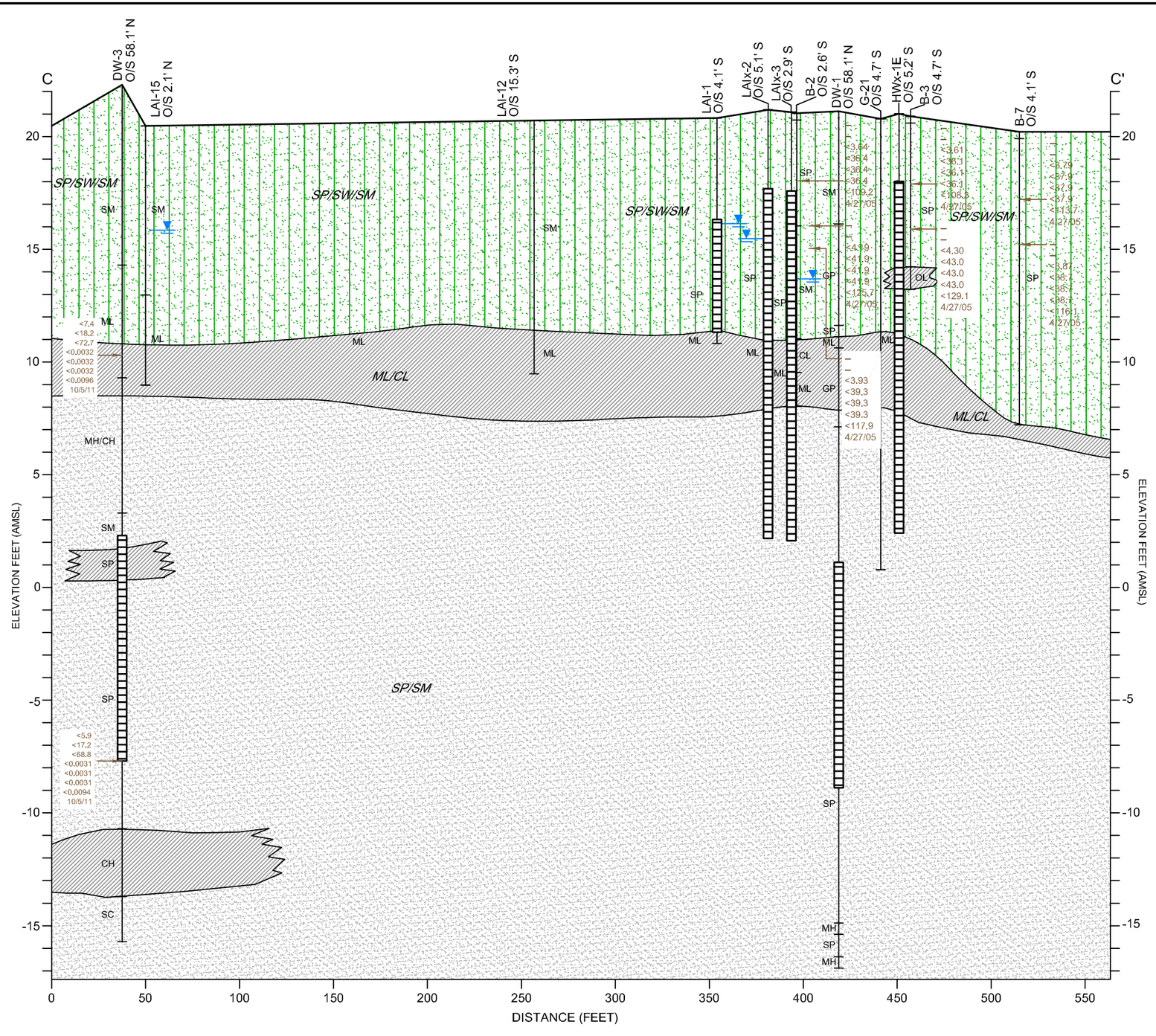
TPHd
TPHo
TPHg
BENZENE
TOLUENE
ETHYLBENZENE
TOTAL XYLENES
DATE
— SOIL SAMPLE LOCATION (MG/KG)

HOR. 0 20 50ft

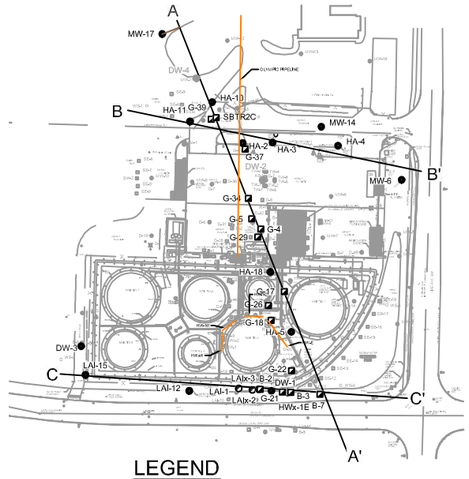
VER. 0 2 5ft

figure 7

CROSS SECTION B-B'
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



1" = 300'



LEGEND

- MW-15 O/S 1.1' — WELL DESIGNATION; O/S OFFSET (FT)
- GROUND SURFACE
- OBSERVATION WELL INSTALLATION
- STRATIGRAPHIC BOUNDARY
- CL — TYPICAL SOIL CLASSIFICATION
- SCREENED INTERVAL
- BOTTOM OF BORING
- GROUNDWATER DEPTH

AMSL — ABOVE MEAN SEA LEVEL

- *SP/SW/SM* — SAND, GRAVELLY SAND - SILTY SAND MIXTURES, SOME CLAY
- *SP/SM* — SAND, SILTY SAND
- *MC/CL* — CLAYEY SILT, SILTY CLAY

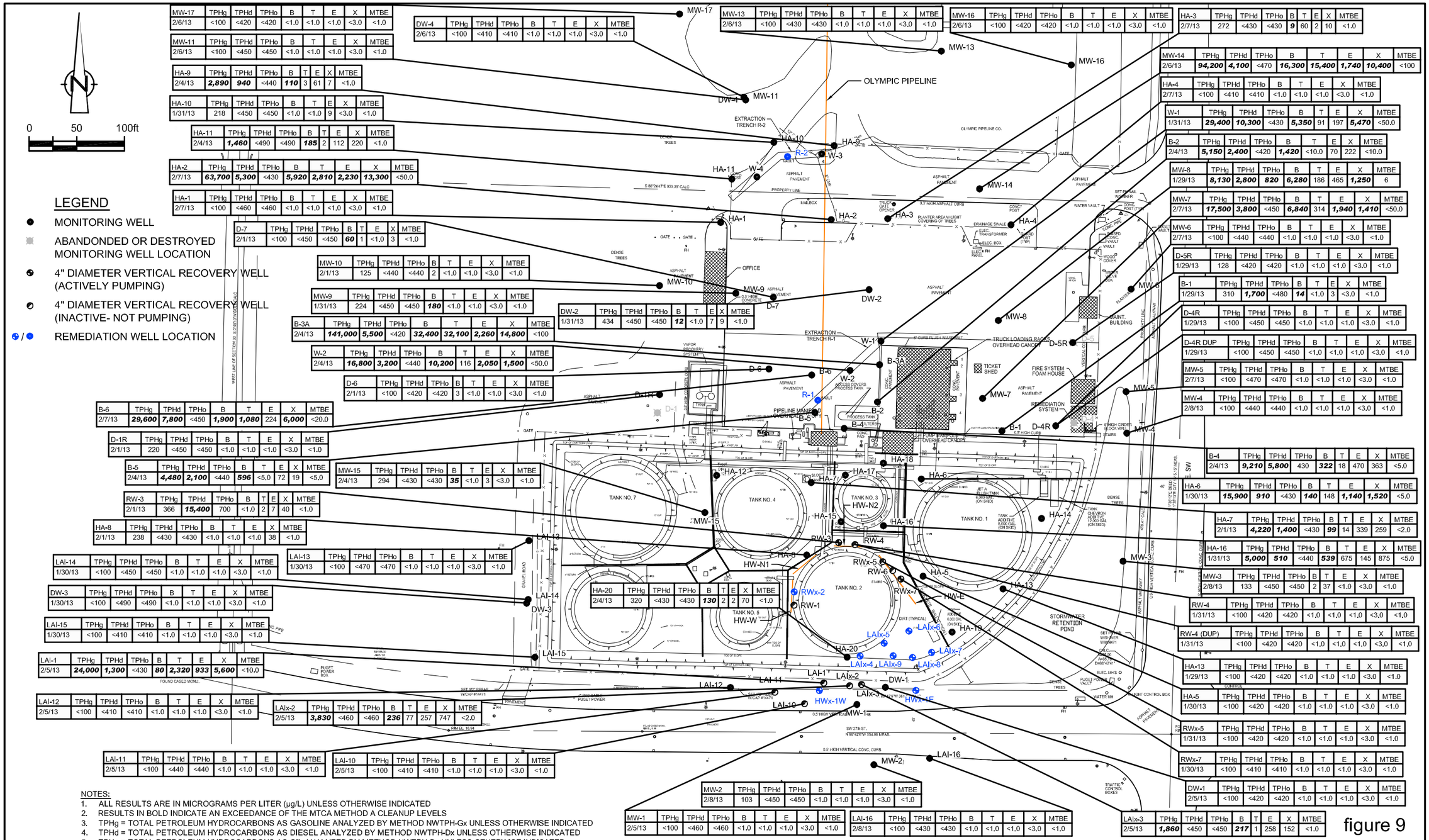
TPHd
TPHo
TPHg
BENZENE
TOLUENE
ETHYLBENZENE
TOTAL XYLENES
DATE
— SOIL SAMPLE LOCATION (MG/KG)

HOR. 0 20 60ft

VER. 0 2 5ft

figure 8

CROSS SECTION C-C'
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



MW-17	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/6/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

MW-11	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/6/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0

HA-9	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	***2,890***	***940***	<440	***110***	3	61	7	<1.0

HA-10	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	218	<450	<450	<1.0	<1.0	9	<3.0	<1.0

HA-11	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	***1,460***	<490	<490	***185***	2	112	220	<1.0

HA-2	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	***63,700***	***5,300***	<430	***5,920***	***2,810***	***2,230***	***13,300***	<50.0

HA-1	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	<100	<460	<460	<1.0	<1.0	<1.0	<3.0	<1.0

D-7	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/1/13	<100	<450	<450	***60***	1	<1.0	3	<1.0

MW-10	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/1/13	125	<440	<440	2	<1.0	<1.0	<3.0	<1.0

MW-9	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	224	<450	<450	***180***	<1.0	<1.0	<3.0	<1.0

B-3A	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	***141,000***	***5,500***	<420	***32,400***	***32,100***	***2,260***	***14,800***	<100

W-2	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	***16,800***	***3,200***	<440	***10,200***	116	***2,050***	***1,500***	<50.0

D-6	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/1/13	<100	<420	<420	3	<1.0	<1.0	<3.0	<1.0

B-6	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	***29,600***	***7,800***	<450	***1,900***	***1,080***	224	***6,000***	<20.0

D-1R	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/1/13	220	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0

B-5	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	***4,480***	***2,100***	<440	***596***	<5.0	72	19	<5.0

MW-15	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	294	<430	<430	***35***	<1.0	3	<3.0	<1.0

RW-3	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/1/13	366	***15,400***	700	<1.0	2	7	40	<1.0

HA-8	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/1/13	238	<430	<430	<1.0	<1.0	<1.0	38	<1.0

LAI-14	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/30/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0

LAI-13	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/30/13	<100	<470	<470	<1.0	<1.0	<1.0	<3.0	<1.0

DW-3	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/30/13	<100	<490	<490	<1.0	<1.0	<1.0	<3.0	<1.0

LAI-15	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/30/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0

LAI-1	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	***24,000***	***1,300***	<430	***80***	***2,320***	***933***	***5,600***	<10.0

LAI-12	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0

LAIx-2	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	***3,830***	<460	<460	***236***	77	257	747	<2.0

LAI-11	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	<100	<440	<440	<1.0	<1.0	<1.0	<3.0	<1.0

LAI-10	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0

DW-4	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/6/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0

DW-2	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	434	<450	<450	***12***	<1.0	7	9	<1.0

MW-13	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/6/13	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<1.0

MW-16	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/6/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

HA-3	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	272	<430	<430	***9***	60	2	10	<1.0

MW-14	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/6/13	***94,200***	***4,100***	<470	***16,300***	***15,400***	***1,740***	***10,400***	<100

HA-4	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0

W-1	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	***29,400***	***10,300***	<430	***5,350***	91	197	***5,470***	<50.0

B-2	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	***5,150***	***2,400***	<420	***1,420***	<10.0	70	222	<10.0

MW-8	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/29/13	***8,130***	***2,800***	***820***	***6,280***	186	465	***1,250***	6

MW-7	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	***17,500***	***3,800***	<450	***6,840***	314	***1,940***	***1,410***	<50.0

MW-6	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	<100	<440	<440	<1.0	<1.0	<1.0	<3.0	<1.0

D-5R	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/29/13	128	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

B-1	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/29/13	310	***1,700***	<480	***14***	<1.0	3	<3.0	<1.0

D-4R	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/29/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0

D-4R DUP	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/29/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0

MW-5	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/7/13	<100	<470	<470	<1.0	<1.0	<1.0	<3.0	<1.0

MW-4	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/8/13	<100	<440	<440	<1.0	<1.0	<1.0	<3.0	<1.0

B-4	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	***9,210***	***5,800***	430	***322***	18	470	363	<5.0

HA-6	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/30/13	***15,900***	***910***	<430	***140***	148	***1,140***	***1,520***	<5.0

HA-7	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/1/13	***4,220***	***1,400***	<430	***99***	14	339	259	<2.0

HA-16	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	***5,000***	***510***	<440	***539***	675	145	875	<5.0

MW-3	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/8/13	133	<450	<450	2	37	<1.0	<3.0	<1.0

RW-4	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

RW-4 (DUP)	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

HA-13	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/29/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

HA-5	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/30/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

RWx-5	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/31/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

RWx-7	TPHg	TPHd	TPHo	B	T	E	X	MTBE
1/30/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0

DW-1	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0

HA-20	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/4/13	320	<430	<430	***130***	2	2	70	<1.0

MW-2	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/8/13	103	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0

MW-1	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	<100	<460	<460	<1.0	<1.0	<1.0	<3.0	<1.0

LAI-16	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/8/13	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<1.0

LAIx-3	TPHg	TPHd	TPHo	B	T	E	X	MTBE
2/5/13	***1,860***	<450	<450	***217***	1	258	152	<1.0

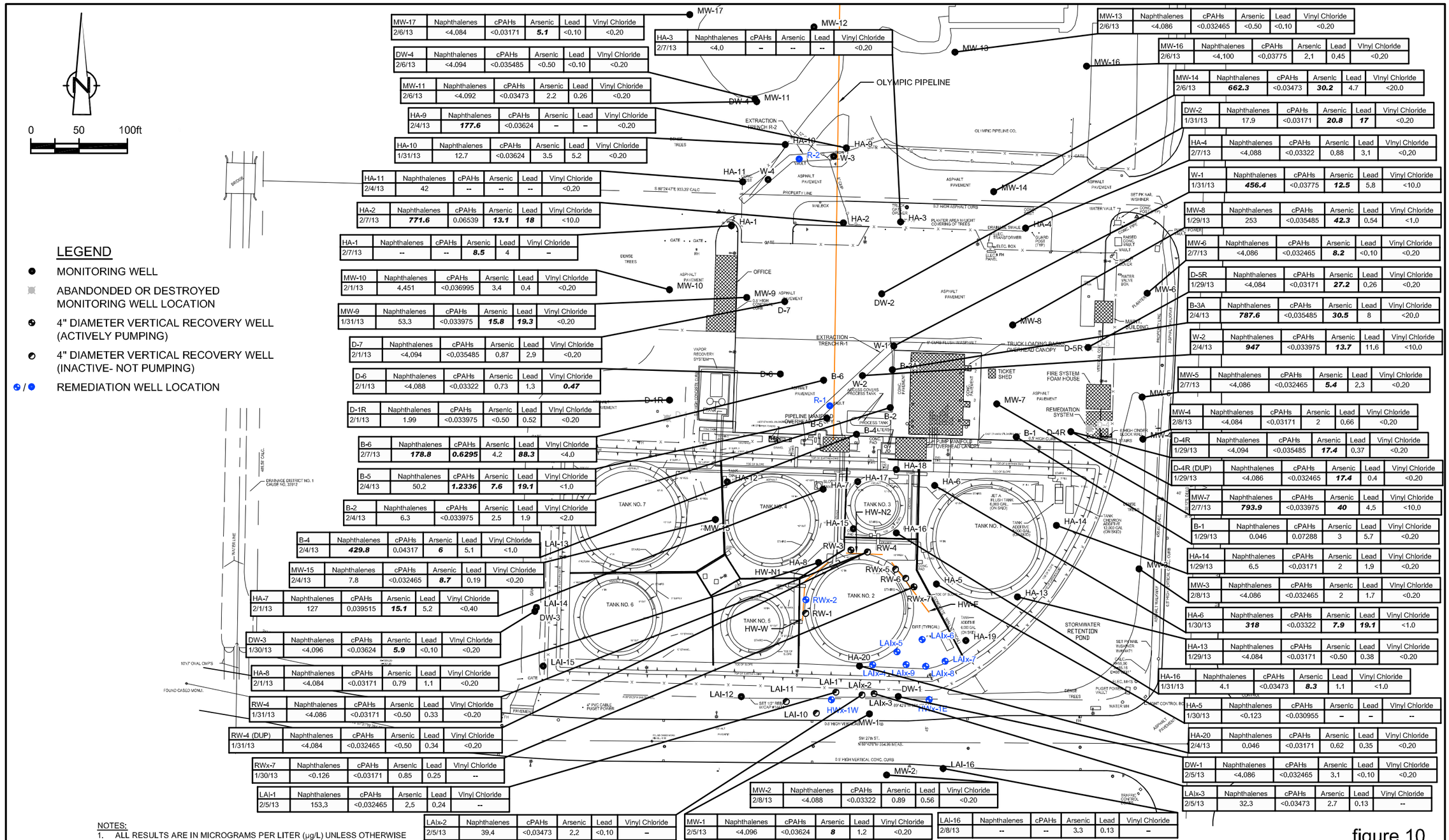
NOTES:

1. ALL RESULTS ARE IN MICROGRAMS PER LITER (µg/L) UNLESS OTHERWISE INDICATED
2. RESULTS IN BOLD INDICATE AN EXCEEDANCE OF THE MTCA METHOD A CLEANUP LEVELS
3. TPHg = TOTAL PETROLEUM HYDROCARBONS AS GASOLINE ANALYZED BY METHOD NWTPH-Gx UNLESS OTHERWISE INDICATED
4. TPHd = TOTAL PETROLEUM HYDROCARBONS AS DIESEL ANALYZED BY METHOD NWTPH-Dx UNLESS OTHERWISE INDICATED
5. TPHo = TOTAL PETROLEUM HYDROCARBONS AS OIL ANALYZED BY METHOD NWTPH-Dx UNLESS OTHERWISE INDICATED
6. BTEX = BENZENE, TOLUENE, ETHYLBENZENE, TOTAL XYLENES ANALYZED BY EPA METHOD 8260B UNLESS OTHERWISE INDICATED
7. MTBE = METHYL-TERTIARY BUTYL ETHER ANALYZED BY EPA METHOD 8260B UNLESS OTHERWISE INDICATED
8. MTCA = MODEL TOXICS CONTROL ACT
9. <X = NOT DETECTED AT THE REPORTING LIMIT X
10. M1 = MATRIX SPIKE RECOVERY EXCEEDED THE QC LIMITS. BATCH ACCEPTED BASED ON LABORATORY CONTROL SAMPLE RECOVERY
11. 10 = SAMPLE WAS DILUTED DUE TO PRESENCE OF HIGH LEVELS OF TARGET ANALYTES

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12. UPDATED JULY 27, 2012.

figure 9

SITE PLAN WITH GROUNDWATER ANALYTICAL RESULTS (JANUARY/FEBRUARY 2013)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



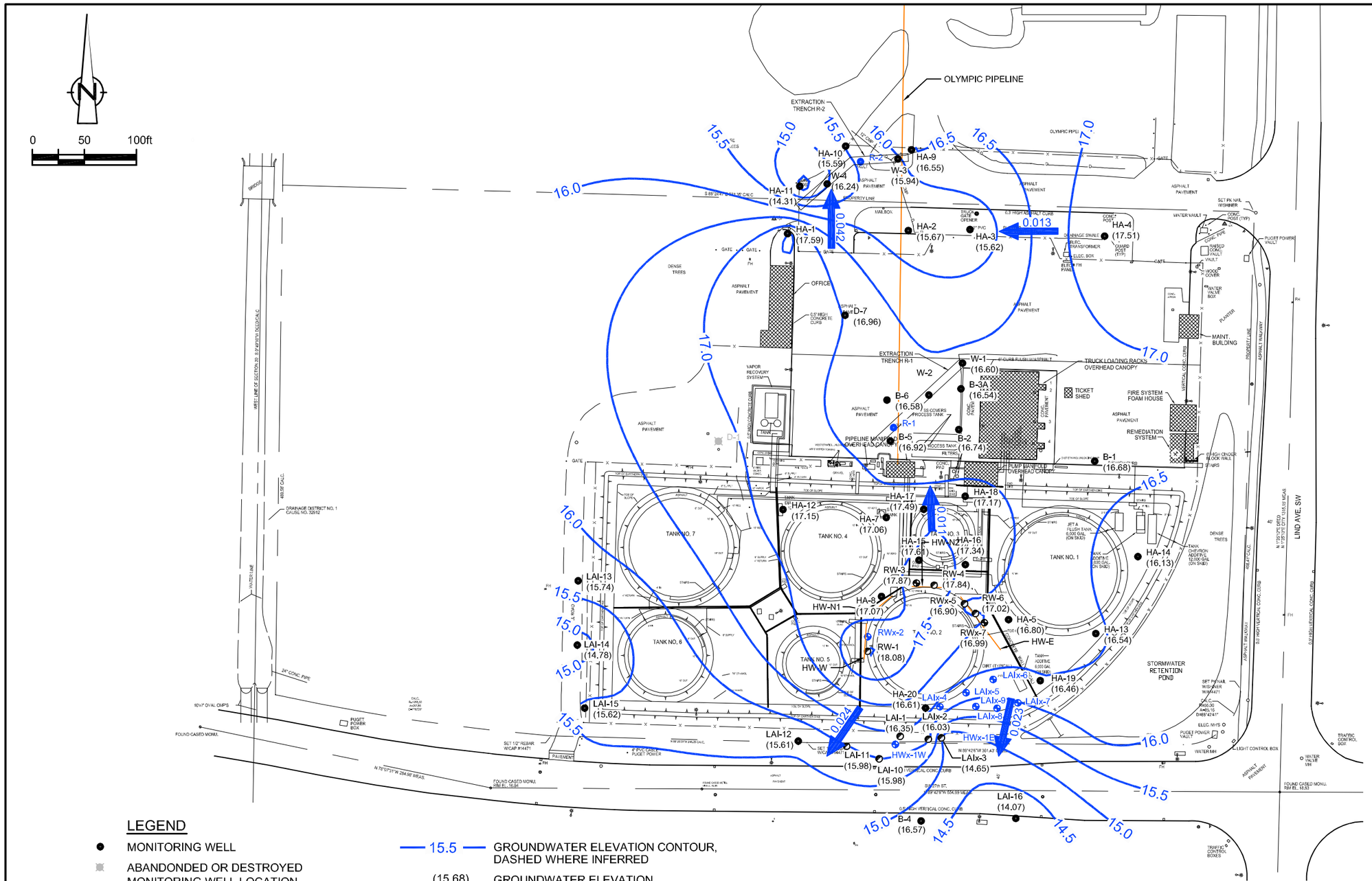
NOTES:

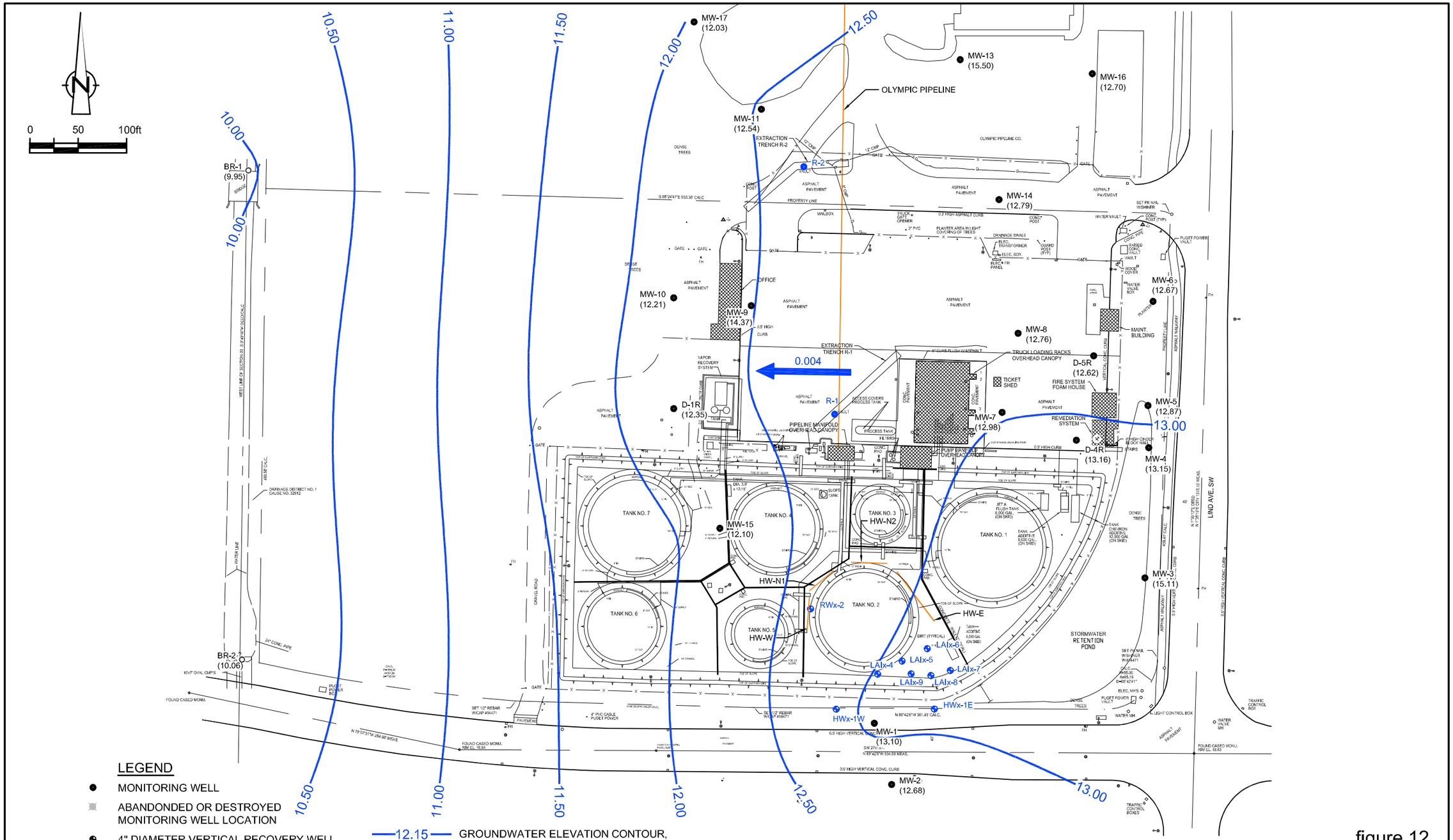
1. ALL RESULTS ARE IN MICROGRAMS PER LITER (µg/L) UNLESS OTHERWISE INDICATED
2. RESULTS IN BOLD INDICATE AN EXCEEDANCE OF THE MTCA METHOD A CLEANUP LEVELS
3. cPAHs = CARCENOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
4. EDC = 1,2 DICHLOROETHANE.
5. MTCA = MODEL TOXICS CONTROL ACT
6. <X = NOT DETECTED AT THE REPORTING LIMIT X
7. (4) = NAPHTHALENE ANALYZED BY EPA METHOD 8260B

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12. UPDATED JULY 27, 2012.

figure 10

SITE PLAN WITH GROUNDWATER ANALYTICAL RESULTS (JANUARY/FEBRUARY 2013)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington


0
50
100ft
OLYMPIC PIPELINE
EXTRACTION TRENCH R-2
EXTRACTION TRENCH R-1
HA-10 (15.59)
HA-9 (16.55)
W-3 (15.94)
W-4 (16.24)
HA-11 (14.31)
HA-1 (17.59)
HA-2 (15.67)
HA-3 (15.62)
HA-4 (17.51)
D-7 (16.96)
W-1 (16.60)
W-2
B-6 (16.58)
B-3A (16.54)
B-5 (16.92)
B-2 (16.74)
B-1 (16.68)
HA-17 (17.49)
HA-18 (17.17)
HA-12 (17.15)
HA-7 (17.06)
HA-15 (17.61)
HW-N2
HA-16 (17.34)
RW-3 (17.87)
RW-4 (17.84)
HA-8 (17.07)
HW-N1
RWx-5 (16.90)
RW-6 (17.02)
HA-5 (16.80)
HA-13 (16.54)
HA-14 (16.13)
RWx-2
RW-1 (18.08)
RW-7 (16.99)
HW-E
HW-W
HA-19 (16.46)
HA-20 (16.61)
LAIx-4
LAIx-5
LAIx-6
LAIx-9
LAIx-7
LAIx-8
LAI-1 (16.35)
LAIx-2 (16.03)
HWx-1E
LAI-12 (15.61)
LAI-11 (15.98)
HWx-1W
LAIx-3 (14.65)
LAI-10 (15.98)
LAI-16 (14.07)
B-4 (16.57)
LAI-13 (15.74)
LAI-14 (14.78)
LAI-15 (15.62)
0.042
0.013
0.011
0.024
0.023
16.0
15.5
15.0
16.5
17.0
17.5
14.5
TANK NO. 7
TANK NO. 4
TANK NO. 6
TANK NO. 5
TANK NO. 3
TANK NO. 2
TANK NO. 1
OFFICE
MAINT. BUILDING
TRUCK LOADING RACKS OVERHEAD CANOPY
PIPELINE MANIFOLD OVERHEAD CANOPY
PUMP MANIFOLD OVERHEAD CANOPY
TICKET SHED
FIRE SYSTEM FOAM HOUSE
REMEDIATION SYSTEM
VAPOR RECOVERY SYSTEM
STORMWATER RETENTION POND
ASPHALT PAVEMENT
DENSE TREES
LIND AVE. SW
SIXTH ST.
DRAINAGE DISTRICT NO. 1 CAUSE NO. 32512
24" CONC. PIPE
10'x7' OVAL CMP'S
FOUND CASED MONU.
PUGET POWER BOX
PUGET POWER VAULT
TRAFFIC CONTROL BOX
WATER VALVE VAULT
WATER VALVE BOX
WATER MH
ELEC. MH'S
LIGHT CONTROL BOX
MAILBOX
PROPERTY LINE
WEST LINE OF SECTION 30, T 23 N R 5 E W.M.
S 89°24'47" E 631.35' CALC.
N 76°07'31" W 284.99' MEAS.
N 89°42'6" W 361.43'
N 17°29'10" E 1318.51' MEAS.
485.89' CALC.
SET PK NAIL W/SHINER
SET 1/2" REBAR W/CAP #14471
CONC. POST (TYP.)
GUARD POST (TYP.)
ELEC. BOX
ELEC. PANEL
DRAINAGE SWALE
ELEC. TRANSFORMER
TRUCK GATE OPENER
6.5" HIGH CONCRETE CURB
6.5" HIGH VERTICAL CONC. CURB
8" PVC
GATE
FH
WATER LINE
ROAD
SIDEWALK
PAVEMENT
CONC. PAD
CONC. PAVEMENT
CONC. AREA
PLANTER
WOOD COVER
RAISED CONC. VAULT
CONC. POST
SET PK NAIL W/SHINER
ASPHALT WALKWAY
PROPERTY LINE
VERTICAL CONC. CURB
TANK
FILTERS
PROCESS TANK
BS COVERS PROCESS TANK
JET A FLUSH TANK, 6,000 GAL. (ON SKID)
TANK CHEVRON ADDITIVE, 12,000 GAL. (ON SKID)
TANK ADDITIVE 6,000 GAL. (ON SKID)
TANK CHEVRON ADDITIVE 6,000 GAL. (ON SKID)
TANK ADDITIVE 6,000 GAL. (ON SKID)
TANK CHEVRON ADDITIVE 12



LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION

—12.15— GROUNDWATER ELEVATION CONTOUR, DASHED WHERE INFERRED

(12.30) GROUNDWATER ELEVATION

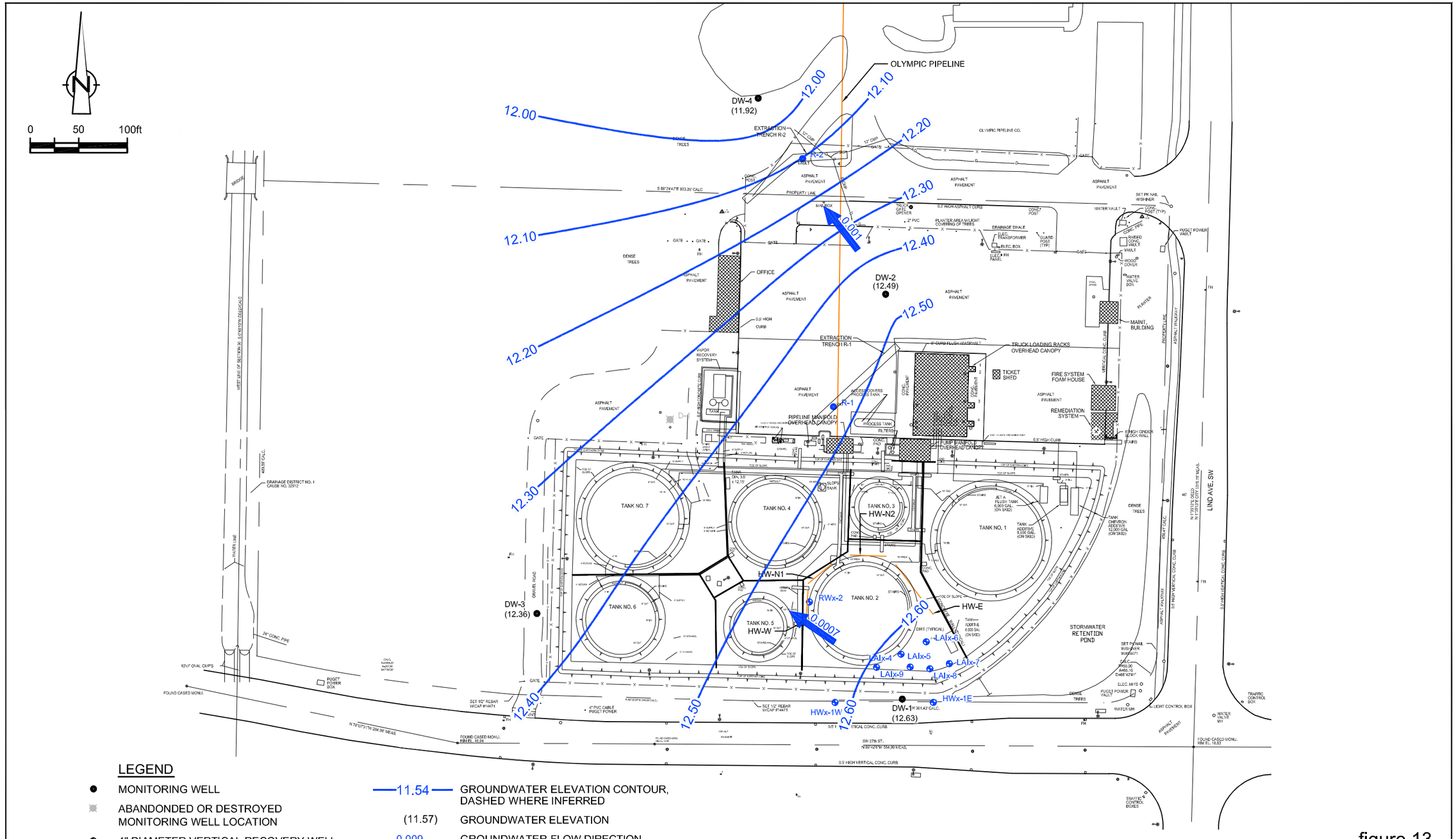
0.002 GROUNDWATER FLOW DIRECTION AND GRADIENT

NOTES:
1. GROUNDWATER ELEVATIONS ARE IN FEET.
2. WELL MW-9 NOT USED IN CONTOURING.

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12. UPDATED JULY 27, 2012.

figure 12

GROUNDWATER ELEVATION CONTOURS - INTERMEDIATE WELLS (JANUARY 2013)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION

11.54 — GROUNDWATER ELEVATION CONTOUR, DASHED WHERE INFERRED

(11.57) GROUNDWATER ELEVATION

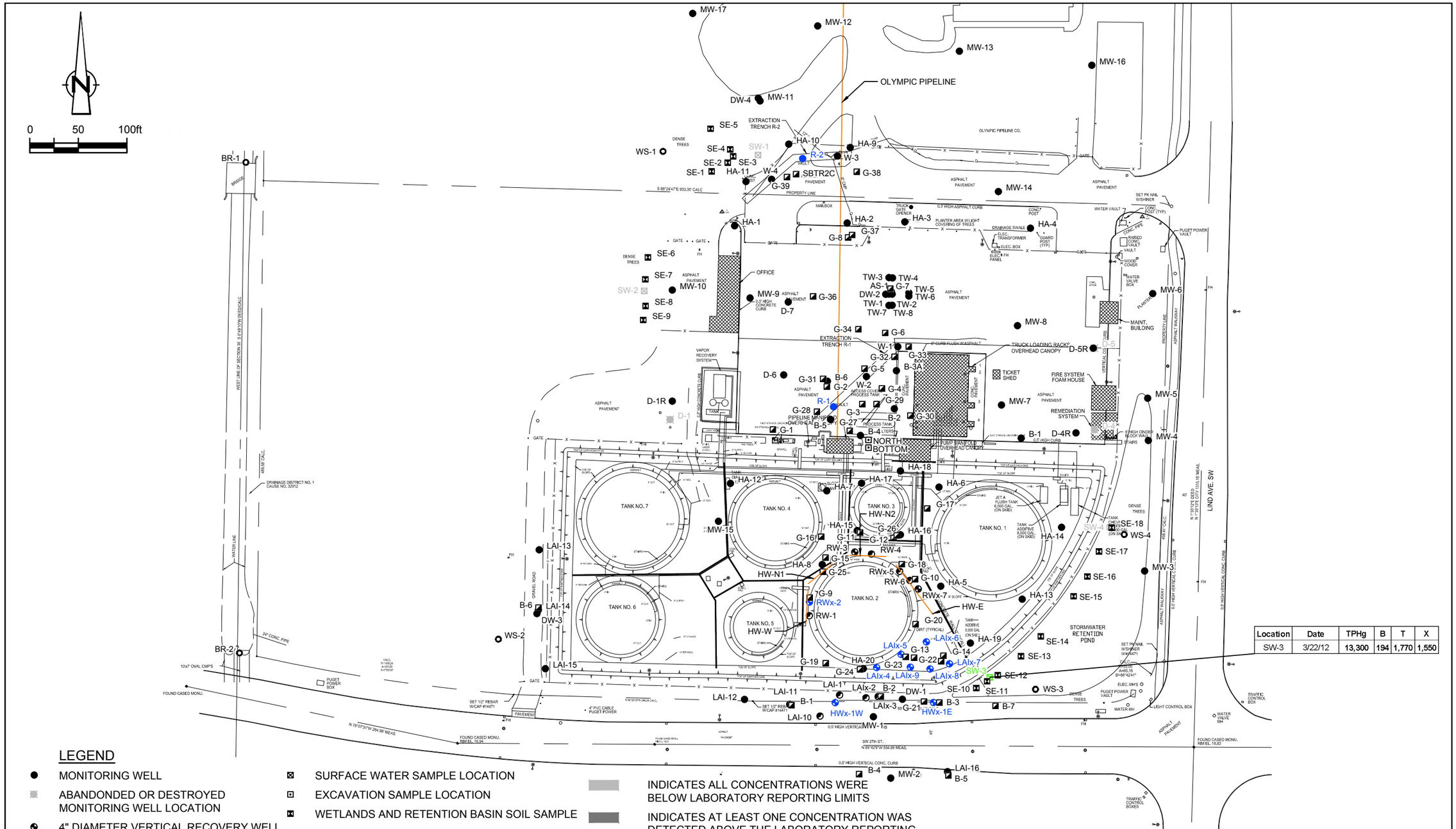
0.009 GROUNDWATER FLOW DIRECTION AND GRADIENT

NOTES:
1. GROUNDWATER ELEVATIONS ARE IN FEET.

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12. UPDATED JULY 27, 2012.

figure 13

GROUNDWATER ELEVATION CONTOURS - DEEP WELLS (JANUARY 2013)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



Location	Date	TPHg	B	T	X
SW-3	3/22/12	13,300	194	1,770	1,550

LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- SURFACE WATER SAMPLE LOCATION
- EXCAVATION SAMPLE LOCATION
- WETLANDS AND RETENTION BASIN SOIL SAMPLE
- STAFF GAUGE LOCATION
- SOIL BORING LOCATION

INDICATES ALL CONCENTRATIONS WERE BELOW LABORATORY REPORTING LIMITS

INDICATES AT LEAST ONE CONCENTRATION WAS DETECTED ABOVE THE LABORATORY REPORTING LIMITS, BUT NO CONCENTRATION EXCEEDED

INDICATES AT LEAST ONE CONCENTRATION EXCEEDED SITE SPECIFIC CLEANUP LEVELS

NOTE:

ALL CONCENTRATIONS ARE IN MICROGRAMS PER LITER.

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 14

SITE PLAN WITH SURFACE WATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

0 50 100ft

Location	Date	Arsenic
SE-6	4/24/12	20.2

Location	Date	Benzene	Arsenic
SE-7	4/25/12	0.0549	22.5

LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- SURFACE WATER SAMPLE LOCATION
- EXCAVATION SAMPLE LOCATION
- WETLANDS AND RETENTION BASIN SOIL SAMPLE
- STAFF GAUGE LOCATION
- SOIL BORING LOCATION

- INDICATES ALL CONCENTRATIONS WERE BELOW LABORATORY REPORTING LIMITS
- INDICATES AT LEAST ONE CONCENTRATION WAS DETECTED ABOVE THE LABORATORY REPORTING LIMITS, BUT NO CONCENTRATION EXCEEDED
- INDICATES AT LEAST ONE CONCENTRATION EXCEEDED SITE SPECIFIC CLEANUP LEVELS

NOTE:

ALL CONCENTRATIONS ARE IN MILLIGRAMS PER KILOGRAM.

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 15

SITE PLAN WITH WETLANDS AND RETENTION BASIN SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

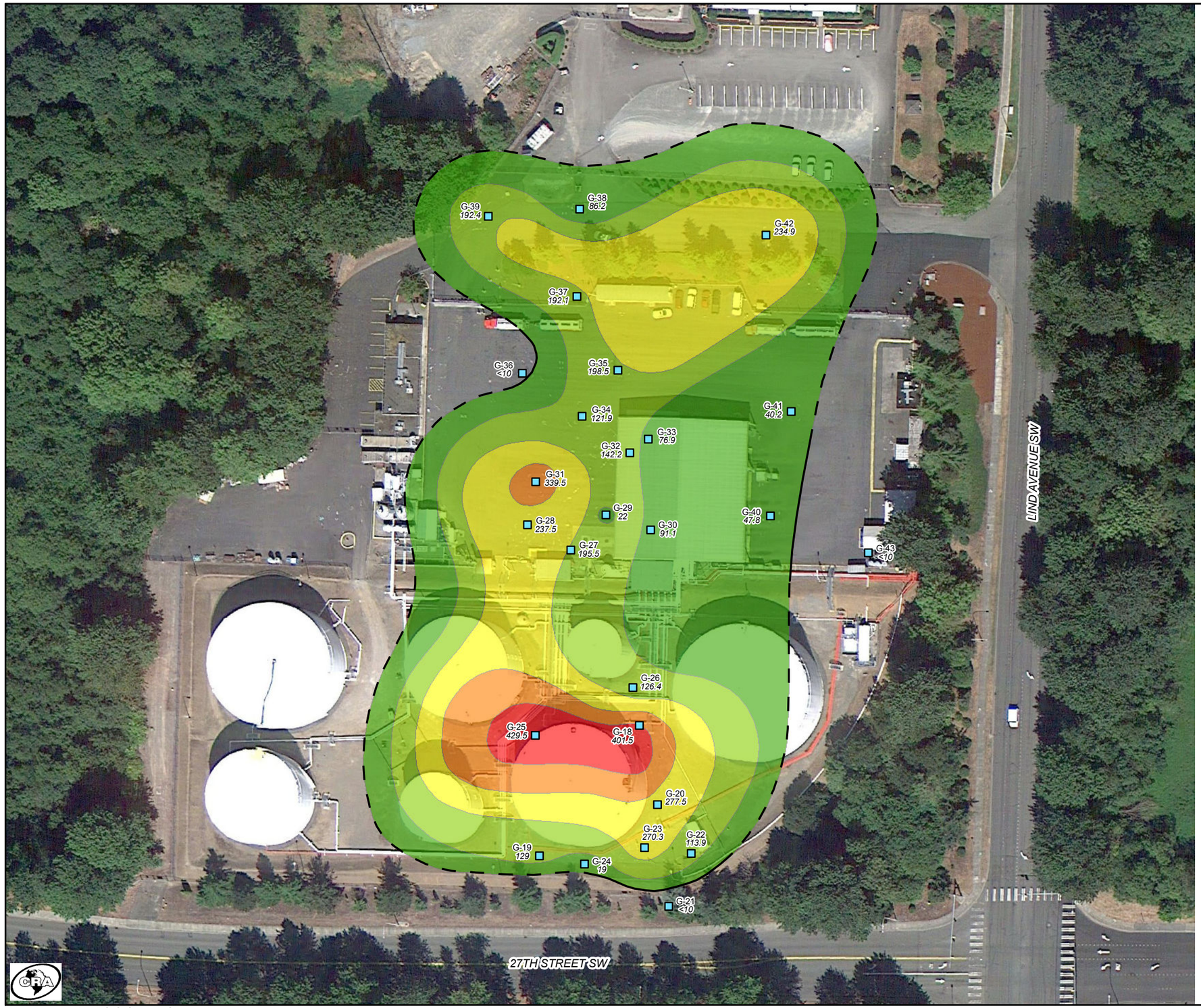
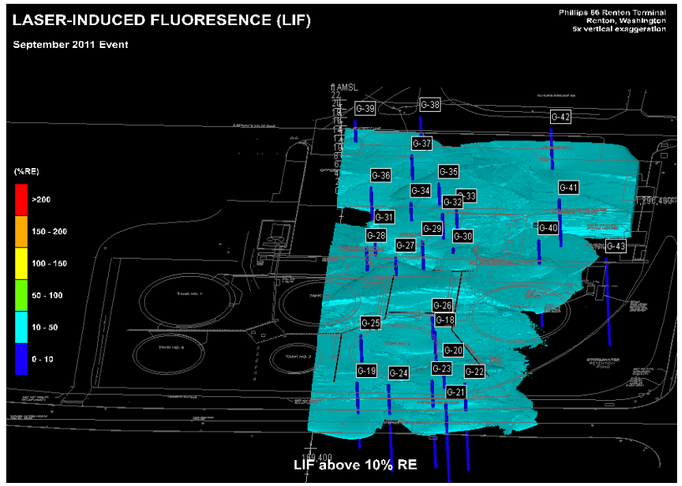


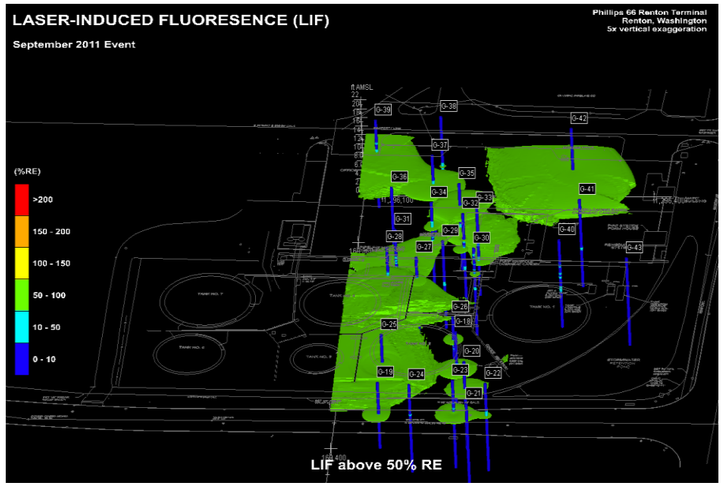
figure 16

LIF MAXIMUM FLUORESCENCE
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

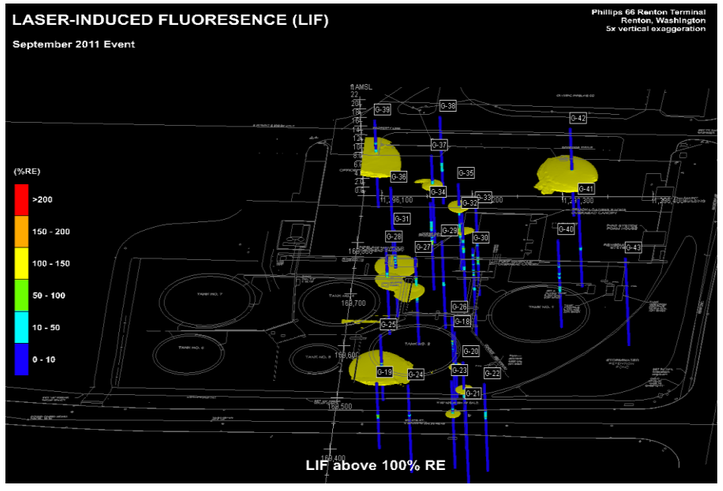
070496-RI00(018)GIS-SP001 SEP 06/2012



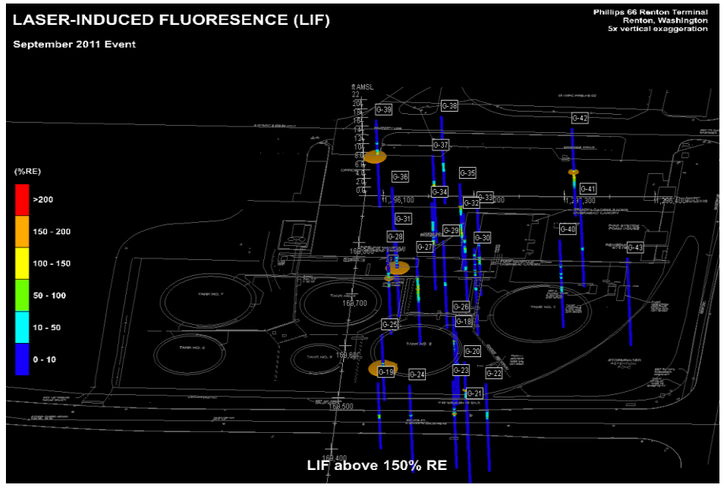
Greater Than 10 % RE



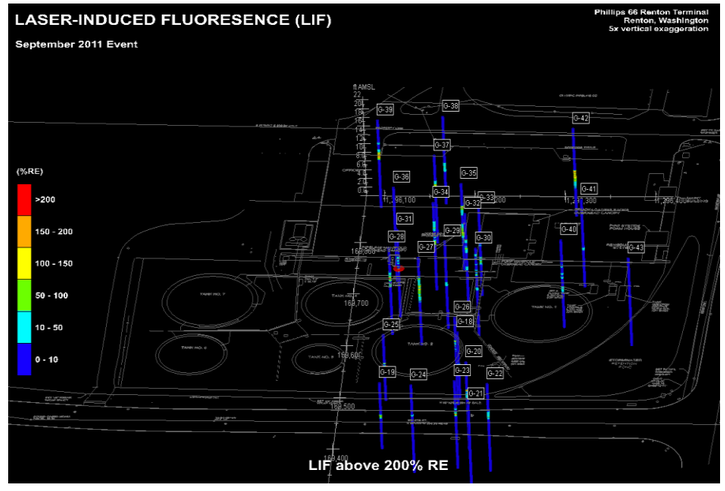
Greater Than 50 % RE



Greater Than 100 % RE



Greater Than 150 % RE



Greater Than 200 % RE

figure 17

LIF 4DIM SCREEN CAPTURES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

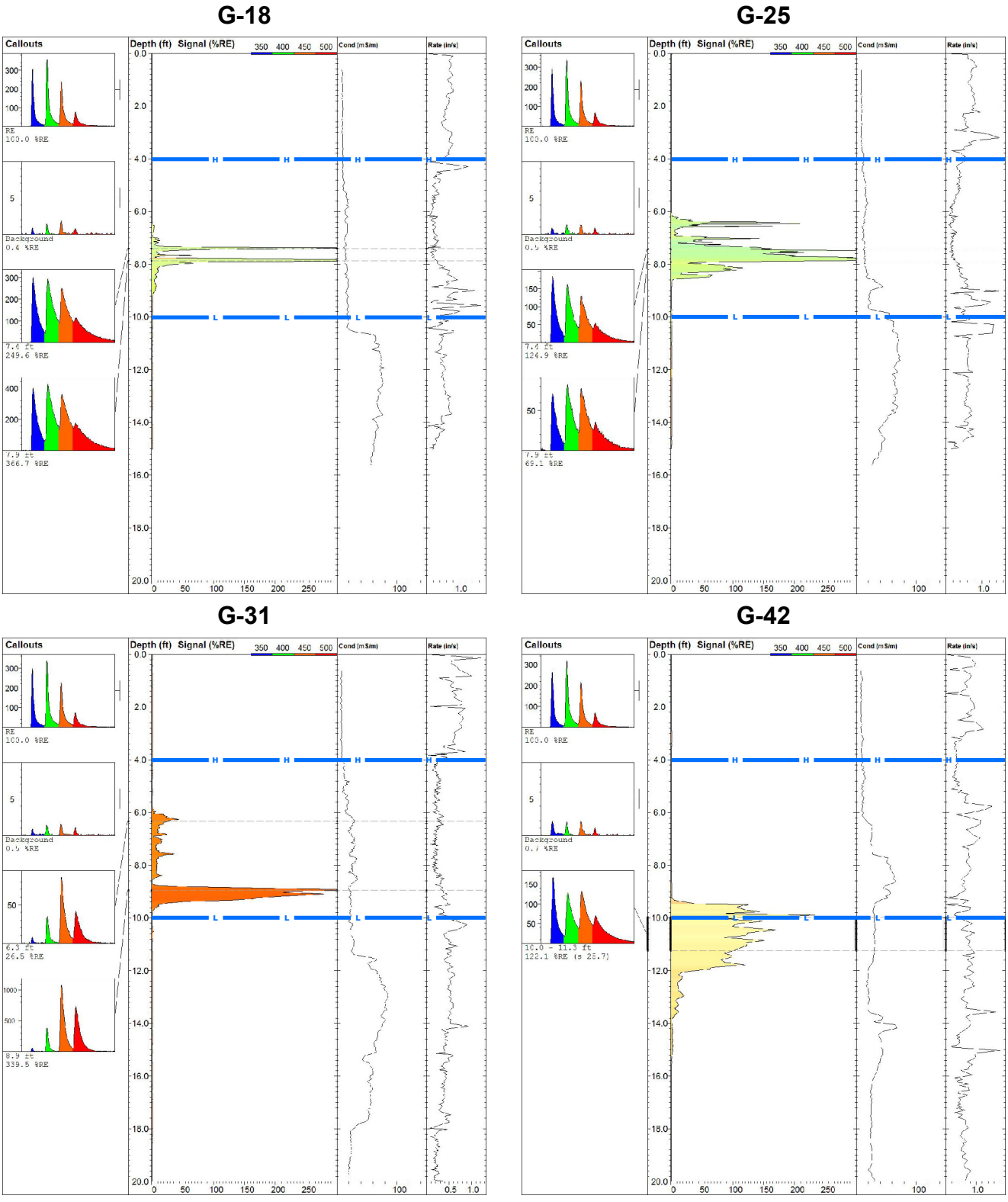
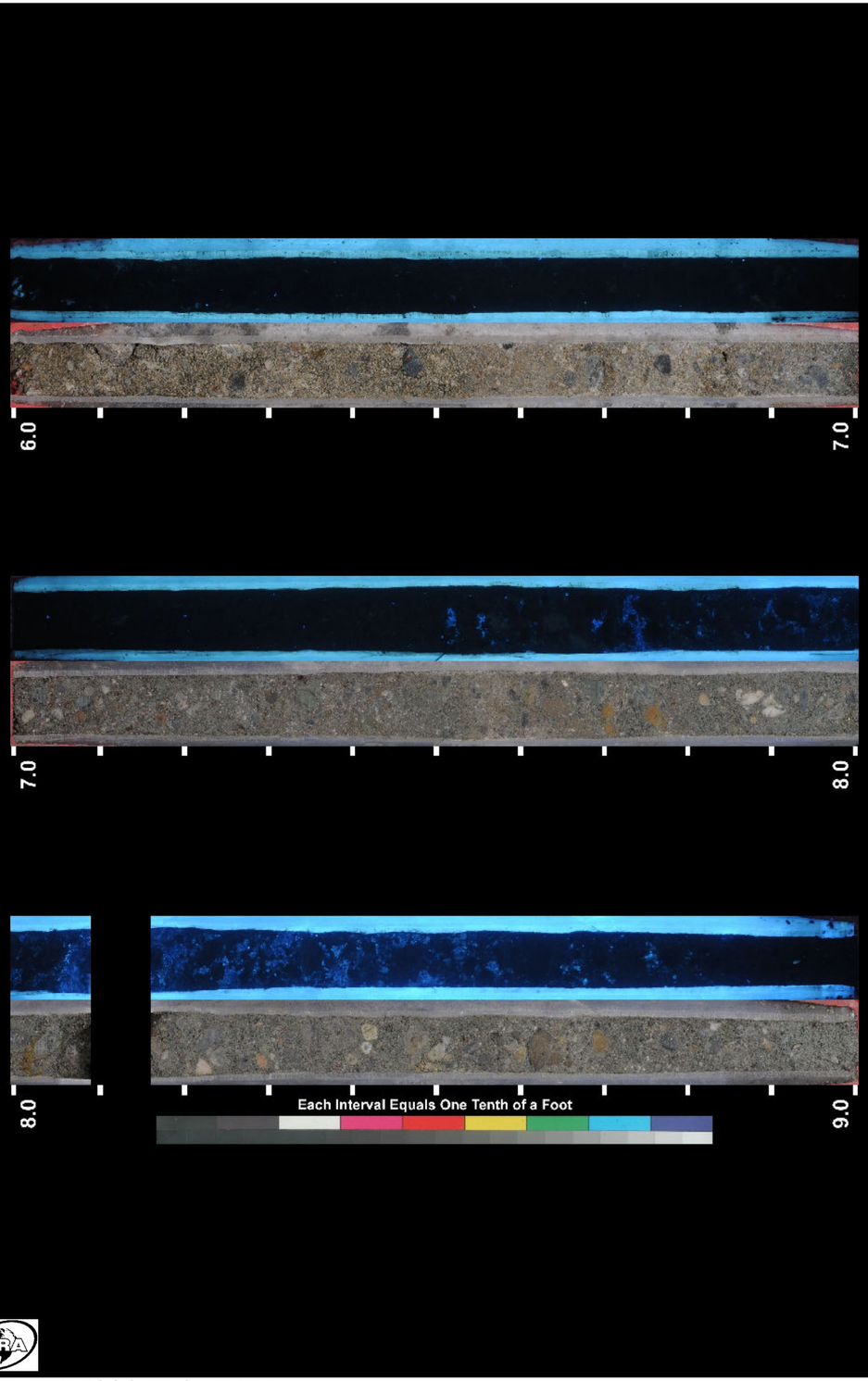


figure 18

EXAMPLE LIF PROFILES AND AVERAGE WATER TABLE
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



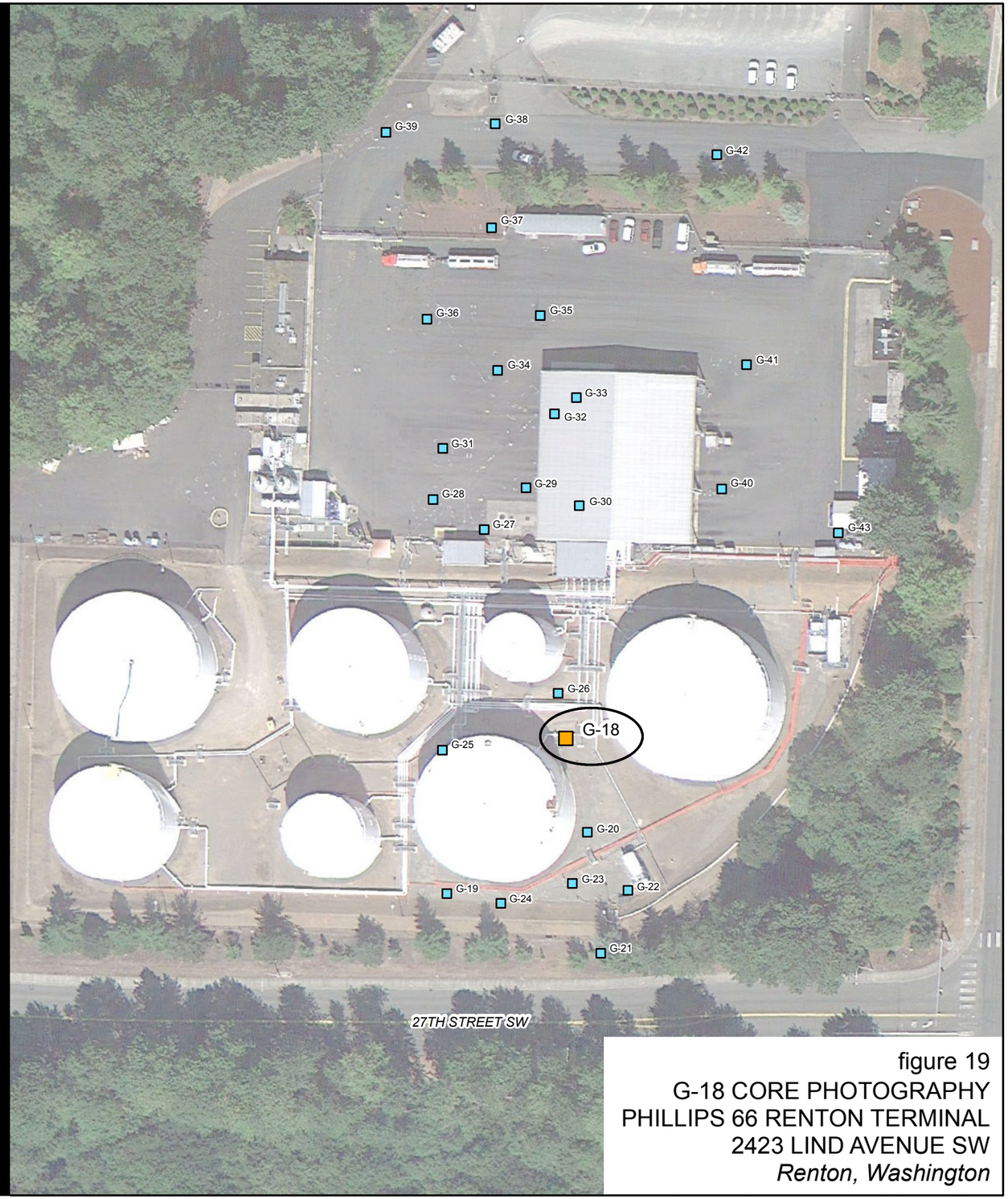
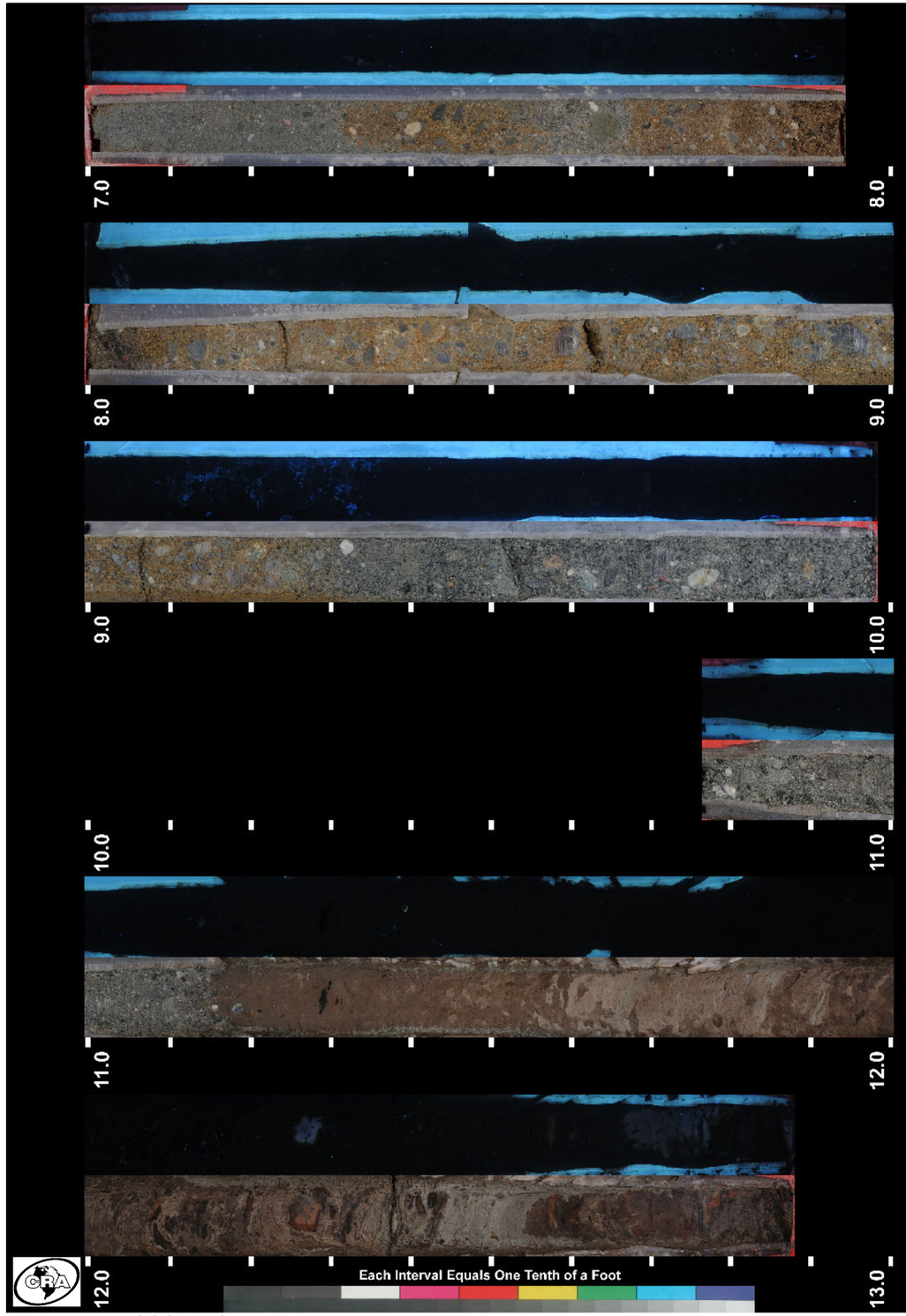


figure 19
G-18 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP003 SEP 06/2012



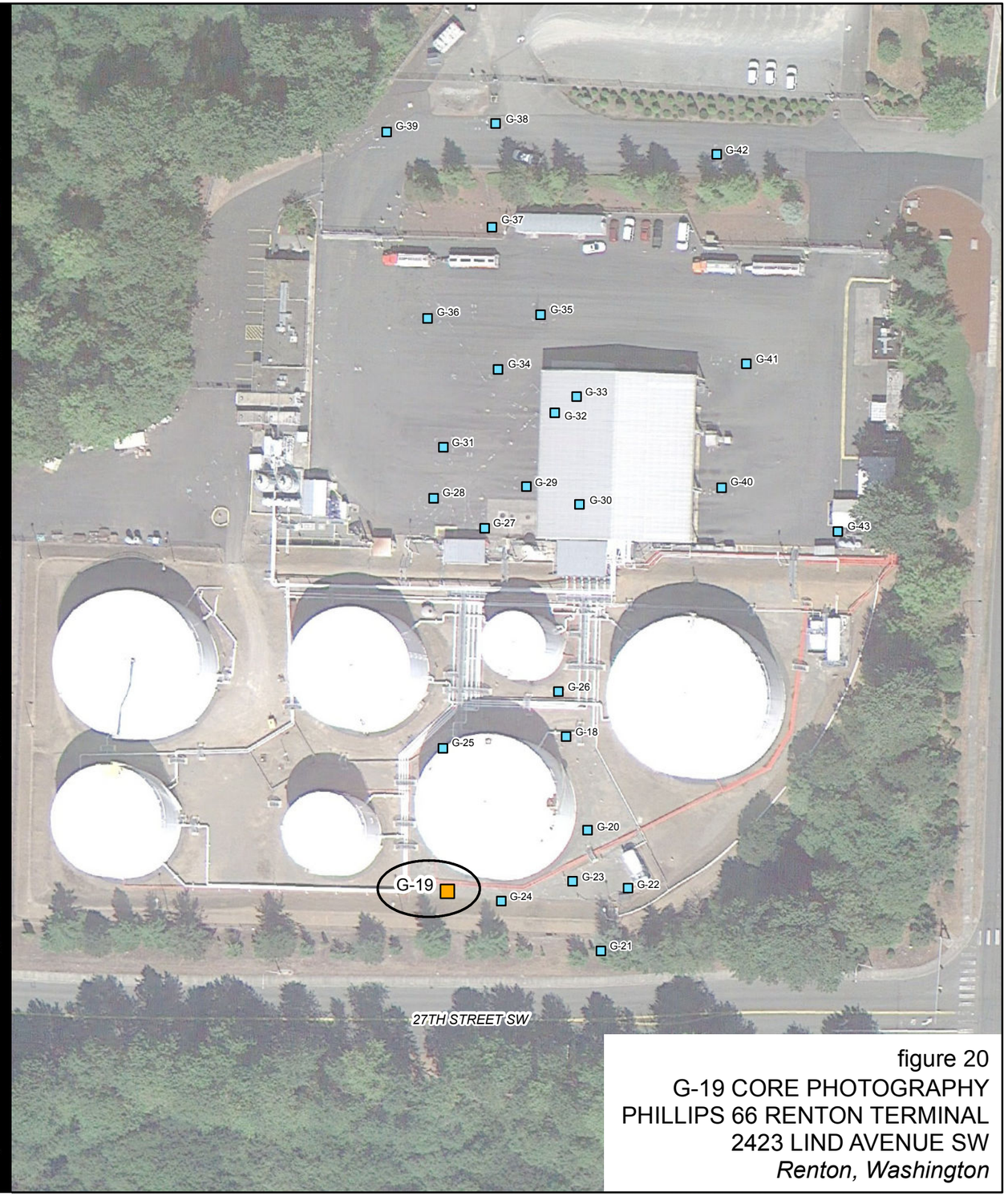
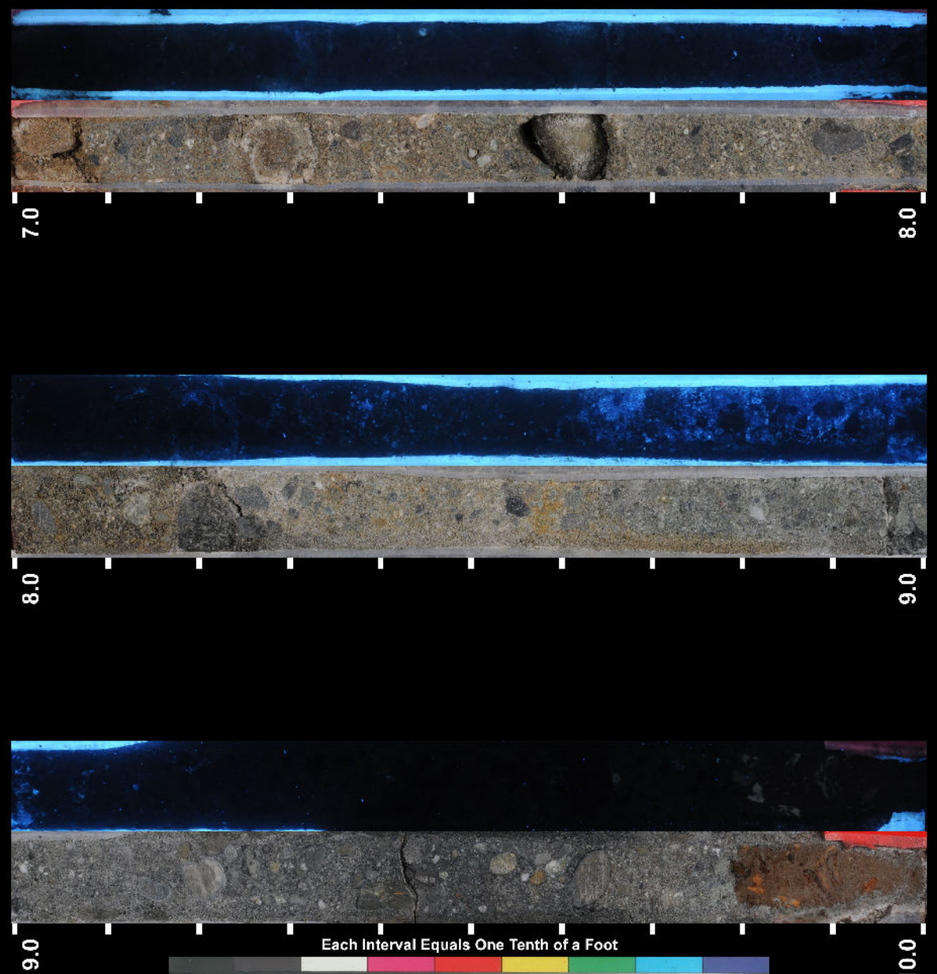


figure 20
G-19 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP004 SEP 06/2012



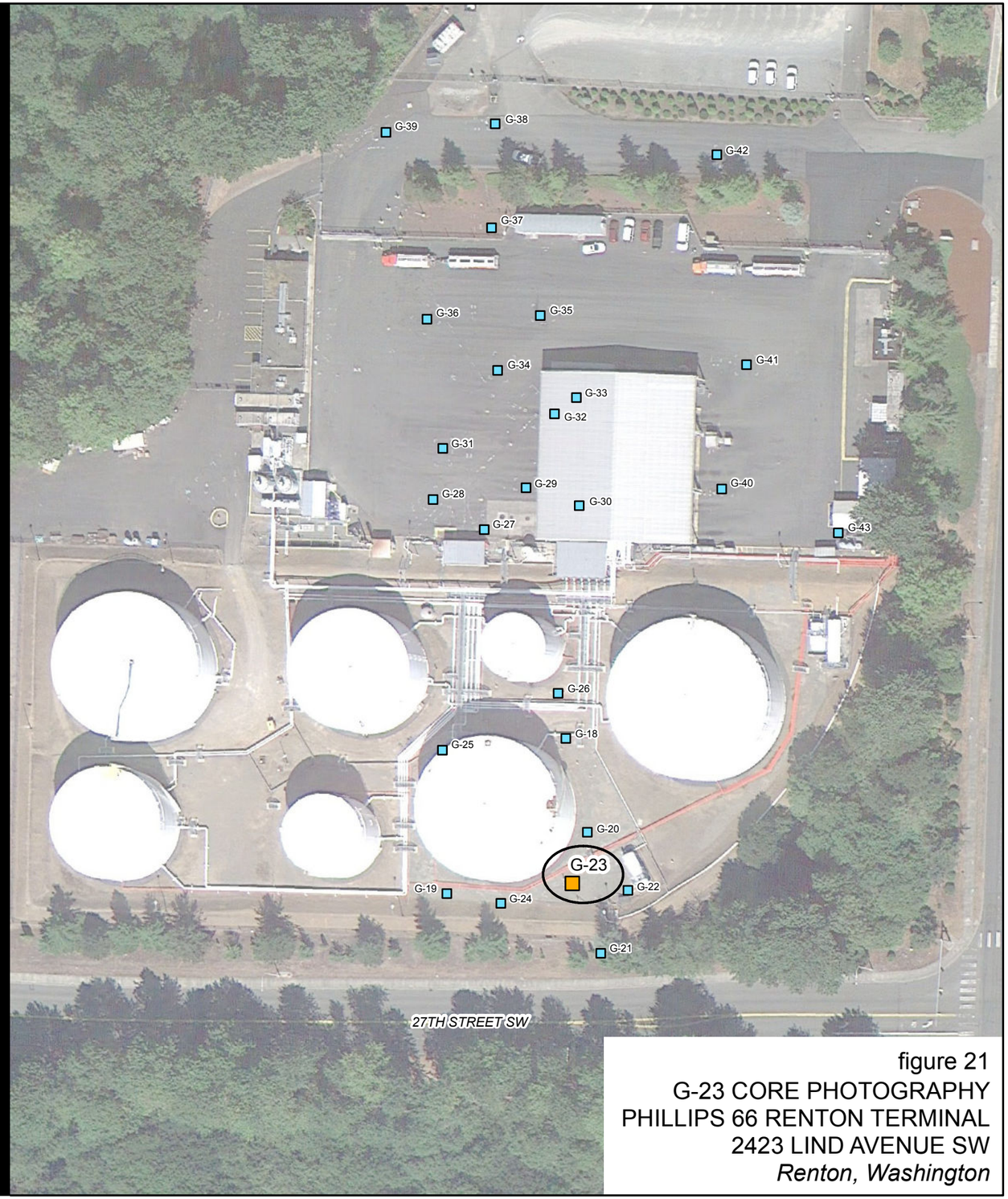
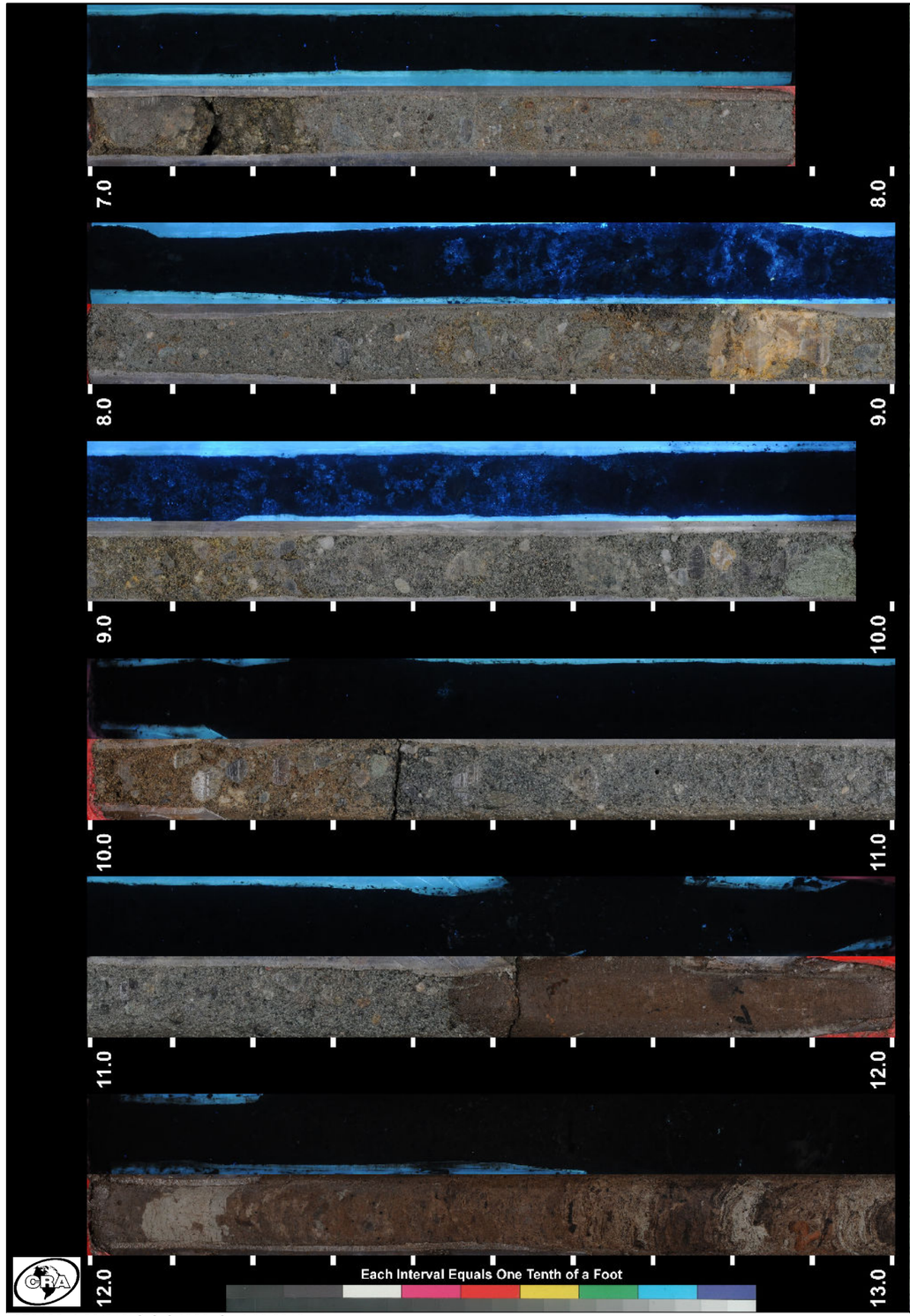


figure 21
G-23 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP005 SEP 06/2012



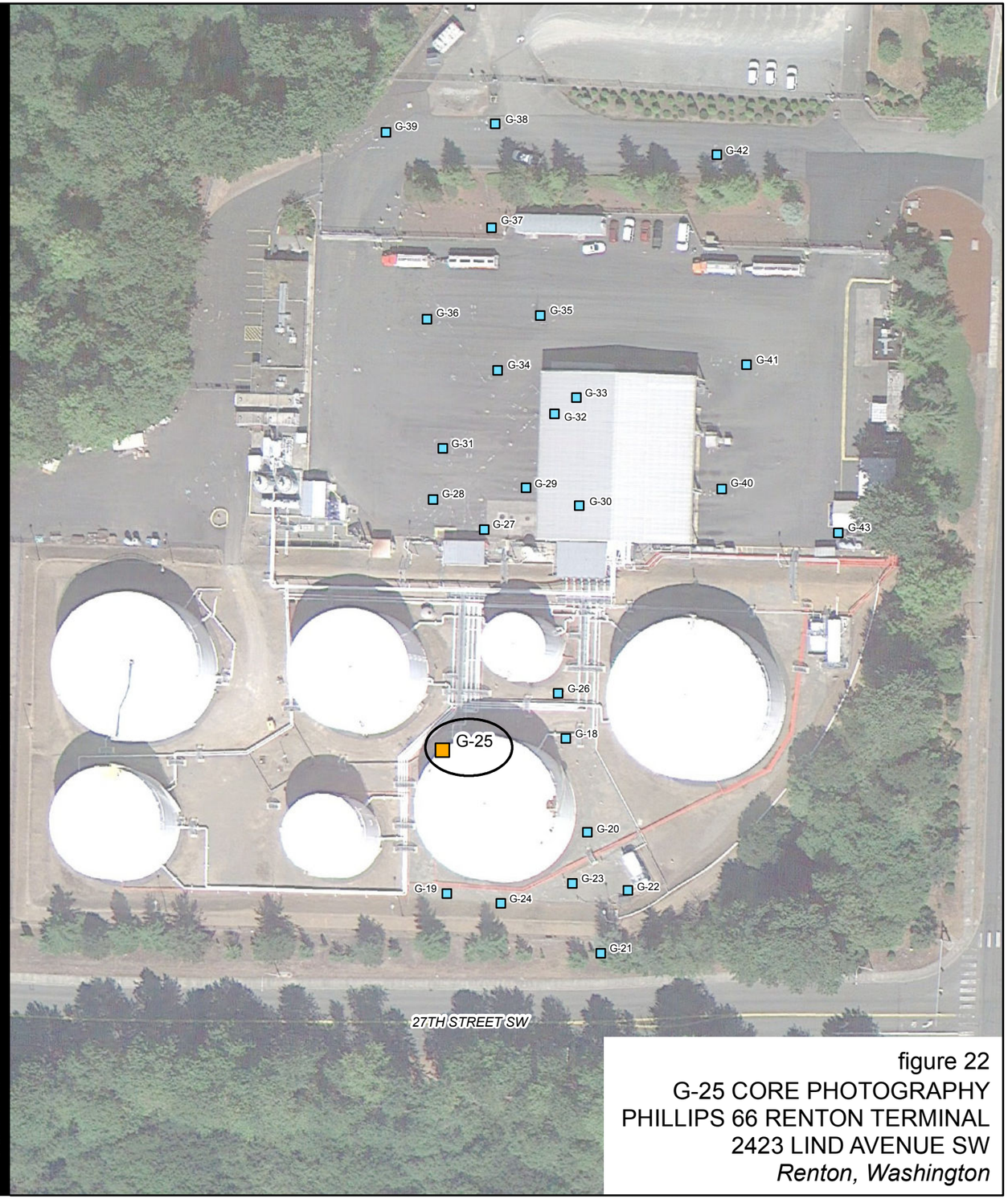
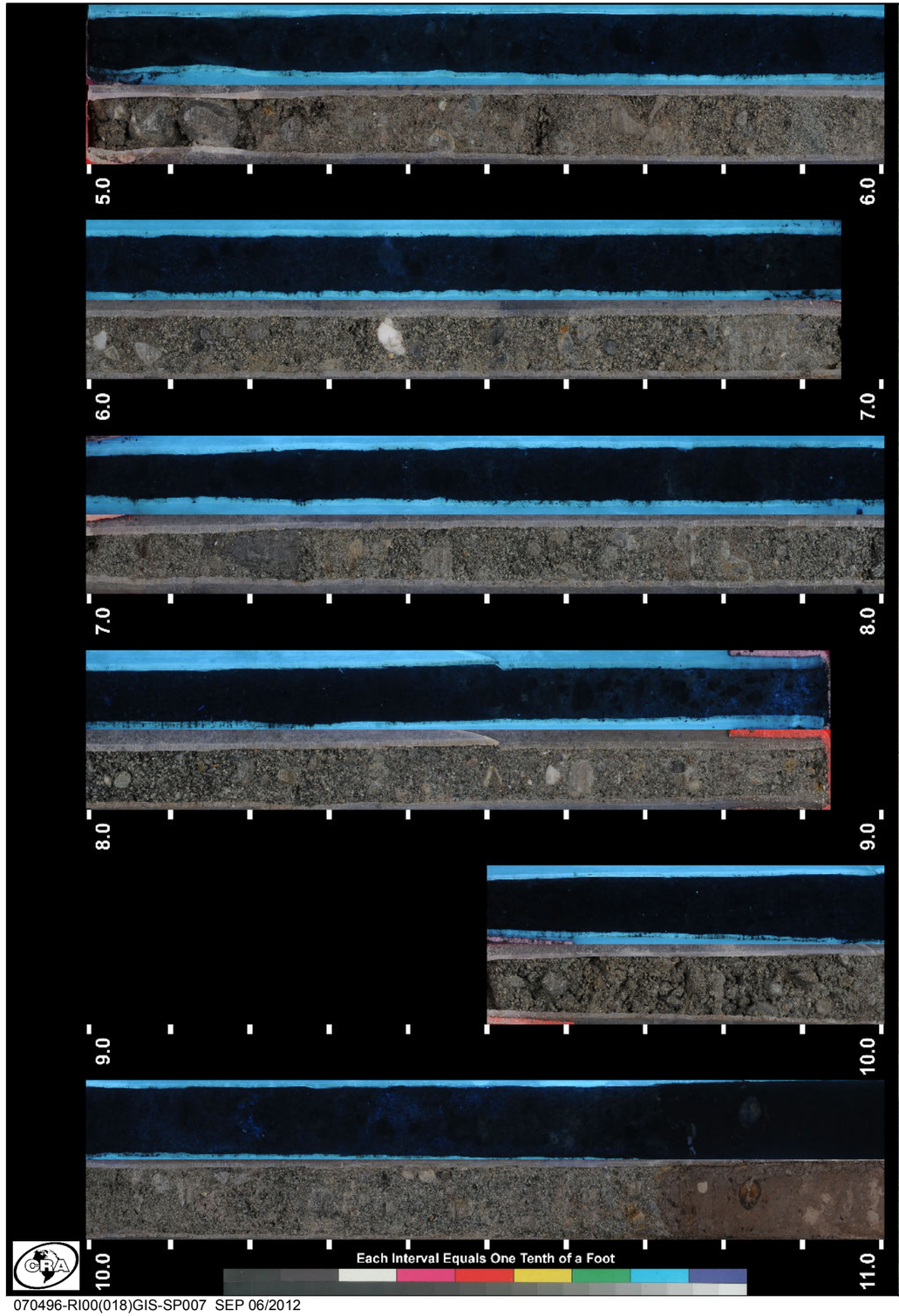


figure 22
G-25 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP006 SEP 06/2012



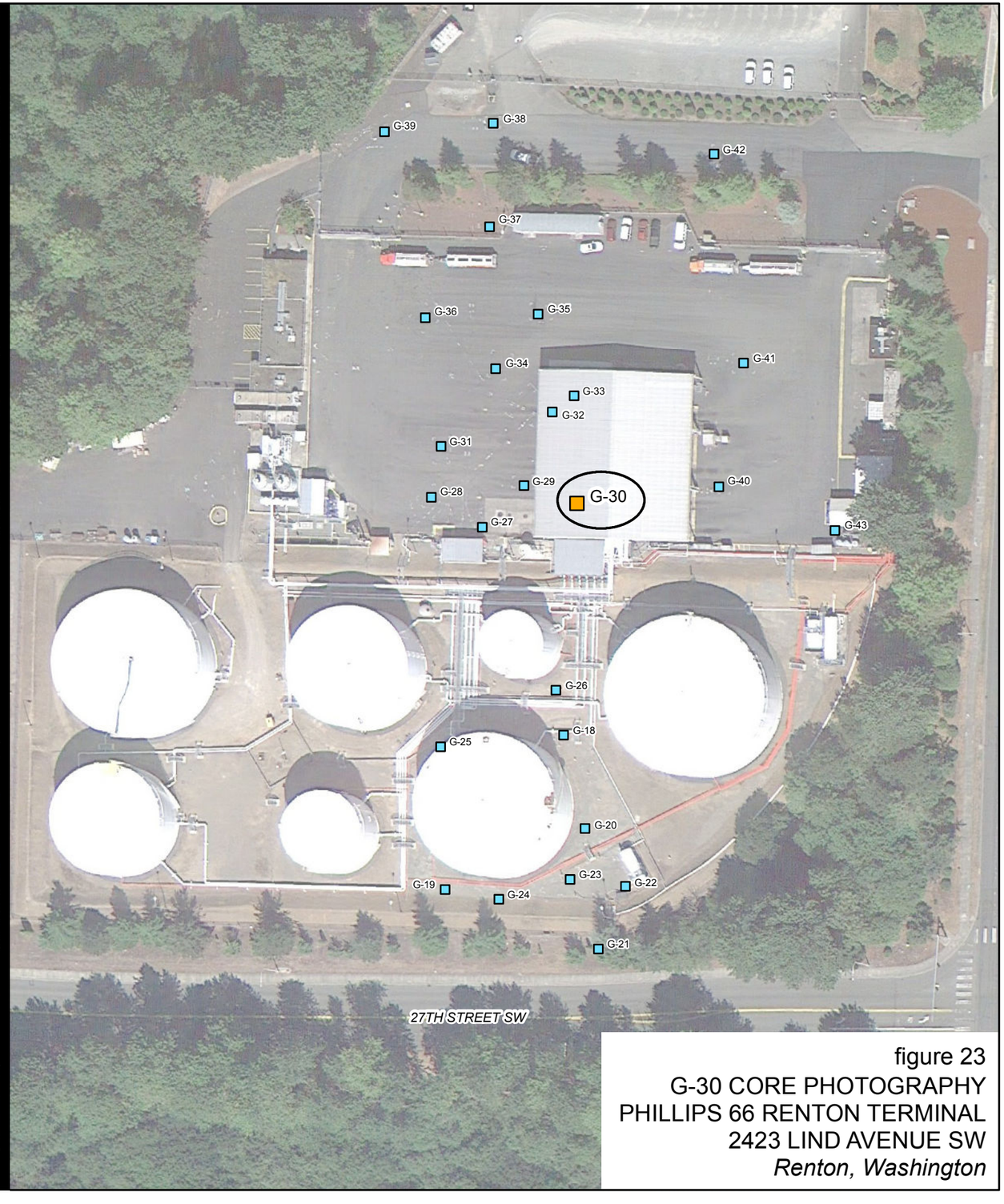


figure 23
G-30 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP007 SEP 06/2012

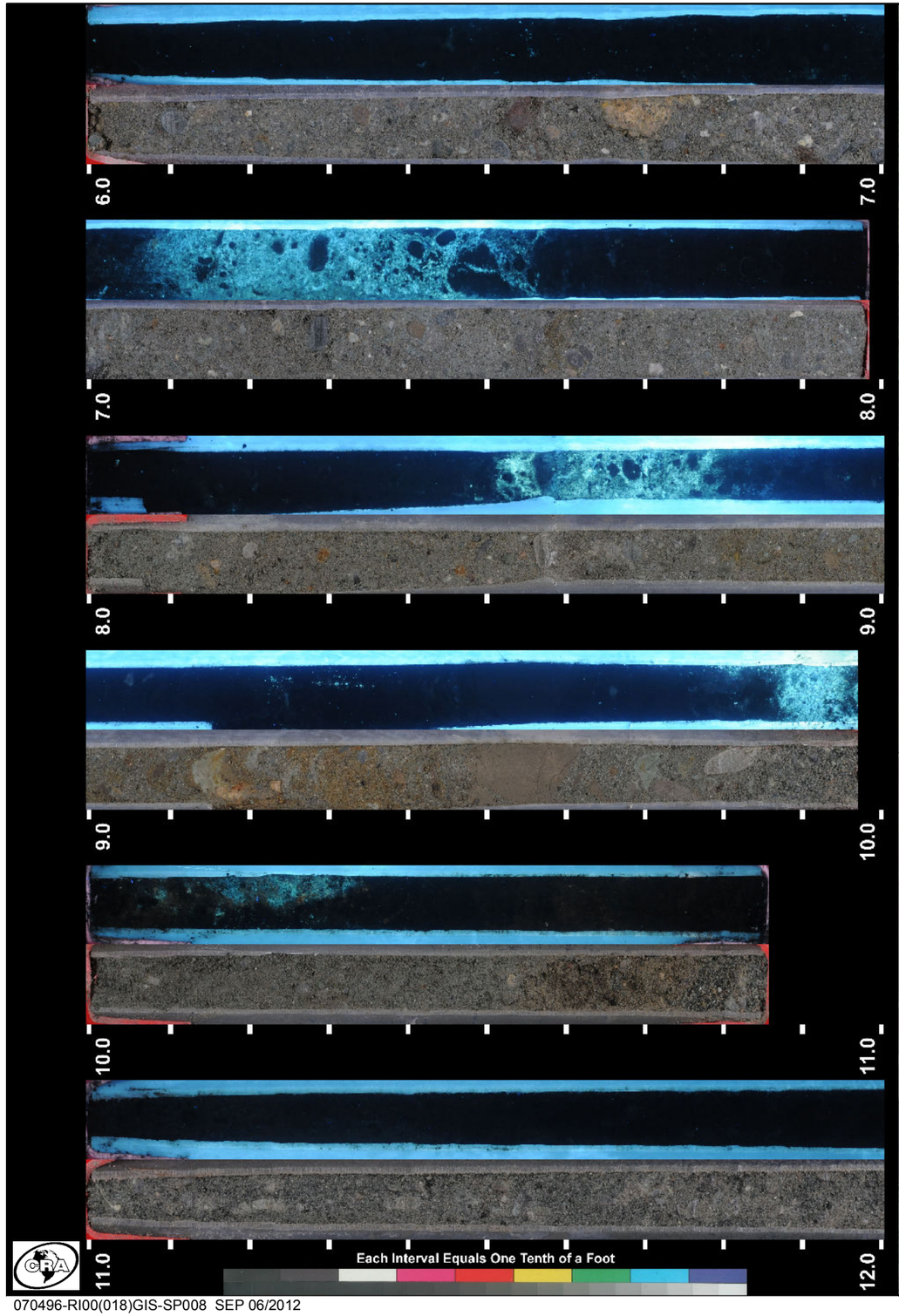
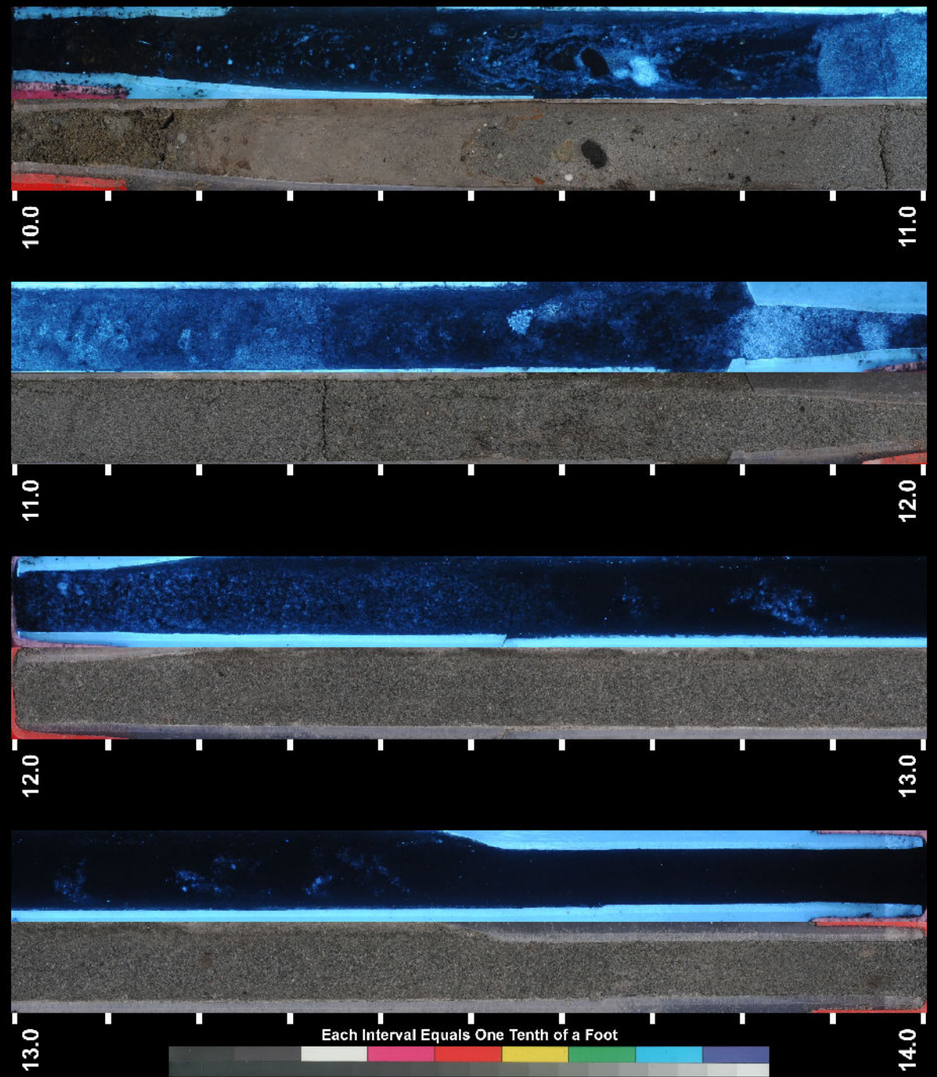




figure 24
G-31 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP008 SEP 06/2012



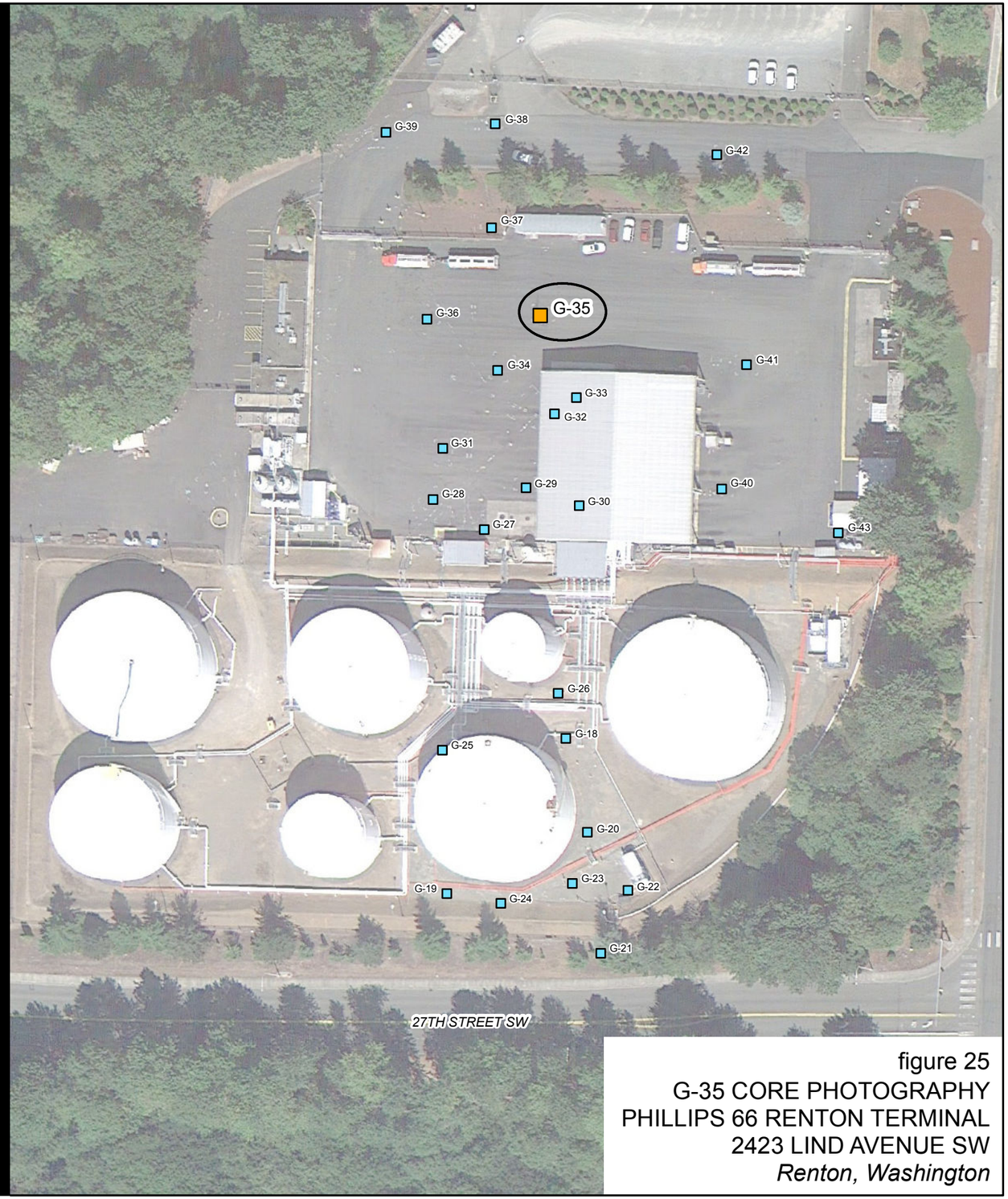


figure 25
G-35 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP009 SEP 06/2012

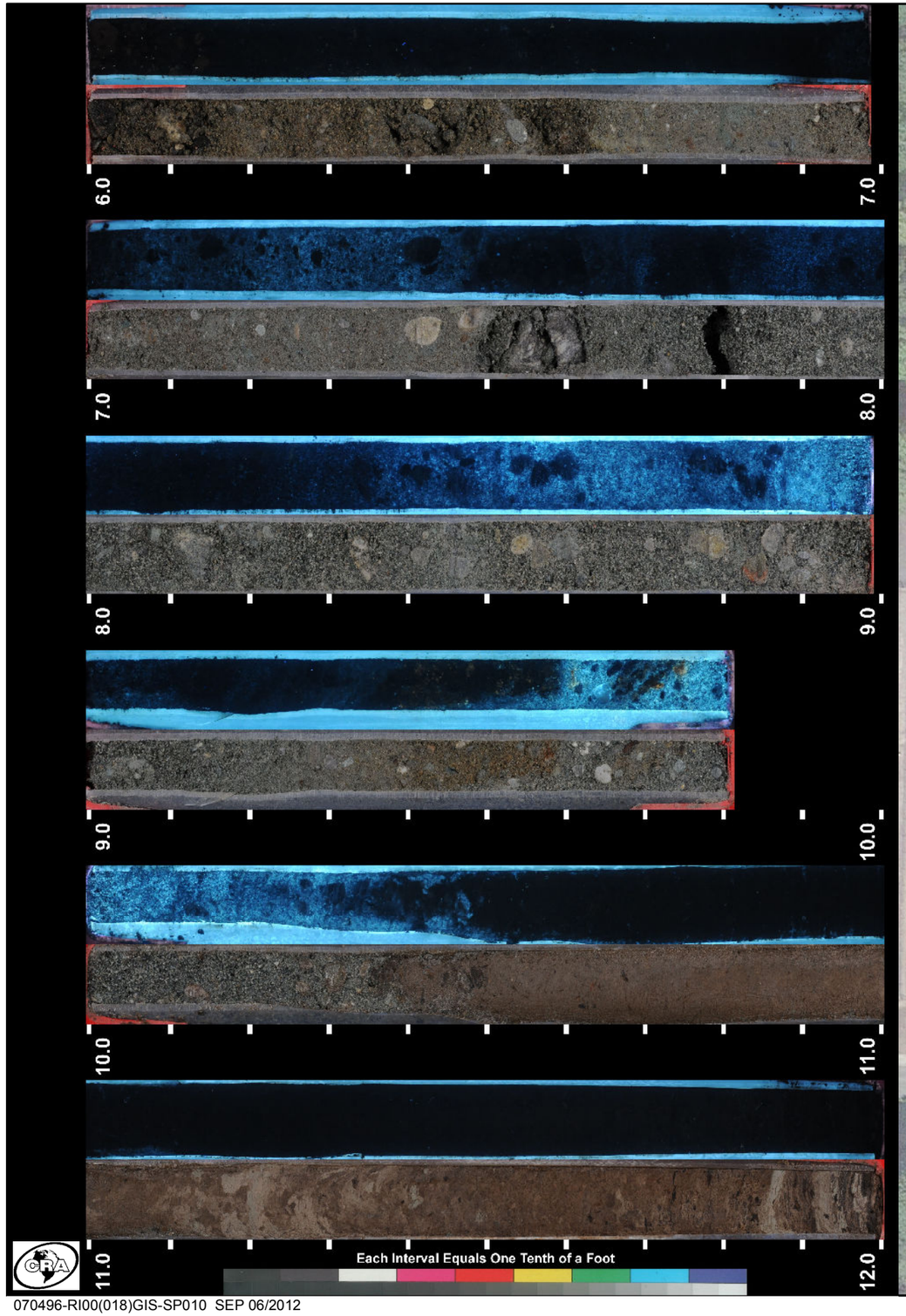




figure 26
G-39 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

070496-RI00(018)GIS-SP010 SEP 06/2012

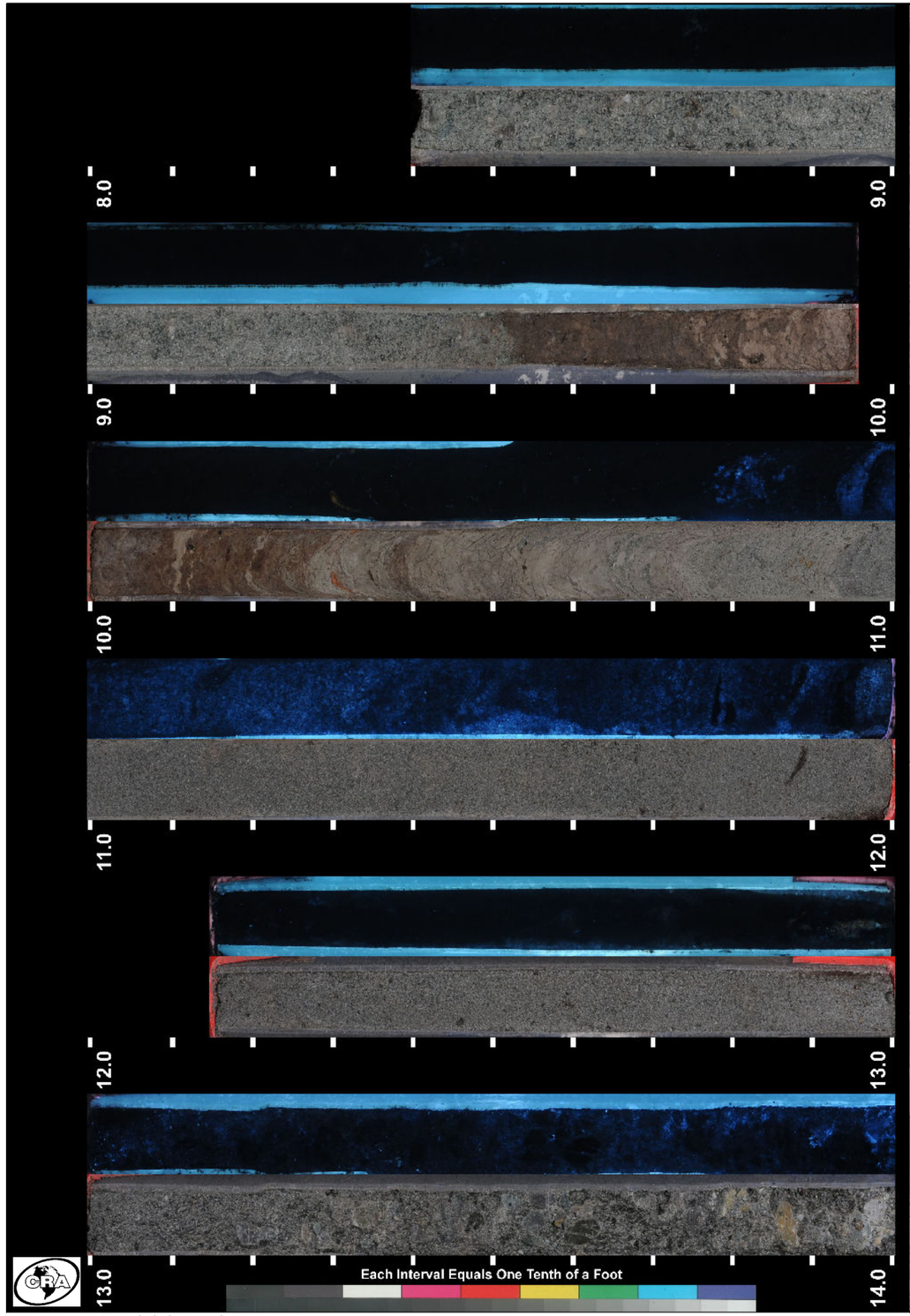
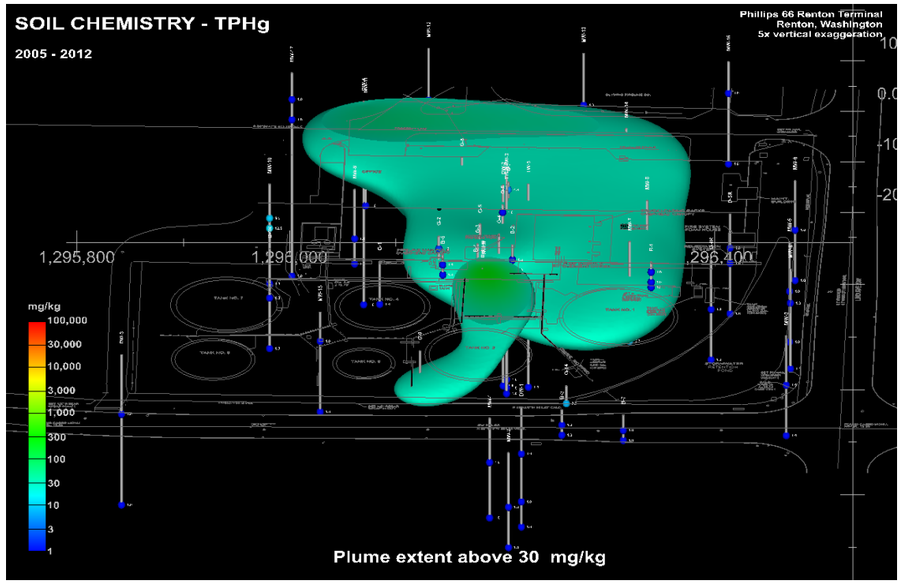


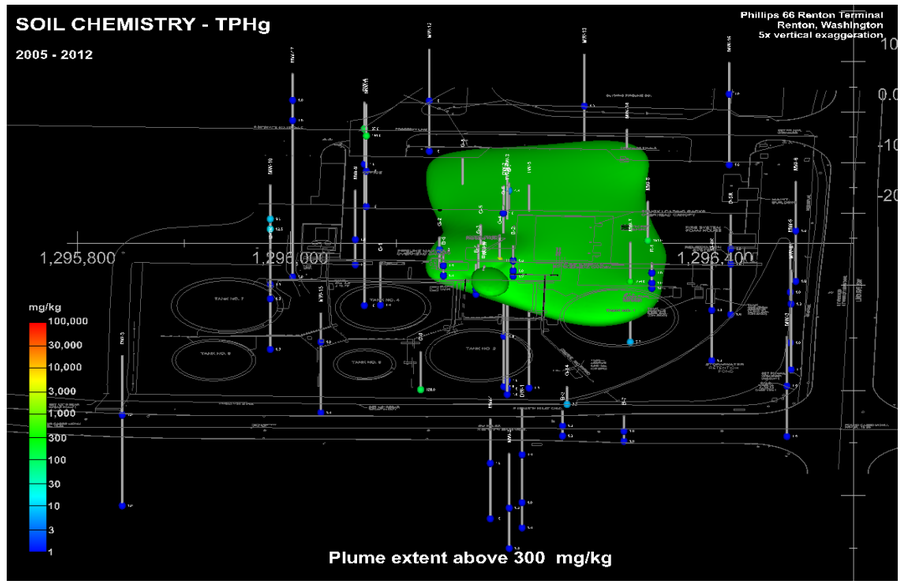


figure 27
G-42 CORE PHOTOGRAPHY
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

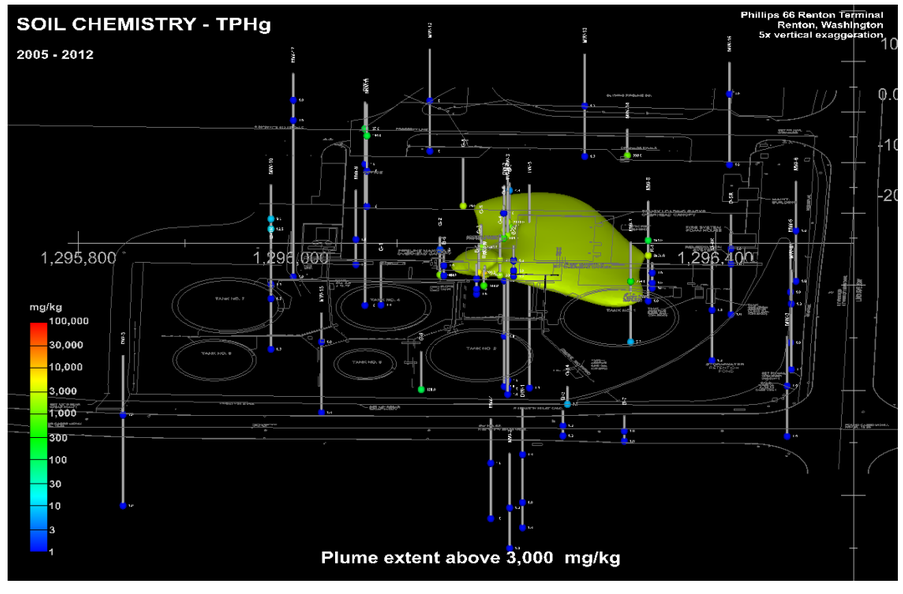
070496-RI00(018)GIS-SP011 SEP 06/2012



TPHg above 30 mg/kg



TPHg above 300 mg/kg



TPHg above 3,000 mg/kg



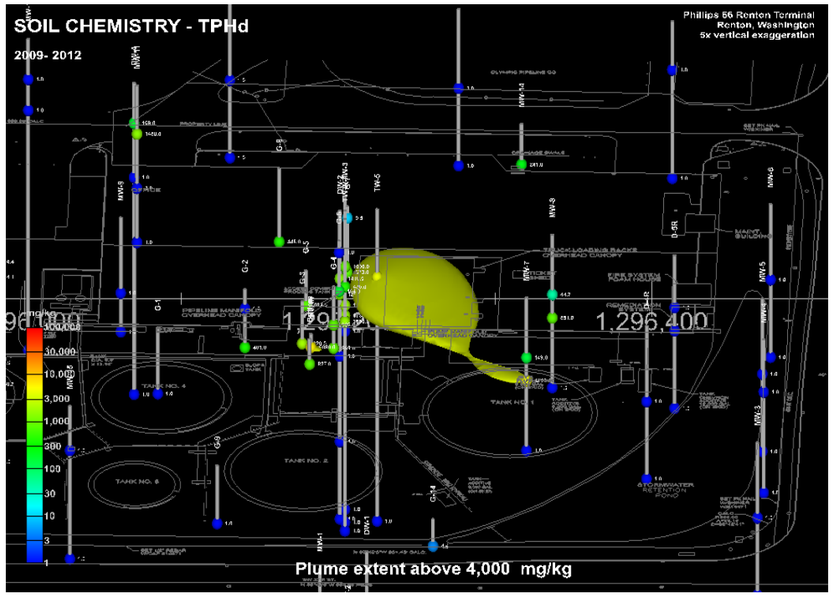
TPHg above 30,000 mg/kg

figure 28

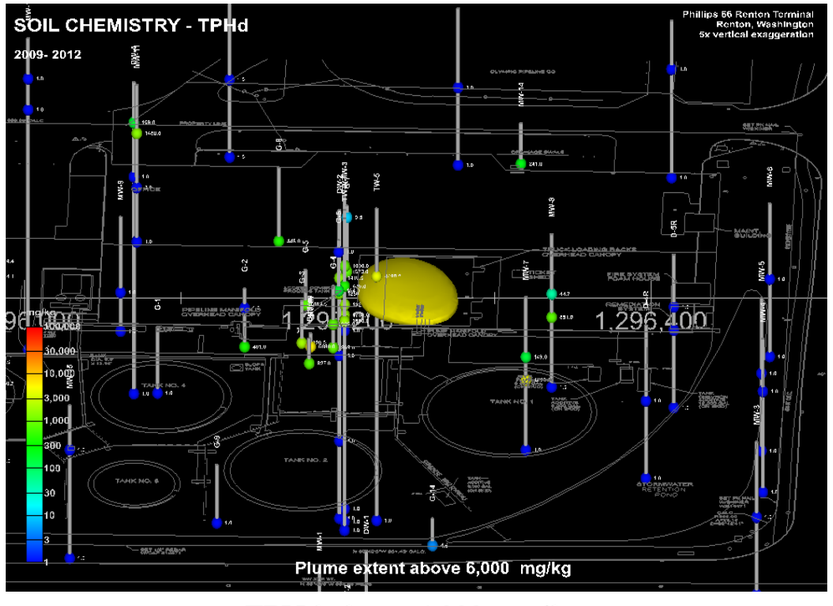
TPHg SOIL CHEMISTRY 4DIM SCREEN CAPTURES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



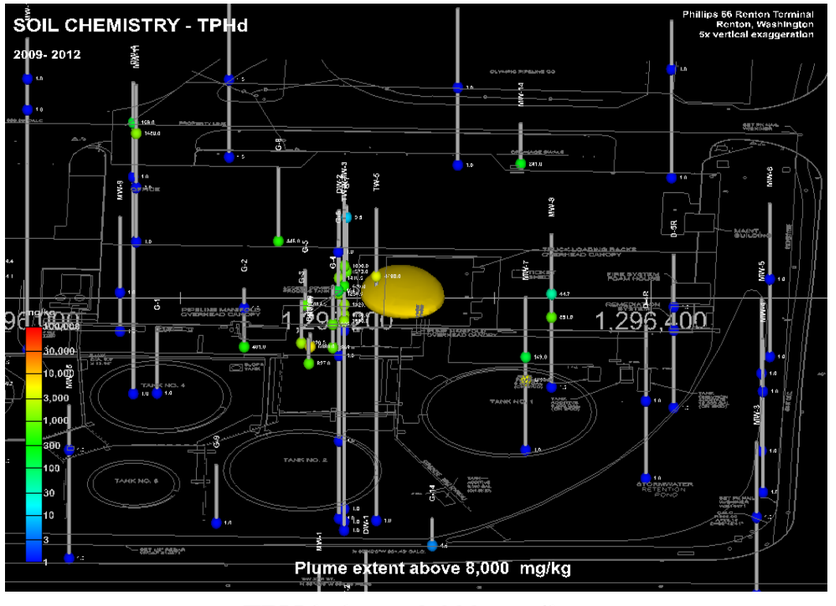
TPHd above 3,000 mg/kg



TPHd above 4,000 mg/kg



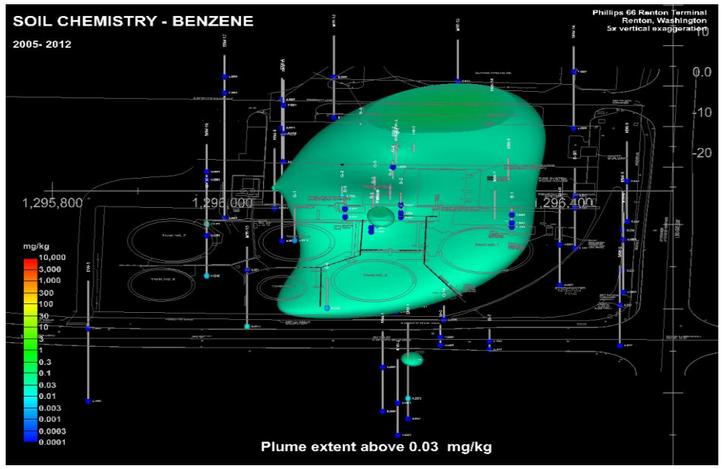
TPHd above 6,000 mg/kg



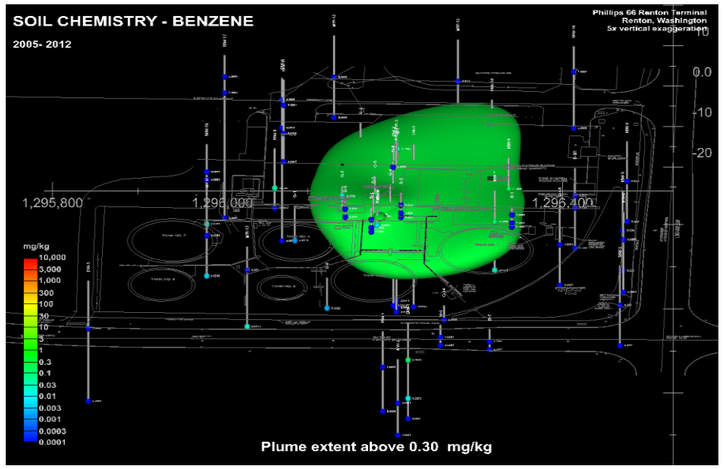
TPHd above 8,000 mg/kg

figure 29

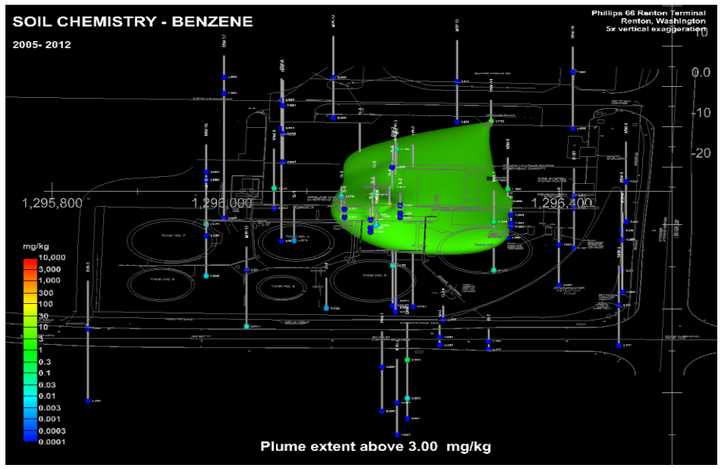
TPHd SOIL CHEMISTRY 4DIM SCREEN CAPTURES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



Benzene above 0.03 mg/kg



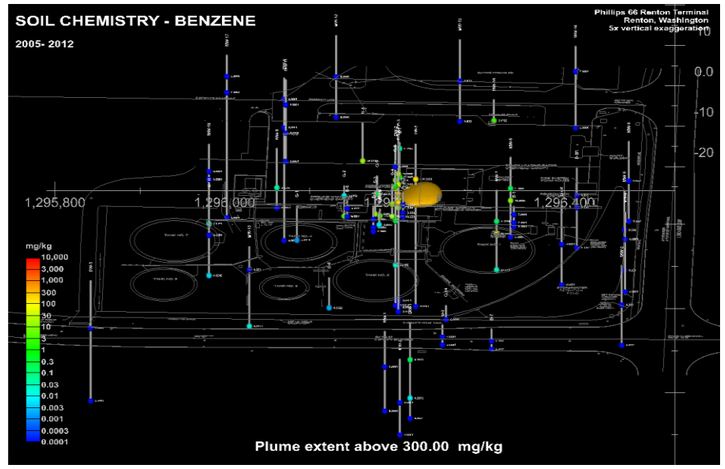
Benzene above 0.30 mg/kg



Benzene above 3 mg/kg



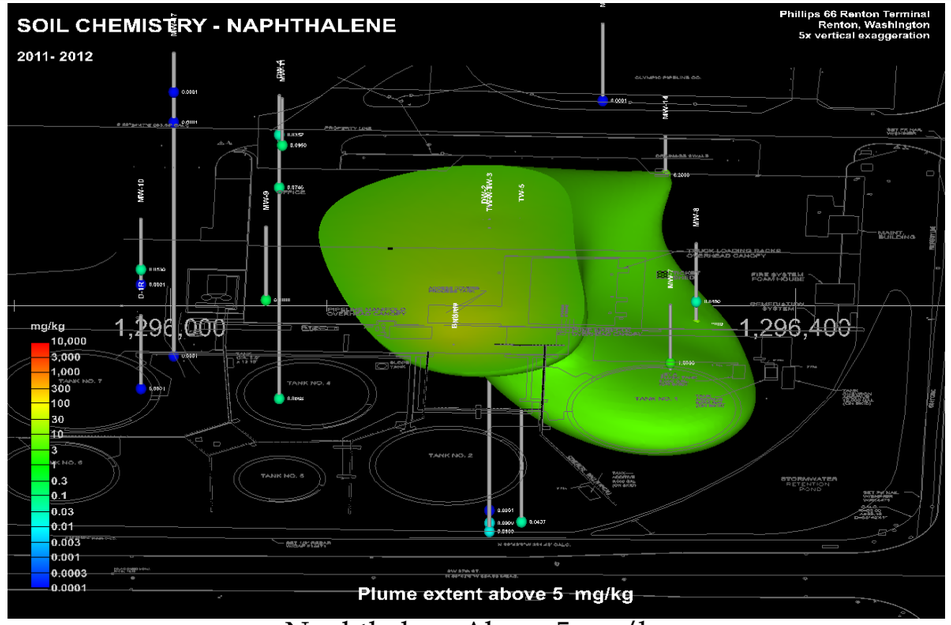
Benzene above 30 mg/kg



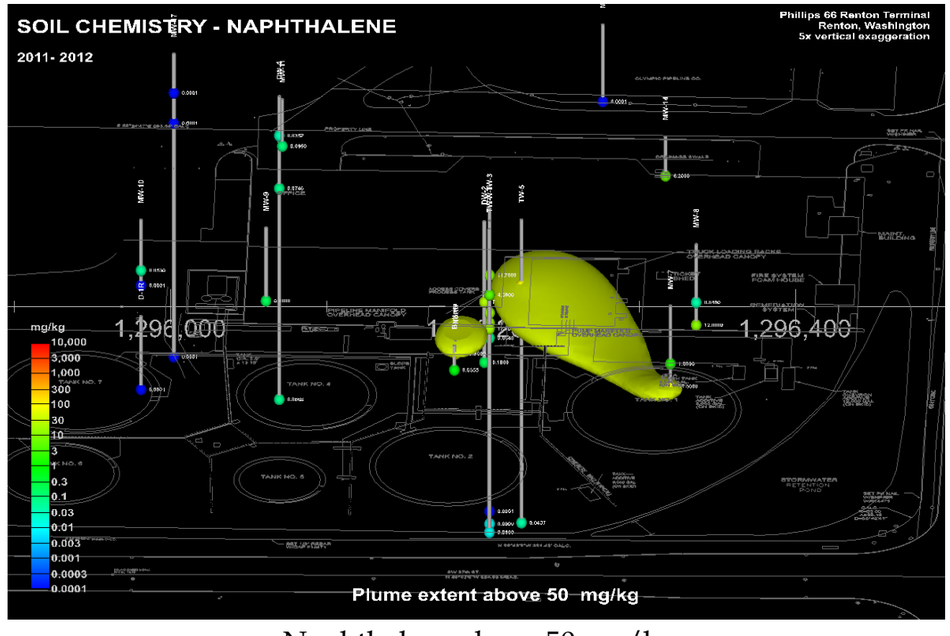
Benzene above 300 mg/kg

figure 30

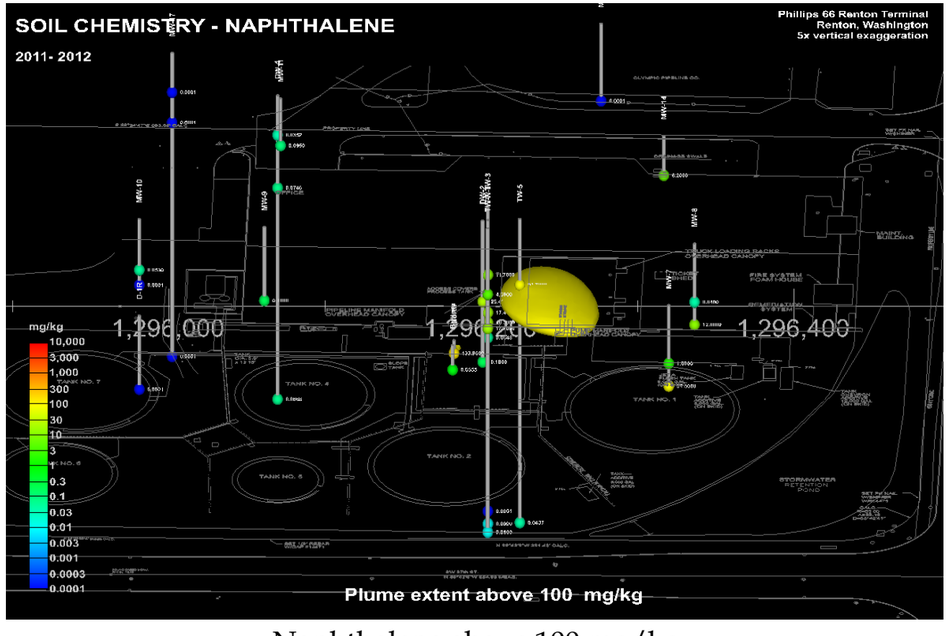
BENZENE SOIL CHEMISTRY 4DIM SCREEN CAPTURES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



Naphthalene Above 5 mg/kg



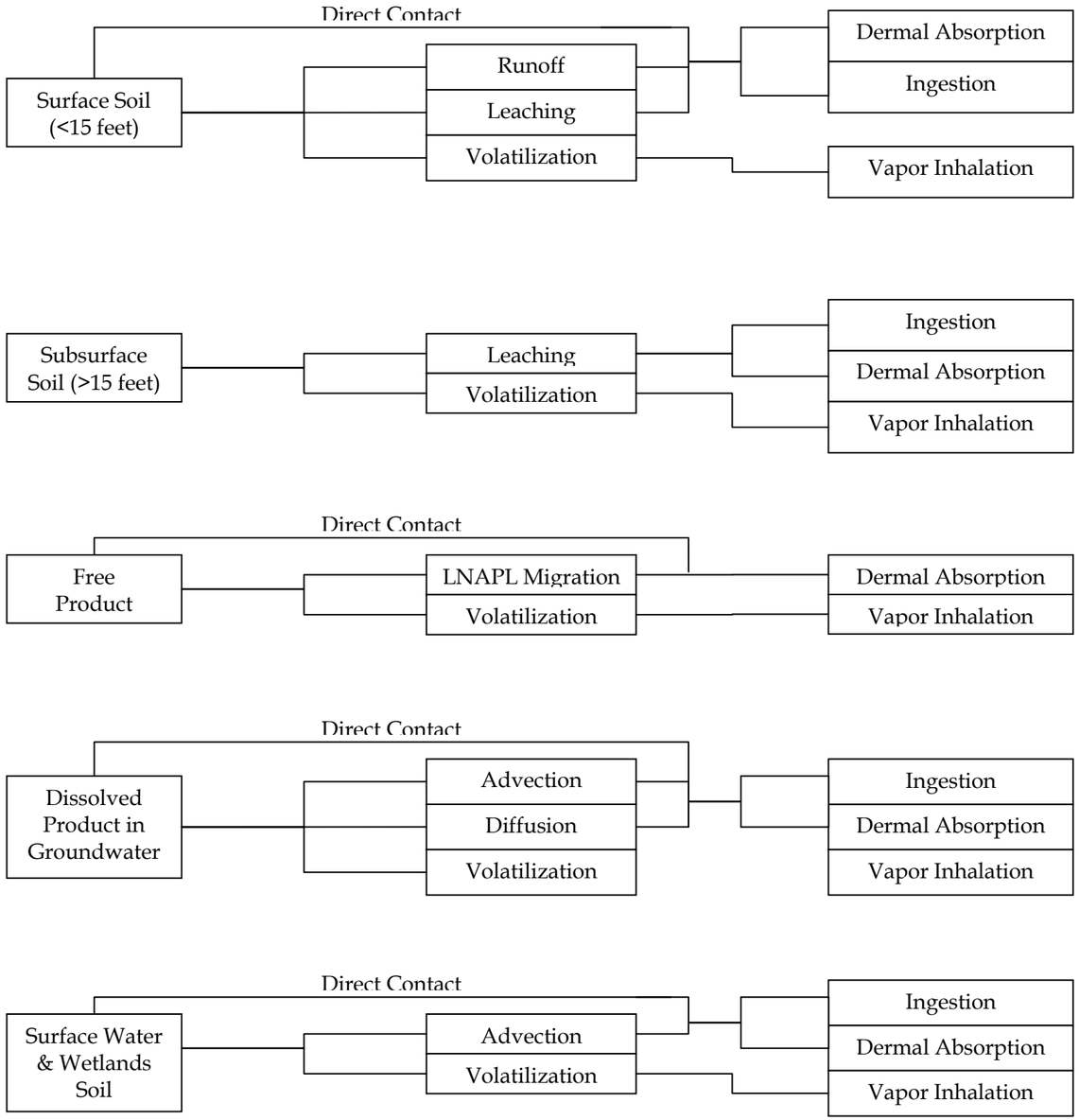
Naphthalene above 50 mg/kg



Naphthalene above 100 mg/kg

figure 31

NAPHTHALENE SOIL CHEMISTRY 4DIM SCREEN CAPTURES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



POTENTIAL RECEPTORS						
Commercial Workers	*Industrial Workers*	*Construction Workers*	*Soil Biota*	*Plants*	*Animals*	*Benthic Organisms*
I	P	P	P	P	P	P
I	P	P	P	P	P	P
I	P	P	P	I	P	I
I	I	I	I	I	I	I
I	I	I	I	I	I	I
I	I	I	I	I	I	I
I	I	P	P	P	I	I
I	P	P	P	I	P	I
I	I	P	P	P	I	I
I	I	P	P	P	I	I
I	P	P	P	I	P	I
I	P	P	P	P	P	P
I	P	P	P	P	P	P
I	P	P	P	I	P	I

Notes:
P = Potential Complete Exposure Pathway
I = Incomplete Exposure Pathway

figure 32

CONCEPTUAL SITE MODEL
PHILLIPS 66 RENTON TERMINAL
Renton, Washington

0 50 100ft

LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- SURFACE WATER SAMPLE LOCATION
- EXCAVATION SAMPLE LOCATION
- WETLANDS AND RETENTION BASIN SOIL SAMPLE
- STAFF GAUGE LOCATION
- SOIL BORING LOCATION
- APPROXIMATE EXTENT OF SEPARATE PHASE HYDROCARBONS

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 33

SITE PLAN WITH APPROXIMATE SPH EXTENTS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

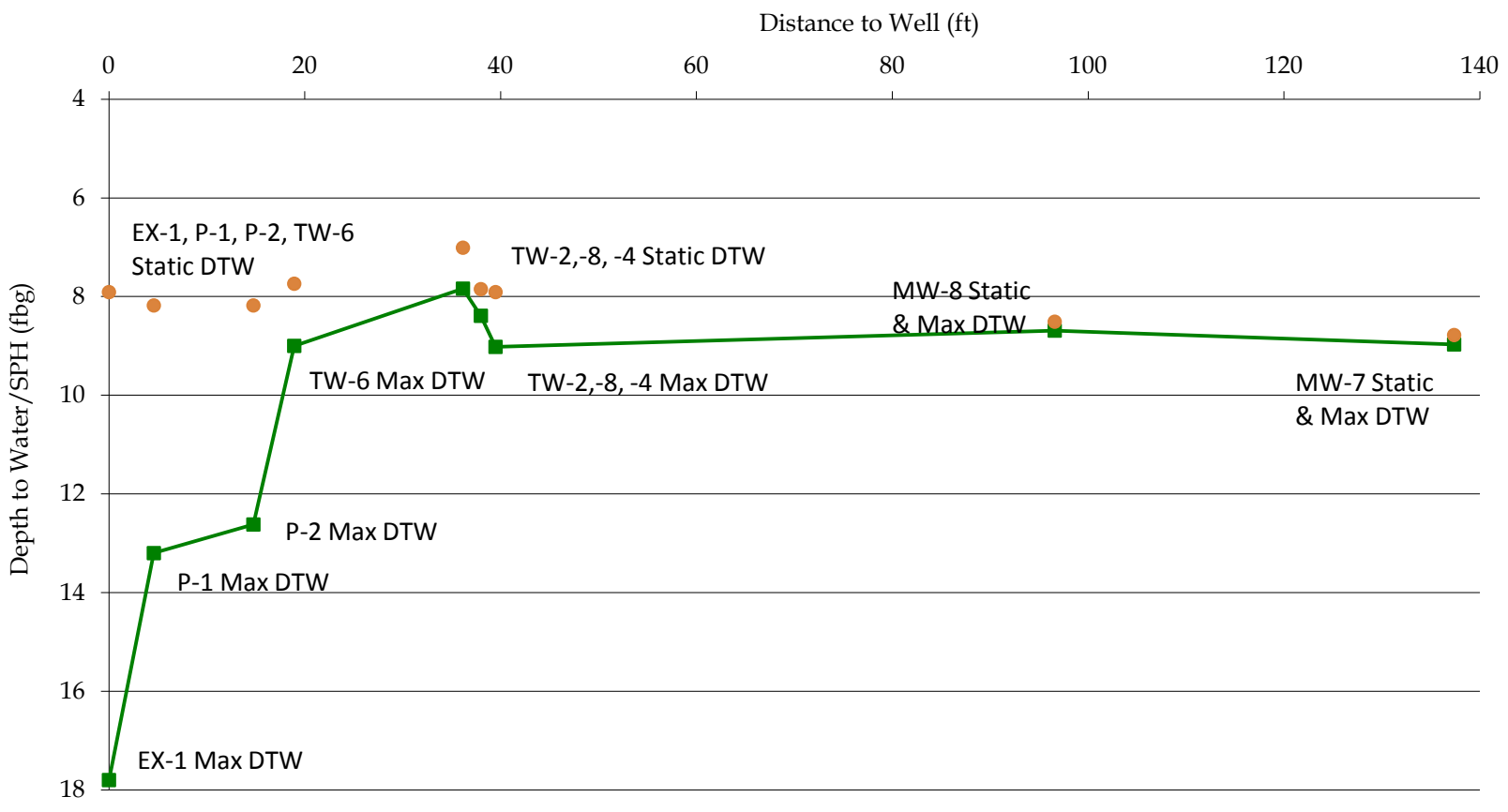
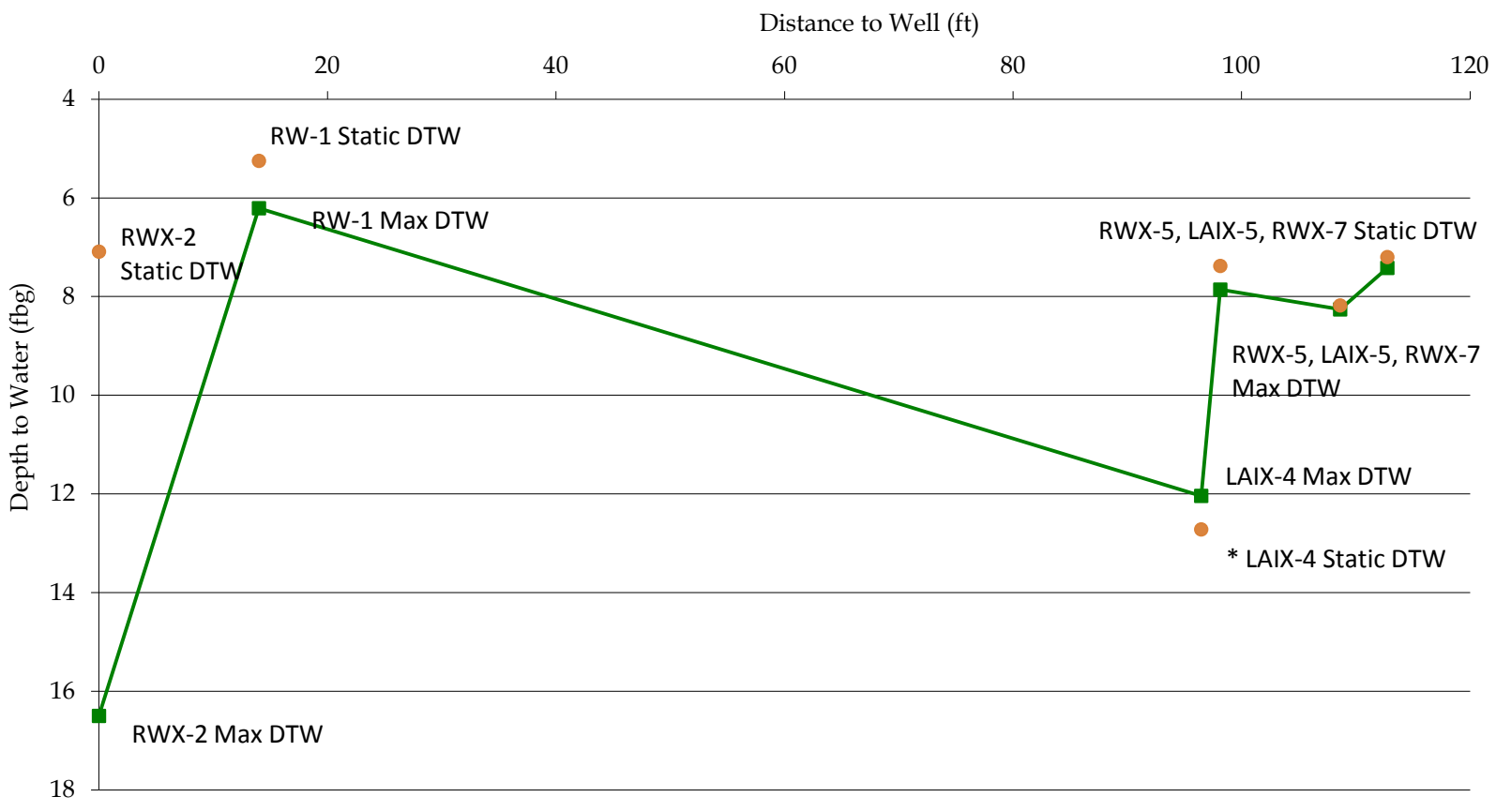


FIGURE 34

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

GROUNDWATER DRAWDOWN VS.
DISTANCE TO WELL EX-1



* LAIX-4 Static DTW was higher than the Max DTW, which is likely due to natural fluctuations due to the distance from the extraction well

FIGURE 35

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

GROUNDWATER DRAWDOWN VS. DISTANCE TO WELL RWX-2

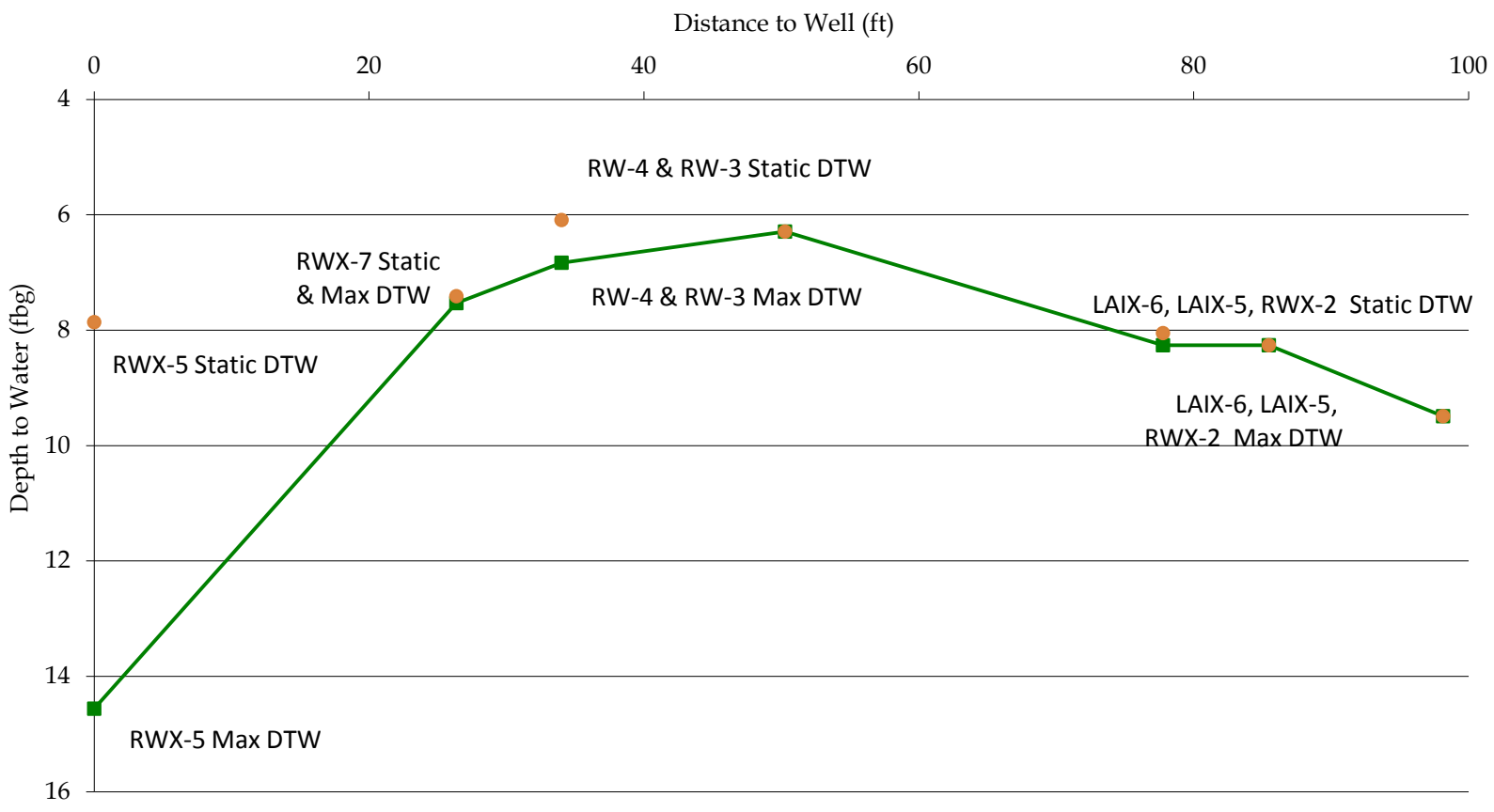


FIGURE 36

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

GROUNDWATER DRAWDOWN VS.
DISTANCE TO WELL RWX-5

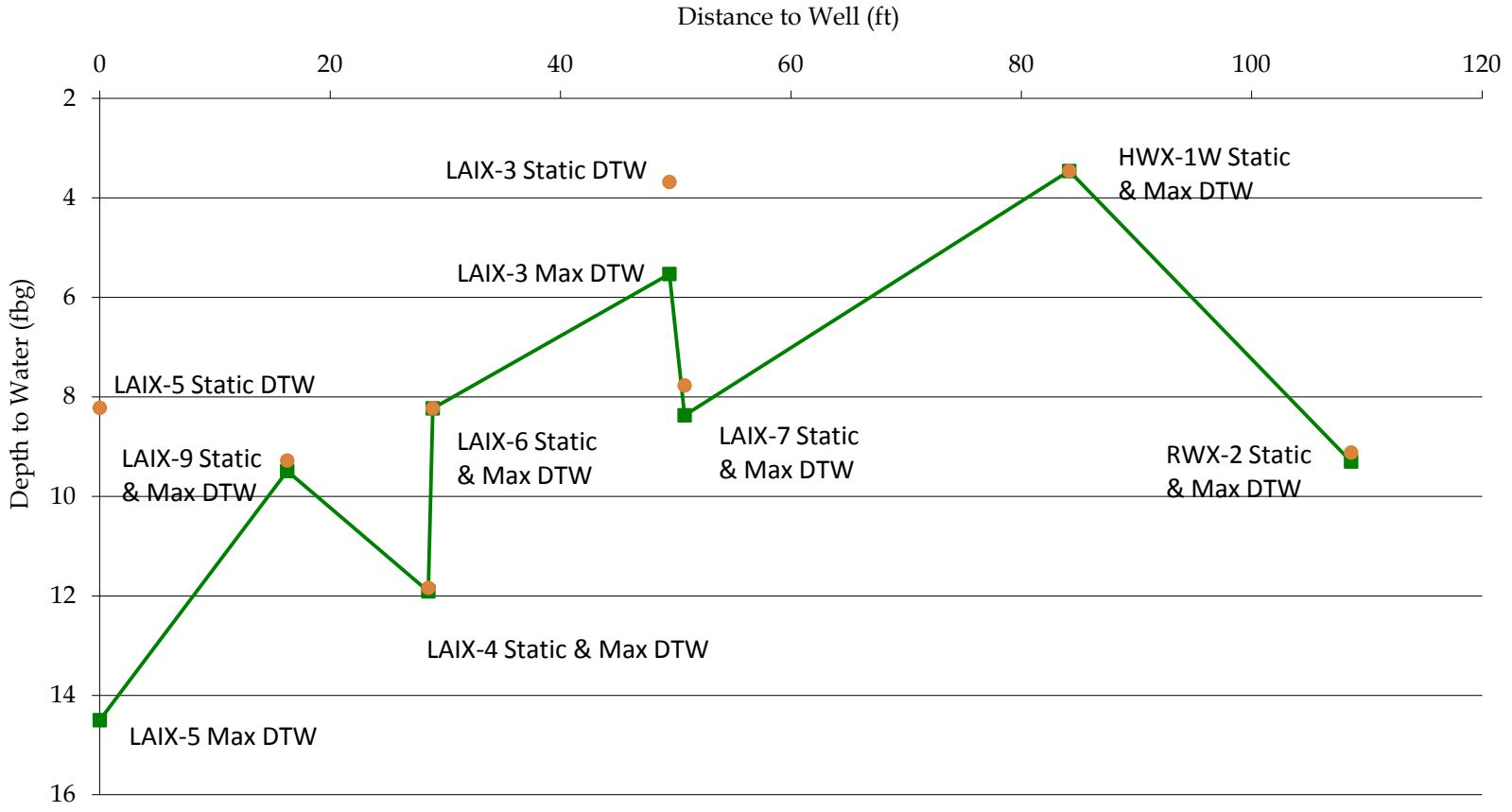
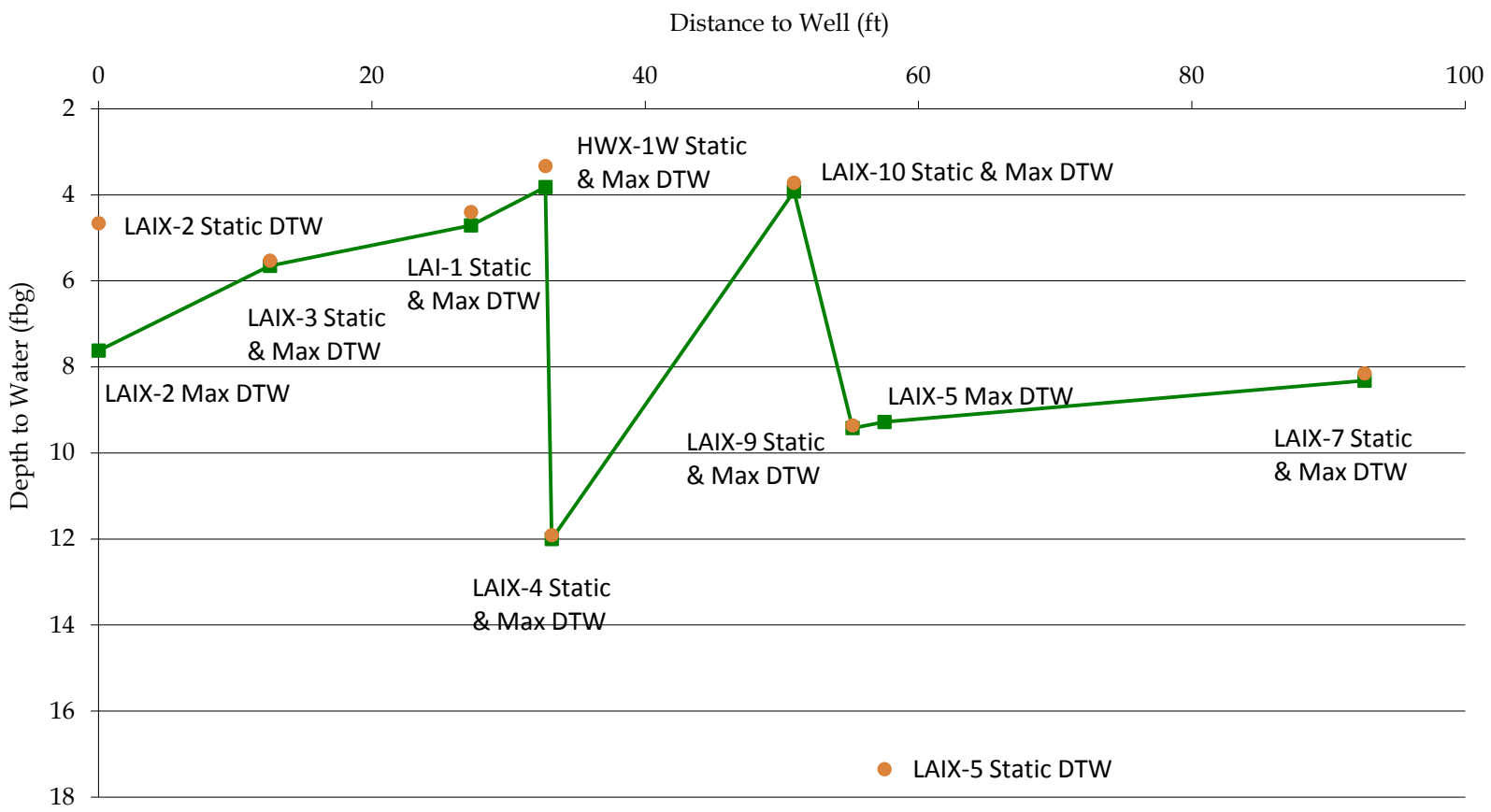


FIGURE 37

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

GROUNDWATER DRAWDOWN VS.
DISTANCE TO WELL LAIX-5



GRAPH 38

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

GROUNDWATER DRAWDOWN VS. DISTANCE TO WELL LAIX-2

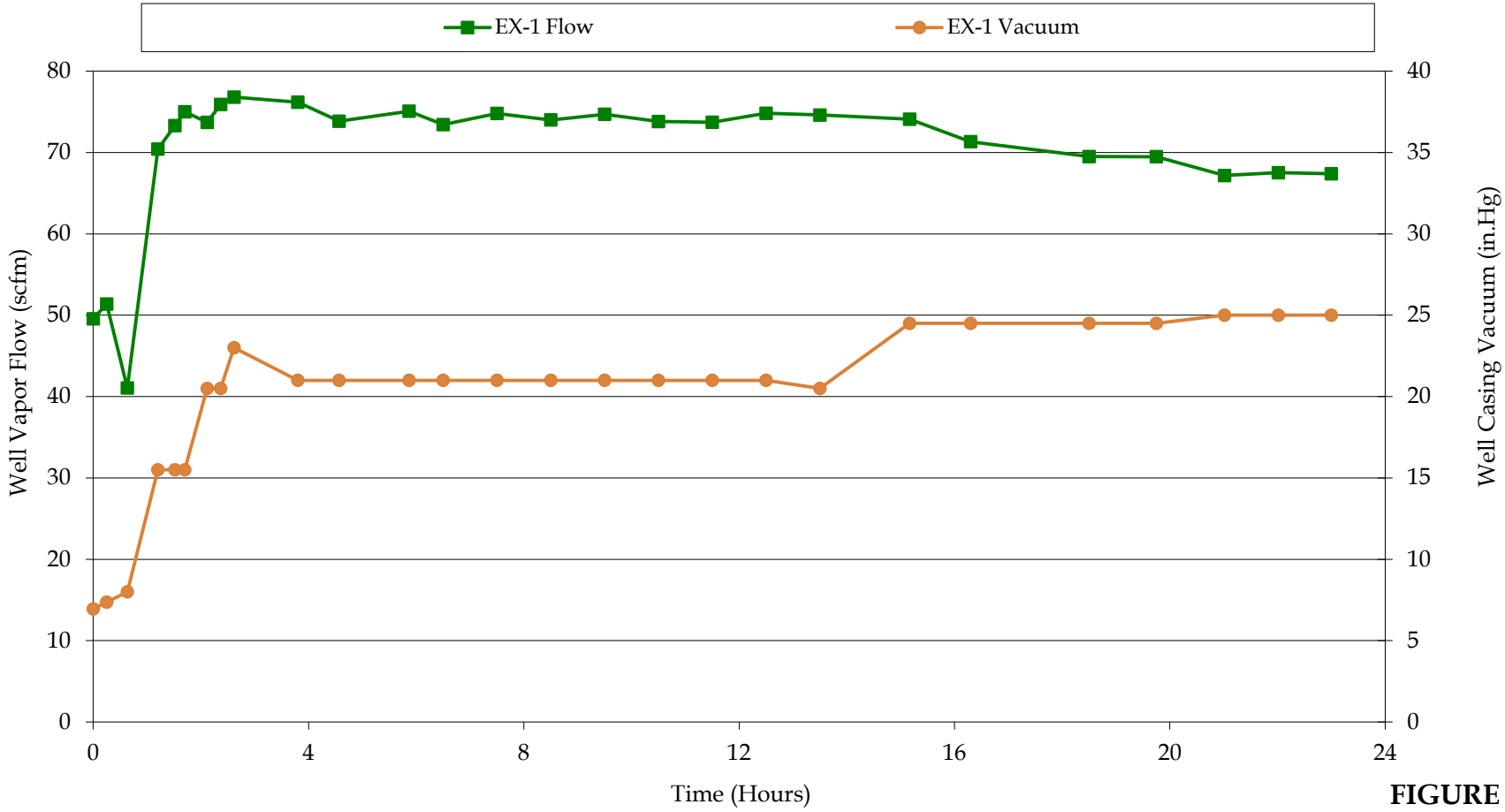


FIGURE 39

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

EX-1 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

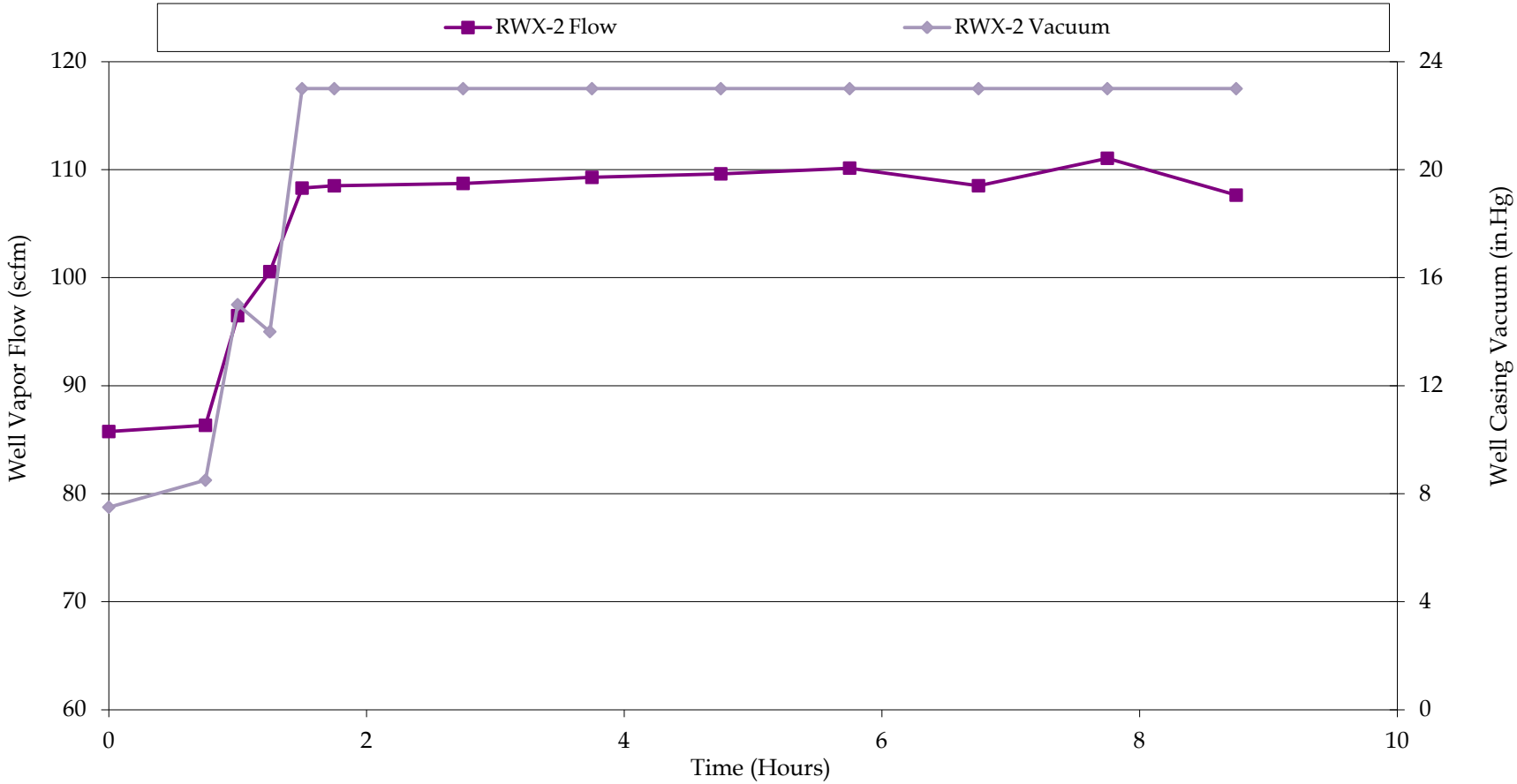


FIGURE 40

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

RWX-2 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

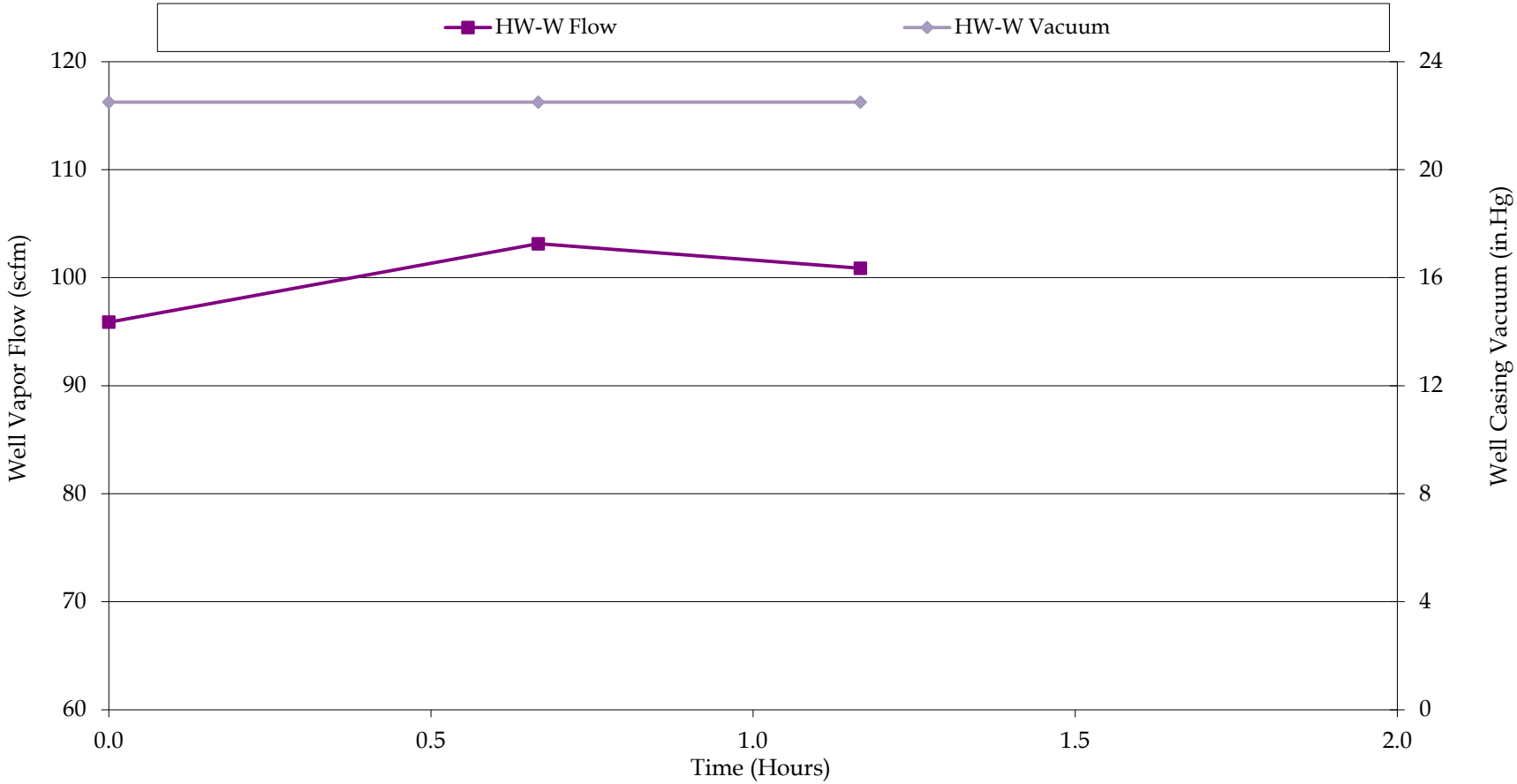


FIGURE 41

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

HW-W WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

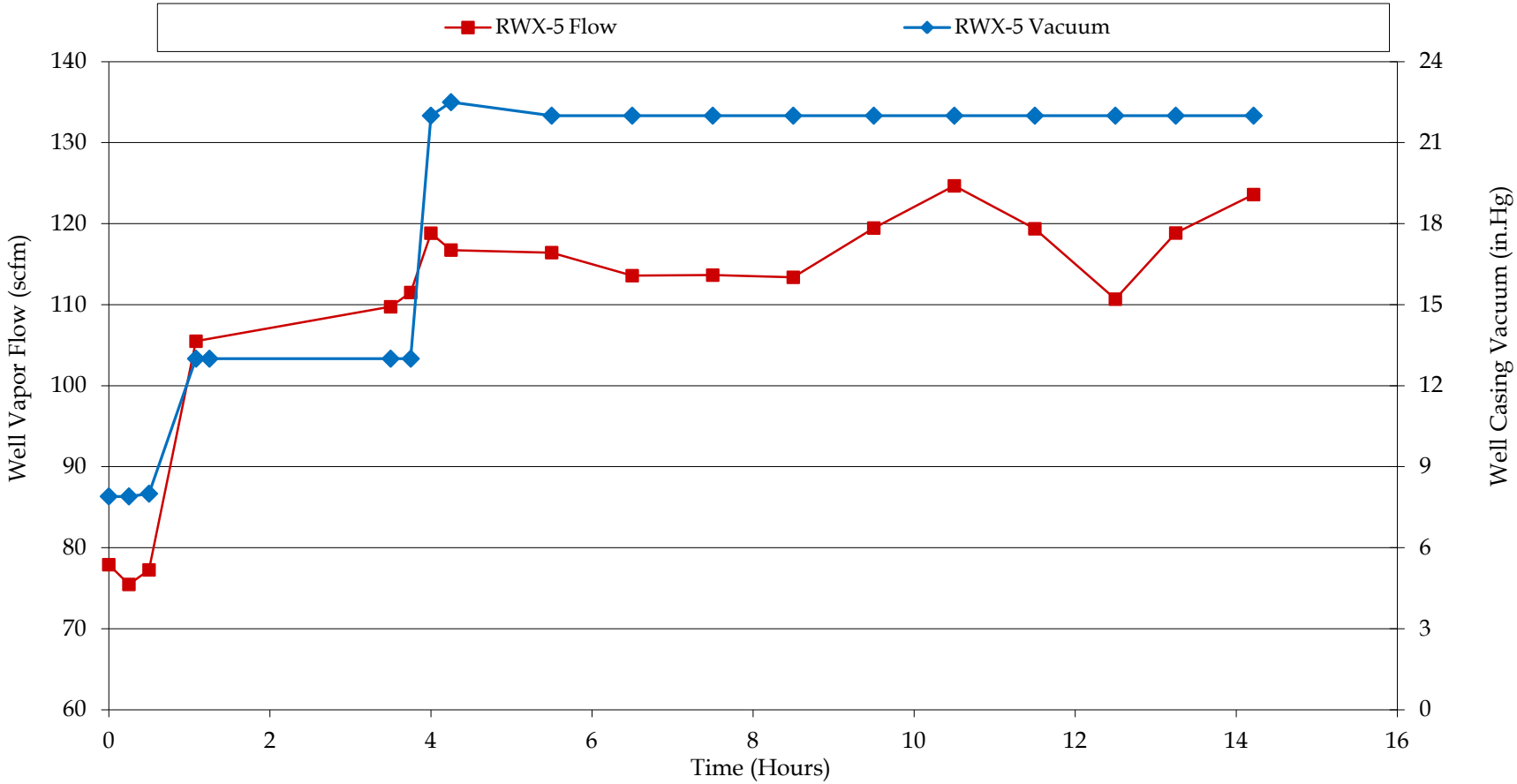


FIGURE 42

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

RWX-5 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

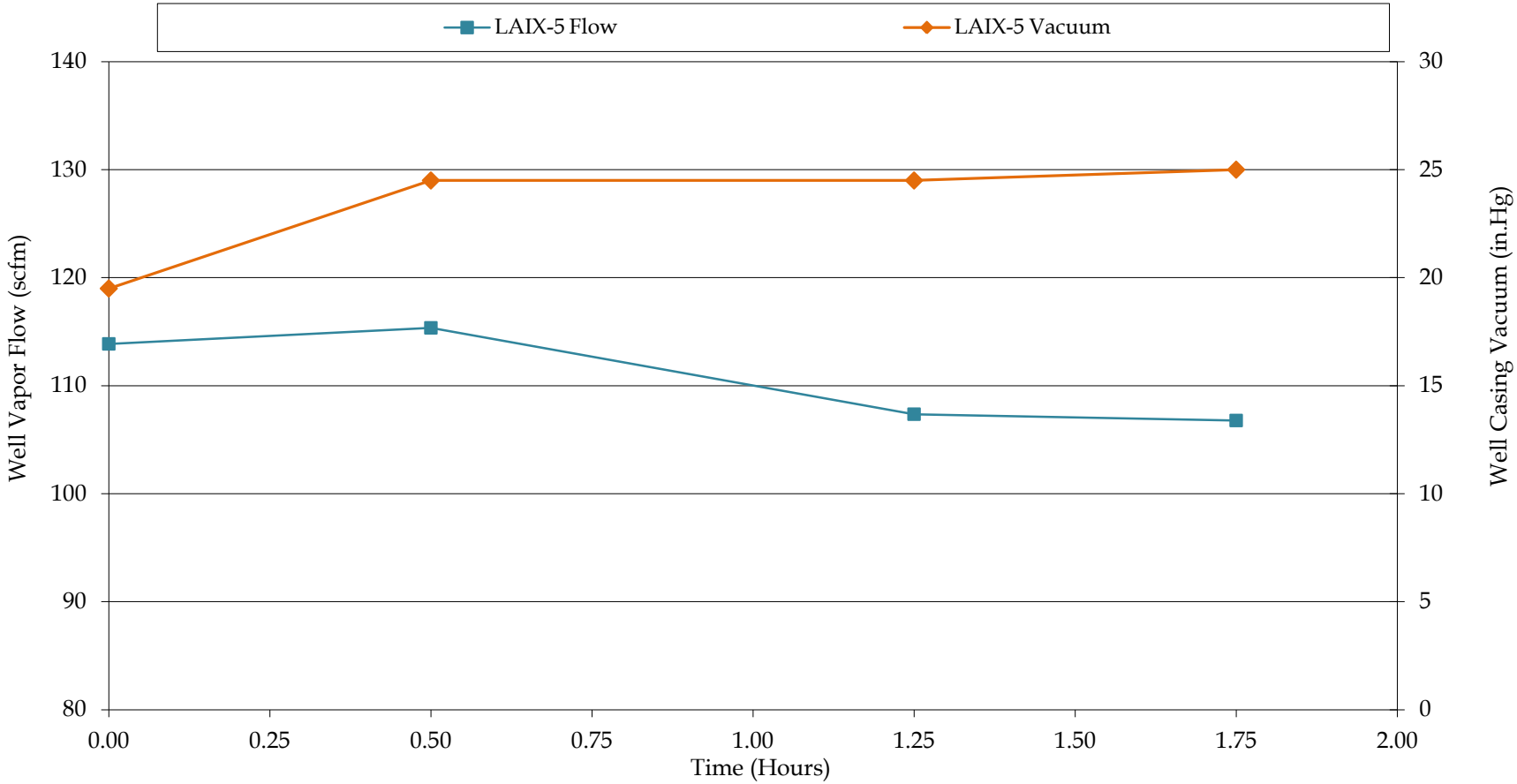


FIGURE 43

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

LAIX-5 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

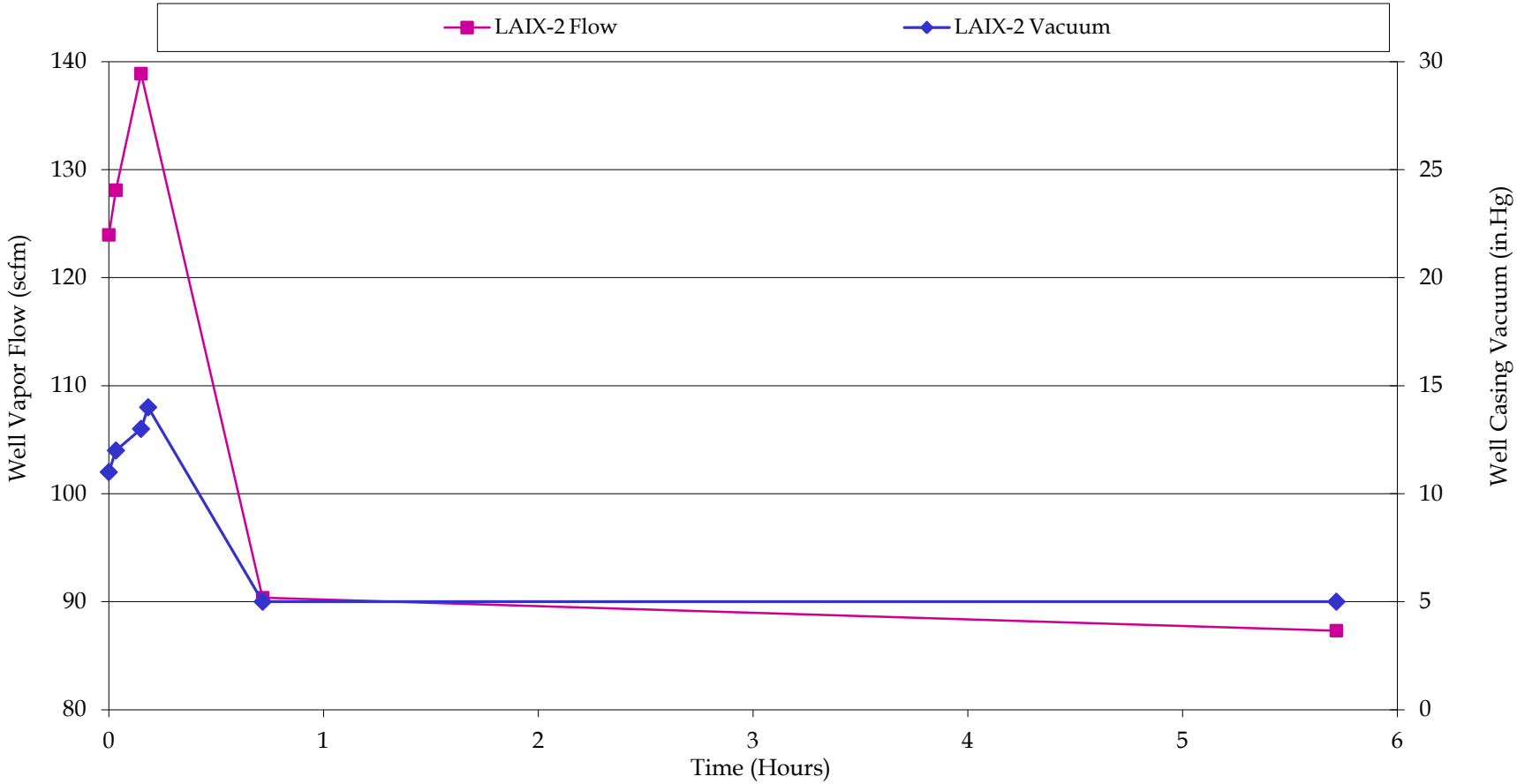


FIGURE 44

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

LAIX-2 WELL VAPOR FLOW AND CASING VACUUM VS. ELAPSED TIME

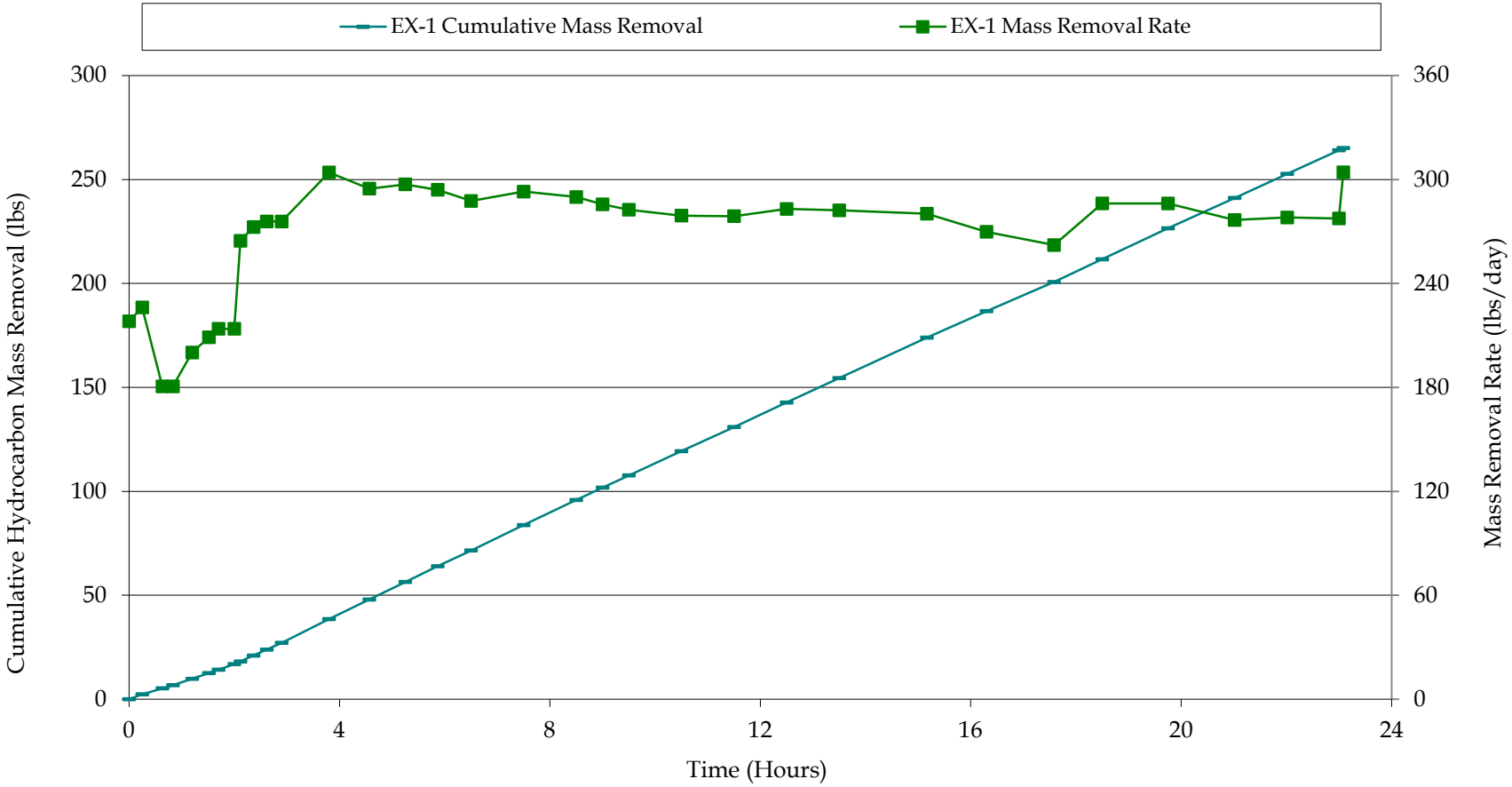


FIGURE 45

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

EX-1 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL VS. ELAPSED TIME

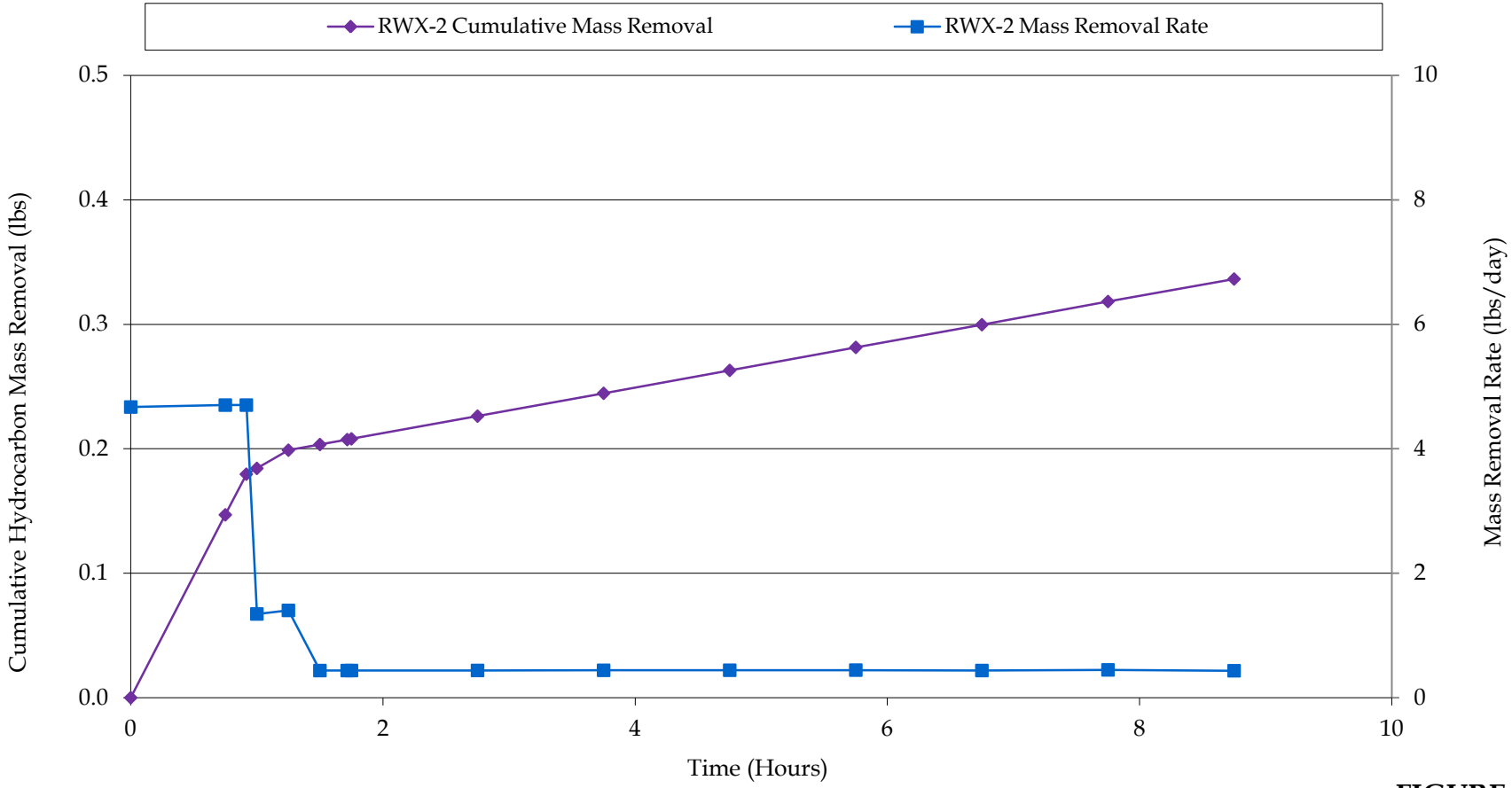


FIGURE 46

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

RWX-2 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL VS. ELAPSED TIME

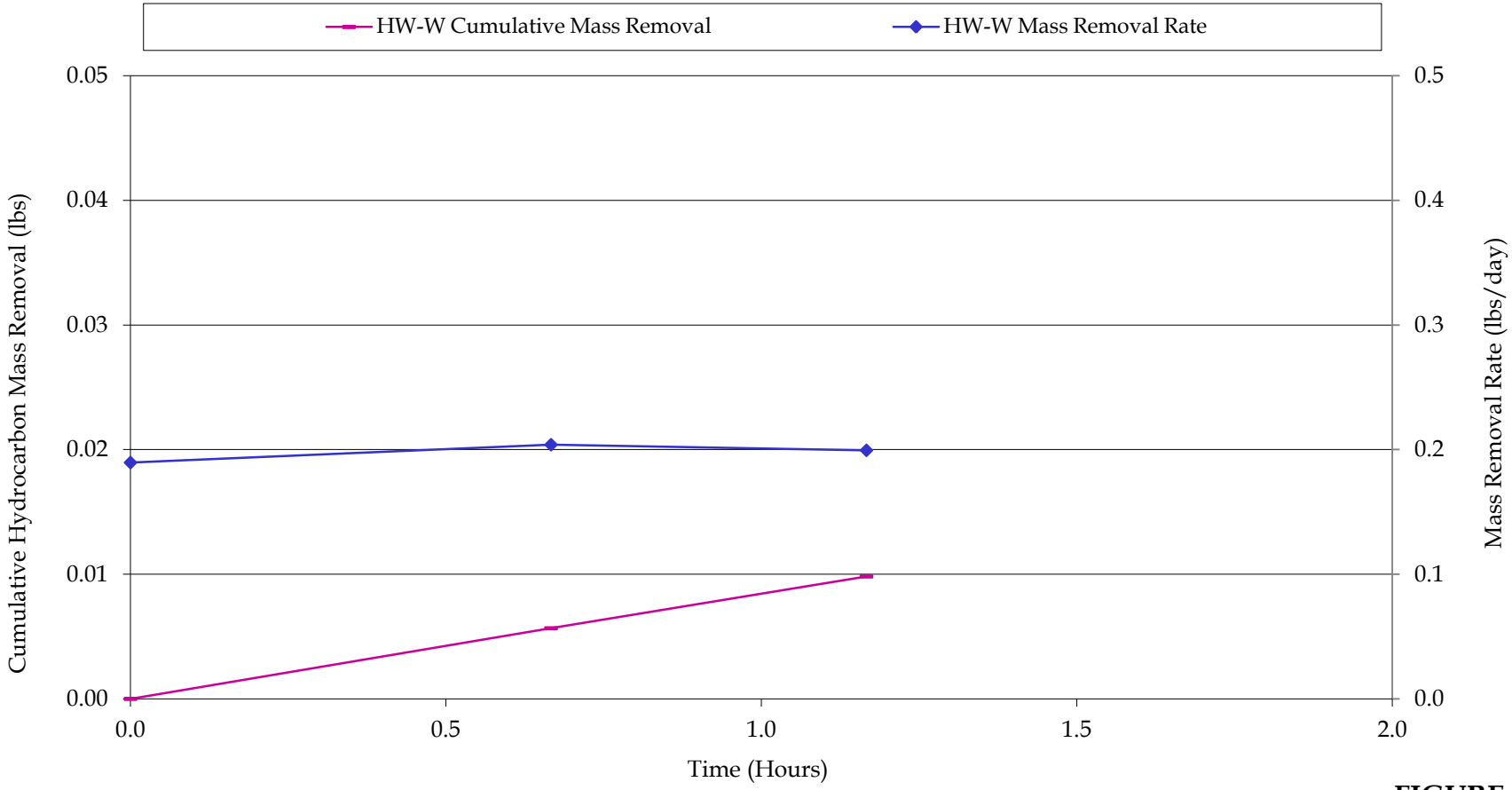


FIGURE 47

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

HW-W VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL VS. ELAPSED TIME

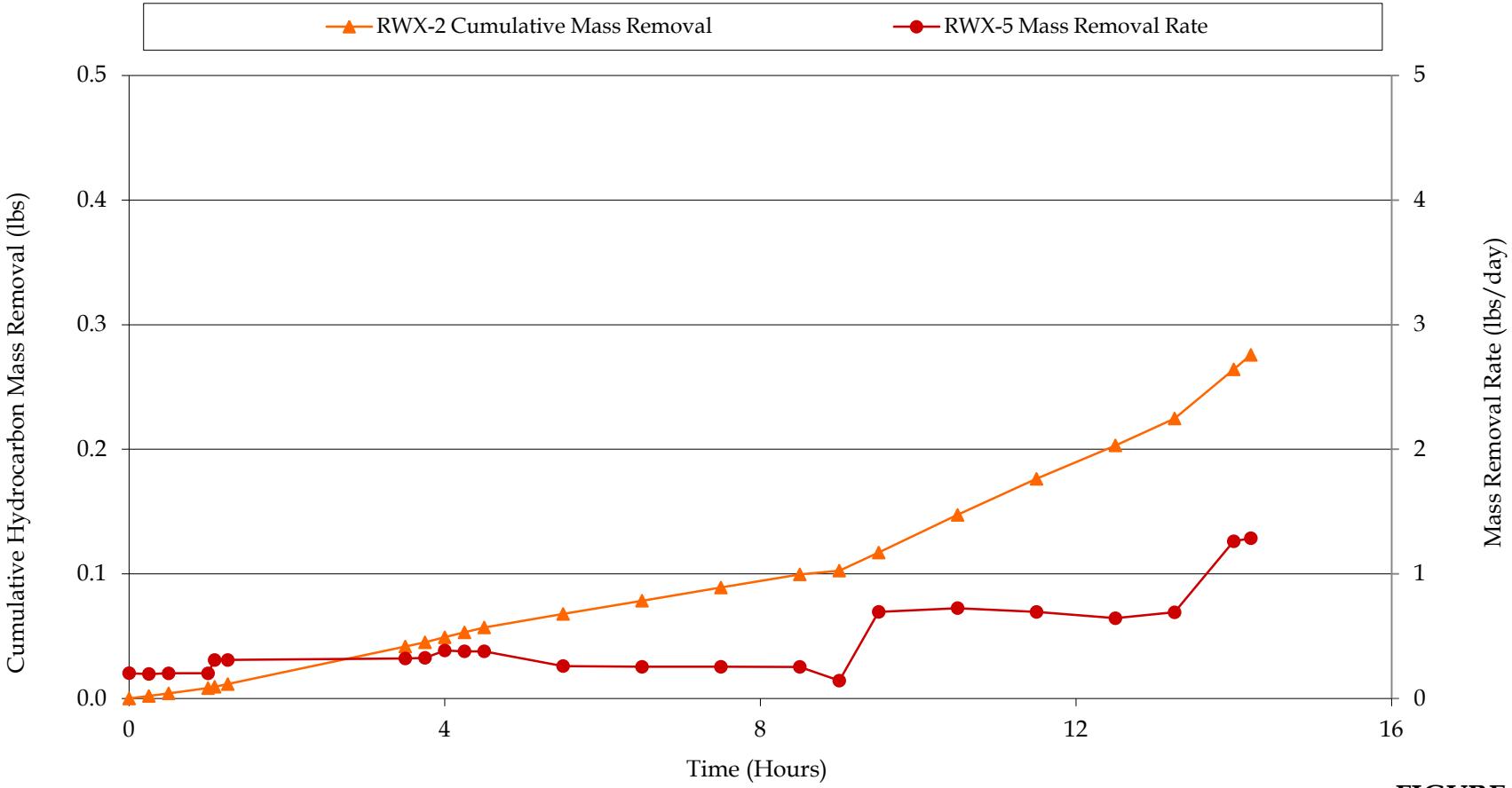


FIGURE 48

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

RWX-5 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL VS. ELAPSED TIME

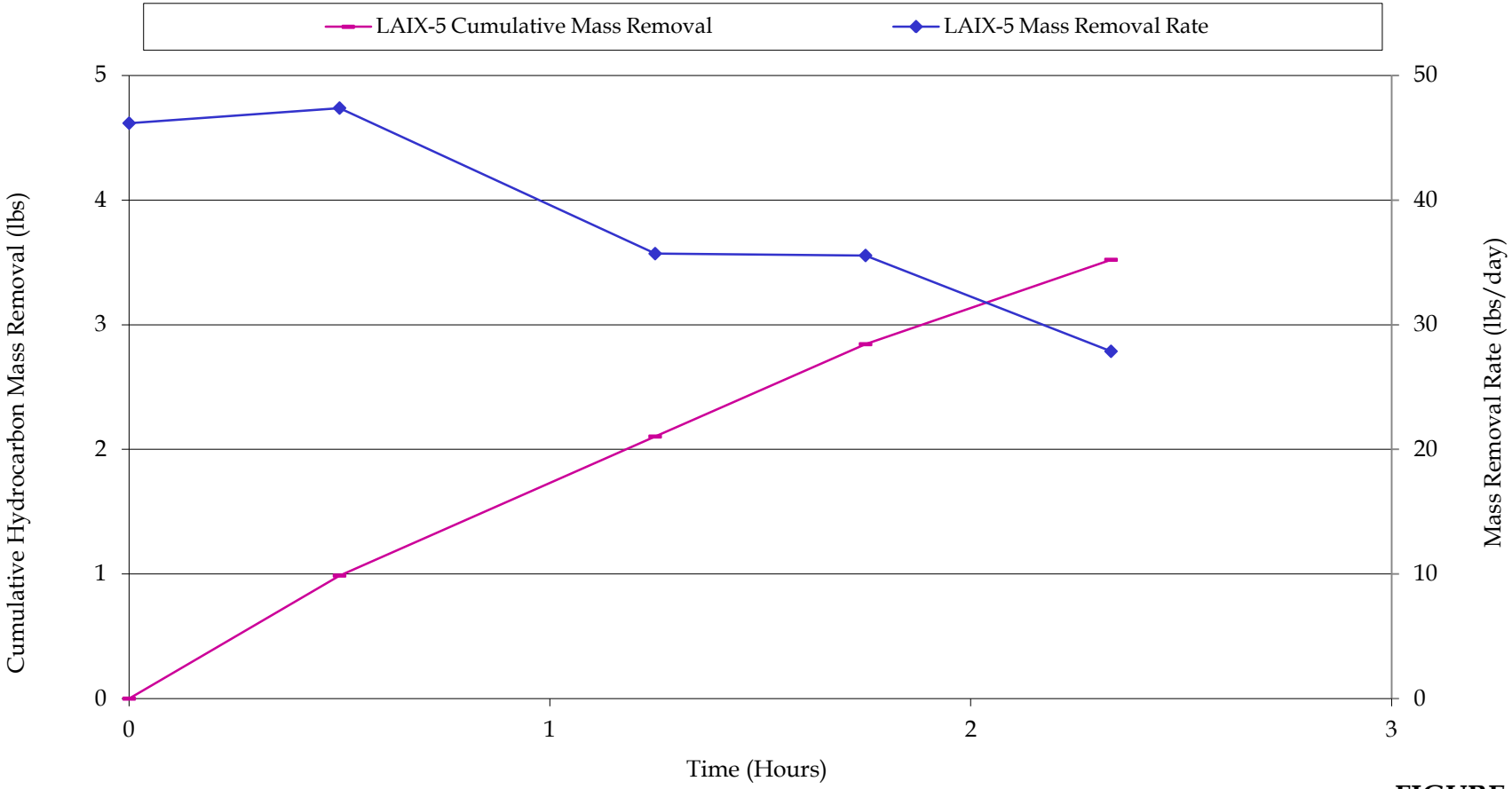


FIGURE 49

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

LAIX-5 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL VS. ELAPSED TIME

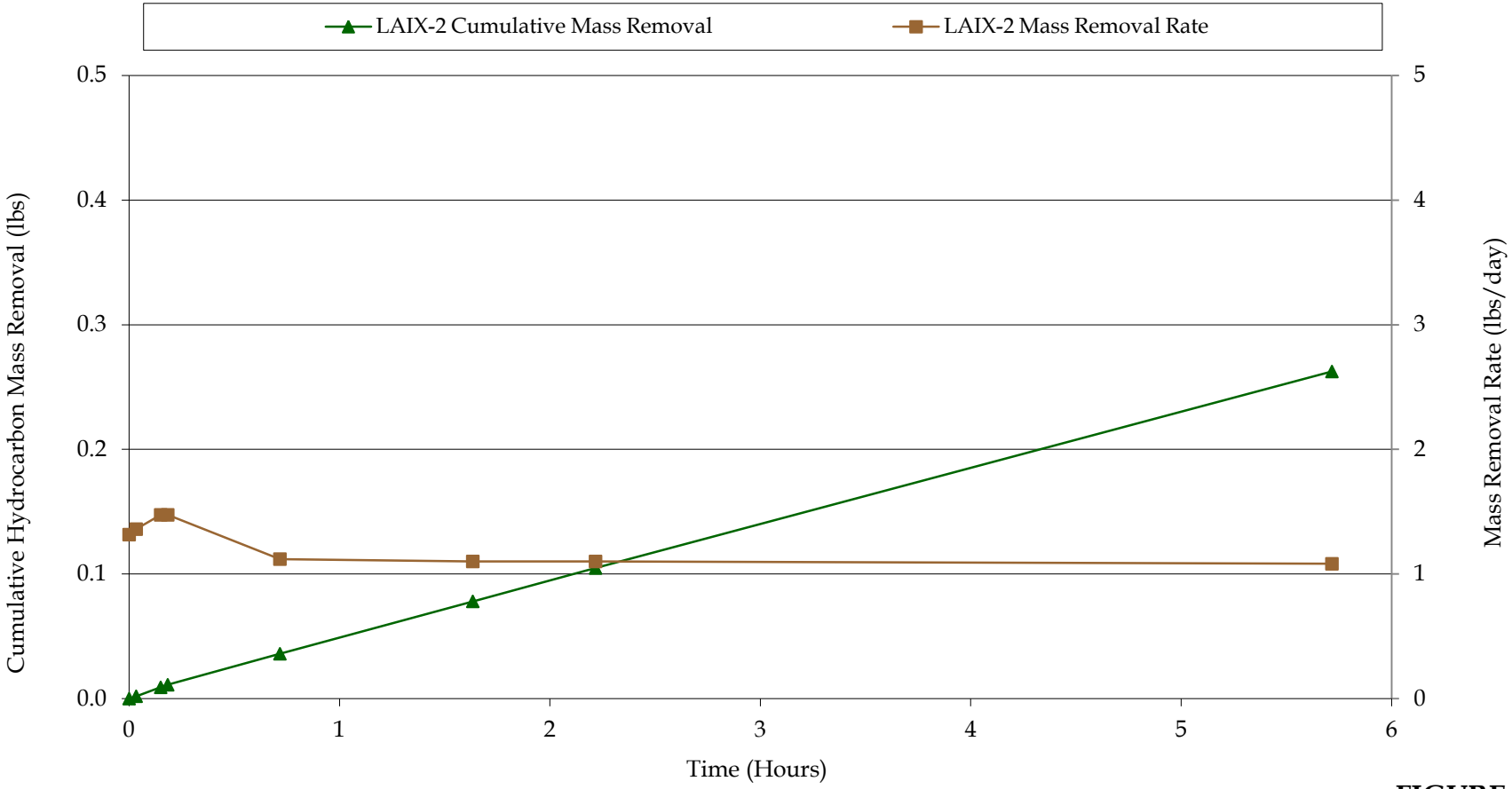


FIGURE 50

PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

CONESTOGA-ROVERS & ASSOCIATES

LAIX-2 VAPOR HYDROCARBON MASS REMOVAL RATE AND CUMULATIVE MASS REMOVAL VS. ELAPSED TIME

TABLES

TABLE 1

SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

				HYDROCARBONS			*PRIMARY VOCS*					*LEAD*	*SEMI-VOLATILES*	
Sample ID	***Sample Location***	***Sample Date***	***Sample Depth***	***TPHg***	***TPHd***	***TPHo***	***B***	***T***	***E***	***X***	***MTBE***	***Total***	***NAPHTHALENE***	***cPAHs***
		MTCA Method A Cleanup Level		***30/100***	***2000***	***2000***	***0.03***	***7***	***6***	***9***	***0.1***	***1,000***	5	***2***
			ft	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***
B-1	B-1	6/3/2004	0.5-1.0'	46.8	16.4	45.8	**2,910**	**3010**	**1,070**	**9,300**	--	--	--	--
B-2	B-2	6/3/2004	1.0-1.5'	8.45	<10.0	<25.0	**169**	**483**	<50.0	**1,780**	--	--	--	--
B-2	B-2	6/3/2004	2.0-2.5'	27.3	<20.2	<50.5	**1,450**	**376**	**2,290**	**7,810**	--	--	--	--
D-1	D-1	6/3/2004	0-0.5'	7.83	<10.0	<25.0	**752**	**379**	**200**	**7,710**	--	--	--	--
B1-1.5	B-1	4/27/2005	2'	<4.11	--	--	<41.1	<41.1	<41.1	<123.3	--	--	--	--
B1-3.5	B-1	4/27/2005	4'	<4.32	--	--	<43.2	<43.2	<43.2	<129.6	--	--	--	--
B1-5	B-1	4/27/2005	5'	<3.32	--	--	<33.2	<33.2	<33.2	<99.6	--	--	--	--
B2-2.5	B-2	4/27/2005	3'	<3.64	--	--	<36.4	<36.4	<36.4	<109.2	--	--	--	--
B2-4.5	B-2	4/27/2005	5'	<4.19	--	--	<41.9	<41.9	<41.9	<125.7	--	--	--	--
B2-6	B-2	4/27/2005	6'	<3.93	--	--	<39.3	<39.3	<39.3	<117.9	--	--	--	--
B3-2.5	B-3	4/27/2005	3'	<3.61	--	--	<36.1	<36.1	<36.1	<108.3	--	--	--	--
B3-4.5	B-3	4/27/2005	5'	<4.30	--	--	<43.0	<43.0	<43.0	<129.1	--	--	--	--
B4-2.5	B-4	4/28/2005	3'	<4.58	--	--	<45.8	<45.8	<45.8	<137.5	--	--	--	--
B4-4.5	B-4	4/28/2005	5'	<4.18	--	--	<41.8	<41.8	<41.8	<125.4	--	--	--	--
B4-6	B-4	4/28/2005	6'	<3.84	--	--	<38.4	<38.4	<38.4	<115.2	--	--	--	--
B5-1.5	B-5	4/28/2005	2'	<3.53	--	--	<35.3	<35.3	<35.3	<105.8	--	--	--	--
B5-3.5	B-5	4/28/2005	4'	<4.49	--	--	<44.9	<44.9	<44.9	<134.8	--	--	--	--
B7-2.5	B-7	4/27/2005	3'	<3.79	--	--	<37.9	<37.9	<37.9	<113.7	--	--	--	--
B7-4.5	B-7	4/27/2005	5'	<3.87	--	--	<38.7	<38.7	<38.7	<116.1	--	--	--	--
G-1	G-1	4/20/2009	8'-9'	<0.067	<3.2	<3.1	0.0015	0.0010	<0.00068	0.0020	--	0.44	--	--
G-2	G-2	4/20/2009	2'-3'	1.9	<8.4	<11.4	0.0119	0.0026	0.0023	0.0333	--	0.36	--	--
G-2	G-2	4/20/2009	7'-8'	**1,500**	401	<12.0	**5.57**	**43**	**19.2**	**124**	--	0.75	--	--

TABLE 1

SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

				HYDROCARBONS			*PRIMARY VOCS*					*LEAD*	*SEMI-VOLATILES*	
Sample ID	*Sample Location*	*Sample Date*	*Sample Depth*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*MTBE*	*Total*	*NAPHTHALENE*	*cPAHs*
		MTCA Method A Cleanup Level		***30/100***	***2000***	***2000***	***0.03***	***7***	***6***	***9***	***0.1***	***1,000***	5	***2***
			ft	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
G-3	G-3	4/20/2009	5'-6'	**5,000**	1,920	35	**14.9**	**15.8**	**58.6**	**305**	--	1.6	--	--
G-4	G-4	4/20/2009	4.5'-5.5'	**2,840**	902	<11.3	**21.2**	**123**	**50.9**	**314**	--	1.8	--	--
G-4	G-4	4/20/2009	7.5'-8.5'	**2,060**	969	<11.7	**10.8**	**61**	**27.3**	**173**	--	2.6	--	--
G-5	G-5	4/20/2009	4'-5'	**1,440**	882	<11.6	**0.443**	1.76	**8.16**	**60.3**	--	1.4	--	--
G-6	G-6	4/20/2009	1'-2'	0.65	<3.1	44.1	<0.00055	<0.00062	0.00054	0.0032	--	0.42	--	--
G-6	G-6	4/20/2009	6'-7'	**509**	164	<11.4	**1.19**	**8.21**	5.97	**37**	--	<0.016	--	--
G-7	G-7	4/20/2009	1'-2'	4.9	9.5	122	**0.0485**	0.0585	0.0228	0.118	--	0.43	--	--
G-7	G-7	4/20/2009	8'-9'	**1,170**	873	12.1	**0.744**	5.3	5.12	**33.9**	--	<0.018	--	--
G-8	G-8	4/20/2009	9-10'	**2,530**	446	<13.3	**15**	1.64	**49.3**	**234**	--	1.4	--	--
G-9	G-9	4/21/2009	7'-8'	**120**	<3.3	<13.2	0.0022	<0.0026	<0.0026	0.0077	--	0.78	--	--
G-14	G-14	4/21/2009	3'-4'	7.7	4.6	<11.9	<0.0030	<0.0030	0.00061	0.0035	--	0.48	--	--
S-100411-MD-DW-1-9.5	DW-1	10/4/2011	9.5	<7.6	<21.0	<84.1	**0.15**	0.0064	0.056	0.21	<0.0033	--	--	--
S-100411-MD-DW-1-19	DW-1	10/4/2011	19	<5.6	<18.5	<74.1	0.0075	<0.0031	0.0047	0.017	<0.0031	--	--	--
S-100411-MD-DW-1-24	DW-1	10/4/2011	24	<6.6	<18.9	<75.5	<0.0036	<0.0036	<0.0036	<0.011	<0.0036	--	--	--
S-100511-MD-DW-2-9	DW-2	10/5/2011	9	**2580**	1410	<66.4	**4.7**	**54.2**	**44.6**	**265**	<0.0025	--	--	--
S-100511-MD-DW-2-11	DW-2	10/5/2011	11	**7930**	1280	154	**112**	**478**	**161**	**846**	<1.5	4.7	**78.3**	0.09532
S-100511-MD-DW-2-19	DW-2	10/5/2011	19	<7.3	<20.3	<81.4	**0.25**	0.52	0.24	1.2	<0.0035	1.6	0.64	<0.0066
S-100511-MD-DW-2-30	DW-2	10/5/2011	30	<6.4	<18.5	<74.1	0.018	0.015	<0.0032	0.01	<0.0032	--	--	--
S-100511-MD-DW-2-40	DW-2	10/5/2011	40	<5.7	<17.5	<70.0	<0.0035	<0.0035	<0.0035	<0.011	<0.0035	--	--	--
S-100511-MD-DW-3-12	DW-3	10/5/2011	12	<7.4	<18.2	<72.7	<0.0032	<0.0032	<0.0032	<0.0096	<0.0032	--	--	--
S-100511-MD-DW-3-30	DW-3	10/5/2011	30	<5.9	<17.2	<68.8	<0.0031	<0.0031	<0.0031	<0.0094	<0.0031	--	--	--
S-101011-MD-D-1R-10	D-1R	10/10/2011	10	<6.6	40.2	<71.9	<0.0033	<0.0033	<0.0033	<0.0099	<0.0033	3.2	<0.0079	0.0199

TABLE 1

SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

				HYDROCARBONS			*PRIMARY VOCS*					*LEAD*	*SEMI-VOLATILES*	
Sample ID	*Sample Location*	*Sample Date*	*Sample Depth*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*MTBE*	*Total*	*NAPHTHALENE*	*cPAHs*
		MTCA Method A Cleanup Level		***30/100***	***2000***	***2000***	***0.03***	***7***	***6***	***9***	***0.1***	***1,000***	5	***2***
			ft	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
S-101011-MD-D-1R-20	D-1R	10/10/2011	20	<7.7	<20.0	<79.9	0.0046	<0.0042	<0.0042	<0.013	<0.0042	--	--	--
S-101311-MD-D-4R-10	D-4R	10/13/2011	10	<7.4	<19.1	<76.3	<0.0034	<0.0034	<0.0034	<0.010	<0.0034	--	--	--
S-101311-MD-D-4R-20	D-4R	10/13/2011	20	<7.5	<19.2	<76.7	<0.0033	<0.0033	<0.0033	<0.0099	<0.0033	--	--	--
S-100611-MD-D-5R-7	D-5R	10/6/2011	7	<5.1	<17.4	<69.4	<0.0027	<0.0027	<0.0027	<0.0080	<0.0027	--	--	--
S-100611-MD-D-5R-10	D-5R	10/6/2011	20	<6.6	<18.3	<73.1	<0.0034	<0.0034	<0.0034	<0.010	<0.0034	--	--	--
S-100611-MD-D-5R-20	D-5R	10/6/2011	9	<5.4	<17.7	<70.8	<0.0031	<0.0031	<0.0031	<0.0093	<0.0031	--	--	--
S-101011-MD-MW-1-9	MW-1	10/10/2011	20	<7.5	<18.0	<72.1	<0.0020	<0.0020	<0.0020	<0.0060	<0.0020	--	--	--
S-101011-MD-MW-1-20	MW-1	10/10/2011	20	<6.4	<17.5	<69.9	<0.0028	<0.0028	<0.0028	<0.0085	<0.0028	--	--	--
S-101311-MD-MW-2-11	MW-2	10/13/2011	11	<6.3	<19.2	<76.9	<0.0034	<0.0034	<0.0034	<0.010	<0.0034	--	--	--
S-101311-MD-MW-2-19	MW-2	10/13/2011	19	<7.5	<18.4	<73.8	<0.0034	<0.0034	<0.0034	<0.010	<0.0034	--	--	--
S-101111-MD-MW-3-10	MW-3	10/11/2011	10	<6.2	<16.0	<64.1	<0.0030	<0.0030	<0.0030	<0.0091	<0.0030	--	--	--
S-101111-MD-MW-3-20	MW-3	10/11/2011	20	<7.6	<20.8	<83.4	<0.0037	<0.0037	<0.0037	<0.011	<0.0037	--	--	--
S-101111-MD-MW-4-7	MW-4	10/11/2011	7	<6.7	<18.0	<72.1	<0.0032	<0.0032	<0.0032	<0.0095	<0.0032	--	--	--
S-101111-MD-MW-4-20	MW-4	10/11/2011	20	<6.5	<18.2	<73.0	<0.0038	<0.0038	<0.0038	<0.011	<0.0038	--	--	--
S-101211-MD-MW-5-10	MW-5	10/12/2011	10	<5.8	<17.2	<69.0	<0.0033	<0.0033	<0.0033	<0.0099	<0.0033	--	--	--
S-101211-MD-MW-5-20	MW-5	10/12/2011	20	<7.2	<19.5	<78.1	<0.0039	<0.0039	<0.0039	<0.012	<0.0039	--	--	--
S-101211-MD-MW-6-10	MW-6	10/12/2011	10	<5.3	<17.0	<68.2	<0.0027	<0.0027	<0.0027	<0.0081	<0.0027	--	--	--
S-101211-MD-MW-6-20	MW-6	10/12/2011	20	<6.0	<18.7	<74.9	<0.0032	<0.0032	<0.0032	<0.0097	<0.0032	--	--	--
S-100611-MD-MW-7-8	MW-7	10/6/2011	8	**256**	149	78.5	**0.125**	0.113	1.65	3.03	<0.0027	3.3	**8**	0.2397
S-100611-MD-MW-7-11	MW-7	10/6/2011	11	**14000**	**4910**	90.5	**88.3**	**491**	**207**	**1170**	<6.22	5.4	**266.5**	0.04436
S-100611-MD-MW-7-20	MW-7	10/6/2011	20	7.7	<19.8	<79.3	0.0271	0.108	0.048	0.288	<0.0035	--	--	--
S-100611-MD-MW-8-8	MW-8	10/6/2011	8	**153**	44.7	442	**0.24**	0.0044	0.012	0.029	<0.0035	3.3	0.127	0.3367
S-100611-MD-MW-8-11	MW-8	10/6/2011	11	**2930**	851	93	**10.9**	3.85	**35.5**	**130**	<0.0032	3.8	**43.2**	0.08957

TABLE 1

SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

				HYDROCARBONS			*PRIMARY VOCS*					*LEAD*	*SEMI-VOLATILES*	
Sample ID	*Sample Location*	*Sample Date*	*Sample Depth*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*MTBE*	*Total*	*NAPHTHALENE*	*cPAHs*
		MTCA Method A Cleanup Level		***30/100***	***2000***	***2000***	***0.03***	***7***	***6***	***9***	***0.1***	***1,000***	5	***2***
			ft	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
S-100611-MD-MW-8-20	MW-8	10/6/2011	20	<6.8	<19.8	<79.3	<0.0042	<0.0042	<0.0042	<0.012	<0.0042	--	--	--
S-100711-MD-MW-9-10	MW-9	10/7/2011	10	<5.3	<16.9	<67.7	**0.038**	<0.0034	<0.0034	<0.010	<0.0034	2	0.235	<0.00544
S-100711-MD-MW-9-15	MW-9	10/7/2011	15	<9.9	<23.2	<92.6	<0.012	<0.012	<0.012	<0.037	<0.012	--	--	--
S-100711-MD-MW-10-7	MW-10	10/7/2011	7	9.5	24.4	68.9	<0.0034	<0.0034	0.004	<0.010	<0.0034	<4.1	0.413	<0.00566
S-100711-MD-MW-10-9	MW-10	10/7/2011	9	12.5	34.1	<70.0	<0.0039	<0.0039	<0.0039	<0.012	<0.0039	<1.9	<0.0075	0.00667
S-100711-MD-MW-10-20	MW-10	10/7/2011	20	<6.9	<19.0	<76.0	0.015	<0.0036	<0.0036	<0.011	<0.0036	--	--	--
S-100711-MD-MW-14-5.5	MW-14	10/7/2011	5.5	**998**	241	<69.2	**3.17**	**18.1**	**10**	**54.6**	<0.0027	1.8	**21.6**	0.00657
S-101011-MD-MW-15-6	MW-15	10/10/2011	6	<5.7	<17.5	<70.1	<0.0028	<0.0028	<0.0028	<0.0085	<0.0028	--	--	--
S-101011-MD-MW-15-20	MW-15	10/10/2011	20	<6.6	<19.2	<76.9	0.015	<0.0033	<0.0033	<0.0098	<0.0033	--	--	--
S-120111-NH-MW11 - 6	MW-11	12/1/2011	6	**159**	1480	**3020**	<0.0026	<0.0026	<0.0026	<0.0078	<0.0026	--	0.355	0.935
S-120111-NH-MW11 - 13	MW-11	12/1/2011	13	<8.0	<20.4	<81.6	<0.0031	<0.0031	<0.0031	<0.0092	<0.0031	--	--	--
S-120111-NH-MW11 - 20	MW-11	12/1/2011	20	<6.9	<20.7	<82.8	<0.0032	<0.0032	<0.0032	<0.0096	<0.0032	--	--	--
S-120111-NH-MW12 - 10	MW-12	12/1/2011	10	<8.3	<21.6	<86.5	<0.0028	<0.0028	<0.0028	<0.0083	<0.0028	--	--	--
S-120111-NH-MW12 - 20	MW-12	12/1/2011	20	<7.7	<20.5	<81.9	<0.0036	<0.0036	<0.0036	<0.011	<0.0036	--	--	--
S-120111-NH-MW13 - 10	MW-13	12/1/2011	10	<6.4	<19.1	<76.2	<0.0032	<0.0032	<0.0032	<0.0095	<0.0032	--	<0.0080	<0.00604
S-120111-NH-MW13 - 20	MW-13	12/1/2011	20	<7.2	<21.0	<83.9	<0.0027	<0.0027	<0.0027	<0.0080	<0.0027	--	--	--
S-120111-NH-MW16 - 6	MW-16	12/1/2011	6	<6.8	<19.2	<76.7	<0.0035	<0.0035	<0.0035	<0.011	<0.0035	--	--	--
S-120111-NH-MW16 - 20	MW-16	12/1/2011	20	<5.7	<18.7	<74.8	<0.0033	<0.0033	<0.0033	<0.010	<0.0033	--	--	--
S-043012-MD-Bottom-3'	Excavation Bottom	4/30/2012	3	**498**	827	<68.5	0.0065	0.0045	0.121	0.186	<0.0028	--	**10.16**	<0.0566
S-043012-MD-North-1.5'	North Sidewall	4/30/2012	1.5	**7710**	**6090**	<352	**5.2**	2.09	**50.3**	**93.3**	<0.531	--	**251.9**	<0.5738
S-071112-NH-MW17-5	MW-17	7/11/2012	5	<8.9	<19.7	<78.9	<0.0444	<0.0888	<0.0888	<0.266	--	17	0.0100	0.019911
S-071112-NH-MW17-9	MW-17	7/11/2012	9	<10.3	<21.9	<87.4	<0.0514	<0.103	<0.103	<0.309	--	5.9	<0.0285	<0.007173

TABLE 1

SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

				HYDROCARBONS			*PRIMARY VOCS*					*LEAD*	*SEMI-VOLATILES*	
Sample ID	***Sample Location***	***Sample Date***	***Sample Depth***	***TPHg***	***TPHd***	***TPHo***	***B***	***T***	***E***	***X***	***MTBE***	***Total***	***NAPHTHALENE***	***cPAHs***
		MTCA Method A Cleanup Level		***30/100***	***2000***	***2000***	***0.03***	***7***	***6***	***9***	***0.1***	***1,000***	5	***2***
			ft	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***
S-071112-NH-MW17-40	MW-17	7/11/2012	40	<7.6	<19.3	<77.2	<0.0381	<0.0762	<0.0762	<0.229	--	2	<0.0246	<0.006191
S-071112-NH-DW4-5	DW-4	7/11/2012	5	**137**	169	593	<0.0368	<0.0737	0.0781	0.674	--	28.2	0.2497	0.67779
S-071112-NH-DW4-12	DW-4	7/11/2012	12	<11.7	<27.3	<109	<0.0584	<0.117	<0.117	<0.350	--	36.4	0.2285	0.009719
S-071112-NH-DW4-40	DW-4	7/11/2012	40	<6.6	<19.8	<79.2	<0.0332	<0.0664	<0.0664	<0.199	--	2.1	0.1436	<0.006418
S-071112-NH-DW5-7	TW-1	7/11/2012	7	**2390**	1000	<75.3	**24.3**	**94.9**	**36.6**	**213**	--	6.4	**39.59**	0.077735
S-071112-NH-DW5-12	TW-1	7/11/2012	12	**13700**	1820	87.2	**253**	**879**	**283**	**1540**	--	3.3	**86.7**	0.050282
S-071112-NH-DW5-40	TW-1	7/11/2012	40	<5.5	<18.7	<74.6	<0.0273	<0.0545	<0.0545	<0.164	--	1.8	0.0233	<0.00604
S-071012-NH-MW18-15	TW-3	7/10/2012	15	**7200**	1730	<72.9	**56.5**	**311**	**122**	**683**	--	2.2	**92.8**	0.1089
S-071012-NH-MW18-17	TW-3	7/10/2012	17	<7.5	<20.1	<80.3	**10.3**	<0.0746	<0.0746	<0.224	--	2	0.0943	<0.00672
S-071012-NH-MW18-40	TW-3	7/10/2012	40	<10.7	<19.3	<77.1	<0.0533	<0.107	<0.107	<0.320	--	2.8	<0.0249	<0.006267
S-070912-NH-MW20-8.5	TW-5	7/9/2012	8.5	**10200**	**4490**	147	**137**	**638**	**196**	**1200**	--	11	**288**	0.17872
S-070912-NH-MW20-11	TW-5	7/9/2012	11	**49200**	**29100**	1920	**931**	**3100**	**1110**	**6570**	--	9.8	**2024**	**6.0348**
S-070912-NH-MW20-40	TW-5	7/9/2012	40	<5.4	<19.1	<76.4	<0.0268	<0.0536	<0.0536	<0.161	--	2.6	0.1092	<0.006191
S-070912-NH-MW22-8.5	TW-7	7/9/2012	8.5	**1700**	435	<77.1	**28.2**	**54.4**	**32.4**	**184**	--	9.4	**15.24**	0.029762
S-070912-NH-MW22-13.0	TW-7	7/9/2012	13	**9550**	1680	<76.2	**174**	**685**	**184**	**1010**	--	3.6	**80.3**	0.071715
S-070912-NH-MW22-40	TW-7	7/9/2012	40	<6.7	<18.7	<74.9	<0.0336	<0.0671	<0.0671	<0.201	--	2.9	0.0232	<0.00604
SO-032212-NH-EX1-6.5	EX-1	3/22/2013	6.5	--	--	--	**7.67**	**11.9**	**6.32**	**37.5**	<0.387	--	3.97	--
SO-032212-NH-EX1-15	EX-1	3/22/2013	15	--	--	--	**15.4**	**58.4**	**18.1**	**117.2**	<0.374	--	**11.3**	--

Notes/Abbreviations

TPHg = Total petroleum hydrocarbons as gasoline range organics analyzed by Method NWTPH-Gx

TPHd = Total petroleum hydrocarbons as diesel range organices analyzed by NWTPH-Dx with Silica Gel Cleanup

TPHo = Total petroleum hydrocarbons as heavey oil range organices analyzed by NWTPH-Dx with Silica Gel Cleanup

BTEX = Benzene, toluene, ethylbenzene, xylenes analyzed by EPA Method 8260

cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons analyzed by EPA Method 8270

VOCs = Volatile organic compounds

Total lead analyzed by EPA Method 7420.

TABLE 1

SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

				HYDROCARBONS			*PRIMARY VOCS*					*LEAD*	*SEMI-VOLATILES*	
Sample ID	***Sample Location***	***Sample Date***	***Sample Depth***	***TPHg***	***TPHd***	***TPHo***	***B***	***T***	***E***	***X***	***MTBE***	***Total***	***NAPHTHALENE***	***cPAHs***
		MTCA Method A Cleanup Level		***30/100***	***2000***	***2000***	***0.03***	***7***	***6***	***9***	***0.1***	***1,000***	5	***2***
			ft	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***

mg/kg = milligrams per kilogram
NE = Not established
ND = Not detectable
<x = Not detectable above reporting limit x
-- = Not analyzed
Bolded concentrations indicate the concentration value exceeded the MTCA Method A cleanup levels for industrial properties
a = The laboratory reporting limit in excess of the MTCA Method A cleanup levels.

TABLE 2

SITE-WIDE GROUNDWATER MONITORING WELL NETWORK
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Hydraulic Monitoring Wells		*Groundwater Quality Monitoring Wells*	
W-1	LAI-12	W-1*	LAI-16
W-3	LAI-13	W-2*	RW-3
B-1	LAI-14	B-1*	RW-4*
B-2	LAI-15	B-2*	RWx-5
B-3A	LAI-16	B-3A*	RWx-7*
B-4	RW-1	B-4*	MW-1*
B-5	RW-3	B-5*	MW-2*
B-6	RW-4	B-6*	MW-3*
D-1R	RWx-5	D-1R*	MW-4*
D-4R	RW-6	D-4R*	MW-5*
D-5R	RWx-7	D-5R*	MW-6*
D-7	MW-1	D-6*	MW-7*
HA-1	MW-2	D-7*	MW-8*
HA-2	MW-3	HA-1	MW-9*
HA-3	MW-4	HA-2*	MW-10*
HA-4	MW-5	HA-3*	MW-11*
HA-5	MW-6	HA-4*	MW-13*
HA-7	MW-7	HA-5*	MW-14*
HA-8	MW-8	HA-6*	MW-15*
HA-9	MW-9	HA-7*	MW-16*
HA-10	MW-10	HA-8*	MW-17*
HA-11	MW-11	HA-9*	DW-1*
HA-12	MW-13	HA-10*	DW-2*
HA-13	MW-14	HA-11*	DW-3*
HA-14	MW-15	HA-13*	DW-4*
HA-15	MW-16	HA-16*	
HA-16	MW-17	HA-20*	
HA-17	DW-1	LAI-1*	
HA-18	DW-2	LAIx-2*	
HA-19	DW-3	LAIx-3*	
HA-20	DW-4	LAI-10	
LAI-1	BR-1	LAI-11	
LAIx-2	BR-2	LAI-12	
LAIx-3	WS-1	LAI-13	
LAI-10	WS-2	LAI-14	
LAI-11	WS-3	LAI-15	

Notes:

* Wells received additional analyses listed in text

GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		HYDROCARBONS			*PRIMARY VOCs*				*OXYGENATES*	
MTCA Method A Screening Levels:		***800/1000***	***500***	***500***	***5***	***1,000***	***700***	***1,000***	***20***	***--***
W-1	1/31/13	**29,400**	**10,300**	<430	**5,350**	91	197	**5,470**	<50.0	--
W-2	2/4/13	**16,800**	**3,200**	<440	**10,200**	116	**2,050**	**1,500**	<50.0	--
B-1	1/29/13	310	**1,700**	<480	**13.9**	<1.0	3.2	<3.0	<1.0	--
B-2	2/4/13	**5,150**	**2,400**	<420	**1,420**	<10.0	70.3	222	<10.0	--
B-3A	2/4/13	**141,000**	**5,500**	<420	**32,400**	**32,100**	**2,260**	**14,800**	<100	--
B-4	2/4/13	**9,210**	**5,800**	430	**322**	17.6	470	363	<5.0	--
B-5	2/4/13	**4,480**	**2,100**	<440	**596**	<5.0	72	19.1	<5.0	--
B-6	2/7/13	**29,600**	**7,800**	<450	**1,900**	**1,080**	224	**6,000**	<20.0	--
D-1R	2/1/13	220	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0	--
D-4R	1/29/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0	--
D-4R (DUP)	1/29/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0	--
D-5R	1/29/13	128	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
D-6	2/1/13	<100	<420	<420	2.5	<1.0	<1.0	<3.0	<1.0	--
D-7	2/1/13	<100	<450	<450	**60.1**	1.1	<1.0	3.2	<1.0	--
HA-1	2/7/13	<100	<460	<460	<1.0	<1.0	<1.0	<3.0	<1.0	--
HA-2	2/7/13	**63,700**	**5,300**	<430	**5,920**	**2,810**	**2,230**	**13,300**	<50.0	--
HA-3	2/7/13	272	<430	<430	**9.4**	60.2	1.7	9.7	<1.0	--
HA-4	2/7/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0	--
HA-5	1/30/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
HA-6	1/30/13	**15,900**	**910**	<430	**140**	148	**1,140**	**1,520**	<5.0	--
HA-7	2/1/13	**4,220**	**1,400**	<430	**98.8**	14.3	339	259	<2.0	--
HA-8	2/1/13	238	<430	<430	<1.0	<1.0	<1.0	38.2	<1.0	--
HA-9	2/4/13	**2,890**	**940**	<440	**110**	3	60.6	7	<1.0	--
HA-10	1/31/13	218	<450	<450	<1.0	<1.0	9.4	<3.0	<1.0	--
HA-11	2/4/13	**1,460**	<490	<490	**185**	1.6	112	220	<1.0	--
HA-13	1/29/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
HA-16	1/31/13	**5,000**	**510**	<440	**539**	675	145	875	<5.0	--
HA-20	2/4/13	320	<430	<430	**130**	1.5	1.8	70.1	<1.0	--
LAI-1	2/5/13	**24,000**	**1,300**	<430	**79.6**	**2,320**	**933**	**5,600**	<10.0	--
LAIx-2	2/5/13	**3,830**	<460	<460	**236**	76.6	257	747	<2.0	--
LAIx-3	2/5/13	**1,860**	<450	<450	**217**	1.3	258	152	<1.0	--
LAI-10	2/5/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0	--
LAI-11	2/5/13	<100	<440	<440	<1.0	<1.0	<1.0	<3.0	<1.0	--
LAI-12	2/5/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0	--
LAI-13	1/30/13	<100	<470	<470	<1.0	<1.0	<1.0	<3.0	<1.0	--
LAI-14	1/30/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0	--
LAI-15	1/30/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0	--
LAI-16	2/8/13	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<1.0	--
RW-3	2/1/13	366	**15,400**	**700**	<1.0	2.3	6.6	40.2	<1.0	--
RW-4	1/31/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
RW-4 (DUP)	1/31/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
RWx-5	1/31/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
RWx-7	1/30/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-1	2/5/13	<100	<460	<460	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-2	2/8/13	103	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-3	2/8/13	133	<450	<450	1.7	36.6	<1.0	<3.0	<1.0	--
MW-4	2/8/13	<100	<440	<440	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-5	2/7/13	<100	<470	<470	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-6	2/7/13	<100	<440	<440	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-7	2/7/13	**17,500**	**3,800**	<450	**6,840**	314	**1,940**	**1,410**	<50.0	--
MW-8	1/29/13	**8,130**	**2,800**	**820**	**6,280**	186	465	**1,250**	6.2	--
MW-9	1/31/13	224	<450	<450	**180**	<1.0	<1.0	<3.0	<1.0	--
MW-10	2/1/13	125	<440	<440	1.6	<1.0	<1.0	<3.0	<1.0	--
MW-11	2/6/13	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-13	2/6/13	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-14	2/6/13	**94,200**	**4,100**	<470	**16,300**	**15,400**	**1,740**	**10,400**	<100	--
MW-15	2/4/13	294	<430	<430	**35.2**	<1.0	3.2	<3.0	<1.0	--
MW-16	2/6/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
MW-17	2/6/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
DW-1	2/5/13	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<1.0	--
DW-2	1/31/13	434	<450	<450	**11.9**	<1.0	6.5	9.2	<1.0	--
DW-3	1/30/13	<100	<490	<490	<1.0	<1.0	<1.0	<3.0	<1.0	--
DW-4	2/6/13	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<1.0	--

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		*METALS*								*VOCs*						*PCBs*
Sample Location	*Date*	*Naphthalenes*	*cPAHs*	*Arsenic*	*Barium*	*Cadmium*	*Chromium*	*Lead*	*Mercury*	*Selinium*	*Silver*	*Methylene Chloride*	*PCE*	*TCE*	*Vinyl Chloride*	*EDB*	*EDC*	*AROCLORs*
MTCA Method A Screening Levels:		*160* [1]	*0.1* [2]	*5*	*NE*	*5*	*50*	*15*	*2*	*NE*	*NE*	*5*	*5*	*5*	*0.2*	*0.01*	*5*	*0.1*
		ug/L	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
W-1	5/24/11	**1285**	<0.0755	**15.7J**	<50.0J	0.22J	<10.0	10.4J	<0.20	<10.0	<10.0	<4.0	<1.0	3.7	<0.20	<1.0	<2.0	ND
W-1	8/16/11	**1360**	--	--	--	--	--	--	--	--	--	**20.2 J**	<1.0J	<1.0J	<0.20J	<1.0J	<1.0J	--
W-1	2/23/12	**928**	<0.0725	14.5	--	--	--	5.1	--	--	--	<50.0	<10.0	<10.0	<2.0	<10.0	<10.0	--
W-1	5/10/12	**1191** [3]	<3.5485[3]	**23.9**	--	--	--	5.1	--	--	--	<200	<50.0	<50.0	<20.0	<50.0	<50.0	--
W-1	8/24/12	**239.6**	**0.2234**	**16.3**	--	--	--	8.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
W-1	1/31/13	**456.4**	<0.03775	**12.5**	--	--	--	5.8	--	--	--	<200	<50.0	<50.0	<10.0	<50.0	<100	--
W-2	8/15/11	**346**	<0.0715	**17.2**	--	--	--	3.5	--	--	--	**5.4 J**	<1.0J	<1.0J	<0.20J	<1.0J	<1.0J	--
W-2	3/1/12	**716.6**	<0.0725	**13.6**	--	--	--	5.6	--	--	--	**--**	--	--	--	--	--	--
W-2	8/29/12	**550**	0.083050	**14.8**	--	--	--	5.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
W-2	2/4/13	**947**	<0.033975	**13.7**	--	--	--	11.6	--	--	--	<200	<50.0	<50.0	<10.0	<50.0	<100	--
B-1	5/18/11	13.9	<0.071	4.6	<100.0	0.88	<10.0	14.7	<0.20	<10.0J	<10.0	<4.0J	<1.0J	<1.0J	<0.20J	<1.0J	<2.0J	ND
B-1	8/17/11	6.8	**0.39**	2.7	--	--	--	3.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-1	2/22/12	11.5	**3.4**	**17.2**	--	--	--	**158**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-1	5/9/12	<9.6 [3]	<3.624[5]	2.9	--	--	--	0.47	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
B-1	8/23/12	11.0 [4]	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-1	11/6/12	<20.0	--	--		--	--	--	--	--	--	<20.0	<5.0	<5.0	<2.0	<5.0	<5.0	--
B-1	1/29/13	0.046	0.07288	3	--	--	--	5.7	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
B-2	5/18/11	86.6	<0.071	**10.4**	<100.0	0.099	<10.0	11.6	<0.20	<10.0J	<10.0	<4.0	<1.0	1.4	<0.20	<1.0	<2.0	ND
B-2	8/16/11	**178.2**	<0.0715	4.9	--	--	--	6.6	--	--	--	17.1	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-2	3/1/12	86.7	<0.0715	**6.8**	--	--	--	9.3	--	--	--	**20.6**	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-2	8/27/12	69.4	0.069984	**5.8**	--	--	--	4.7	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-2	2/4/13	6.3	<0.033975	2.5	--	--	--	1.9	--	--	--	<40.0	<10.0	<10.0	<2.0	<10.0	<20.0	--
B-3A	5/18/11	**822.3**	<0.071	**33.4**	<100.0	<0.080	<10.0	**25.2**	<0.20	11.6J	<10.0	<200.0J	<50.0J	<50.0J	<10.0J	<50.0J	<100.0J	ND
B-3A	8/15/11	**575**	--	--	--	--	--	--	--	--	--	**26.4 J**	<1.0J	1.4J	<0.20J	<1.0J	<1.0J	--
B-3A	2/28/12	**996**	<0.0725	**30.9**	--	--	--	10.6	--	--	--	**7.4 J**	<1.0 J	1.3 J	<0.20 J	<1.0 J	<1.0 J	--
B-3A	8/29/12	**354.9**	0.08305	**42.5**	--	--	--	7.7	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-3A	2/4/13	**787.6**	<0.035485	**30.5**	--	--	--	8	--	--	--	<400	<100	<100	<20.0	<100	<200	--
B-4	5/18/11	**3388**	**14.42**	**5.4**	<100.0	0.24	<10.0	13.7	<0.20	<10.0J	<10.0	**7.8**	<1.0	<1.0	<0.20	<1.0	<2.0	ND
B-4	8/16/11	**1195**	**0.39085**	**9.6**	--	--	--	**22.1**	--	--	--	**20**	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-4	2/23/12	106.1	<0.0725	**5.9**	--	--	--	6.3	--	--	--	**7.8**	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-4	8/29/12	**239.9**	**0.2085**	**5.1**	--	--	--	6.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-4 (DUP)	8/29/12	**239.8**	**0.1028**	**6.3**	--	--	--	8.7	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-4	2/4/13	**429.8**	0.04317	**6**	--	--	--	5.1	--	--	--	<20.0	<5.0	<5.0	<1.0	<5.0	<10.0	--
B-5	8/16/11	**309.8**	**13.548**	**30.4**	--	--	--	**108**	--	--	--	**11.1**	<1.0	<1.0	<0.20	<1.0	**26.5**	--
B-5	2/29/12	**334.1**	**9.871**	**12.7**	--	--	--	**35.6**	--	--	--	**30.3**	<1.0	1.2	<0.20	<1.0	<1.0	--
B-5	9/5/12	**1,204**	**84.965**	**52.3**	--	--	--	**172**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-5	2/4/13	50.2	**1.2336**	**7.6**	--	--	--	**19.1**	--	--	--	<20.0	<5.0	<5.0	<1.0	<5.0	<10.0	--
B-6	5/24/11	**588.1**	**0.34**	**26J**	<100.0	<0.080	<10.0	**20.3**	<0.20	<10.0	<10.0	**9.4**	<1.0	<1.0	**0.85**	<1.0	<2.0	ND
B-6	8/15/11	**1446**	**51.791**	**8.1**	--	--	--	**70.2**	--	--	--	**9.1**	<1.0	<1.0	**0.8**	<1.0	<1.0	--
B-6	11/23/11	99	**0.756**	0.75	--	--	--	11.0	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
B-6	2/29/12	**307.3**	**4.393**	4.2	--	--	--	**20.2**	--	--	--	**17.7**	<1.0	1.1	<0.20	<1.0	<1.0	--
B-6	5/10/12	**241.7** [3]	**<4.0015**[3]	**8.2**	--	--	--	**17.9**	--	--	--	<200	<50.0	<50.0	<20.0	<50.0	<50.0	--
B-6	8/27/12	125.0	**0.5108**	**5.0**	--	--	--	10.0	--	--	--	<5.0	<1.0	<1.0	**0.34**	<1.0	<1.0	--
B-6	11/16/12	**184**	**3.3340**	**16.1**	--	--	--	**138**	--	--	--	<80.0	<20.0	<1.0	<8.0	<20.0	<20.0	--
B-6	2/7/13	**178.8**	**0.6295**	4.2	--	--	--	**88.3**	--	--	--	<80.0	<20.0	<20.0	<4.0	<20.0	<40.0	--
D-1R	11/17/11	< 0.097	<0.0715	2.8	--	--	--	0.59	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-1R	2/21/12	0.43	<0.0755	0.76	--	--	--	0.78	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-1R	5/11/12	<9.6 [3]	<3.624[3]	**5.4**	--	--	--	**18.2**	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
D-1R	8/31/12	0.54	0.08305	2.3	--	--	--	0.34	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-1R	11/9/12	<4.0	<0.03096	0.59	--	--	--	0.38	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
D-1R	2/1/13	1.99	<0.033975	<0.50	--	--	--	0.52	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
D-4R	11/15/11	0.2	<0.0715	**34.4**	--	--	--	0.66	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		METALS								VOCs						PCBs
Sample Location	*Date*	*Naphthalenes*	*cPAHs*	*Arsenic*	*Barium*	*Cadmium*	*Chromium*	*Lead*	*Mercury*	*Selinium*	*Silver*	*Methylene Chloride*	*PCE*	*TCE*	*Vinyl Chloride*	*EDB*	*EDC*	*AROCLORs*
MTCA Method A Screening Levels:		*160 (1)*	*0.1 (2)*	*5*	*NE*	*5*	*50*	*15*	*2*	*NE*	*NE*	*5*	*5*	*5*	*0.2*	*0.01*	*5*	*0.1*
		ug/L	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
D-4R	2/22/12	<0.095	<0.0715	**23.4**	--	--	--	1.2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-4R	5/9/12	<10.4 (3)	<3.926 (3)	**27.9**	--	--	--	11	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	
D-4R	8/23/12	0.14	0.0755	**29.2**	--	--	--	0.52	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-4R	11/6/12	<4.0	<0.03398	**33.3**	--	--	--	0.62	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
D-4R	1/29/13	<4.094	<0.035485	**17.4**	--	--	--	0.37	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
D-4R (DUP)	1/29/13	<4.086	<0.032465	**17.4**	--	--	--	0.4	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
D-5R	11/15/11	1.0	<0.0715	**8.3**	--	--	--	0.35	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-5R	2/22/12	3.9	<0.0725	**27.2**	--	--	--	0.4	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-5R	5/9/12	<10.2 (3)	<3.8505 (3)	**27.4**	--	--	--	1.2	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
D-5R	8/23/12	<0.33	0.08305	**25.4**	--	--	--	<0.10	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-5R	11/6/12	<4.0	<0.03208	**28.2**	--	--	--	0.47	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
D-5R	1/29/13	<4.084	<0.03171	**27.2**	--	--	--	0.26	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
D-6	8/16/11	<0.33	<0.085	**19.3**	--	--	--	0.76	--	--	--	<5.0	<1.0	<1.0	**2.2**	<1.0	<1.0	--
D-6	11/22/11	0.35	**0.15**	**10.2**	--	--	--	2.4	--	--	--	<5.0	<1.0	<1.0	**4.5**	<1.0	<1.0	--
D-6	3/1/12	1.9	**0.192**	2.9	--	--	--	1.7	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-6	5/10/12	<4.0 (4)	**--**	**16.9**	--	--	--	3.4	--	--	--	<4.0	<1.0	<1.0	**4.4**	<1.0	<1.0	--
D-6 (DUP)	5/10/12	<4.0 (4)	**--**	**18.7**	--	--	--	1.7	--	--	--	<4.0	<1.0	<1.0	**4.0**	<1.0	<1.0	--
D-6	8/27/12	<0.36	0.0906	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	**7.0**	<1.0	<1.0	--
D-6	11/12/12	<4.0	--	**27.8**	--	--	--	0.58	--	--	--	<4.0	<1.0	<1.0	**5.9**	<1.0	<1.0	--
D-6 (DUP)	11/12/12	<4.0	--	**26.3**	--	--	--	0.8	--	--	--	<4.0	<1.0	<50.0	**6.5**	<1.0	<1.0	--
D-6	2/1/13	<4.088	<0.03322	0.73	--	--	--	1.3	--	--	--	<4.0	<1.0	<1.0	**0.47**	<1.0	<2.0	--
D-7	8/16/11	<1.0	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-7	2/22/12	<0.096	**0.168**	1.3	--	--	--	3.3	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-7	8/27/12	8.9 (4)	**--**	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
D-7	2/1/13	<4.094	<0.035485	0.87	--	--	--	2.9	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-1	8/17/11	<1.0	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-1	5/15/12	--	--	1.4	--	--	--	1.2	--	--	--	--	--	--	--	--	--	--
HA-1	2/7/13	--	--	**8.5**	--	--	--	4	--	--	--	--	--	--	--	--	--	--
HA-2	5/17/11	**779.7**	**0.18**	**12.7**	<100.0	<0.080	<10.0	**20.8**	<0.20	<10.0J	<10.0	<4.0J	<1.0J	<1.0J	<0.20J	<1.0J	<2.0J	ND
HA-2	8/11/11	**699**	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	**58.4**	--
HA-2	11/18/11	**786**	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-2	2/24/12	**922.7**	**0.194**	**12.7**	--	--	--	**33.4**	--	--	--	<50.0	<10.0	<10.0	<2.0	<10.0	<10.0	--
HA-2	5/15/12	**952 (4)**	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-2	8/29/12	**737 (4)**	--	**18.4**	--	--	--	**30.1**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-2	11/13/12	**573**	--	--	--	--	--	--	--	--	--	<200	<50.0	<1.0	<20.0	<50.0	<50.0	--
HA-2	2/7/13	**771.6**	0.06539	**13.1**	--	--	--	**18**	--	--	--	<200	<50.0	<50.0	<10.0	<50.0	<100	--
HA-3	8/11/11	<1.0	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-3	11/18/11	<5.0	--	**6.4**	--	--	--	8.5	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-3	2/24/12	3.91	<0.0725	3.7	--	--	--	3.2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-3	5/16/12	4.1 (4)	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
HA-3	8/29/12	10.0 (4)	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-3	11/13/12	<4.0	--	--	--	--	--	--	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-3	2/7/13	<4.0	--	--	--	--	--	--	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-4	5/17/11	<1.0	--	**9.1**	32.4	0.52	10.7	**21.7**	<0.20	<50.0	<50.0	<4.0J	<1.0J	<1.0J	<0.20J	<1.0J	<2.0J	--
HA-4	11/18/11	<0.39	<0.098	**6.5**	--	--	--	3.9	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
HA-4	2/24/12	<1.0	<0.1055	3.3	--	--	--	5.3	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-4	5/16/12	<1.0 (4)	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
HA-4	8/29/12	6.2 (4)	--	2.0	--	--	--	5.3	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-4	11/15/12	<4.0	<0.03322	<2.5	--	--	--	3.4	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-4	2/7/13	<4.088	<0.03322	0.88	--	--	--	3.1	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-5	8/12/11	0.29	<0.0715	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-5	2/23/12	0.46	<0.0715	--				--				--	--	--	--	--	--	--
HA-5	8/23/12	<0.30	0.0755	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		METALS								VOCs						PCBs
Sample Location	Date	Naphthalenes	cPAHs	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selinium	Silver	Methylene Chloride	PCE	TCE	Vinyl Chloride	EDB	EDC	AROCLORs
MTCA Method A Screening Levels:		160 [1]	0.1 [2]	5	NE	5	50	15	2	NE	NE	5	5	5	0.2	0.01	5	0.1
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
HA-5	1/30/13	<0.123	<0.030955	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
HA-6	5/26/11	144	<0.071	**6.2**	<100.0	<0.080	<10.0	**21.4**	<0.20	<10.0	<10.0	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	ND
HA-6	8/12/11	123.5	<0.0705	**8.7**	--	--	--	**20.7**	--	--	--	**31**	<1.0	<1.0	<0.20	<1.0	3	--
HA-6	11/22/11	106.7	<0.0725	**12.8**	--	--	--	**39.5**	--	--	--	**34.8**	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-6	2/23/12	151	<0.0715	**9.2**	--	--	--	**23.8**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-6	5/11/12	**329.6** [3]	<4.0015 [3]	**7.7**	--	--	--	**21.5**	--	--	--	<40.0	<10.0	<10.0	<4.0	<10.0	<10.0	--
HA-6	8/23/12	**183.5**	0.07399	**13.2**	--	--	--	**21.3**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-6	11/8/12	**191**	<0.03171	**7**	--	--	--	**21.3**	--	--	--	<40.0	<10.0	<10.0	<4.0	<10.0	<10.0	--
HA-6	1/30/13	**318**	<0.03322	**7.9**	--	--	--	**19.1**	--	--	--	<20.0	<5.0	<5.0	<1.0	<5.0	<10.0	--
HA-7	8/15/11	**297.9**	<0.0715	**23.2**	--	--	--	7	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-7	11/22/11	136.4	<0.071	**22.7**	--	--	--	10.2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-7	2/27/12	**359.2**	<0.0725	**17.5**	--	--	--	7.5	--	--	--	**6.3**	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-7	5/11/12	**297.8** [3]	<3.624 [3]	**20.1**	--	--	--	8.2	--	--	--	<20.0	<5.0	<5.0	<2.0	<5.0	<5.0	--
HA-7	8/27/12	**197.8**	0.071725	**26.1**	--	--	--	6.8	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-7	11/12/12	50.9	<0.03652	**22.7**	--	--	--	**18.8**	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-7	2/1/13	127	0.039515	**15.1**	--	--	--	5.2	--	--	--	<8.0	<2.0	<2.0	<0.40	<2.0	<4.0	--
HA-8	8/15/11	15.1	<0.0755	4.1	--	--	--	0.97	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-8	2/27/12	4.8	<0.0725	1.1	--	--	--	1.9	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-8	8/27/12	0.19	0.08305	**9.0**	--	--	--	**24.1**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-8	2/1/13	<4.084	<0.03171	0.79	--	--	--	1.1	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-9	5/17/11	140.9	<.755	--	--	--	--	--	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-9	8/11/11	145	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-9	11/22/11	129	<0.0715	4.5	--	--	--	8.7	--	--	--	--	--	--	--	--	--	--
HA-9	2/29/12	**166.9**	<0.400	**8.6**	--	--	--	**19.5**	--	--	--	**6.3**	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-9	5/15/12	**198** [3]	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-9	8/29/12	**180** [3]	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-9	11/14/12	78.8	<0.03096	--	--	--	--	--	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-9	2/4/13	**177.6**	<0.03624	--	--	--	--	--	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-10	8/11/11	28.4	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-10	2/29/12	7.9	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-10	5/16/12	11.0 [4]	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
HA-10	8/29/12	36.4 [4]	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-10	11/14/12	5.4	<0.03549	**12**	--	--	--	**29.6**	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-10	1/31/13	12.7	<0.03624	3.5	--	--	--	5.2	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-11	5/18/11	**166**	--	--	--	--	--	--	--	--	--	<4.0J	<1.0J	<1.0J	<0.20J	<1.0J	<2.0J	--
HA-11	8/11/11	95.6	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-11	2/29/12	70.7	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-11	5/15/12	92.6 [4]	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-11	8/29/12	**162** [3]	--	**19.6**	--	--	--	13.4	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-11	11/15/12	50.4	--	--	--	--	--	--	--	--	--	<8.0	<2.0	<20.0	<0.80	<2.0	<2.0	--
HA-11	2/4/13	42	--	--	--	--	--	--	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-12	11/21/11	<0.30 J	<0.0755 J	4.7 J	--	--	--	1.4 J	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
HA-12	5/11/12	<9.6 [3]	<3.624 [3]	1.9	--	--	--	2.5	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-12	11/12/12	<4.0	<0.03582	<2.5	--	--	--	1	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-13	8/12/11	<1.0	--	0.6	--	--	--	1.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-13	2/28/12	<1.0	<0.0715	<0.50	--	--	--	0.57	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-13	8/23/12	<0.63	<0.15855	<2.5	--	--	--	4.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-13	1/29/13	<4.084	<0.03171	<0.50	--	--	--	0.38	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-14	5/25/11	120.3	<0.0905	4.5	<100.0	0.16	<10.0	10.6	<0.20	<10.0	<10.0	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	ND
HA-14	8/12/11	69.2 J	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-14	2/28/12	24.5	<0.0725	2.0	--	--	--	1.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-14	8/23/12	11.3 [4]	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		*METALS*								*VOCs*						*PCBs*
Sample Location	*Date*	*Naphthalenes*	*cPAHs*	*Arsenic*	*Barium*	*Cadmium*	*Chromium*	*Lead*	*Mercury*	*Selinium*	*Silver*	*Methylene Chloride*	*PCE*	*TCE*	*Vinyl Chloride*	*EDB*	*EDC*	*AROCLORs*
MTCA Method A Screening Levels:		*160* [1]	*0.1* [2]	*5*	*NE*	*5*	*50*	*15*	*2*	*NE*	*NE*	*5*	*5*	*5*	*0.2*	*0.01*	*5*	*0.1*
		ug/L	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
HA-14	1/29/13	6.5	<0.03171	2	--	--	--	1.9	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-16	5/25/11	12.9	<0.071	**12.9**	<100.0	0.088	<10.0	<10.0	<0.20	<10.0	<10.0	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
HA-16	8/15/11	26.7	--	--	--	--	--	--	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-16	2/27/12	6.41	<0.0725	2.9	--	--	--	0.26	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-16	8/24/12	0.86	<0.21895	**18.4**	--	--	--	0.60	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-16	1/31/13	4.1	<0.03473	**8.3**	--	--	--	1.1	--	--	--	<20.0	<5.0	<5.0	<1.0	<5.0	<10.0	--
HA-19	11/21/11	<0.288 J	<0.0725 J	1 J	--	--	--	0.78 J	--	--	--	--	--	--	--	--	--	--
HA-19	5/11/12	<4.0 [4]	--	--	--	--	--	--	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-19	11/8/12	<4.0	<0.03096	1.5	--	--	--	1.6	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-20	5/25/11	66.03	<0.073	2.9	<100.0	0.21	<10.0	<10.0	<0.20	<10.0	<10.0	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	ND
HA-20	8/15/11	**175**	<0.0715	**6.1**	--	--	--	2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-20	11/18/11	68.2	<0.0715	**8.8**	--	--	--	13.3	--	--	--	--	--	--	--	--	--	--
HA-20	2/27/12	0.24	<0.0715	0.83	--	--	--	1.3	--	--	--	--	--	--	--	--	--	--
HA-20	5/16/12	4.1	<0.072	3.8	--	--	--	4.6	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
HA-20	8/24/12	29.0	0.08305	3.4	--	--	--	1.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
HA-20	11/9/12	60.6	<0.03247	2.5	--	--	--	1.1	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
HA-20	2/4/13	0.046	<0.03171	0.62	--	--	--	0.35	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
LAI-1	5/16/11	**477.3**	<0.071	3.4	<100.0	0.16	<10.0	<10.0	<0.20	<10.0J	<10.0	<4.0J	<1.0J	<1.0J	<0.20J	<1.0J	<2.0J	ND
LAI-1 (DUP)	5/16/11	**421.3**	<0.0715	3.3	<100.0	0.091	<10.0	10.3	<0.20	<10.0J	<10.0	<4.0J	<1.0J	<1.0J	<0.20J	<1.0J	<2.0J	ND
LAI-1	8/9/11	**151.1**	<0.0755	2.4	--	--	--	0.13	--	--	--	--	--	--	--	--	--	--
LAI-1	2/27/12	**403.4**	<0.0755	3.7	--	--	--	0.22	--	--	--	--	--	--	--	--	--	--
LAI-1	9/4/12	**133.7**	0.0755	3.3	--	--	--	0.13	--	--	--	--	--	--	--	--	--	--
LAI-1	2/5/13	153.3	<0.032465	2.5	--	--	--	0.24	--	--	--	--	--	--	--	--	--	--
LAIx-2	5/16/11	70.8	<0.071	4.6	<100.0	0.16	<10.0	<10.0	<0.20	<10.0J	<10.0	<4.0	<1.0	<1.0	<1.0	<1.0J	<2.0	ND
LAIx-2	8/9/11	**183.1**	<0.0725	**18.9**	--	--	--	0.86	--	--	--	--	--	--	--	--	--	--
LAIx-2	2/27/12	**191.3**	<0.071	**10.2**	--	--	--	0.39	--	--	--	--	--	--	--	--	--	--
LAIx-2	9/4/12	**163.4**	0.0755	4.9	--	--	--	0.49	--	--	--	--	--	--	--	--	--	--
LAIx-2	2/5/13	39.4	<0.03473	2.2	--	--	--	<0.10	--	--	--	--	--	--	--	--	--	--
LAIx-3	8/10/11	93.7	<0.0725	**5.5**	--	--	--	0.16	--	--	--	--	--	--	--	--	--	--
LAIx-3 (DUP)	8/10/11	89.1	<0.0725	5	--	--	--	0.22	--	--	--	--	--	--	--	--	--	--
LAIx-3	11/15/11	74.5	<0.0725	4.6	--	--	--	0.17	--	--	--	--	--	--	--	--	--	--
LAIx-3	2/28/12	**473.3**	<0.0715	4.1	--	--	--	0.62	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
LAIx-3	5/8/12	**309**	<3.624 [5]	**6.1**	--	--	--	1.6	--	--	--	<25.0	<5.0	<5.0	<1.0	<5.0	<5.0	
LAIx-3	9/4/12	**195.2**	0.0755	**5.0**	--	--	--	0.34	--	--	--	--	--	--	--	--	--	--
LAIx-3	11/13/12	9.9	<0.03582	2.8	--	--	--	0.2	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
LAIx-3	2/5/13	32.3	<0.03473	2.7	--	--	--	0.13	--	--	--	--	--	--	--	--	--	--
LAI-15	5/24/11	<1.188J	<0.071	3.7J	<100.0	<0.080	<10.0	<10.0	<0.20	<10.0	<10.0	<4.0	<1.0	<1.0	<1.0	<1.0	<2.0	ND
LAI-16	5/16/11	<1.188	<0.071	**7.9**	<100.0	0.42	<10.0	<10.0	<0.20	<10.0J	<10.0	<4.0J	<1.0J	<1.0J	<0.20J	<1.0J	<2.0J	ND
LAI-16	3/1/12	--	--	**6.4**	--	--	--	0.16	--	--	--	--	--	--	--	--	--	--
LAI-16	2/8/13	--	--	3.3	--	--	--	0.13	--	--	--	--	--	--	--	--	--	--
RW-4	8/12/11	1.8	<0.071	1.1	--	--	--	0.11	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	3.8	--
RW-4	11/18/11	<0.285	<0.0715	<0.50	--	--	--	0.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
RW-4	2/23/12	<1.0	<0.0715	<0.50	--	--	--	0.15	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
RW-4	5/11/12	<10.4 [3]	<3.926 [5]	0.86	--	--	--	0.30	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
RW-4	8/24/12	3.72	0.0755	1.4	--	--	--	0.61	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
RW-4	11/9/12	<4.0	<0.03322	<0.50	--	--	--	0.16	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
RW-4	1/31/13	<4.086	<0.03171	<0.50	--	--	--	0.33	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
RW-4 (DUP)	1/31/13	<4.084	<0.032465	<0.50	--	--	--	0.34	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		METALS								VOCs						PCBs
Sample Location	Date	Naphthalenes	cPAHs	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selinium	Silver	Methylene Chloride	PCE	TCE	Vinyl Chloride	EDB	EDC	AROCLORs
MTCA Method A Screening Levels:		160 [1]	0.1 [2]	5	NE	5	50	15	2	NE	NE	5	5	5	0.2	0.01	5	0.1
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RWx-5	11/18/11	0.36	<0.0715	<0.50	--	--	--	0.14	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
RWx-5	5/11/12	10.4	<3.926[5]	1.5	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
RWx-5	11/9/12	18.6	<0.03322	<0.50	--	--	--	0.13	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
RWx-5 (DUP)	11/9/12	17.4	<0.03247	<0.50	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
RWx-7	8/12/11	127.3	<0.0715	**6.1**	--	--	--	0.88	--	--	--	--	--	--	--	--	--	--
RWx-7	2/23/12	0.639	<0.0715	1.2	--	--	--	0.38	--	--	--	--	--	--	--	--	--	--
RWx-7	8/27/12	105.2	0.0755	**5.5**	--	--	--	0.43	--	--	--	--	--	--	--	--	--	--
RWx-7	1/30/13	<0.126	<0.03171	0.85	--	--	--	0.25	--	--	--	--	--	--	--	--	--	--
MW-1	11/15/11	0.18	<0.0725	**8.2**	--	--	--	0.68	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-1	2/28/12	<1.0	<0.0715	**7.8**	--	--	--	3.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-1	5/8/12	<9.6 [3]	<3.624[5]	**11.9**	--	--	--	0.99	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-1	9/4/12	<0.33	0.08305	**14.9**	--	--	--	0.39	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-1	11/7/12	<4.0	<0.03247	**14.5**	--	--	--	0.74	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-1	2/5/13	<4.096	<0.03624	**8**	--	--	--	1.2	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-2	11/16/11	<0.285	<0.0715	0.84	--	--	--	<0.10	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-2	2/28/12	1.8	--	0.56	--	--	--	0.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-2	5/14/12	<9.4 [3]	<3.5485[5]	1.2	--	--	--	0.11	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-2	9/4/12	<0.30	0.0755	1.2	--	--	--	0.15	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-2	11/7/12	<4.0	<0.03096	1.1	--	--	--	0.74	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-2	2/8/13	<4.088	<0.03322	0.89	--	--	--	0.56	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-3	11/17/11	<0.285	<0.0715	1.1	--	--	--	0.76	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-3	3/1/12	<0.095	<0.0715	**57.8**	--	--	--	**44.4**	--	--	--	--	--	--	--	--	--	--
MW-3	5/14/12	<9.6 [3]	<3.624[5]	**91.8**	--	--	--	**102**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-3	8/28/12	<0.297	0.074745	**9.7**	--	--	--	12.2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-3	11/7/12	<4.0	<0.03096	4.5	--	--	--	3.9	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-3	2/8/13	<4.086	<0.032465	2	--	--	--	1.7	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-4	11/17/11	<0.285	<0.0715	**6.3**	--	--	--	<0.10	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-4	3/1/12	<0.094	<0.071	**14.0**	--	--	--	3.9	--	--	--	--	--	--	--	--	--	--
MW-4	5/14/12	<10.2 [3]	<3.8505[5]	3.8	--	--	--	0.53	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
MW-4	8/28/12	0.46	0.071725	**5.6**	--	--	--	0.27	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-4	11/7/12	<4.0	<0.03096	1.5	--	--	--	0.5	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-4	2/8/13	<4.084	<0.03171	2	--	--	--	0.66	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-5	11/17/11	<0.285	<0.0715	4.3	--	--	--	1.2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-5	3/1/12	<0.096	<0.0725	**5.2**	--	--	--	2.1	--	--	--	--	--	--	--	--	--	--
MW-5	5/14/12	<10.4	<3.926[5]	3.2	--	--	--	0.49	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-5	8/28/12	<0.30	0.0755	4.4	--	--	--	1.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-5	11/7/12	<4.0	<0.03096	**5.3**	--	--	--	0.9	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-5	2/7/13	<4.086	<0.032465	**5.4**	--	--	--	2.3	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-6	11/16/11	<0.291	<0.071	**8.0**	--	--	--	1.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-6	3/1/12	0.44	<0.0715	**7.7**	--	--	--	0.17	--	--	--	--	--	--	--	--	--	--
MW-6	5/14/12	<10.6 [3]	<4.0015[5]	**8.3**	--	--	--	0.10	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-6	8/28/12	<0.30	0.0755	**6**	--	--	--	0.64	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-6	11/7/12	<4.0	<0.03171	**7.5**	--	--	--	0.14	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-6	2/7/13	<4.086	<0.032465	**8.2**	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-7	11/15/11	**425**	<0.0715	**38.8**	--	--	--	1.6	--	--	--	**12.2**	<1.0	<1.0	<0.20	<1.0	<1.0	--

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		METALS								VOCs						PCBs
Sample Location	Date	Naphthalenes	cPAHs	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selinium	Silver	Methylene Chloride	PCE	TCE	Vinyl Chloride	EDB	EDC	AROCLORs
MTCA Method A Screening Levels:		160 [1]	0.1 [2]	5	NE	5	50	15	2	NE	NE	5	5	5	0.2	0.01	5	0.1
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-7	3/1/12	**1098.3**	<0.071	**38.6**	--	--	--	7.6	--	--	--	**12.3**	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-7	5/9/12	**685** [3]	<3.624 [5]	**52.4**	--	--	--	13.6	--	--	--	**<200**	<50.0	<50.0	<20.0	**<50.0**	**<50.0**	--
MW-7	8/23/12	**269.4**	0.0755	**61.0**	--	--	--	4.4	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-7	11/6/12	**464**	<0.03247	**58.6**	--	--	--	1.9	--	--	--	<80.0	<20.0	<20.0	<8.0	<20.0	<20.0	--
MW-7	2/7/13	**793.9**	<0.033975	**40**	--	--	--	4.5	--	--	--	<200	<50.0	<50.0	<10.0	<50.0	<100	--
MW-8	11/15/11	110.5	<0.0715	**16.4**	--	--	--	1.8	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-8	2/22/12	110	<0.0725	**23.6**	--	--	--	1.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-8	5/10/12	**299.8** [3]	<3.5485 [5]	**31.6**	--	--	--	0.64	--	--	--	<100	<25.0	<25.0	<10.0	<25.0	<25.0	--
MW-8 (DUP)	5/10/12	**291.8** [3]	<3.8505 [5]	**31.4**	--	--	--	0.63	--	--	--	<20.0	<5.0	<5.0	<2.0	<5.0	<5.0	--
MW-8	8/23/12	**256.9**	0.0755	**43.0**	--	--	--	0.89	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-8	11/6/12	83.8	<0.03171	**32.7**	--	--	--	0.53	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-8	1/29/13	253	<0.035485	**42.3**	--	--	--	0.54	--	--	--	<20.0	<5.0	<5.0	<1.0	<5.0	<10.0	--
MW-9	11/16/11	133.4	<0.083	**27.6**	--	--	--	1.2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-9	2/22/12	83.8	<0.0715	**31.7**	--	--	--	4.0J	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
MW-9 (DUP)	2/22/12	84.0	0.143	**38.8**	--	--	--	**19.3 J**	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
MW-9	5/9/12	88.0 [3]	<3.624 [5]	**31.8**	--	--	--	0.55	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-9	8/24/12	98.1	0.0755	**41.2**	--	--	--	1.2	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-9	11/15/12	31.5	<0.03582	**19**	--	--	--	0.89	--	--	--	<8.0	<2.0	<1.0	<0.80	<2.0	<2.0	--
MW-9	1/31/13	53.3	<0.033975	**15.8**	--	--	--	**19.3**	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-10	11/17/11	0.62 J	<0.0725	**6.4**	--	--	--	0.49	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-10 (DUP)	11/17/11	0.99 J	<0.0715	**7.5**	--	--	--	0.46	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-10	2/28/12	1.8	<0.0715	0.56	--	--	--	0.1	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-10	5/10/12	<10.2 [3]	<3.8505 [5]	**6.4**	--	--	--	1.7	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-10	8/29/12	2.55	0.073235	**8.1**	--	--	--	0.13	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-10	11/9/12	<4.0	<0.03171	**12.8**	--	--	--	0.52	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-10	2/1/13	4.451	<0.036995	3.4	--	--	--	0.4	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-11	2/29/12	0.1	<0.071	**9.1**	--	--	--	4.0	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-11	5/16/12	<0.60	<0.0755	**6.0**	--	--	--	0.95	--	--	--	<5.0	<1.0	<1.0	<3.0	<1.0	<1.0	--
MW-11	8/29/12	0.49	0.074745	**7.1**	--	--	--	0.67	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-11	11/16/12	<4.0	<0.03247	<2.5	--	--	--	8.4	--	--	--	<4.0	<1.0	<50.0	<0.40	<1.0	<1.0	--
MW-11	2/6/13	<4.092	<0.03473	2.2	--	--	--	0.26	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-12	2/29/12	<1.0	<0.0715	**7.2**	--	--	--	0.65	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-12	5/16/12	<0.30	<0.0755	**7.3**	--	--	--	0.75	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
MW-12	8/29/12	<0.285	0.071725	**10.6**	--	--	--	0.72	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-12	11/14/12	<4.0	<0.03322	**9.7**	--	--	--	1.5	--	--	--	<4.0	<1.0	<2.0	<0.40	<1.0	<1.0	--
MW-13	2/29/12	0.12	<0.0715	**26.1**	--	--	--	1.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-13	5/16/12	<0.30	<0.0755	3.4	--	--	--	1.5	--	--	--	<5.0 [M1]	<1.0 [M1]	<1.0 [M1]	<1.0 [M1]	<1.0 [M1]	<1.0 [M1]	--
MW-13	9/5/12	<0.33	0.08305	**9.1**	--	--	--	0.54	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-13	11/14/12	<4.0	<0.03549	0.89	--	--	--	0.39	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-13	2/6/13	<4.086	<0.032465	<0.50	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-14	11/21/11	**263.6 J**	<0.071 J	**33.5 J**	--	--	--	11.6 J	--	--	--	**29.3 J**	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
MW-14	2/28/12	**838.8**	<0.0715	**29.2**	--	--	--	6.6	--	--	--	**25.1 J**	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
MW-14	5/14/12	**643**	<3.624 [5]	**43.7**	--	--	--	**17.7**	--	--	--	<50.0	<1.0	<1.0	<2.0	<10.0	<10.0	--
MW-14	11/16/12	**509**	<0.037	**48.2**	--	--	--	**15.6**	--	--	--	<200	<50.0	<1.0	<20.0	<50.0	<50.0	--
MW-14	2/6/13	**662.3**	<0.03473	**30.2**	--	--	--	4.7	--	--	--	<400	<100	<100	<20.0	<100	<200	--

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		METALS								VOCs						PCBs
Sample Location	*Date*	*Naphthalenes*	*cPAHs*	*Arsenic*	*Barium*	*Cadmium*	*Chromium*	*Lead*	*Mercury*	*Selinium*	*Silver*	*Methylene Chloride*	*PCE*	*TCE*	*Vinyl Chloride*	*EDB*	*EDC*	*AROCLORs*
MTCA Method A Screening Levels:		*160* (1)	*0.1* (2)	*5*	*NE*	*5*	*50*	*15*	*2*	*NE*	*NE*	*5*	*5*	*5*	*0.2*	*0.01*	*5*	*0.1*
		ug/L	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
MW-15	11/21/11	0.62 J	<0.0725 J	**41 J**	--	--	--	**45.2 J**	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
MW-15 (DUP)	11/21/11	0.44 J	<0.0725 J	**32.5 J**	--	--	--	**28.2 J**	--	--	--	<5.0 J	<1.0 J	<1.0 J	<0.20 J	<1.0 J	<1.0 J	--
MW-15	2/28/12	4.66	<0.0715	8.5	--	--	--	3.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-15	5/11/12	<9.6 (3)	<3.624 (5)	**10.9**	--	--	--	6.3	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-15	8/27/12	5.0	0.08305	**12.6**	--	--	--	0.16	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-15 (DUP)	8/27/12	4.1	0.0755	**12.8**	--	--	--	0.26	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-15	11/12/12	<4.0	<0.03582	**18.9**	--	--	--	**14.2**	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-15	2/4/13	7.8	<0.032465	**8.7**	--	--	--	0.19	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-16	2/29/12	<1.0	<0.0715	2.2	--	--	--	0.59	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-16	5/16/12	<0.285	<0.071725	2.4	--	--	--	0.11	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-16	9/5/12	<0.39	0.09815	**5.9**	--	--	--	0.17	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-16	11/14/12	<4.0	<0.03096	1.3	--	--	--	0.94	--	--	--	<4.0	<1.0	<2.0	<0.40	<1.0	<1.0	--
MW-16	2/6/13	<4.100	<0.03775	2.1	--	--	--	0.45	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
MW-17	9/5/12	<0.30	0.0755	**6.7**	--	--	--	0.19	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
MW-17	11/16/12	<4.0	<0.03247	**5.8**	--	--	--	<0.50	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
MW-17	2/6/13	<4.084	<0.03171	**5.1**	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
DW-1	11/15/11	0.1	<0.0725	3.6	--	--	--	0.3	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-1	2/28/12	<1.0	<0.0715	5.6	--	--	--	0.28	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-1	5/16/12	<0.288	<0.07248	3.6	--	--	--	<0.10	--	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	--
DW-1	9/4/12	<0.30	0.0755	3.6	--	--	--	<0.10	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-1	11/13/12	<4.0	<0.03652	2.6	--	--	--	<0.50	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
DW-1	2/5/13	<4.086	<0.032465	3.1	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
DW-2	11/16/11	**194.1**	<0.0715	**5.7**	--	--	--	2.8	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-2	2/23/12	84.9	<0.0715	**7.4**	--	--	--	0.41	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-2 (DUP)	2/23/12	75.7	<0.0725	**7.4**	--	--	--	0.37	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-2	5/9/12	49.8 (4)	--	**7.9**	--	--	--	0.22	--	--	--	<8.0	<2.0	<2.0	<0.80	<2.0	<2.0	
DW-2	8/24/12	20	0.0755	2.9	--	--	--	0.78	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-2	11/6/12	3.3	<0.03398	**16.5**	--	--	--	4	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
DW-2	1/31/13	17.9	<0.03171	**20.8**	--	--	--	**17**	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
DW-3	11/17/11	<0.285	<0.0725	**14.9**	--	--	--	**16**	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-3	2/21/12	<1.0	<0.0715	**6.7**	--	--	--	3.6	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-3	5/15/12	<9.6 (3)	<3.624 (5)	**6.1**	--	--	--	0.75	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-3	8/28/12	<0.30	0.0755	**5.6**	--	--	--	0.14	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-3	11/9/12	<4.0	<0.03322	**5.6**	--	--	--	0.11	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
DW-3	1/30/13	<4.096	<0.03624	**5.9**	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--
DW-4	9/5/12	<0.33	0.08305	<0.50	--	--	--	<0.10	--	--	--	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0	--
DW-4	11/16/12	<4.0	<0.03473	<2.5	--	--	--	<0.50	--	--	--	<4.0	<1.0	<1.0	<0.40	<1.0	<1.0	--
DW-4	2/6/13	<4.094	<0.035485	<0.50	--	--	--	<0.10	--	--	--	<4.0	<1.0	<1.0	<0.20	<1.0	<2.0	--

Notes:
NA Not analyzed.
U Not detected above reporting limit.
J Estimated
x Extension on well nomenclature signifies well extended by SECOR 07/05
µg/L micrograms per liter
(1) Napthalenes equal the sum of 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene. For sample that were non-detect for one or more of these constituents, the reporting limit was used in the summation
(2) cPAHs equal the sum of each cPAH analyte multiplied by the MTCA toxicity factor. For non-detect values, half the reporting limit was used in the calculation.

TABLE 4

ADDITIONAL GROUNDWATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

		SEMI-VOLATILES		METALS								VOCs						PCBs
Sample Location	Date	Naphthalenes	cPAHs	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selinium	Silver	Methylene Chloride	PCE	TCE	Vinyl Chloride	EDB	EDC	AROCLORs
MTCA Method A Screening Levels:		160 (1)	0.1 (2)	5	NE	5	50	15	2	NE	NE	5	5	5	0.2	0.01	5	0.1
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L

(3) Only 2-Methylnaphthalene and Naphthalene were analyzed, and therefore were the only constituents used in the calculation.
(4) Naphthalene analyzed by EPA Method 8260B
ND PCBs not dected above the method detection limit.
M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
(5) A lab error resulted in cPAHs being analyzed by method 8270 instead of 8270Sim. Reporting limits do not meet the cleanup standards.

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation (feet)	Depth to Free Product (feet BTOC)	Product Thickness In Well (feet)	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet)
R-1	1/27/1993	16.94	--	0.05	5.22	11.76
R-1	3/12/1993	16.94	--	0.10	11.80	5.22
R-1	6/30/1993	16.94	--	0.01	6.88	10.07
R-1	12/23/1994	16.94	--	--	3.43	13.51
R-1	2/3/1995	16.94	--	0.10	4.10	12.92
R-1	2/22/1995	16.94	--	0.13	5.28	11.76
R-1	3/24/1995	16.94	--	0.40	5.55	11.69
R-1	4/27/1995	16.94	--	0.32	5.62	11.56
R-1	5/15/1995	16.94	--	0.47	4.91	12.38
R-1	6/16/1995	16.94	--	0.44	5.29	11.98
R-1	8/25/1995	16.94	--	0.20	5.85	11.24
R-1	9/26/1995	16.94	--	0.19	7.67	9.41
R-1	10/20/1995	16.94	--	0.02	6.17	10.79
R-1	4/4/1996	16.94	--	0.15	3.82	13.23
R-1	4/16/1996	16.94	--	0.14	3.14	13.91
R-1	5/10/1996	16.94	--	0.11	2.72	14.30
R-1	5/15/1996	16.94	--	0.06	2.67	14.32
R-1	5/22/1996	16.94	--	--	7.83	9.11
R-1	6/5/1996	16.94	--	--	8.62	8.32
R-1	6/24/1996	16.94	--	--	8.50	8.44
R-1	7/15/1996	16.94	--	--	8.63	8.31
R-1	8/23/1996	16.94	--	--	8.53	8.41
R-1	9/18/1996	16.94	--	--	8.34	8.60
R-1	1/3/1997	16.94	--	--	3.11	13.83
R-1	3/12/1997	16.94	--	--	8.91	8.03
R-1	4/2/1997	16.94	--	0.05	11.04	5.94
R-1	7/8/1997	16.94	--	--	5.71	11.23
R-1	8/26/1997	16.94	--	--	11.02	5.92
R-1	9/17/1997	16.94	--	--	10.84	6.10
R-1	4/30/1998	16.94	--	0.02	4.60	12.36
R-1	5/24/2001	16.94	--	--	10.75	6.19
R-1	11/24/2002	19.83	--	--	5.90	13.93
R-1	6/29/2007	19.83	--	--	5.66	14.17
R-1	10/22/2007	19.83			Not Monitored	
R-1	11/28/2007	19.83			Not Monitored	
R-1	12/13/2007	19.83	--	--	9.10	10.73
R-1	1/21/2008	19.83	--	--	6.98	12.85
R-1	2/24/2008	19.83			Not Monitored	
R-1	3/24/2008	19.83	--	--	5.35	14.48
R-1	8/25/2008	19.83			Not Monitored	
R-1	2/18/2009	19.83			Not Monitored	
R-1	8/25/2009	19.83			Not Monitored	
R-1	3/22/2010	16.94	--	--	4.75	12.19
R-1	8/23/2010	16.94	5.35	0.02	5.37	11.59
R-1	2/7/2011	16.94	--	--	4.56	12.38
R-2	1/27/1993	17.52	--	--	6.15	11.37
R-2	3/12/1993	17.52	--	--	7.20	10.32
R-2	2/22/1995	17.52	--	--	7.66	9.86
R-2	5/15/1995	17.52	--	--	7.87	9.65
R-2	6/16/1995	17.52	--	0.01	7.51	10.02
R-2	9/26/1995	17.52	--	0.01	7.81	9.72
R-2	10/20/1995	17.52	--	0.06	7.63	9.94
R-2	4/4/1996	17.52	--	--	5.55	11.97
R-2	4/16/1996	17.52	--	--	5.29	12.23
R-2	5/10/1996	17.52	--	--	5.21	12.31
R-2	5/15/1996	17.52	--	--	5.10	12.42
R-2	5/22/1996	17.52	--	0.02	7.59	9.95
R-2	6/5/1996	17.52	--	0.18	7.80	9.86
R-2	6/24/1996	17.52	--	0.03	7.72	9.82
R-2	7/15/1996	17.52	--	0.04	7.60	9.95
R-2	8/23/1996	17.52	--	0.02	7.77	9.77
R-2	9/18/1996	17.52	--	0.04	7.87	9.68
R-2	1/3/1997	17.52	--	--	4.25	13.27
R-2	3/12/1997	17.52	--	0.02	8.02	9.52
R-2	4/2/1997	17.52	--	0.11	7.72	9.88
R-2	7/8/1997	17.52	--	--	6.47	11.05
R-2	8/19/1997	17.52	--	0.02	7.76	9.78
R-2	9/17/1997	17.52	--	--	7.67	9.85

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
R-2	4/30/1998	17.52	--	0.03	6.43	11.11
R-2	5/24/2001	17.52	--	0.35	8.25	9.53
R-2	11/24/2002	20.28	--	--	6.69	13.59
R-2	6/29/2007	20.28	--	--	6.72	13.56
R-2	10/22/2007	20.28			Not Monitored	
R-2	11/28/2007	20.28			Not Monitored	
R-2	12/13/2007	20.28	--	--	7.76	12.52
R-2	1/21/2008	20.28	--	--	5.83	14.45
R-2	2/24/2008	20.28			Not Monitored	
R-2	3/24/2008	20.28	--	--	6.19	14.09
R-2	8/25/2008	20.28			Not Monitored	
R-2	2/18/2009	20.28			Not Monitored	
R-2	8/25/2009	20.28			Not Monitored	
R-2	3/22/2010	17.52	--	--	5.68	11.84
R-2	8/23/2010	17.52	--	--	6.85	10.67
R-2	2/7/2011	17.52	--	--	7.87	9.65
W-1	1/27/1993	18.86	--	0.19	5.71	13.29
W-1	3/12/1993	18.86	--	0.06	8.24	10.67
W-1	4/14/1993	18.86	--	--	8.22	10.64
W-1	6/30/1993	18.86	--	0.08	8.25	10.67
W-1	12/15/1993	18.86	--	--	8.60	10.26
W-1	2/8/1994	18.86	--	0.13	6.51	12.45
W-1	7/8/1994	18.86	--	--	8.64	10.22
W-1	8/12/1994	18.86	--	--	8.63	10.23
W-1	12/23/1994	18.86	--	--	5.48	13.38
W-1	2/3/1995	18.86	--	--	5.24	13.62
W-1	2/22/1995	18.86	--	0.03	7.13	11.75
W-1	3/24/1995	18.86	--	0.14	7.04	11.93
W-1	4/27/1995	18.86	--	--	6.75	12.11
W-1	5/15/1995	18.86	--	0.39	6.88	12.27
W-1	6/16/1995	18.86	--	0.45	7.34	11.86
W-1	8/25/1995	18.86	--	0.18	7.89	11.11
W-1	10/20/1995	18.86	--	0.12	8.60	10.35
W-1	4/4/1996	18.86	--	0.07	5.81	13.10
W-1	4/16/1996	18.86	--	0.12	5.07	13.88
W-1	5/10/1996	18.86	--	0.09	4.75	14.18
W-1	5/15/1996	18.86	--	0.11	4.74	14.20
W-1	5/22/1996	18.86	--	0.07	8.08	10.83
W-1	6/5/1996	18.86	--	0.02	8.12	10.76
W-1	6/24/1996	18.86	--	0.01	8.28	10.59
W-1	7/15/1996	18.86	--	0.08	8.52	10.40
W-1	8/23/1996	18.86	--	--	8.63	10.23
W-1	9/18/1996	18.86	--	--	8.63	10.23
W-1	1/3/1997	18.86	--	--	4.97	13.89
W-1	3/12/1997	18.86	--	--	8.08	10.78
W-1	4/2/1997	18.86	--	0.03	8.14	10.74
W-1	5/1/1997	18.86	--	--	8.18	10.68
W-1	8/19/1997	18.86	--	--	8.57	10.29
W-1	9/17/1997	18.86	--	--	8.20	10.66
W-1	4/30/1998	18.86	--	0.08	6.70	12.22
W-1	7/28/1999	18.86	--	0.12	7.18	11.77
W-1	5/23/2000	18.86	--	--	6.91	11.95
W-1	5/24/2001	18.86	--	0.01	8.45	10.42
W-1	6/5/2002	18.86	--	--	6.42	12.44
W-1	5/29/2003	18.86	--	sheen	7.91	10.95
W-1	6/16/2004	18.86	--	0.02	7.65	11.23
W-1	6/20/2005	18.86	--	--	6.31	12.55
W-1	6/5/2006	18.86	--	--	5.99	12.87
W-1	10/23/2006	18.86	--	--	8.22	10.64
W-1	3/14/2007	21.89	--	--	5.41	16.48
W-1	9/10/2007	21.89	--	--	8.63	13.26
W-1	11/28/2007	21.89	--	--	8.62	13.27
W-1	12/13/2007	21.89	--	--	6.92	14.97
W-1	1/21/2008	21.89	--	--	8.00	13.89
W-1	2/24/2008	21.89	--	--	6.65	15.24
W-1	3/24/2008	21.89	--	--	7.37	14.52
W-1	6/2/2008	21.89	--	--	8.49	13.40
W-1	8/25/2008	21.89	--	--	8.61	13.28
W-1	2/18/2009	21.89			Not Monitored	
W-1	8/25/2009	21.89			Not Monitored	

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
W-1	3/22/2010	21.89	--	--	5.35	16.54
W-1	8/23/2010	21.89	--	--	7.40	14.49
W-1	2/7/2011	21.89	--	--	6.60	15.29
W-1	5/27/2011	21.89	--	--	8.42	13.47
W-1	8/16/2011	21.89	--	--	8.50	13.39
W-1	11/14/2011	21.89	--	--	8.61	13.28
W-1	2/20/2012	21.89	--	--	8.07	13.82
W-1	8/22/2012	21.89	--	--	7.79	14.10
W-1	11/5/2012	21.89	--	--	8.61	13.28
W-1	1/28/2013	21.89	--	--	5.29	16.60
W-2	1/27/1993	18.28	--	0.16	5.11	13.29
W-2	3/12/1993	18.28	--	0.02	7.94	10.36
W-2	4/14/1993	18.28	--	0.02	7.96	10.34
W-2	6/30/1993	18.28	--	0.09	7.65	10.70
W-2	12/15/1993	18.28	--	--	8.04	10.24
W-2	2/8/1994	18.28	--	0.13	5.93	12.45
W-2	7/8/1994	18.28	--	--	8.69	9.59
W-2	8/12/1994	18.28	--	--	8.98	9.30
W-2	9/21/1994	18.28	--	0.18	9.38	9.04
W-2	11/4/1994	18.28	--	0.37	9.51	9.05
W-2	12/23/1994	18.28	--	--	4.92	13.36
W-2	2/3/1995	18.28	--	--	5.16	13.12
W-2	2/22/1995	18.28	--	0.06	6.57	11.76
W-2	3/24/1995	18.28	--	0.14	6.48	11.91
W-2	4/27/1995	18.28	--	--	5.65	12.63
W-2	5/15/1995	18.28	--	0.57	6.48	12.23
W-2	6/16/1995	18.28	--	0.60	6.93	11.80
W-2	8/25/1995	18.28	--	0.22	7.36	11.09
W-2	10/20/1995	18.28	--	--	7.67	10.61
W-2	4/4/1996	18.28	--	0.02	5.19	13.11
W-2	4/16/1996	18.28	--	--	4.40	13.88
W-2	5/10/1996	18.28	--	--	4.10	14.18
W-2	5/15/1996	18.28	--	--	4.08	14.20
W-2	5/22/1996	18.28	--	--	7.59	10.69
W-2	6/5/1996	18.28	--	--	7.69	10.59
W-2	6/24/1996	18.28	--	--	8.08	10.20
W-2	7/15/1996	18.28	--	--	8.45	9.83
W-2	8/23/1996	18.28	--	--	8.80	9.48
W-2	9/18/1996	18.28	--	--	8.98	9.30
W-2	1/3/1997	18.28	--	--	4.48	13.80
W-2	3/12/1997	18.28	--	--	7.57	10.71
W-2	4/2/1997	18.28	--	--	7.60	10.68
W-2	5/1/1997	18.28	--	--	7.72	10.56
W-2	8/19/1997	18.28	--	--	8.10	10.18
W-2	9/18/1997	18.28	--	0.07	7.40	10.93
W-2	4/30/1998	18.28	--	0.07	6.11	12.22
W-2	7/29/1999	18.28	--	--	6.50	11.78
W-2	5/23/2000	18.28	--	--	6.33	11.95
W-2	5/24/2001	18.28	--	--	8.10	10.18
W-2	6/5/2002	18.28	--	0.02	5.87	12.43
W-2	5/28/2003	18.28	--	sheen	7.32	10.96
W-2	6/15/2004	18.28	--	--	8.55	9.73
W-2	6/22/2005	18.28	--	--	5.71	12.57
W-2	6/5/2006	18.28	--	--	5.38	12.90
W-2	10/23/2006	18.28	--	--	7.63	10.65
W-2	3/14/2007	21.30	--	--	4.82	16.48
W-2	9/10/2007	21.30	--	--	8.97	12.33
W-2	11/28/2007	21.30	--	--	8.15	13.15
W-2	12/13/2007	21.30	--	--	7.65	13.65
W-2	1/21/2008	21.30	--	--	7.58	13.72
W-2	2/24/2008	21.30	--	--	6.04	15.26
W-2	3/24/2008	21.30	--	--	6.78	14.52
W-2	6/2/2008	21.30	--	--	8.25	13.05
W-2	8/25/2008	21.30	--	--	8.51	12.79
W-2	2/18/2009	21.30			Not Monitored	
W-2	8/25/2009	21.30			Not Monitored	
W-2	3/22/2010	21.30	--	--	4.78	16.52
W-2	8/23/2010	21.30	--	--	6.79	14.51
W-2	2/7/2011	21.30	--	--	5.99	15.31
W-2	5/27/2011	21.30	--	--	7.61	13.69
W-2	8/8/2011	21.30	--	--	8.38	12.92
W-2	11/14/2011	21.30	--	--	8.46	12.84

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
W-2	2/20/2012	21.30	--	--	7.60	13.70
W-2	8/22/2012	21.30	--	--	7.20	14.10
W-2	11/5/2012	21.30	--	--	8.39	12.91
W-3	1/27/1993	17.10	--	--	5.42	11.68
W-3	3/12/1993	17.10	--	--	6.11	10.99
W-3	4/14/1993	17.10	--	--	5.88	11.22
W-3	12/15/1993	17.10	--	--	5.59	11.51
W-3	11/4/1994	17.10	--	--	7.72	9.38
W-3	2/22/1995	17.10	--	--	5.82	11.28
W-3	6/16/1995	17.10	--	--	6.37	10.73
W-3	10/20/1995	17.10	--	--	6.17	10.93
W-3	4/4/1996	17.10	--	--	5.19	11.91
W-3	4/16/1996	17.10	--	--	4.86	12.24
W-3	5/10/1996	17.10	--	--	4.83	12.27
W-3	5/15/1996	17.10	--	--	4.71	12.39
W-3	5/22/1996	17.10	--	--	5.78	11.32
W-3	6/5/1996	17.10	--	--	6.07	11.03
W-3	6/24/1996	17.10	--	--	6.30	10.80
W-3	7/15/1996	17.10	--	--	6.65	10.45
W-3	9/18/1996	17.10	--	--	6.37	10.73
W-3	1/3/1997	17.10	--	--	3.72	13.38
W-3	4/2/1997	17.10	--	0.04	5.83	11.30
W-3	5/1/1997	17.10	--	--	5.80	11.30
W-3	4/29/1998	17.10	--	--	5.81	11.29
W-3	7/30/1999	17.10	--	--	6.11	10.99
W-3	5/23/2000	17.10	--	--	5.55	11.55
W-3	5/22/2001	17.10	--	--	6.10	11.00
W-3	6/4/2002	17.10	--	--	5.78	11.32
W-3	5/28/2003	17.10	--	--	6.26	10.84
W-3	6/16/2004	17.10	--	0.02	6.23	10.89
W-3	6/21/2005	17.10	--	--	5.75	11.35
W-3	6/5/2006	17.10	--	--	5.43	11.67
W-3	10/23/2006	17.10	--	--	6.22	10.88
W-3	3/14/2007	19.95	--	--	4.74	15.21
W-3	9/10/2007	19.95	--	--	6.55	13.40
W-3	11/28/2007	19.95	--	--	8.84	11.11
W-3	12/13/2007	19.95	--	--	5.79	14.16
W-3	1/21/2008	19.95	--	--	5.44	14.51
W-3	2/24/2008	19.95	--	--	5.77	14.18
W-3	3/24/2008	19.95	--	--	5.75	14.20
W-3	6/2/2008	19.95	--	--	6.20	13.75
W-3	8/25/2008	19.95	--	--	5.79	14.16
W-3	2/18/2009	19.95			Not Monitored	
W-3	8/25/2009	19.95			Not Monitored	
W-3	3/22/2010	19.95	--	--	4.61	15.34
W-3	8/23/2010	19.95	--	--	5.84	14.11
W-3	2/7/2011	19.95	--	--	4.69	15.26
W-3	5/27/2011	19.95			Not Monitored	
W-3	8/8/2011	19.95			Dry	
W-3	11/14/2011	19.95			Dry	
W-3	2/20/2012	19.95			Dry	
W-3	8/22/2012	19.95			Dry	
W-3	11/5/2012	19.95	--	--	4.98	14.97
W-3	1/28/2013	19.95	--	--	4.01	15.94
W-4	1/27/1993	18.03	--	--	4.43	13.60
W-4	3/12/1993	18.03	--	--	7.43	10.60
W-4	4/14/1993	18.03	--	--	7.32	10.71
W-4	12/15/1993	18.03	--	--	6.59	11.44
W-4	11/4/1994	18.03	--	--	8.20	9.83
W-4	2/22/1995	18.03	--	--	7.17	10.86
W-4	6/16/1995	18.03	--	--	7.55	10.48
W-4	10/20/1995	18.03	--	--	7.67	10.36
W-4	4/4/1996	18.03	--	--	6.12	11.91
W-4	4/16/1996	18.03	--	--	5.74	12.29
W-4	5/10/1996	18.03	--	--	5.99	12.04
W-4	5/15/1996	18.03	--	--	5.67	12.36
W-4	5/22/1996	18.03	--	--	7.20	10.83
W-4	6/5/1996	18.03	--	--	7.41	10.62
W-4	6/24/1996	18.03	--	--	7.49	10.54

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
W-4	7/15/1996	18.03	--	--	7.73	10.30
W-4	1/3/1997	18.03	--	--	4.80	13.23
W-4	4/2/1997	18.03	--	--	7.37	10.66
W-4	5/1/1997	18.03	--	--	7.34	10.69
W-4	4/29/1998	18.03	--	--	6.84	11.19
W-4	7/30/1999	18.03	--	--	7.30	10.73
W-4	5/23/2001	18.03	--	0.03	7.71	10.34
W-4	6/4/2002	18.03	--	--	6.84	11.19
W-4	5/28/2003	18.03	--	sheen	7.68	10.35
W-4	6/15/2004	18.03	--	0.02	7.65	10.40
W-4	6/21/2005	18.03	--	--	6.78	11.25
W-4	6/5/2006	18.03	--	--	6.23	11.80
W-4	10/23/2006	18.03	--	--	7.67	10.36
W-4	3/14/2007	20.91	--	--	5.70	15.21
W-4	9/10/2007	20.91	--	--	8.20	12.71
W-4	11/28/2007	20.91	--	--	7.68	13.23
W-4	12/13/2007	20.91	--	--	7.40	13.51
W-4	1/21/2008	20.91	--	--	6.30	14.61
W-4	2/24/2008	20.91	--	--	6.81	14.10
W-4	3/24/2008	20.91	--	--	6.78	14.13
W-4	6/2/2008	20.91	--	--	7.69	13.22
W-4	8/25/2008	20.91	--	--	8.00	12.91
W-4	2/18/2009	20.91			Not Monitored	
W-4	8/25/2009	20.91			Not Monitored	
W-4	3/22/2010	20.91	--	--	5.89	15.02
W-4	8/23/2010	20.91	--	--	7.11	13.80
W-4	2/7/2011	20.91	--	--	6.01	14.90
W-4	5/27/2011	20.91			Not Monitored	
W-4	8/8/2011	20.91	--	--	7.81	13.1
W-4	11/14/2011	20.91	--	--	7.89	13.02
W-4	2/20/2012	20.91	--	--	7.90	13.01
W-4	8/22/2012	20.91	--	--	7.55	13.36
B-1	1/27/1993	18.62	--	--	5.55	13.07
B-1	3/12/1993	18.62	--	--	6.64	11.98
B-1	4/14/1993	18.62	--	--	5.65	12.97
B-1	6/30/1993	18.62	--	--	6.81	11.81
B-1	12/15/1993	18.62	--	--	7.82	10.80
B-1	11/4/1994	18.62	--	--	8.80	9.82
B-1	2/22/1995	18.62	--	--	4.54	14.08
B-1	5/15/1995	18.62	--	--	6.25	12.37
B-1	6/16/1995	18.62	--	--	7.00	11.62
B-1	10/20/1995	18.62	--	--	7.75	10.87
B-1	4/4/1996	18.62	--	--	5.13	13.49
B-1	4/16/1996	18.62	--	--	4.93	13.69
B-1	5/10/1996	18.62	--	--	4.73	13.89
B-1	5/15/1996	18.62	--	--	4.73	13.89
B-1	5/22/1996	18.62	--	--	5.03	13.59
B-1	6/5/1996	18.62	--	--	5.88	12.74
B-1	6/24/1996	18.62	--	--	6.80	11.82
B-1	7/15/1996	18.62	--	--	7.48	11.14
B-1	1/3/1997	18.62	--	--	3.55	15.07
B-1	3/12/1997	18.62	--	--	4.62	14.00
B-1	4/2/1997	18.62	--	--	4.93	13.69
B-1	5/1/1997	18.62	--	--	5.52	13.10
B-1	8/19/1997	18.62	--	--	7.51	11.11
B-1	9/17/1997	18.62	--	--	6.80	11.82
B-1	5/1/1998	18.62	--	--	6.42	12.20
B-1	5/23/2000	18.62	--	--	6.53	12.09
B-1	5/24/2001	18.62	--	--	6.65	11.97
B-1	6/5/2002	18.62	--	--	6.52	12.10
B-1	5/29/2003	18.62	--	--	6.81	11.81
B-1	6/15/2004	18.62	--	--	7.43	11.19
B-1	6/20/2005	18.62	--	--	6.43	12.19
B-1	6/5/2006	18.62	--	--	6.13	12.49
B-1	10/23/2006	18.62	--	--	7.86	10.76
B-1	3/14/2007	21.61	--	--	5.00	16.61
B-1	9/10/2007	21.61	--	--	8.00	13.61
B-1	12/13/2007	21.61	--	--	5.97	15.64
B-1	1/21/2008	21.61	--	--	5.09	16.52
B-1	2/24/2008	21.61	--	--	5.63	15.98

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
B-1	3/24/2008	21.61	--	--	6.20	15.41
B-1	6/2/2008	21.61	--	--	7.17	14.44
B-1	8/25/2008	21.61	--	--	7.95	13.66
B-1	2/18/2009	21.61			Not Monitored	
B-1	8/25/2009	21.61			Not Monitored	
B-1	3/22/2010	21.61	--	--	5.09	16.52
B-1	8/23/2010	21.61	--	--	7.50	14.11
B-1	2/7/2011	21.61	--	--	5.00	16.61
B-1	5/27/2011	21.61	--	--	6.73	14.88
B-1	11/14/2011	21.61	--	--	7.58	14.03
B-1	2/20/2012	21.61	--	--	4.82	16.79
B-1	8/22/2012	21.61	--	--	7.50	14.11
B-1	11/5/2012	21.61	--	--	7.21	14.40
B-1	1/28/2013	21.61	--	--	4.93	16.68
B-2	1/27/1993	18.60	--	1.08	6.20	13.21
B-2	3/12/1993	18.60	--	0.24	8.15	10.63
B-2	4/14/1993	18.60	--	1.25	8.82	10.72
B-2	6/30/1993	18.60	--	0.75	8.47	10.69
B-2	12/15/1993	18.60	--	0.21	8.62	10.14
B-2	2/8/1994	18.60	--	0.50	6.63	12.35
B-2	7/8/1994	18.60	--	--	8.95	9.65
B-2	8/12/1994	18.60	--	--	9.34	9.26
B-2	9/21/1994	18.60	--	0.10	9.70	8.98
B-2	11/4/1994	18.60	--	0.12	9.68	9.01
B-2	12/23/1994	18.60	--	--	5.18	13.42
B-2	2/3/1995	18.60			Not Monitored	
B-2	2/22/1995	18.60	--	0.03	6.03	12.59
B-2	5/15/1995	18.60	--	0.04	6.46	12.17
B-2	6/16/1995	18.60	--	--	6.92	11.68
B-2	10/20/1995	18.60	--		8.10	10.50
B-2	4/4/1996	18.60	--	0.83	5.40	13.82
B-2	4/16/1996	18.60	--	--	4.80	13.80
B-2	5/10/1996	18.60	--	0.43	4.88	14.04
B-2	5/15/1996	18.60	--	0.42	4.85	14.07
B-2	5/22/1996	18.60	--	0.05	7.14	11.50
B-2	6/5/1996	18.60	--	--	5.62	12.98
B-2	6/24/1996	18.60	--	--	8.17	10.43
B-2	7/15/1996	18.60	--	--	8.65	9.95
B-2	8/23/1996	18.60	--	--	9.08	9.52
B-2	9/18/1996	18.60	--	--	9.33	9.27
B-2	1/3/1997	18.60	--	--	3.91	14.69
B-2	3/12/1997	18.60	--	--	7.05	11.55
B-2	4/2/1997	18.60	--	--	7.15	11.45
B-2	5/1/1997	18.60	--	--	7.49	11.11
B-2	7/8/1997	18.60	--	0.02	6.03	12.59
B-2	8/19/1997	18.60	--	--	8.43	10.17
B-2	8/26/1997	18.60	--	--	8.52	10.08
B-2	9/18/1997	18.60	--	--	7.70	10.90
B-2	4/29/1998	18.60	--	--	6.47	12.13
B-2	7/30/1999	18.60	--	--	7.00	11.60
B-2	5/23/2000	18.60	--	--	6.67	11.93
B-2	5/24/2001	18.60	--	0.14	8.24	10.47
B-2	6/5/2002	18.60	--	0.31	6.56	12.27
B-2	5/29/2003	18.60	--	--	7.75	10.85
B-2	6/15/2004	18.60	--	--	8.76	9.84
B-2	6/20/2005	18.60	--	0.29	6.34	12.48
B-2	6/5/2006	18.60	--	0.02	8.87	9.75
B-2	10/23/2006	18.60	--	--	8.15	10.45
B-2	3/14/2007	21.82	--	--	5.23	16.59
B-2	9/10/2007	21.82	--	--	9.31	12.51
B-2	11/28/2007	21.82	3.85	1.50	5.35	17.60
B-2	12/13/2007	21.82	4.16	3.37	7.53	16.82
B-2	1/21/2008	21.82	--	--	7.08	14.74
B-2	2/24/2008	21.82	--	--	6.48	15.34
B-2	3/24/2008	21.82	--	--	7.19	14.63
B-2	6/2/2008	21.82	--	--	8.47	13.35
B-2	8/25/2008	21.82	--	--	8.85	12.97
B-2	2/18/2009	21.82			Not Monitored	
B-2	8/25/2009	21.82			Not Monitored	
B-2	3/22/2010	21.82	--	--	5.29	16.53

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
B-2	8/23/2010	21.82	--	--	7.37	14.45
B-2	2/7/2011	21.82	--	--	6.27	15.55
B-2	5/27/2011	21.82	--	--	7.26	14.56
B-2	11/14/2011	21.82	--	--	8.71	13.11
B-2	2/20/2012	21.82	--	--	7.12	14.70
B-2	8/22/2012	21.82	--	--	7.68	14.14
B-2	11/5/2012	21.82	--	--	8.78	13.04
B-2	1/28/2013	21.82	--	--	5.08	16.74
B-3	1/27/1993	18.73	--	4.64	10.18	12.03
B-3	3/12/1993	18.73	--	3.49	11.64	9.71
B-3	4/14/1993	18.73	--	2.64	10.75	9.96
B-3	6/30/1993	18.73	--	2.36	11.21	9.29
B-3	12/15/1993	18.73	--	0.68	11.05	8.19
B-3	2/8/1994	18.73	--	4.07	11.48	10.30
B-3	7/8/1994	18.73	--	2.37	11.58	8.93
B-3	8/12/1994	18.73	--	1.70	11.55	8.46
B-3	9/21/1994	18.73	--	0.82	11.60	7.75
B-3	11/4/1994	18.73	--	1.20	11.60	8.03
B-3	12/23/1994	18.73	--	6.00	11.95	11.28
B-3	2/3/1995	18.73	--	0.05	5.00	13.77
B-3	2/22/1995	18.73	--	8.63	13.68	11.52
B-3	3/24/1995	18.73	--	6.30	11.60	11.86
B-3	4/27/1995	18.73	--	3.70	9.90	11.61
B-3	5/15/1995	18.73	--	5.06	11.46	11.07
B-3	6/16/1995	18.73	--	4.53	11.48	10.65
B-3	8/25/1995	18.73	--	3.44	11.47	9.84
B-3	10/20/1995	18.73	--	0.55	9.91	9.23
B-3	4/4/1996	18.73	--	6.34	11.12	12.37
B-3	4/16/1996	18.73	--	5.28	10.04	12.65
B-3	5/10/1996	18.73	--	3.09	7.49	13.56
B-3	5/15/1996	18.73	--	2.52	6.93	13.69
B-3	5/22/1996	18.73	--	0.44	7.69	11.37
B-3	6/5/1996	18.73	--	1.54	9.31	10.58
B-3	6/24/1996	18.73	--	3.35	11.78	9.46
B-3	7/15/1996	18.73	--	2.77	11.59	9.22
B-3	8/23/1996	18.73	--	2.11	11.66	8.65
B-3	9/18/1996	18.73	--	1.96	11.63	8.57
B-3	1/3/1997	18.73	--	0.45	5.00	14.07
B-3	3/12/1997	18.73	--	0.61	8.15	11.04
B-3	4/2/1997	18.73	--	--	7.62	11.11
B-3	5/1/1997	18.73	--	1.20	7.93	11.70
B-3	7/8/1997	18.73	--	5.02	11.00	11.50
B-3	8/19/1997	18.73	--	2.52	11.12	9.50
B-3	8/26/1997	18.73	--	2.77	11.57	9.24
B-3	9/18/1997	18.73	--	0.37	10.28	8.73
B-3	4/30/1998	18.73	--	5.56	11.59	11.31
B-3	7/28/1999	18.73	--	4.77	11.63	10.68
B-3	5/23/2000	18.73	--	3.73	10.63	10.90
B-3	5/24/2001	18.73	--	2.00	10.81	9.42
B-3	6/5/2002	18.73	--	5.48	11.45	11.39
B-3	5/27/2003	18.73	--	3.55	11.42	9.97
B-3	6/15/2004	18.73	--	2.35	11.50	8.99
B-3	6/20/2005	18.73	--	3.52	9.30	12.07
B-3	6/5/2006	18.73	--	0.02	5.82	12.93
B-3	10/23/2006	18.73	--	0.91	9.05	10.36
B-3	3/14/2007	21.77	--	0.08	5.56	16.27
B-3	9/10/2007	21.77	--	0.08	10.21	11.62
B-3A	11/28/2007	21.77	--	--	8.60	13.17
B-3A	12/13/2007	21.77	--	--	7.96	13.81
B-3A	1/21/2008	21.77	--	--	7.09	14.68
B-3A	2/24/2008	21.77	--	--	6.69	15.08
B-3A	3/24/2008	21.77	--	--	7.38	14.39
B-3A	6/2/2008	21.85	--	--	8.62	13.23
B-3A	8/25/2008	21.85	--	--	8.93	12.92
B-3A	2/18/2009	21.85			Not Monitored	
B-3A	8/25/2009	21.85			Not Monitored	
B-3A	3/22/2010	21.85	--	--	5.31	16.54

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
B-3A	8/23/2010	21.85	7.31	0.23	7.54	14.48
B-3A	2/7/2011	21.85	--	--	6.56	15.29
B-3A	5/27/2011	21.85			7.75	14.10
B-3A	8/8/2011	21.85	--	--	8.61	13.24
B-3A	11/14/2011	21.85	--	--	8.87	12.98
B-3A	2/20/2012	21.85	--	--	7.69	14.16
B-3A	8/22/2012	21.85	--	--	7.79	14.06
B-3A	11/5/2012	21.85	--	--	9.07	12.78
B-3A	1/28/2013	21.85	--	--	5.31	16.54
B-4	1/27/1993	18.09	--	0.59	5.16	13.37
B-4	3/12/1993	18.09	--	0.03	7.48	10.63
B-4	4/14/1993	18.09	--	0.07	7.23	10.91
B-4	6/30/1993	18.09	--	--	7.20	10.89
B-4	12/15/1993	18.09	--	0.30	8.01	10.31
B-4	2/8/1994	18.09	--	0.78	6.29	12.39
B-4	7/8/1994	18.09	--	--	8.42	9.67
B-4	8/12/1994	18.09	--	--	8.79	9.30
B-4	9/21/1994	18.09	--	--	9.07	9.02
B-4	11/4/1994	18.09	--	--	8.94	9.15
B-4	12/23/1994	18.09	--	0.34	4.69	13.66
B-4	2/3/1995	18.09	--	0.90	5.00	13.77
B-4	2/22/1995	18.09	--	0.64	5.77	12.80
B-4	3/24/1995	18.09	--	0.90	6.09	12.68
B-4	4/27/1995	18.09	--	0.50	6.00	12.47
B-4	5/15/1995	18.09	--	0.44	6.24	12.18
B-4	6/16/1995	18.09	--	0.03	6.42	11.69
B-4	8/25/1995	18.09	--	--	7.14	10.95
B-4	10/20/1995	18.09	--	--	7.12	10.97
B-4	4/4/1996	18.09	--	--	5.03	13.06
B-4	4/16/1996	18.09	--	0.49	4.75	13.71
B-4	5/10/1996	18.09	--	0.92	4.71	14.07
B-4	5/15/1996	18.09	--	0.87	4.61	14.13
B-4	5/22/1996	18.09	--	0.68	7.10	11.50
B-4	6/5/1996	18.09	--	0.10	7.17	11.00
B-4	6/24/1996	18.09	--	--	7.67	10.42
B-4	7/15/1996	18.09	--	--	8.13	9.96
B-4	8/23/1996	18.09	--	--	8.59	9.50
B-4	9/18/1996	18.09	--	--	8.78	9.31
B-4	1/3/1997	18.09	--	1.61	4.46	14.84
B-4	3/12/1997	18.09	--	0.10	6.45	11.72
B-4	4/2/1997	18.09	--	0.01	6.54	11.56
B-4	5/1/1997	18.09	--	--	6.87	11.22
B-4	8/19/1997	18.09	--	--	7.87	10.22
B-4	8/26/1997	18.09	--	--	8.08	10.01
B-4	9/18/1997	18.09	--	--	7.40	10.69
B-4	4/30/1998	18.09	--	0.02	5.93	12.18
B-4	7/29/1999	18.09	--	--	6.42	11.67
B-4	5/23/2000	18.09	--	--	6.10	11.99
B-4	5/23/2001	18.09	--	--	7.46	10.63
B-4	6/5/2002	18.09	--	0.48	6.18	12.27
B-4	5/29/2003	18.09	--	sheen	7.10	10.99
B-4	6/15/2004	18.09	--	0.05	8.20	9.93
B-4	6/20/2005	18.09	--	0.48	5.95	12.50
B-4	6/5/2006	18.09	--	0.55	5.67	12.83
B-4	10/23/2006	18.09	--	0.04	7.60	10.52
B-4	3/14/2007	21.28	--	0.21	4.66	16.78
B-4	9/10/2007	21.28	--	--	8.78	12.50
B-4	11/28/2007	21.28	--	--	7.62	13.66
B-4	12/13/2007	21.28	--	--	6.82	14.46
B-4	1/21/2008	21.28			Not Monitored	
B-4	2/24/2008	21.28	--	--	5.88	15.40
B-4	3/24/2008	21.28	--	--	6.52	14.76
B-4	6/2/2008	21.28	--	--	7.96	13.32
B-4	8/25/2008	21.28	--	--	8.35	12.93
B-4	2/18/2009	21.28			Not Monitored	
B-4	8/25/2009	21.28			Not Monitored	
B-4	3/22/2010	21.28	4.64	0.46	5.10	16.53
B-4	8/23/2010	21.28	6.79	0.46	7.25	14.38

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
B-4	2/7/2011	21.28	5.46	0.19	5.65	15.77
B-4	5/27/2011	21.28	6.72	0.09	6.81	14.47
B-4	2/20/2012	21.28	--	--	6.49	14.79
B-4	8/22/2012	21.28	--	--	7.14	14.14
B-4	11/5/2012	21.28	--	--	7.91	13.37
B-4	1/28/2013	21.28	--	--	4.71	16.57
B-5	1/27/1993	17.97	--	--	4.48	13.49
B-5	3/12/1993	17.97	--	--	7.98	9.99
B-5	4/14/1993	17.97	--	--	7.64	10.33
B-5	6/30/1993	17.97	--	--	7.03	10.94
B-5	12/15/1993	17.97	--	--	7.35	10.62
B-5	2/8/1994	17.97	--	0.03	5.40	12.59
B-5	7/8/1994	17.97	--	0.05	8.58	9.43
B-5	8/12/1994	17.97	--	0.01	8.78	9.20
B-5	9/21/1994	17.97	--	0.06	9.02	9.00
B-5	11/4/1994	17.97	--	0.07	8.96	9.06
B-5	12/23/1994	17.97	--	0.01	4.23	13.75
B-5	2/3/1995	17.97	--	0.04	4.30	13.70
B-5	2/22/1995	17.97	--	0.34	5.74	12.49
B-5	3/24/1995	17.97	--	0.78	5.93	12.63
B-5	4/27/1995	17.97	--	0.90	6.00	12.65
B-5	5/15/1995	17.97	--	0.90	6.30	12.35
B-5	6/16/1995	17.97	--	0.84	6.73	11.87
B-5	8/25/1995	17.97	--	0.07	6.87	11.15
B-5	10/20/1995	17.97	--	--	7.39	10.58
B-5	4/4/1996	17.97	--	--	4.24	13.73
B-5	4/16/1996	17.97	--	--	3.85	14.12
B-5	5/10/1996	17.97	--	--	3.63	14.34
B-5	5/15/1996	17.97	--	--	3.60	14.37
B-5	5/22/1996	17.97	--	--	7.46	10.51
B-5	6/5/1996	17.97	--	0.01	7.77	10.21
B-5	6/24/1996	17.97	--	--	7.57	10.40
B-5	7/15/1996	17.97	--	--	8.35	9.62
B-5	8/23/1996	17.97	--	--	8.62	9.35
B-5	9/18/1996	17.97	--	--	8.75	9.22
B-5	1/3/1997	17.97	--	--	2.95	15.02
B-5	3/12/1997	17.97	--	--	7.38	10.59
B-5	4/2/1997	17.97	--	--	7.43	10.54
B-5	5/1/1997	17.97	--	--	7.68	10.29
B-5	8/19/1997	17.97	--	--	7.56	10.41
B-5	8/26/1997	17.97	--	--	7.88	10.09
B-5	9/17/1997	17.97	--	--	7.53	10.44
B-5	4/29/1998	17.97	--	--	5.61	12.36
B-5	7/29/1999	17.97	--	--	6.09	11.88
B-5	5/23/2000	17.97	--	--	5.95	12.02
B-5	5/23/2001	17.97	--	--	7.95	10.02
B-5	6/5/2002	17.97	--	--	5.27	12.70
B-5	5/29/2003	17.97	--	sheen	6.82	11.15
B-5	6/15/2004	17.97	--	--	7.37	10.60
B-5	6/22/2005	17.97	--	--	5.29	12.68
B-5	6/5/2006	17.97	--	--	4.91	13.06
B-5	10/23/2006	17.97	--	--	7.24	10.73
B-5	3/14/2007	20.95	--	--	4.16	16.79
B-5	9/10/2007	20.95	--	--	8.77	12.18
B-5	11/28/2007	20.95	3.45	0.38	3.83	17.41
B-5	12/13/2007	20.94	--	--	7.56	13.38
B-5	1/21/2008	20.94	--	--	6.77	14.17
B-5	2/24/2008	20.94	--	--	5.56	15.38
B-5	3/24/2008	20.94	--	--	6.24	14.70
B-5	6/2/2008	20.95	--	--	8.21	12.74
B-5	8/25/2008	20.95	--	--	7.86	13.09
B-5	2/18/2009	20.95			Not Monitored	
B-5	8/25/2009	20.95			Not Monitored	
B-5	3/22/2010	20.95	--	--	4.25	16.70
B-5	8/23/2010	20.95	6.38	0.30	6.68	14.50
B-5	2/7/2011	20.95	--	--	5.41	15.54
B-5	5/27/2011	20.95	--	--	7.39	13.56
B-5	11/14/2011	20.95	--	--	8.15	12.80
B-5	2/20/2012	20.95	--	--	7.13	13.82
B-5	8/22/2012	20.95	--		6.80	14.15

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
B-5	11/5/2012	20.95	--	--	7.71	13.24
B-5	1/28/2013	20.95	--	--	4.03	16.92
B-6	1/27/1993	17.94	--	--	6.15	11.79
B-6	3/12/1993	17.94	--	--	7.86	10.08
B-6	4/14/1993	17.94	--	--	7.89	10.05
B-6	6/30/1993	17.94	--	--	7.26	10.68
B-6	12/15/1993	17.94	--	--	7.69	10.25
B-6	2/8/1994	17.94	--	--	5.61	12.33
B-6	7/8/1994	17.94	--	--	8.52	9.42
B-6	8/12/1994	17.94	--	0.76	9.38	9.13
B-6	9/21/1994	17.94	--	1.37	10.08	8.89
B-6	11/4/1994	17.94	--	1.76	10.48	8.78
B-6	12/23/1994	17.94	--	--	4.77	13.17
B-6	2/3/1995	17.94	--	0.05	4.79	13.19
B-6	2/22/1995	17.94	--	0.01	5.07	12.88
B-6	3/24/1995	17.94	--	0.77	6.97	11.55
B-6	4/27/1995	17.94	--	0.10	3.65	14.37
B-6	5/15/1995	17.94	--	0.46	6.10	12.19
B-6	6/16/1995	17.94	--	0.69	6.71	11.75
B-6	8/25/1995	17.94	--	0.37	7.20	11.02
B-6	10/20/1995	17.94	--	0.18	7.54	10.54
B-6	4/4/1996	17.94	--	1.46	5.79	13.25
B-6	4/16/1996	17.94	--	2.24	5.92	13.70
B-6	5/10/1996	17.94	--	2.20	5.64	13.95
B-6	5/15/1996	17.94	--	2.33	5.72	13.97
B-6	5/17/1996	17.94			Not Monitored	
B-6	5/22/1996	17.94	--	--	7.34	10.60
B-6	6/5/1996	17.94	--	0.41	8.00	10.25
B-6	6/24/1996	17.94	--	0.25	8.20	9.93
B-6	7/15/1996	17.94	--	0.59	8.77	9.61
B-6	8/23/1996	17.94	--	0.92	9.34	9.29
B-6	9/18/1996	17.94	--	0.91	9.51	9.11
B-6	1/3/1997	17.94	--	--	3.71	14.23
B-6	3/12/1997	17.94	--	--	7.01	10.93
B-6	4/2/1997	17.94	--	--	7.56	10.38
B-6	5/1/1997	17.94	--	--	7.65	10.29
B-6	8/19/1997	17.94	--	--	7.81	10.13
B-6	9/17/1997	17.94	--	--	7.00	10.94
B-6	4/29/1998	17.94	--	--	5.89	12.05
B-6	7/29/1999	17.94	--	--	6.15	11.79
B-6	5/24/2001	17.94	--	--	8.05	9.89
B-6	6/5/2002	17.94	--	0.10	5.65	12.37
B-6	5/29/2003	17.94	--	--	7.08	10.86
B-6	6/15/2004	17.94	--	--	8.42	9.52
B-6	6/22/2005	17.94	--	--	5.44	12.50
B-6	6/5/2006	17.94	--	--	5.10	12.84
B-6	10/23/2006	17.94	--	--	7.34	10.60
B-6	3/14/2007	21.00	--	--	4.46	16.54
B-6	9/10/2007	21.00	--	--	8.76	12.24
B-6	11/28/2007	21.00	--	--	9.50	11.50
B-6	12/13/2007	21.00	--	--	1.79	19.21
B-6	1/21/2008	21.00	--	--	11.60	9.40
B-6	2/24/2008	21.00	--	--	5.78	15.22
B-6	3/24/2008	21.00	--	--	6.47	14.53
B-6	6/2/2008	21.00	--	--	7.99	13.01
B-6	8/25/2008	21.00	--	--	8.11	12.89
B-6	2/18/2009	21.00			Not Monitored	
B-6	8/25/2009	21.00			Not Monitored	
B-6	3/22/2010	21.00	--	--	4.31	16.69
B-6	8/23/2010	21.00	--	--	6.40	14.60
B-6	2/7/2011	21.00	--	--	5.60	15.40
B-6	5/27/2011	21.00			7.01	13.99
B-6	8/8/2011	21.00	--	--	6.24	14.76
B-6	11/14/2011	21.00	--	--	8.19	12.81
B-6	2/20/2012	21.00	--	--	7.34	13.66
B-6	8/22/2012	21.00	--	--	6.92	14.08
B-6	11/5/2012	21.00	--	--	7.90	13.10
B-6	1/28/2013	21.00	--	--	4.42	16.58
D-1	1/27/1993	18.03	--	--	5.53	12.50

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
D-1	3/12/1993	18.03	--	--	6.65	11.38
D-1	4/14/1993	18.03	--	--	5.84	12.19
D-1	12/15/1993	18.03	--	--	6.59	11.44
D-1	11/4/1994	18.03	--	--	7.55	10.48
D-1	2/22/1995	18.03	--	--	5.90	12.13
D-1	6/16/1995	18.03	--	--	6.86	11.17
D-1	10/20/1995	18.03	--	--	6.60	11.43
D-1	4/4/1996	18.03	--	--	6.44	11.59
D-1	4/16/1996	18.03	--	--	6.36	11.67
D-1	5/1/1997	18.03	--	--	6.06	11.97
D-1R	11/14/2011	20.13	--	--	8.66	11.47
D-1R	2/20/2012	20.13	--	--	7.31	12.82
D-1R	8/22/2012	20.13	--	--	9.49	10.64
D-1R	11/5/2012	20.13	--	--	7.77	12.36
D-1R	1/28/2013	20.13	--	--	7.78	12.35
D-4	11/4/1994	17.82	--	--	6.44	11.38
D-4	2/22/1995	17.82	--	--	3.95	13.87
D-4	6/16/1995	17.82	--	--	6.37	11.45
D-4	10/20/1995	17.82	--	--	6.10	11.72
D-4	4/4/1996	17.82	--	--	5.17	12.65
D-4	4/16/1996	17.82	--	--	5.40	12.42
D-4	4/30/1998	17.82	--	--	5.68	12.14
D-4	6/5/2002	17.82			Dry	
D-4	5/27/2003	17.82			Dry	
D-4	6/15/2004	17.82			Dry	
D-4	6/21/2005	17.82	--	--	5.90	11.92
D-4	6/5/2006	17.82	--	--	4.77	13.05
D-4	10/23/2006	17.82	--	--	5.82	DRY
D-4	3/14/2007	21.09	--	--	5.30	15.79
D-4	9/10/2007	21.09	--	--	5.57	15.52
D-4	11/28/2007	21.09	--	--	4.10	16.99
D-4	12/13/2007	21.09	--	--	5.00	16.09
D-4	1/21/2008	21.09	--	--	6.00	15.09
D-4	2/24/2008	21.09	--	--	4.15	16.94
D-4	3/24/2008	21.09	--	--	3.47	17.62
D-4	6/2/2008	21.09			Dry	
D-4	8/25/2008	21.09	--	--	2.89	18.20
D-4	2/18/2009	21.09			Not Monitored	
D-4	8/25/2009	21.09			Not Monitored	
D-4	3/22/2010	21.09	--	--	5.41	15.68
D-4	8/23/2010	21.09	--	--	5.75	15.34
D-4	2/7/2011	21.09	--	--	2.93	18.16
D-4	5/27/2011	21.09	--	--	4.87	16.22
D-4	8/8/2011	21.09			Dry	
D-4	10/13/2011		Decomissioned Well and Replaced With D-4R			
D-4R	11/14/2011	21.27	--	--	9.06	12.21
D-4R	2/20/2012	21.27	--	--	7.85	13.42
D-4R	8/22/2012	21.27	--	--	10.22	11.05
D-4R	11/5/2012	21.27	--	--	8.37	12.90
D-4R	1/28/2013	21.27	--	--	8.11	13.16
D-5	1/27/1993	18.12	--	--	5.51	12.61
D-5	4/14/1993	18.12	--	--	5.58	12.54
D-5	12/15/1993	18.12	--	--	6.55	11.57
D-5	11/4/1994	18.12	--	--	6.56	11.56
D-5	2/22/1995	18.12	--	--	4.10	14.02
D-5	6/16/1995	18.12	--	--	6.77	11.35
D-5	10/20/1995	18.12	--	--	6.55	11.57
D-5	4/4/1996	18.12	--	--	4.51	13.61
D-5	4/16/1996	18.12	--	--	4.94	13.18
D-5	5/1/1997	18.12	--	--	6.50	11.62
D-5	4/30/1998	18.12	--	--	6.61	11.51
D-5	5/27/2003	18.12			Dry	
D-5	6/15/2004	18.12			Dry	
D-5	6/21/2005	18.12			Dry	
D-5	6/5/2006	18.12	--	--	6.51	11.61
D-5	10/23/2006	18.12			Dry	
D-5	3/14/2007	21.33			Dry	

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
D-5	9/10/2007	21.33			Dry	
D-5	11/28/2007	21.33	--	--	6.74	14.59
D-5	12/13/2007	21.33	--	--	2.30	19.03
D-5	1/21/2008	21.33			Not Monitored	
D-5	2/24/2008	21.33	--	--	6.23	15.10
D-5	3/24/2008	21.33			Dry	
D-5	6/2/2008	21.33			Dry	
D-5	8/25/2008	21.33	--	--	6.91	14.42
D-5	2/18/2009	21.33			Not Monitored	
D-5	8/25/2009	21.33			Not Monitored	
D-5	3/22/2010	21.33			Dry	
D-5	8/23/2010	21.33	--	--	6.82	14.51
D-5	2/7/2011	21.33	--	--	6.90	14.43
D-5	5/27/2011	21.33			Not Monitored	
D-5	8/8/2011	21.33			Dry	
D-5	10/6/2011		Decomissioned Well and Replaced With D-5R			
D-5R	11/14/2011	21.45	--	--	9.39	12.06
D-5R	2/20/2012	21.45	--	--	8.33	13.12
D-5R	8/22/2012	21.45	--	--	10.44	11.01
D-5R	11/5/2012	21.45	--	--	8.79	12.66
D-5R	1/28/2013	21.45	--	--	8.83	12.62
D-6	1/27/1993	17.74	--	1.00	5.54	12.95
D-6	3/12/1993	17.74	--	--	6.79	10.95
D-6	4/14/1993	17.74	--	--	5.68	12.06
D-6	6/30/1993	17.74	--	--	6.58	11.16
D-6	12/15/1993	17.74	--	--	7.14	10.60
D-6	2/8/1994	17.74	--	--	5.27	12.47
D-6	7/8/1994	17.74	--	--	7.43	10.31
D-6	12/23/1994	17.74	--	--	5.14	12.60
D-6	2/3/1995	17.74	--	--	4.34	13.40
D-6	2/22/1995	17.74	--	--	4.79	12.95
D-6	3/24/1995	17.74	--	--	4.55	13.19
D-6	4/27/1995	17.74	--	--	6.64	11.10
D-6	5/15/1995	17.74	--	--	5.19	12.55
D-6	6/16/1995	17.74	--	--	5.67	12.07
D-6	8/25/1995	17.74	--	--	6.42	11.32
D-6	10/20/1995	17.74	--	--	4.81	12.93
D-6	4/4/1996	17.74	--	--	1.58	16.16
D-6	4/16/1996	17.74	--	--	1.21	16.53
D-6	5/10/1996	17.74	--	--	3.50	14.24
D-6	5/15/1996	17.74	--	--	3.28	14.46
D-6	5/22/1996	17.74	--	--	5.59	12.15
D-6	6/5/1996	17.74	--	--	6.09	11.65
D-6	6/24/1996	17.74	--	--	6.55	11.19
D-6	7/15/1996	17.74	--	--	7.10	10.64
D-6	8/23/1996	17.74	--	--	7.73	10.01
D-6	9/18/1996	17.74	--	--	7.09	10.65
D-6	1/3/1997	17.74	--	--	2.77	14.97
D-6	3/12/1997	17.74	--	--	1.61	16.13
D-6	4/2/1997	17.74	--	--	5.97	11.77
D-6	5/1/1997	17.74	--	--	5.89	11.85
D-6	8/19/1997	17.74	--	--	7.28	10.46
D-6	9/17/1997	17.74	--	--	7.38	10.36
D-6	4/30/1998	17.74	--	--	5.49	12.25
D-6	5/23/2000	17.74	--	--	5.82	11.92
D-6	5/23/2001	17.74	--	--	6.92	10.82
D-6	6/5/2002	17.74	--	--	4.67	13.07
D-6	5/27/2003	17.74	--	--	6.72	11.02
D-6	6/15/2004	17.74	--	--	8.52	9.22
D-6	6/22/2005	17.74	--	--	4.67	13.07
D-6	6/5/2006	17.74	--	--	2.62	15.12
D-6	10/23/2006	17.74	--	--	6.95	10.79
D-6	3/14/2007	20.61	--	--	4.62	15.99
D-6	9/10/2007	20.61	--	--	7.92	12.69
D-6	11/28/2007	20.61	--	--	7.80	12.81
D-6	12/13/2007	20.61	--	--	6.26	14.35
D-6	1/21/2008	20.61	--	--	6.03	14.58
D-6	2/24/2008	20.61	--	--	5.93	14.68
D-6	3/24/2008	20.61	--	--	5.76	14.85
D-6	6/2/2008	20.61	--	--	6.75	13.86

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
D-6	8/25/2008	20.61	--	--	7.51	13.10
D-6	2/18/2009	20.61			Not Monitored	
D-6	8/25/2009	20.61			Not Monitored	
D-6	3/22/2010	20.61	--	--	3.85	16.76
D-6	8/23/2010	20.61	--	--	5.99	14.62
D-6	2/7/2011	20.61	--	--	3.50	17.11
D-6	5/27/2011	20.61	--	--	5.40	15.21
D-6	8/8/2011	20.61	--	--	7.05	13.56
D-6	11/14/2011	20.61	--	--	5.95	14.66
D-6	2/20/2012	20.61	--	--	5.60	15.01
D-6	8/22/2012	20.61	--	--	6.52	14.09
D-6	11/5/2012	20.61	--	--	7.26	13.35
D-7	1/27/1993	17.69	--	--	5.07	12.62
D-7	3/12/1993	17.69	--	--	6.38	11.31
D-7	4/14/1993	17.69	--	--	6.38	11.31
D-7	12/15/1993	17.69	--	--	7.37	10.32
D-7	7/8/1994	17.69	--	--	7.14	10.55
D-7	8/12/1994	17.69	--	--	7.14	10.55
D-7	11/4/1994	17.69	--	--	7.94	9.75
D-7	12/23/1994	17.69	--	--	7.14	10.55
D-7	2/3/1995	17.69	--	--	4.59	13.10
D-7	2/22/1995	17.69	--	--	5.31	12.38
D-7	3/24/1995	17.69	--	--	5.35	12.34
D-7	4/27/1995	17.69	--	--	5.18	12.51
D-7	5/15/1995	17.69	--	--	5.50	12.19
D-7	6/16/1995	17.69	--	--	5.95	11.74
D-7	8/25/1995	17.69	--	--	6.59	11.10
D-7	10/20/1995	17.69	--	--	6.00	11.69
D-7	3/24/1996	17.69	--	--	5.35	12.34
D-7	4/4/1996	17.69	--	--	4.30	13.39
D-7	4/16/1996	17.69	--	--	4.01	13.68
D-7	4/2/1997	17.69	--	--	6.04	11.65
D-7	5/1/1997	17.69	--	--	6.30	11.39
D-7	4/30/1998	17.69	--	--	5.85	11.84
D-7	5/23/2000	17.69	--	--	6.11	11.58
D-7	5/23/2001	17.69	--	--	6.85	10.84
D-7	6/4/2002	17.69	--	--	5.51	12.18
D-7	5/27/2003	17.69	--	--	6.36	11.33
D-7	6/15/2004	17.69	--	--	7.24	10.45
D-7	6/22/2005	17.69	--	--	5.11	12.58
D-7	6/5/2006	17.69	--	--	4.74	12.95
D-7	10/23/2006	17.69	--	--	7.04	10.65
D-7	3/14/2007	20.49	--	--	3.83	16.66
D-7	9/10/2007	20.49	--	--	7.67	12.82
D-7	11/28/2007	20.49	--	--	6.92	13.57
D-7	12/13/2007	20.49	--	--	2.36	18.13
D-7	1/21/2008	20.49	--	--	9.97	10.52
D-7	2/24/2008	20.49	--	--	6.03	14.46
D-7	3/24/2008	20.49			Not Monitored	
D-7	6/2/2008	20.49	--	--	6.25	14.24
D-7	8/25/2008	20.49	--	--	7.42	13.07
D-7	2/18/2009	20.49			Not Monitored	
D-7	8/25/2009	20.49			Not Monitored	
D-7	3/22/2010	20.49	--	--	4.41	16.08
D-7	8/23/2010	20.49	--	--	5.96	14.53
D-7	2/7/2011	20.49	--	--	5.36	15.13
D-7	5/27/2011	20.49	--	--	5.92	14.57
D-7	8/8/2011	20.49	--	--	6.85	13.64
D-7	11/14/2011	20.49	--	--	4.81	15.68
D-7	2/20/2012	20.49	--	--	5.04	15.45
D-7	8/22/2012	20.49	--	--	6.73	13.76
D-7	11/5/2012	20.49	--	--	7.06	13.43
D-7	1/28/2013	20.49	--	--	3.53	16.96
HA-1	1/27/1993	19.50	--	--	5.94	13.56
HA-1	3/12/1993	19.50	--	--	8.54	10.96
HA-1	4/14/1993	19.50	--	--	6.47	13.03
HA-1	12/15/1993	19.50	--	--	5.54	13.96
HA-1	11/4/1994	19.50	--	--	10.30	9.20
HA-1	2/22/1995	19.50	--	--	5.11	14.39
HA-1	6/16/1995	19.50	--	--	8.33	11.17
HA-1	10/20/1995	19.50	--	--	5.48	14.02

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-1	4/4/1996	19.50	--	--	5.81	13.69
HA-1	4/16/1996	19.50	--	--	5.78	13.72
HA-1	5/1/1997	19.50	--	--	5.59	13.91
HA-1	9/17/1997	19.50	--	--	5.50	14.00
HA-1	4/29/1998	19.50	--	--	5.83	13.67
HA-1	5/24/2000	19.50	--	--	6.20	13.30
HA-1	5/23/2001	19.50	--	--	6.30	13.20
HA-1	6/4/2002	19.50	--	--	6.40	13.10
HA-1	5/28/2003	19.50	--	--	6.45	13.05
HA-1	6/15/2004	19.50	--	--	5.80	13.70
HA-1	6/22/2005	19.50	--	--	5.77	13.73
HA-1	6/5/2006	19.50	--	--	5.00	14.50
HA-1	10/23/2006	19.50	--	--	5.97	13.53
HA-1	3/14/2007	20.76	--	--	3.42	17.34
HA-1	9/10/2007	20.76	--	--	4.46	16.30
HA-1	11/28/2007	20.76	--	--	7.32	13.44
HA-1	12/13/2007	20.76	--	--	3.83	16.93
HA-1	1/21/2008	20.76	--	--	3.87	16.89
HA-1	2/24/2008	20.76	--	--	4.46	16.30
HA-1	3/24/2008	20.76	--	--	3.06	17.70
HA-1	6/2/2008	20.76	--	--	4.83	15.93
HA-1	8/25/2008	20.76	--	--	3.33	17.43
HA-1	2/18/2009	20.76			Not Monitored	
HA-1	8/25/2009	20.76			Not Monitored	
HA-1	3/22/2010	20.76	--	--	3.94	16.82
HA-1	8/23/2010	20.76	--	--	6.68	14.08
HA-1	2/7/2011	20.76	--	--	3.88	16.88
HA-1	5/27/2011	20.76	--	--	3.76	17.00
HA-1	8/8/2011	20.76	--	--	6.10	14.66
HA-1	11/14/2011	20.76	--	--	4.01	16.75
HA-1	2/20/2012	20.76	--	--	3.01	17.75
HA-1	8/22/2012	20.76	--	--	7.42	13.34
HA-1	11/5/2012	20.76	--	--	2.98	17.78
HA-1	1/28/2013	20.76	--	--	3.17	17.59
HA-2	1/27/1993	18.17	--	--	5.80	12.37
HA-2	4/14/1993	18.17	--	--	7.12	11.05
HA-2	12/15/1993	18.17	--	--	7.84	10.33
HA-2	11/4/1994	18.17	--	--	8.45	9.72
HA-2	2/22/1995	18.17	--	--	6.39	11.78
HA-2	6/16/1995	18.17	--	--	7.03	11.14
HA-2	10/20/1995	18.17	--	--	7.29	10.88
HA-2	4/4/1996	18.17	--	--	5.43	12.74
HA-2	4/16/1996	18.17	--	--	5.17	13.00
HA-2	4/2/1997	18.17	--	--	6.80	11.37
HA-2	5/1/1997	18.17	--	--	6.98	11.19
HA-2	9/18/1997	18.17	--	--	7.34	10.83
HA-2	4/30/1998	18.17	--	--	6.74	11.43
HA-2	7/30/1999	18.17	--	--	7.03	11.14
HA-2	5/23/2000	18.17	--	--	6.94	11.23
HA-2	5/23/2001	18.17	--	--	7.50	10.67
HA-2	6/4/2002	18.17	--	--	6.45	11.72
HA-2	5/27/2003	18.17	--	sheen	7.40	10.77
HA-2	6/16/2004	18.17	--	--	7.84	10.33
HA-2	6/21/2005	18.17	--	--	6.41	11.76
HA-2	6/5/2006	18.17	--	--	6.22	11.95
HA-2	10/23/2006	18.17	--	--	7.84	10.33
HA-2	3/14/2007	21.09	--	--	5.69	15.40
HA-2	9/10/2007	21.09	--	--	7.89	13.20
HA-2	11/28/2007	21.09	--	--	7.53	13.56
HA-2	12/13/2007	21.09	6.95	0.36	7.31	14.05
HA-2	1/21/2008	21.09	--	--	6.35	14.74
HA-2	2/24/2008	21.09	--	--	6.31	14.78
HA-2	3/24/2008	21.09	--	--	6.65	14.44
HA-2	6/2/2008	21.09	--	--	7.12	13.97
HA-2	8/25/2008	21.09	--	--	7.77	13.32
HA-2	2/18/2009	21.09			Not Monitored	
HA-2	8/25/2009	21.09			Not Monitored	
HA-2	3/22/2010	21.09	--	--	5.93	15.16
HA-2	8/23/2010	21.09	--	--	6.61	14.48
HA-2	2/7/2011	21.09	--	--	6.20	14.89

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-2	5/27/2011	21.09	--	--	6.35	14.74
HA-2	8/8/2011	21.09	--	--	7.22	13.87
HA-2	11/14/2011	21.09	--	--	7.70	13.39
HA-2	2/20/2012	21.09	--	--	6.10	14.99
HA-2	8/22/2012	21.09	--	--	7.29	13.80
HA-2	11/5/2012	21.09	--	--	7.37	13.72
HA-2	1/28/2013	21.09	--	--	5.42	15.67
HA-3	1/27/1993	21.03	--	--	8.65	12.38
HA-3	3/12/1993	21.03	--	--	9.01	12.02
HA-3	4/14/1993	21.03	--	--	8.61	12.42
HA-3	12/15/1993	21.03	--	--	9.22	11.81
HA-3	11/4/1994	21.03	--	--	10.26	10.77
HA-3	2/22/1995	21.03	--	--	8.35	12.68
HA-3	6/16/1995	21.03	--	--	9.31	11.72
HA-3	10/20/1995	21.03	--	--	9.46	11.57
HA-3	4/4/1996	21.03	--	--	7.95	13.08
HA-3	4/16/1996	21.03	--	--	8.10	12.93
HA-3	4/2/1997	21.03	--	--	6.70	14.33
HA-3	5/1/1997	21.03	--	--	8.44	12.59
HA-3	9/18/1997	21.03	--	--	9.34	11.69
HA-3	4/30/1998	21.03	--	--	9.20	11.83
HA-3	5/23/2000	21.03	--	--	9.25	11.78
HA-3	5/23/2001	21.03	--	--	9.18	11.85
HA-3	6/4/2002	21.03	--	--	9.07	11.96
HA-3	5/27/2003	21.03	--	--	9.30	11.73
HA-3	6/22/2005	21.03	--	--	8.94	12.09
HA-3	6/5/2006	21.03	--	--	8.91	12.12
HA-3	10/23/2006	21.03	--	--	9.66	11.37
HA-3	3/14/2007	21.09	--	--	5.42	15.67
HA-3	9/10/2007	21.09	--	--	6.70	14.39
HA-3	11/28/2007	21.09	--	--	6.91	14.18
HA-3	12/13/2007	21.09	5.90	0.90	6.80	14.97
HA-3	1/21/2008	21.09	--	--	5.96	15.13
HA-3	2/24/2008	21.09	--	--	5.77	15.32
HA-3	3/24/2008	21.09	--	--	6.07	15.02
HA-3	6/2/2008	21.09	--	--	6.36	14.73
HA-3	8/25/2008	21.09	--	--	6.30	14.79
HA-3	2/18/2009	21.09			Not Monitored	
HA-3	8/25/2009	21.09			Not Monitored	
HA-3	3/22/2010	21.09	--	--	5.44	15.65
HA-3	8/23/2010	21.09	--	--	6.34	14.75
HA-3	2/7/2011	21.09	--	--	5.31	15.78
HA-3	5/27/2011	21.09	--	--	5.67	15.42
HA-3	8/8/2011	21.09	--	--	6.45	14.64
HA-3	11/14/2011	21.09	--	--	6.33	14.76
HA-3	2/20/2012	21.09	--	--	5.20	15.89
HA-3	8/22/2012	21.09	--	--	6.56	14.53
HA-3	11/5/2012	21.09	--	--	5.41	15.68
HA-3	1/28/2013	21.09	--	--	5.47	15.62
HA-4	1/27/1993	20.24	--	--	7.68	12.56
HA-4	3/12/1993	20.24	--	--	8.56	11.68
HA-4	4/14/1993	20.24	--	--	8.02	12.22
HA-4	12/15/1993	20.24	--	--	8.41	11.83
HA-4	11/4/1994	20.24	--	--	10.14	10.10
HA-4	2/22/1995	20.24	--	--	7.09	13.15
HA-4	6/16/1995	20.24	--	--	8.78	11.46
HA-4	10/20/1995	20.24	--	--	8.54	11.70
HA-4	4/4/1996	20.24	--	--	7.68	12.56
HA-4	4/16/1996	20.24	--	--	7.11	13.13
HA-4	4/2/1997	20.24	--	--	8.00	12.24
HA-4	5/1/1997	20.24	--	--	5.49	14.75
HA-4	9/18/1997	20.24	--	--	7.70	12.54
HA-4	4/30/1998	20.24	--	--	8.67	11.57
HA-4	5/23/2000	20.24	--	--	7.35	12.89
HA-4	5/23/2001	20.24	--	--	8.95	11.29
HA-4	6/4/2002	20.24	--	--	6.45	13.79
HA-4	5/27/2003	20.24	--	--	8.64	11.60
HA-4	6/16/2004	20.24	--	--	8.67	11.57
HA-4	6/22/2005	20.24	--	--	8.58	11.66

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-4	6/5/2006	20.24	--	--	8.04	12.20
HA-4	10/23/2006	20.24	--	--	9.00	11.24
HA-4	3/14/2007	21.05	--	--	5.06	15.99
HA-4	9/10/2007	21.05	--	--	6.77	14.28
HA-4	11/28/2007	21.05	--	--	5.42	15.63
HA-4	12/13/2007	21.05	--	--	6.20	14.85
HA-4	1/21/2008	21.05	--	--	5.08	15.97
HA-4	2/24/2008	21.05	--	--	5.78	15.27
HA-4	3/24/2008	21.05	--	--	5.15	15.90
HA-4	6/2/2008	21.05	--	--	6.37	14.68
HA-4	8/25/2008	21.05	--	--	4.15	16.90
HA-4	2/18/2009	21.05			Not Monitored	
HA-4	8/25/2009	21.05			Not Monitored	
HA-4	3/22/2010	21.05	--	--	5.69	15.36
HA-4	8/23/2010	21.05	--	--	6.75	14.30
HA-4	2/7/2011	21.05	--	--	5.17	15.88
HA-4	5/27/2011	21.05	--	--	5.61	15.44
HA-4	8/8/2011	21.05	--	--	6.63	14.42
HA-4	11/14/2011	21.05	--	--	4.71	16.34
HA-4	2/20/2012	21.05	--	--	4.90	16.15
HA-4	8/22/2012	21.05	--	--	10.72	10.33
HA-4	11/5/2012	21.05	--	--	3.98	17.07
HA-4	1/28/2013	21.05	--	--	3.54	17.51
HA-5	1/27/1993	18.07	--	--	4.50	13.57
HA-5	3/12/1993	18.07	--	--	6.22	11.85
HA-5	4/14/1993	18.07	--	--	5.13	12.94
HA-5	12/15/1993	18.07	--	--	6.39	11.68
HA-5	11/4/1994	18.07	--	--	7.86	10.21
HA-5	2/22/1995	18.07	--	--	3.67	14.40
HA-5	6/16/1995	18.07	--	--	6.70	11.37
HA-5	10/20/1995	18.07	--	--	6.41	11.66
HA-5	4/4/1996	18.07	--	--	4.88	13.19
HA-5	4/16/1996	18.07	--	--	4.91	13.16
HA-5	5/1/1997	18.07	--	--	5.04	13.03
HA-5	9/18/1997	18.07	--	--	5.90	12.17
HA-5	5/1/1998	18.07	--	--	5.98	12.09
HA-5	7/29/1999	18.07	--	--	6.53	11.54
HA-5	5/23/2000	18.07	--	--	6.22	11.85
HA-5	5/22/2001	18.07	--	--	6.09	11.98
HA-5	6/5/2002	18.07	--	--	6.08	11.99
HA-5	11/24/2002	21.13	--	--	6.80	14.33
HA-5	1/17/2003	21.13	4.37	0.00	4.37	16.76
HA-5	1/20/2003	21.13	--	--	4.58	16.55
HA-5	1/31/2003	21.13	--	--	4.49	16.64
HA-5	2/7/2003	21.13	--	--	4.46	16.67
HA-5	2/12/2003	21.13	--	--	4.93	16.20
HA-5	2/18/2003	21.13	--	--	5.30	15.83
HA-5	2/21/2003	21.13	--	--	5.14	15.99
HA-5	2/24/2003	21.13	--	--	5.23	15.90
HA-5	3/4/2003	21.13	--	--	5.55	15.58
HA-5	3/12/2003	21.13	--	--	5.24	15.89
HA-5	3/14/2003	21.13	5.25	0.01	5.26	15.88
HA-5	3/26/2003	21.13	--	--	4.41	16.72
HA-5	3/28/2003	21.13	--	--	4.98	16.15
HA-5	4/2/2003	21.13	--	--	5.00	16.13
HA-5	4/4/2003	21.13	--	--	5.44	15.69
HA-5	4/8/2003	21.13	--	--	5.49	15.64
HA-5	4/11/2003	21.13	--	--	5.53	15.60
HA-5	4/15/2003	21.13	--	--	5.06	16.07
HA-5	4/17/2003	21.13	--	--	5.70	15.43
HA-5	4/22/2003	21.13	--	--	5.54	15.59
HA-5	4/25/2003	21.13	--	--	5.92	15.21
HA-5	5/2/2003	21.13	--	--	5.98	15.15
HA-5	5/6/2003	21.13	--	--	6.02	15.11
HA-5	5/9/2003	21.13	--	--	6.34	14.79
HA-5	5/23/2003	21.13	--	--	6.95	14.18
HA-5	5/28/2003	21.13	--	--	6.85	14.28
HA-5	6/13/2003	21.13	--	--	7.22	13.91
HA-5	6/18/2003	21.13	--	--	7.16	13.97
HA-5	6/27/2003	21.13	--	--	7.14	13.99

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-5	7/7/2003	21.13	--	--	7.47	13.66
HA-5	7/16/2003	21.13	--	--	7.57	13.56
HA-5	7/31/2003	21.13	7.82	0.01	7.83	13.31
HA-5	8/5/2003	21.13	--	--	7.90	13.23
HA-5	8/11/2003	21.13	--	--	9.01	12.12
HA-5	8/22/2003	21.13	9.24	0.01	9.25	11.89
HA-5	8/26/2003	21.13	--	--	8.19	12.94
HA-5	9/2/2003	21.13	--	--	8.48	12.65
HA-5	9/9/2003	21.13	--	--	8.93	12.20
HA-5	9/19/2003	21.13	8.80	0.01	8.81	12.33
HA-5	10/14/2003	21.13			Not Monitored	
HA-5	11/20/2003	21.13			Not Monitored	
HA-5	12/3/2003	21.13	--	--	4.44	16.69
HA-5	1/19/2004	21.13	--	--	3.99	17.14
HA-5	2/24/2004	21.13	--	--	5.26	15.87
HA-5	3/15/2004	21.13	--	--	6.11	15.02
HA-5	4/19/2004	21.13	--	--	6.62	14.51
HA-5	5/17/2004	21.13	--	--	7.15	13.98
HA-5	6/16/2004	18.07	--	--	7.01	11.06
HA-5	6/22/2004	21.13	--	--	6.98	14.15
HA-5	8/18/2004	21.13	8.10	0.01	8.11	13.03
HA-5	9/21/2004	21.13	--	--	6.97	14.16
HA-5	10/19/2004	21.13	--	--	6.28	14.85
HA-5	11/23/2004	21.13	--	--	6.52	14.61
HA-5	12/21/2004	21.13	--	--	4.56	16.57
HA-5	1/13/2005	21.13	--	--	5.84	15.29
HA-5	4/28/2005	21.13	--	--	4.88	16.25
HA-5	6/1/2005	21.13	--	--	5.17	15.96
HA-5	6/20/2005	18.07	--	--	5.82	12.25
HA-5	6/29/2005	21.13	--	--	6.59	14.54
HA-5	7/20/2005	21.13	--	--	7.00	14.13
HA-5	8/22/2005	21.13	--	--	7.20	13.93
HA-5	9/12/2005	21.13	--	--	7.82	13.31
HA-5	10/12/2005	21.13	--	--	8.35	12.78
HA-5	11/21/2005	21.13	6.02	0.01	6.03	15.11
HA-5	12/27/2005	21.13			Not Monitored	
HA-5	1/30/2006	21.13	--	--	6.10	15.03
HA-5	2/16/2006	21.13	--	--	3.97	17.16
HA-5	3/13/2006	21.13	--	--	4.94	16.19
HA-5	4/18/2006	21.13	--	--	5.28	15.85
HA-5	5/12/2006	21.13	--	--	5.70	15.43
HA-5	6/5/2006	18.07	--	--	5.42	12.65
HA-5	6/9/2006	21.13	--	--	5.31	15.82
HA-5	7/13/2006	21.13	--	--	6.39	14.74
HA-5	8/16/2006	21.13	--	--	7.35	13.78
HA-5	9/19/2006	21.13	--	--	7.80	13.33
HA-5	10/13/2006	21.13	--	--	7.52	13.61
HA-5	10/23/2006	18.07	--	--	7.54	10.53
HA-5	11/20/2006	21.13	--	--	3.70	17.43
HA-5	12/8/2006	21.13	--	--	4.69	16.44
HA-5	1/19/2007	21.13	--	--	3.22	17.91
HA-5	2/19/2007	21.13	--	--	5.25	15.88
HA-5	3/14/2007	21.13	--	--	4.38	16.75
HA-5	3/15/2007	21.13	--	--	4.31	16.82
HA-5	4/16/2007	21.13	--	--	4.76	16.37
HA-5	5/14/2007	21.13	--	--	6.05	15.08
HA-5	6/29/2007	21.13	--	--	7.17	13.96
HA-5	7/20/2007	21.13	--	--	7.57	13.56
HA-5	8/21/2007	21.13	--	--	8.15	12.98
HA-5	9/10/2007	21.13	--	--	8.24	12.89
HA-5	10/22/2007	21.13	--	--	6.92	14.21
HA-5	11/28/2007	21.13	--	--	6.33	14.80
HA-5	12/13/2007	21.13	--	--	5.08	16.05
HA-5	1/21/2008	21.13	--	--	4.96	16.17
HA-5	2/24/2008	21.13	--	--	5.73	15.40
HA-5	3/24/2008	21.13	--	--	8.99	12.14
HA-5	6/2/2008	21.13	--	--	7.04	14.09
HA-5	8/25/2008	21.13	--	--	7.65	13.48
HA-5	2/18/2009	21.13			Not Monitored	
HA-5	8/25/2009	21.13			Not Monitored	
HA-5	3/22/2010	21.13	--	--	5.56	15.57

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-5	8/23/2010	21.13	--	--	7.47	13.66
HA-5	2/7/2011	21.13	--	--	6.63	14.50
HA-5	5/27/2011	21.13			Not Monitored	
HA-5	8/8/2011	21.13	--	--	7.35	13.78
HA-5	11/14/2011	21.13	--	--	7.03	14.1
HA-5	2/20/2012	21.13	--	--	4.63	16.5
HA-5	8/22/2012	21.13	--	--	7.10	14.03
HA-5	11/5/2012	21.13	--	--	5.78	15.35
HA-5	1/28/2013	21.13	--	--	4.33	16.80
HA-6	1/27/1993	18.16	--	--	4.58	13.58
HA-6	3/12/1993	18.16	--	--	6.46	11.70
HA-6	4/14/1993	18.16	--	--	5.55	12.61
HA-6	12/15/1993	18.16	--	--	7.15	11.01
HA-6	11/4/1994	18.16	--	--	8.42	9.74
HA-6	2/22/1995	18.16	--	--	4.98	13.18
HA-6	5/15/1995	18.16	--	--	5.86	12.30
HA-6	6/16/1995	18.16	--	--	6.62	11.54
HA-6	10/20/1995	18.16	--	--	6.86	11.30
HA-6	4/4/1996	18.16	--	--	4.68	13.48
HA-6	4/16/1996	18.16	--	--	4.60	13.56
HA-6	5/10/1996	18.16	--	--	4.20	13.96
HA-6	5/15/1996	18.16	--	--	4.02	14.14
HA-6	5/22/1996	18.16	--	--	4.97	13.19
HA-6	6/5/1996	18.16	--	--	5.79	12.37
HA-6	6/24/1996	18.16	--	--	6.78	11.38
HA-6	7/15/1996	18.16	--	--	7.51	10.65
HA-6	8/23/1996	18.16	--	--	8.09	10.07
HA-6	9/18/1996	18.16	--	--	8.37	9.79
HA-6	1/3/1997	18.16	--	--	2.84	15.32
HA-6	3/12/1997	18.16	--	--	4.54	13.62
HA-6	4/2/1997	18.16	--	--	4.85	13.31
HA-6	5/1/1997	18.16	--	--	5.35	12.81
HA-6	8/19/1997	18.16	--	--	7.40	10.76
HA-6	8/26/1997	18.16	--	--	7.60	10.56
HA-6	9/17/1997	18.16	--	--	6.44	11.72
HA-6	5/1/1998	18.16	--	--	5.95	12.21
HA-6	7/30/1999	18.16	--	--	6.54	11.62
HA-6	5/22/2000	18.16	--	--	6.21	11.95
HA-6	5/22/2001	18.16	--	--	6.36	11.80
HA-6	6/5/2002	18.16	--	--	6.00	12.16
HA-6	11/24/2002	21.43	--	--	7.12	14.31
HA-6	5/28/2003	18.16	--	sheen	6.93	11.23
HA-6	6/16/2004	18.16	--	--	7.45	10.71
HA-6	1/13/2005	21.43	--	--	5.56	15.87
HA-6	4/28/2005	21.43	--	--	4.81	16.62
HA-6	6/1/2005	21.43	--	--	5.05	16.38
HA-6	6/20/2005	18.16	--	--	5.76	12.40
HA-6	6/29/2005	21.43	--	--	6.52	14.91
HA-6	7/20/2005	21.43	--	--	7.21	14.22
HA-6	8/22/2005	21.43	--	--	7.40	14.03
HA-6	9/12/2005	21.43	--	--	7.82	13.61
HA-6	10/12/2005	21.43	--	--	8.62	12.81
HA-6	11/21/2005	21.43	--	--	6.57	14.86
HA-6	12/27/2005	21.43	--	--	5.69	15.74
HA-6	1/30/2006	21.43	--	--	2.46	18.97
HA-6	2/16/2006	21.43	--	--	3.62	17.81
HA-6	3/13/2006	21.43	--	--	4.62	16.81
HA-6	4/18/2006	21.43	--	--	5.01	16.42
HA-6	5/12/2006	21.43	--	--	5.43	16.00
HA-6	6/5/2006	18.16	--	--	5.39	12.77
HA-6	6/9/2006	21.43	--	--	5.20	16.23
HA-6	7/13/2006	21.43	--	--	6.60	14.83
HA-6	8/16/2006	21.43	--	--	7.35	14.08
HA-6	9/19/2006	21.43	--	--	7.91	13.52
HA-6	10/13/2006	21.43	--	--	7.72	13.71
HA-6	10/23/2006	18.16	--	--	7.72	10.44
HA-6	11/20/2006	21.43	--	--	4.22	17.21
HA-6	12/8/2006	21.43	--	--	3.59	17.84
HA-6	1/19/2007	21.43	--	--	3.13	18.30
HA-6	2/19/2007	21.43	--	--	5.36	16.07

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-6	3/14/2007	21.43	--	--	4.37	17.06
HA-6	3/15/2007	21.43	--	--	4.25	17.18
HA-6	4/16/2007	21.43	--	--	4.50	16.93
HA-6	5/14/2007	21.43	--	--	6.20	15.23
HA-6	6/29/2007	21.43	--	--	7.25	14.18
HA-6	7/20/2007	21.43	--	--	7.71	13.72
HA-6	8/21/2007	21.43	--	--	8.35	13.08
HA-6	9/10/2007	21.43	--	--	8.46	12.97
HA-6	10/22/2007	21.43	--	--	7.55	13.88
HA-6	11/28/2007	21.43	--	--	6.62	14.81
HA-6	12/13/2007	21.43	--	--	5.49	15.94
HA-6	1/21/2008	21.43	--	--	5.21	16.22
HA-6	2/24/2008	21.43	--	--	5.73	15.70
HA-6	3/24/2008	21.43	--	--	6.05	15.38
HA-6	6/2/2008	21.43	--	--	7.24	14.19
HA-6	8/25/2008	21.43	--	--	8.00	13.43
HA-6	2/18/2009	21.43			Not Monitored	
HA-6	8/25/2009	21.43			Not Monitored	
HA-6	3/22/2010	21.43	--	--	4.96	16.47
HA-6	8/23/2010	21.43	--	--	7.32	14.11
HA-6	2/7/2011	21.43	--	--	4.81	16.62
HA-6	5/27/2011	21.43	--	--	5.64	15.79
HA-6	8/8/2011	21.43	--	--	7.61	13.82
HA-6	11/14/2011	21.43	--	--	7.38	14.05
HA-6	2/20/2012	21.43	--	--	4.80	16.63
HA-6	8/22/2012	21.43	--	--	7.24	14.19
HA-6	11/5/2012	21.43	--	--	7.00	14.43
HA-7	1/27/1993	18.44	--	2.22	6.33	13.78
HA-7	3/12/1993	18.44	--	0.61	7.30	11.60
HA-7	4/14/1993	18.44	--	1.23	7.00	12.36
HA-7	6/30/1993	18.44	--	0.84	7.36	11.71
HA-7	12/15/99	18.44	--	0.55	7.80	11.05
HA-7	2/8/1994	18.44	--	0.50	6.14	12.68
HA-7	8/12/1994	18.44	--	0.53	9.09	9.75
HA-7	9/21/1994	18.44	--	0.47	9.39	9.40
HA-7	11/4/1994	18.44	--	0.51	9.15	9.67
HA-7	12/23/1994	18.44	--	0.19	4.07	14.51
HA-7	2/3/1995	18.44	--	0.40	3.94	14.80
HA-7	2/22/1995	18.44	--	0.48	4.75	14.05
HA-7	3/24/1995	18.44	--	0.45	5.30	13.48
HA-7	4/27/1995	18.44	--	0.50	5.85	12.97
HA-7	5/15/1995	18.44	--	0.55	6.44	12.41
HA-7	6/16/1995	18.44	--	0.58	7.16	11.72
HA-7	8/25/1995	18.44	--	0.42	7.72	11.04
HA-7	10/20/1995	18.44	--	0.40	7.45	11.29
HA-7	4/4/1996	18.44	--	0.63	5.38	13.53
HA-7	4/16/1996	18.44	--	0.62	5.17	13.74
HA-7	5/10/1996	18.44	--	0.64	4.89	14.03
HA-7	5/15/1996	18.44	--	0.63	4.62	14.29
HA-7	5/22/1996	18.44	--	0.86	6.35	12.74
HA-7	6/5/1996	18.44	--	0.72	6.92	12.06
HA-7	6/24/1996	18.44	--	0.67	7.72	11.22
HA-7	7/15/1996	18.44	--	0.57	8.32	10.55
HA-7	8/23/1996	18.44	--	0.55	8.90	9.95
HA-7	9/18/1996	18.44	--	0.57	9.19	9.68
HA-7	1/3/1997	18.44	--	0.66	3.67	15.27
HA-7	3/12/1997	18.44	--	0.83	5.86	13.20
HA-7	4/2/1997	18.44	--	0.78	6.17	12.86
HA-7	5/1/1997	18.44	--	0.83	6.58	12.48
HA-7	7/8/1997	18.44	--	0.06	5.67	12.82
HA-7	8/19/1997	18.44	--	--	7.62	10.82
HA-7	8/26/1997	18.44	--	0.05	7.93	10.55
HA-7	9/18/1997	18.44	--	0.06	8.70	9.79
HA-7	4/30/1998	18.44	--	0.08	6.07	12.43
HA-7	7/29/1999	18.44	--	--	6.82	11.62
HA-7	5/22/2000	18.44	--	--	6.18	12.26
HA-7	5/22/2001	18.44	--	--	6.74	11.70
HA-7	6/5/2002	18.44	--	--	6.11	12.33
HA-7	11/24/2002	21.60	--	--	7.25	14.35
HA-7	5/28/2003	18.44	--	sheen	7.08	11.36

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-7	6/15/2004	18.44	--	--	7.83	10.61
HA-7	1/13/2005	21.60	--	--	5.70	15.90
HA-7	4/28/2005	21.60			Not Monitored	
HA-7	6/1/2005	21.60			Not Monitored	
HA-7	6/20/2005	18.44	--	--	5.71	12.73
HA-7	6/29/2005	21.60			Not Monitored	
HA-7	7/20/2005	21.60			Not Monitored	
HA-7	8/22/2005	21.60			Not Monitored	
HA-7	9/12/2005	21.60			Not Monitored	
HA-7	10/12/2005	21.60			Not Monitored	
HA-7	11/21/2005	21.60			Not Monitored	
HA-7	12/27/2005	21.60			Not Monitored	
HA-7	1/30/2006	21.60			Not Monitored	
HA-7	2/16/2006	21.60			Not Monitored	
HA-7	3/13/2006	21.60			Not Monitored	
HA-7	4/18/2006	21.60			Not Monitored	
HA-7	5/12/2006	21.60			Not Monitored	
HA-7	6/5/2006	18.44	--	--	5.28	13.16
HA-7	6/9/2006	21.60			Not Monitored	
HA-7	7/13/2006	21.60			Not Monitored	
HA-7	8/16/2006	21.60			Not Monitored	
HA-7	9/19/2006	21.60			Not Monitored	
HA-7	10/13/2006	21.60			Not Monitored	
HA-7	10/23/2006	18.44	--	--	7.86	10.58
HA-7	11/20/2006	21.60			Not Monitored	
HA-7	12/8/2006	21.60			Not Monitored	
HA-7	1/19/2007	21.60			Not Monitored	
HA-7	1/19/2007	21.60			Not Monitored	
HA-7	1/19/2007	21.60			Not Monitored	
HA-7	3/14/2007	21.60	--	--	4.47	17.13
HA-7	4/16/2007	21.60			Not Monitored	
HA-7	5/14/2007	21.60			Not Monitored	
HA-7	6/29/2007	21.60	--	--	7.35	14.25
HA-7	7/20/2007	21.60			Not Monitored	
HA-7	8/21/2007	21.60			Not Monitored	
HA-7	9/10/2007	21.60	--	--	8.78	12.82
HA-7	10/22/2007	21.60			Not Monitored	
HA-7	11/28/2007	21.60	--	--	7.02	14.58
HA-7	12/13/2007	21.60			Not Monitored	
HA-7	1/21/2008	21.60	--	--	5.27	16.33
HA-7	2/24/2008	21.60	--	--	5.97	15.63
HA-7	3/24/2008	21.60	--	--	6.34	15.26
HA-7	6/2/2008	21.60	--	--	7.62	13.98
HA-7	8/25/2008	21.60	--	--	8.27	13.33
HA-7	2/18/2009	21.60			Not Monitored	
HA-7	8/25/2009	21.60			Not Monitored	
HA-7	3/22/2010	21.60	--	--	5.19	16.41
HA-7	8/23/2010	21.60	--	--	7.38	14.22
HA-7	2/7/2011	21.60	--	--	4.97	16.63
HA-7	5/27/2011	21.60	--	--	5.97	15.63
HA-7	8/8/2011	21.60	--	--	7.91	13.69
HA-7	11/14/2011	21.60	--	--	7.68	13.92
HA-7	2/20/2012	21.60	--	--	5.31	16.29
HA-7	8/22/2012	21.60	--	--	7.36	14.24
HA-7	11/5/2012	21.60	--	--	7.19	14.41
HA-7	1/28/2013	21.60	--	--	4.54	17.06
HA-8	1/27/1993	18.88	--	--	4.60	14.28
HA-8	3/12/1993	18.88	--	--	6.79	12.09
HA-8	4/14/1993	18.88	--	--	5.20	13.68
HA-8	12/15/1993	18.88	--	--	7.18	11.70
HA-8	11/4/1994	18.88	--	--	8.85	10.03
HA-8	2/22/1995	18.88	--	--	4.03	14.85
HA-8	6/16/1995	18.88	--	--	7.13	11.75
HA-8	10/20/1995	18.88	--	--	7.09	11.79
HA-8	4/4/1996	18.88	--	--	5.32	13.56
HA-8	4/16/1996	18.88	--	--	5.18	13.70
HA-8	5/1/1997	18.88	--	--	5.01	13.87
HA-8	8/26/1997	18.88	--	--	7.99	10.89
HA-8	9/18/1997	18.88	--	--	6.90	11.98
HA-8	5/1/1998	18.88	--	--	6.25	12.63

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-8	7/29/1999	18.88	--	--	7.93	10.95
HA-8	5/22/2000	18.88	--	--	6.10	12.78
HA-8	5/22/2001	18.88	--	--	6.65	12.23
HA-8	6/5/2002	18.88	--	--	6.54	12.34
HA-8	11/24/2002	21.97	--	--	7.40	14.57
HA-8	1/31/2003	21.97	--	--	4.04	17.93
HA-8	2/7/2003	21.97	--	--	4.16	17.81
HA-8	2/12/2003	21.97	--	--	4.71	17.26
HA-8	2/18/2003	21.97	--	--	4.99	16.98
HA-8	2/21/2003	21.97	--	--	5.16	16.81
HA-8	2/24/2003	21.97	--	--	5.21	16.76
HA-8	3/4/2003	21.97	--	--	5.89	16.08
HA-8	3/12/2003	21.97	--	--	5.36	16.61
HA-8	3/14/2003	21.97	5.21	0.01	5.22	16.76
HA-8	3/26/2003	21.97	--	--	4.74	17.23
HA-8	3/28/2003	21.97	--	--	5.21	16.76
HA-8	4/2/2003	21.97	--	--	5.25	16.72
HA-8	4/4/2003	21.97	--	--	5.57	16.40
HA-8	4/8/2003	21.97	--	--	5.57	16.40
HA-8	4/11/2003	21.97	--	--	5.77	16.20
HA-8	4/15/2003	21.97	--	--	5.41	16.56
HA-8	4/17/2003	21.97	--	--	5.91	16.06
HA-8	4/22/2003	21.97	--	--	6.07	15.90
HA-8	4/25/2003	21.97	--	--	6.37	15.60
HA-8	5/2/2003	21.97	--	--	6.44	15.53
HA-8	5/6/2003	21.97	--	--	6.62	15.35
HA-8	5/9/2003	21.97	--	--	6.92	15.05
HA-8	5/23/2003	21.97	--	--	7.38	14.59
HA-8	5/28/2003	21.97	--	--	7.34	14.63
HA-8	6/13/2003	21.97	--	--	7.66	14.31
HA-8	6/18/2003	21.97	--	--	7.60	14.37
HA-8	6/27/2003	21.97	--	--	7.65	14.32
HA-8	7/7/2003	21.97	--	--	8.51	13.46
HA-8	7/16/2003	21.97	--	--	8.24	13.73
HA-8	7/31/2003	21.97	--	--	8.61	13.36
HA-8	8/5/2003	21.97	--	--	9.62	12.35
HA-8	8/11/2003	21.97	--	--	9.70	12.27
HA-8	8/22/2003	21.97	10.02	0.01	10.03	11.95
HA-8	8/26/2003	21.97	--	--	8.99	12.98
HA-8	9/2/2003	21.97	--	--	9.02	12.95
HA-8	9/9/2003	21.97	9.51	0.01	9.52	12.46
HA-8	9/19/2003	21.97	10.40	0.10	10.50	11.55
HA-8	10/14/2003	21.97			Not Monitored	
HA-8	11/20/2003	21.97	7.22	0.32	7.54	14.67
HA-8	12/3/2003	21.97	4.65	0.57	5.22	17.18
HA-8	1/19/2004	21.97	4.23	0.55	4.78	17.60
HA-8	2/24/2004	21.97	5.08	0.53	5.61	16.76
HA-8	3/15/2004	21.97	6.15	0.51	6.66	15.69
HA-8	4/19/2004	21.97	6.98	0.50	7.48	14.87
HA-8	5/17/2004	21.97	7.74	0.49	8.23	14.11
HA-8	6/15/2004	18.88	--	0.51	8.21	11.05
HA-8	6/22/2004	21.97	7.57	0.51	8.08	14.27
HA-8	8/18/2004	21.97	8.71	0.49	9.20	13.14
HA-8	9/21/2004	21.97	7.67	0.17	7.84	14.26
HA-8	10/19/2004	21.97	6.89	0.16	7.05	15.04
HA-8	11/23/2004	21.97	6.89	0.11	7.00	15.05
HA-8	12/21/2004	21.97	5.08	0.15	5.23	16.85
HA-8	1/13/2005	21.97	--	--	6.02	15.95
HA-8	4/28/2005	21.97	--	--	8.63	13.34
HA-8	6/1/2005	21.97	5.55	0.11	5.66	16.39
HA-8	6/20/2005	18.88	--	0.11	6.27	12.69
HA-8	6/29/2005	21.97	7.08	0.12	7.20	14.86
HA-8	7/20/2005	21.97	7.55	0.15	7.70	14.38
HA-8	8/22/2005	21.97	7.85	0.05	7.90	14.11
HA-8	9/12/2005	21.97			Dry	
HA-8	10/12/2005	21.97	9.14	3.61	9.22	15.46
HA-8	11/21/2005	21.97	7.49	0.02	7.51	14.48
HA-8	12/27/2005	21.97	5.04	0.06	5.10	16.92
HA-8	1/30/2006	21.97	2.30	0.06	2.36	19.66
HA-8	2/16/2006	21.97	4.11	0.06	4.17	17.85
HA-8	3/13/2006	21.97	4.98	0.06	5.04	16.98

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-8	4/18/2006	21.97	--	--	5.12	16.85
HA-8	5/12/2006	21.97	--	--	5.89	16.08
HA-8	6/5/2006	18.88	--	0.06	5.38	13.55
HA-8	6/9/2006	21.97	--	--	5.40	16.57
HA-8	7/13/2006	21.97	--	--	6.80	15.17
HA-8	8/16/2006	21.97	--	--	7.80	14.17
HA-8	9/19/2006	21.97	--	--	8.54	13.43
HA-8	10/13/2006	21.97	--	--	8.20	13.77
HA-8	10/23/2006	18.88	--	0.02	8.26	10.64
HA-8	11/20/2006	21.97	3.85	0.03	3.88	18.11
HA-8	12/8/2006	21.97	3.65	0.02	3.67	18.32
HA-8	1/19/2007	21.97	3.22	0.04	3.24	18.76
HA-8	2/19/2007	21.97	5.28	0.03	5.31	16.68
HA-8	3/15/2007	21.97	4.18	0.02	4.20	17.79
HA-8	4/16/2007	21.97	4.88	0.03	4.91	17.08
HA-8	5/14/2007	21.97	6.60	0.05	6.65	15.36
HA-8	6/29/2007	21.97	--	--	7.72	14.25
HA-8	7/20/2007	21.97	--	--	8.13	13.84
HA-8	8/21/2007	21.97	--	--	8.88	13.09
HA-8	9/10/2007	21.97	--	--	8.98	12.99
HA-8	10/22/2007	21.97	--	--	7.83	14.14
HA-8	11/28/2007	21.97	--	--	6.72	15.25
HA-8	12/13/2007	21.97	--	--	5.80	16.17
HA-8	1/21/2008	21.97	--	--	5.76	16.21
HA-8	2/24/2008	21.97	--	--	6.29	15.68
HA-8	3/24/2008	21.97	--	--	6.41	15.56
HA-8	6/2/2008	21.97	--	--	7.64	14.33
HA-8	8/25/2008	21.97	--	--	8.34	13.63
HA-8	2/18/2009	21.97			Not Monitored	
HA-8	8/25/2009	21.97			Not Monitored	
HA-8	3/22/2010	21.97	--	--	5.80	16.17
HA-8	8/23/2010	21.97	--	--	8.13	13.84
HA-8	2/7/2011	21.97	--	--	4.94	17.03
HA-8	5/27/2011	21.97			Not Monitored	
HA-8	8/8/2011	21.97	--	--	8.00	13.97
HA-8	11/14/2011	21.97	--	--	7.72	14.25
HA-8	2/20/2012	21.97	--	--	5.13	16.84
HA-8	8/22/2012	21.97	--	--	7.73	14.24
HA-8	11/5/2012	21.97	--	--	6.80	15.17
HA-8	1/28/2013	21.97	--	--	4.90	17.07
HA-9	1/27/1993	19.40	--	--	7.00	12.40
HA-9	3/12/1993	19.40	--	--	7.95	11.45
HA-9	4/14/1993	19.40	--	--	7.74	11.66
HA-9	12/15/1993	19.40	--	--	7.82	11.58
HA-9	11/4/1994	19.40	--	--	9.75	9.65
HA-9	2/22/1995	19.40	--	--	7.61	11.79
HA-9	6/16/1995	19.40	--	--	8.17	11.23
HA-9	10/20/1995	19.40	--	--	8.08	11.32
HA-9	4/4/1996	19.40	--	--	7.30	12.10
HA-9	4/16/1996	19.40	--	--	7.28	12.12
HA-9	4/2/1997	19.40	--	--	7.76	11.64
HA-9	5/1/1997	19.40	--	--	7.78	11.62
HA-9	9/18/1997	19.40	--	--	7.95	11.45
HA-9	4/29/1998	19.40	--	--	7.99	11.41
HA-9	7/28/1999	19.40	--	--	8.23	11.17
HA-9	5/24/2000	19.40	--	--	9.25	10.15
HA-9	5/23/2001	19.40	--	--	7.92	11.48
HA-9	6/4/2002	19.40	--	--	8.01	11.39
HA-9	11/24/2002	21.32	--	--	8.20	13.12
HA-9	5/28/2003	19.40	--	sheen	8.05	11.35
HA-9	6/17/2004	19.40	--	--	8.18	11.22
HA-9	6/20/2005	19.40	--	--	7.98	11.42
HA-9	6/5/2006	19.40	--	--	7.62	11.78
HA-9	10/23/2006	19.40	--	--	8.32	11.08
HA-9	3/14/2007	21.32	--	--	6.08	15.24
HA-9	6/29/2007	21.32	--	--	7.04	14.28
HA-9	7/20/2007	21.32			Not Monitored	
HA-9	8/21/2007	21.32			Not Monitored	
HA-9	9/10/2007	21.32	--	--	7.13	14.19
HA-9	10/22/2007	21.32			Not Monitored	

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-9	11/28/2007	21.32			Not Monitored	
HA-9	12/13/2007	21.32	--	--	6.66	14.66
HA-9	1/21/2008	21.32	--	--	6.35	14.97
HA-9	2/24/2008	21.32	--	--	6.67	14.65
HA-9	3/24/2008	21.32	--	--	6.62	14.70
HA-9	6/2/2008	21.32	--	--	6.90	14.42
HA-9	8/25/2008	21.32	--	--	7.08	14.24
HA-9	2/18/2009	21.32			Not Monitored	
HA-9	8/25/2009	21.32			Not Monitored	
HA-9	3/22/2010	21.32	--	--	6.14	15.18
HA-9	8/23/2010	21.32	--	--	7.17	14.15
HA-9	2/7/2011	21.32	--	--	6.03	15.29
HA-9	5/27/2011	21.32	--	--	7.01	14.31
HA-9	8/8/2011	21.32	--	--	7.16	14.16
HA-9	11/14/2011	21.32	--	--	6.96	14.36
HA-9	2/20/2012	21.32	--	--	6.15	15.17
HA-9	8/22/2012	21.32	--	--	7.15	14.17
HA-9	11/5/2012	21.32	--	--	6.50	14.82
HA-9	1/28/2013	21.32	--	--	4.77	16.55
HA-10	1/27/1993	19.40	--	--	6.88	12.52
HA-10	3/12/1993	19.40	--	--	8.94	10.46
HA-10	4/14/1993	19.40	--	--	8.73	10.67
HA-10	12/15/1993	19.40	--	--	8.05	11.35
HA-10	2/22/1995	19.40	--	--	8.14	11.26
HA-10	6/16/1995	19.40	--	--	9.18	10.22
HA-10	10/20/1995	19.40	--	--	7.83	11.57
HA-10	4/4/1996	19.40	--	--	7.67	11.73
HA-10	4/16/1996	19.40	--	--	7.29	12.11
HA-10	7/15/1996	19.40	--	--	9.40	10.00
HA-10	4/2/1997	19.40	--	--	8.74	10.66
HA-10	5/1/1997	19.40	--	--	8.26	11.14
HA-10	5/23/2001	19.40	--	--	8.86	10.54
HA-10	6/6/2002	19.40	--	--	9.80	9.60
HA-10	11/24/2002	21.15	--	--	8.49	12.66
HA-10	5/27/2003	19.40	--	--	9.31	10.09
HA-10	6/17/2004	19.40	--	--	9.17	10.23
HA-10	6/21/2005	19.40	--	--	8.58	10.82
HA-10	6/5/2006	19.40	--	--	7.84	11.56
HA-10	10/23/2006	19.40	--	--	9.09	10.31
HA-10	3/14/2007	21.15	--	--	6.21	14.94
HA-10	6/29/2007	21.15	--	--	7.79	13.36
HA-10	7/20/2007	21.15			Not Monitored	
HA-10	8/21/2007	21.15			Not Monitored	
HA-10	9/10/2007	21.15	--	--	8.20	12.95
HA-10	10/22/2007	21.15			Not Monitored	
HA-10	11/28/2007	21.15	--	--	7.50	13.65
HA-10	12/13/2007	21.15	--	--	7.35	13.80
HA-10	1/21/2008	21.15	--	--	6.79	14.36
HA-10	2/24/2008	21.15	--	--	6.70	14.45
HA-10	3/24/2008	21.15	--	--	7.21	13.94
HA-10	6/2/2008	21.15	--	--	7.85	13.30
HA-10	8/25/2008	21.15	--	--	6.51	14.64
HA-10	2/18/2009	21.15			Not Monitored	
HA-10	8/25/2009	21.15			Not Monitored	
HA-10	3/22/2010	21.15	--	--	6.32	14.83
HA-10	8/23/2010	21.15	--	--	7.55	13.60
HA-10	2/7/2011	21.15	--	--	7.11	14.04
HA-10	5/27/2011	21.15	--	--	6.97	14.18
HA-10	8/8/2011	21.15	--	--	8.07	13.08
HA-10	2/20/2012	21.15	--	--	6.92	14.23
HA-10	8/22/2012	21.15	--	--	8.03	13.12
HA-10	11/5/2012	21.15	--	--	5.61	15.54
HA-10	1/28/2013	21.15	--	--	5.56	15.59
HA-11	1/27/1993	18.51	--	--	5.80	12.71
HA-11	3/12/1993	18.51	--	--	7.97	10.54
HA-11	4/14/1993	18.51	--	--	7.33	11.18
HA-11	12/15/1993	18.51	--	--	7.18	11.33
HA-11	11/4/1994	18.51	--	--	9.77	8.74
HA-11	2/22/1995	18.51	--	--	7.49	11.02

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-11	6/16/1995	18.51	--	--	8.25	10.26
HA-11	10/20/1995	18.51	--	--	7.62	10.89
HA-11	4/4/1996	18.51	--	--	6.95	11.56
HA-11	4/16/1996	18.51	--	--	6.60	11.91
HA-11	4/2/1997	18.51	--	--	7.95	10.56
HA-11	5/1/1997	18.51	--	--	7.96	10.55
HA-11	4/29/1998	18.51	--	--	7.89	10.62
HA-11	7/28/1999	18.51	--	--	8.08	10.43
HA-11	5/24/2000	18.51	--	--	7.75	10.76
HA-11	5/23/2001	18.51	--	--	8.40	10.11
HA-11	6/4/2002	18.51	--	--	7.77	10.74
HA-11	11/24/2002	20.69	--	--	8.33	12.36
HA-11	5/27/2003	18.51	--	--	8.33	10.18
HA-11	6/21/2005	18.51	--	--	7.85	10.66
HA-11	6/5/2006	18.51	--	--	7.57	10.94
HA-11	10/23/2006	18.51	--	--	8.60	9.91
HA-11	3/14/2007	20.69	--	--	6.21	14.48
HA-11	6/29/2007	20.69	--	--	7.64	13.05
HA-11	7/20/2007	20.69			Not Monitored	
HA-11	8/21/2007	20.69			Not Monitored	
HA-11	9/10/2007	20.69	--	--	8.18	12.51
HA-11	10/22/2007	20.69			Not Monitored	
HA-11	11/28/2007	20.69	--	--	7.41	13.28
HA-11	12/13/2007	20.69	--	--	3.94	16.75
HA-11	1/21/2008	20.69	--	--	6.69	14.00
HA-11	2/24/2008	20.69	--	--	6.83	13.86
HA-11	3/24/2008	20.69	--	--	7.06	13.63
HA-11	6/2/2008	20.69	--	--	7.58	13.11
HA-11	8/25/2008	20.69	--	--	8.09	12.60
HA-11	2/18/2009	20.69			Not Monitored	
HA-11	8/25/2009	20.69			Not Monitored	
HA-11	3/22/2010	20.69	--	--	6.55	14.14
HA-11	8/23/2010	20.69	--	--	7.22	13.47
HA-11	2/7/2011	20.69	--	--	6.99	13.70
HA-11	5/27/2011	20.69	--	--	7.24	13.45
HA-11	8/8/2011	20.69			Dry	
HA-11	11/14/2011	20.69	--	--	8.72	11.97
HA-11	2/20/2012	20.69	--	--	6.75	13.94
HA-11	8/22/2012	20.69	--	--	7.80	12.89
HA-11	11/5/2012	20.69	--	--	7.03	13.66
HA-11	1/28/2013	20.69	--	--	6.38	14.31
6.38						
HA-12	1/27/1993	19.91	--	--	4.01	15.90
HA-12	3/12/1993	19.91	--	--	7.36	12.55
HA-12	4/14/1993	19.91	--	--	5.92	13.99
HA-12	12/15/1993	19.91	--	--	7.02	12.89
HA-12	11/4/1994	19.91	--	--	9.06	10.85
HA-12	2/22/1995	19.91	--	--	3.80	16.11
HA-12	6/16/1995	19.91	--	--	7.40	12.51
HA-12	10/20/1995	19.91	--	--	7.40	12.51
HA-12	4/4/1996	19.91	--	--	5.65	14.26
HA-12	4/16/1996	19.91	--	--	5.26	14.65
HA-12	5/1/1997	19.91	--	--	6.13	13.78
HA-12	8/26/1997	19.91	--	--	8.58	11.33
HA-12	9/18/1997	19.91	--	--	8.70	11.21
HA-12	5/1/1998	19.91	--	--	6.65	13.26
HA-12	7/29/1999	19.91	--	--	7.46	12.45
HA-12	5/22/2000	19.91	--	--	7.63	12.28
HA-12	5/22/2001	19.91	--	--	7.29	12.62
HA-12	6/5/2002	19.91	--	--	7.06	12.85
HA-12	11/24/2002	22.47	--	--	7.43	15.04
HA-12	5/28/2003	19.91	--	--	7.84	12.07
HA-12	6/16/2004	19.91	--	--	8.43	11.48
HA-12	6/21/2005	19.91	--	--	6.67	13.24
HA-12	6/5/2006	19.91	--	--	5.91	14.00
HA-12	10/23/2006	19.91	--	--	8.71	11.20
HA-12	3/14/2007	22.47	--	--	5.11	17.36
HA-12	6/29/2007	22.47	--	--	8.07	14.40
HA-12	7/20/2007	22.47			Not Monitored	
HA-12	8/21/2007	22.47			Not Monitored	
HA-12	9/10/2007	22.47	--	--	9.38	13.09

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-12	10/22/2007	22.47			Not Monitored	
HA-12	11/28/2007	22.47	--	--	7.50	14.97
HA-12	12/13/2007	22.47			Not Monitored	
HA-12	1/21/2008	22.47	--	--	4.09	18.38
HA-12	2/24/2008	22.47	--	--	6.81	15.66
HA-12	3/24/2008	22.47	--	--	6.87	15.60
HA-12	6/2/2008	22.47	--	--	8.14	14.33
HA-12	8/25/2008	22.47	--	--	8.67	13.80
HA-12	2/18/2009	22.47			Not Monitored	
HA-12	8/25/2009	22.47	--	--	8.67	13.80
HA-12	3/22/2010	22.47	--	--	6.00	16.47
HA-12	8/23/2010	22.47			Dry	
HA-12	2/7/2011	22.47	--	--	5.46	17.01
HA-12	5/27/2011	22.47	--	--	6.34	16.13
HA-12	8/8/2011	22.47	--	--	8.39	14.08
HA-12	11/14/2011	22.47	--	--	8.05	14.42
HA-12	2/20/2012	22.47	--	--	5.20	17.27
HA-12	8/22/2012	22.47	--	--	Dry	--
HA-12	11/5/2012	22.47	--	--	6.02	16.45
HA-12	1/28/2013	22.47	--	--	5.32	17.15
HA-13	1/27/1993	19.56	--	--	5.32	14.24
HA-13	3/12/1993	19.56	--	--	8.23	11.33
HA-13	4/14/1993	19.56	--	--	7.08	12.48
HA-13	12/15/1993	19.56	--	--	6.34	13.22
HA-13	11/4/1994	19.56	--	--	8.93	10.63
HA-13	2/22/1995	19.56	--	--	4.54	15.02
HA-13	6/16/1995	19.56	--	--	8.83	10.73
HA-13	10/20/1995	19.56	--	--	8.23	11.33
HA-13	4/4/1996	19.56	--	--	7.06	12.50
HA-13	4/16/1996	19.56	--	--	7.31	12.25
HA-13	5/1/1997	19.56	--	--	7.01	12.55
HA-13	9/18/1997	19.56	--	--	6.93	12.63
HA-13	4/30/1998	19.56	--	--	8.26	11.30
HA-13	7/28/1999	19.56	--	--	8.62	10.94
HA-13	5/22/2000	19.56	--	--	8.45	11.11
HA-13	5/22/2001	19.56	--	--	8.20	11.36
HA-13	6/4/2002	19.56	--	--	8.41	11.15
HA-13	11/24/2002	22.73	--	--	8.60	14.13
HA-13	1/17/2003	22.73	--	--	6.30	16.43
HA-13	1/31/2003	22.73	--	--	4.49	18.24
HA-13	2/7/2003	22.73	--	--	6.27	16.46
HA-13	2/12/2003	22.73	--	--	6.78	15.95
HA-13	2/18/2003	22.73	--	--	7.13	15.60
HA-13	2/21/2003	22.73	--	--	6.99	15.74
HA-13	2/24/2003	22.73	--	--	6.98	15.75
HA-13	3/4/2003	22.73	--	--	7.49	15.24
HA-13	3/12/2003	22.73	--	--	6.48	16.25
HA-13	3/14/2003	22.73	--	--	5.16	17.57
HA-13	3/26/2003	22.73	--	--	5.65	17.08
HA-13	3/28/2003	22.73	--	--	6.34	16.39
HA-13	4/2/2003	22.73	--	--	6.74	15.99
HA-13	4/4/2003	22.73	--	--	7.08	15.65
HA-13	4/8/2003	22.73	--	--	7.17	15.56
HA-13	4/11/2003	22.73	--	--	7.31	15.42
HA-13	4/15/2003	22.73	--	--	6.93	15.80
HA-13	4/17/2003	22.73	--	--	7.32	15.41
HA-13	4/22/2003	22.73	--	--	7.52	15.21
HA-13	4/25/2003	22.73	--	--	7.81	14.92
HA-13	5/2/2003	22.73	--	--	8.04	14.69
HA-13	5/6/2003	22.73	--	--	8.13	14.60
HA-13	5/9/2003	22.73	--	--	8.36	14.37
HA-13	5/23/2003	22.73	--	--	8.93	13.80
HA-13	5/27/2003	19.56	--	--	8.89	10.67
HA-13	5/28/2003	22.73	--	--	8.98	13.75
HA-13	6/13/2003	22.73	--	--	6.08	16.65
HA-13	6/18/2003	22.73	--	--	9.12	13.61
HA-13	6/27/2003	22.73	--	--	9.07	13.66
HA-13	7/7/2003	22.73	--	--	9.55	13.18
HA-13	7/16/2003	22.73	--	--	9.42	13.31
HA-13	7/31/2003	22.73	--	--	9.59	13.14

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-13	8/5/2003	22.73	--	--	9.63	13.10
HA-13	8/11/2003	22.73	--	--	10.75	11.98
HA-13	8/22/2003	22.73	--	--	11.26	11.47
HA-13	8/26/2003	22.73	--	--	9.87	12.86
HA-13	9/2/2003	22.73	--	--	10.31	12.42
HA-13	9/9/2003	22.73	--	--	10.46	12.27
HA-13	9/19/2003	22.73	--	--	10.46	12.27
HA-13	10/14/2003	22.73			Not Monitored	
HA-13	11/20/2003	22.73	--	--	5.70	17.03
HA-13	12/3/2003	22.73	--	--	5.91	16.82
HA-13	1/19/2004	22.73	--	--	5.91	16.82
HA-13	2/24/2004	22.73	--	--	6.92	15.81
HA-13	3/15/2004	22.73	--	--	7.81	14.92
HA-13	4/19/2004	22.73	--	--	8.56	14.17
HA-13	5/17/2004	22.73	--	--	9.07	13.66
HA-13	6/16/2004	19.56	--	--	7.99	11.57
HA-13	6/22/2004	22.73	--	--	8.98	13.75
HA-13	8/18/2004	22.73	'--	--	9.79	12.94
HA-13	9/21/2004	22.73	--	--	8.64	14.09
HA-13	10/19/2004	22.73	--	--	8.16	14.57
HA-13	11/23/2004	22.73	--	--	8.62	14.11
HA-13	12/21/2004	22.73	--	--	6.84	15.89
HA-13	1/13/2005	22.73	--	--	7.80	14.93
HA-13	4/28/2005	22.73	--	--	7.07	15.66
HA-13	6/1/2005	22.73	--	--	7.83	14.90
HA-13	6/21/2005	19.56	--	--	8.34	11.22
HA-13	6/29/2005	22.73	--	--	8.77	13.96
HA-13	7/20/2005	22.73	--	--	9.05	13.68
HA-13	8/22/2005	22.73	--	--	9.28	13.45
HA-13	9/12/2005	22.73	--	--	9.61	13.12
HA-13	10/12/2005	22.73	--	--	9.96	12.77
HA-13	11/21/2005	22.73	--	--	7.78	14.95
HA-13	12/27/2005	22.73	--	--	5.36	17.37
HA-13	1/30/2006	22.73	--	--	3.60	19.13
HA-13	2/16/2006	22.73	--	--	6.05	16.68
HA-13	3/13/2006	22.73	--	--	7.26	15.47
HA-13	4/18/2006	22.73	--	--	7.70	15.03
HA-13	5/12/2006	22.73	--	--	8.21	14.52
HA-13	6/5/2006	19.56	--	--	7.74	11.82
HA-13	6/9/2006	22.73	--	--	7.80	14.93
HA-13	7/13/2006	22.73	--	--	8.82	13.91
HA-13	8/16/2006	22.73	--	--	9.84	12.89
HA-13	9/19/2006	22.73	--	--	9.70	13.03
HA-13	10/13/2006	22.73	--	--	9.46	13.27
HA-13	10/23/2006	19.56	--	--	9.45	10.11
HA-13	11/20/2006	22.73	--	--	4.85	17.88
HA-13	12/8/2006	22.73	--	--	5.67	17.06
HA-13	1/19/2007	22.73	--	--	5.08	17.65
HA-13	2/19/2007	22.73	--	--	7.39	15.34
HA-13	3/14/2007	22.73	--	--	6.28	16.45
HA-13	3/15/2007	22.73	--	--	6.36	16.37
HA-13	4/16/2007	22.73	--	--	7.18	15.55
HA-13	5/14/2007	22.73	--	--	8.40	14.33
HA-13	6/29/2007	22.73	--	--	9.26	13.47
HA-13	7/20/2007	22.73	--	--	9.51	13.22
HA-13	8/21/2007	22.73	--	--	9.89	12.84
HA-13	9/10/2007	22.73	--	--	9.91	12.82
HA-13	10/22/2007	22.73	--	--	8.11	14.62
HA-13	11/28/2007	22.73	--	--	8.22	14.51
HA-13	12/13/2007	22.73	6.32	0.01	6.33	16.41
HA-13	1/21/2008	22.73	--	--	6.83	15.90
HA-13	2/24/2008	22.73	--	--	7.55	15.18
HA-13	3/24/2008	22.73	--	--	7.89	14.84
HA-13	6/2/2008	22.73	--	--	9.03	13.70
HA-13	8/25/2008	22.73	--	--	9.29	13.44
HA-13	2/18/2009	22.73			Not Monitored	
HA-13	8/25/2009	22.73			Not Monitored	
HA-13	3/22/2010	22.73	--	--	7.52	15.21
HA-13	8/23/2010	22.73	--	--	9.35	13.38
HA-13	2/7/2011	22.73	--	--	6.48	16.25
HA-13	5/27/2011	22.73	--	--	7.55	15.18

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-13	8/8/2011	22.73	--	--	9.21	13.52
HA-13	11/14/2011	22.73	--	--	8.69	14.04
HA-13	2/20/2012	22.73	--	--	5.17	17.56
HA-13	8/22/2012	22.73	--	--	9.11	13.62
HA-13	11/5/2012	22.73	--	--	4.28	18.45
HA-13	1/28/2013	22.73	--	--	6.19	16.54
HA-14	1/27/1993	20.02	--	--	6.10	13.92
HA-14	3/12/1993	20.02	--	--	8.80	11.22
HA-14	4/14/1993	20.02	--	--	7.04	12.98
HA-14	12/15/1993	20.02	--	--	8.56	11.46
HA-14	11/4/1994	20.02	--	--	8.35	11.67
HA-14	2/22/1995	20.02	--	--	5.10	14.92
HA-14	6/16/1995	20.02	--	--	9.51	10.51
HA-14	10/20/1995	20.02	--	--	8.77	11.25
HA-14	4/4/1996	20.02	--	--	7.52	12.50
HA-14	4/16/1996	20.02	--	--	6.01	14.01
HA-14	5/1/1997	20.02	--	--	6.92	13.10
HA-14	9/18/1997	20.02	--	--	8.17	11.85
HA-14	4/30/1998	20.02	--	--	9.05	10.97
HA-14	7/29/1999	20.02	--	--	9.49	10.53
HA-14	5/22/2000	20.02	--	--	9.22	10.80
HA-14	5/22/2001	20.02	--	--	9.03	10.99
HA-14	6/4/2002	20.02	--	--	8.41	11.61
HA-14	11/24/2002	23.47	--	--	9.67	13.80
HA-14	5/27/2003	20.02	--	--	9.48	10.54
HA-14	6/16/2004	20.02	--	--	9.69	10.33
HA-14	9/21/2004	23.47	--	--	9.24	14.23
HA-14	6/1/2005	23.47	--	--	8.68	14.79
HA-14	6/21/2005	20.02	--	--	9.15	10.87
HA-14	6/29/2005	23.47	--	--	9.32	14.15
HA-14	7/20/2005	23.47	--	--	9.63	13.84
HA-14	8/22/2005	23.47	--	--	10.50	12.97
HA-14	9/12/2005	23.47			Not Monitored	
HA-14	10/12/2005	23.47			Not Monitored	
HA-14	11/21/2005	23.47			Not Monitored	
HA-14	12/27/2005	23.47			Not Monitored	
HA-14	1/30/2006	23.47			Not Monitored	
HA-14	2/16/2006	23.47			Not Monitored	
HA-14	3/13/2006	23.47			Not Monitored	
HA-14	4/18/2006	23.47			Not Monitored	
HA-14	5/12/2006	23.47			Not Monitored	
HA-14	6/5/2006	20.02	--	--	7.96	12.06
HA-14	6/9/2006	23.47			Not Monitored	
HA-14	7/13/2006	23.47			Not Monitored	
HA-14	8/16/2006	23.47			Not Monitored	
HA-14	9/19/2006	23.47			Not Monitored	
HA-14	10/13/2006	23.47	--	--	10.26	13.21
HA-14	10/23/2006	20.02	--	--	10.18	9.84
HA-14	11/20/2006	23.47	--	--	9.27	14.20
HA-14	12/8/2006	23.47	--	--	5.12	18.35
HA-14	1/19/2007	23.47	--	--	5.01	18.46
HA-14	2/19/2007	23.47	--	--	8.00	15.47
HA-14	3/14/2007	23.47	--	--	7.13	16.34
HA-14	3/15/2007	23.47	--	--	6.85	16.62
HA-14	4/16/2007	23.47	--	--	7.87	15.60
HA-14	5/14/2007	23.47	--	--	9.10	14.37
HA-14	6/29/2007	23.47	--	--	8.70	14.77
HA-14	7/20/2007	23.47	--	--	10.08	13.39
HA-14	8/21/2007	23.47	--	--	10.12	13.35
HA-14	9/10/2007	23.47	--	--	10.41	13.06
HA-14	10/22/2007	23.47	--	--	8.76	14.71
HA-14	11/28/2007	23.47	--	--	6.79	16.68
HA-14	12/13/2007	23.47	7.72	0.07	7.79	15.73
HA-14	1/21/2008	23.47	--	--	6.54	16.93
HA-14	2/24/2008	23.47	--	--	8.21	15.26
HA-14	3/24/2008	23.47	--	--	8.61	14.86
HA-14	6/2/2008	23.47	--	--	9.68	13.79
HA-14	8/25/2008	23.47	--	--	8.67	14.80
HA-14	2/18/2009	23.47			Not Monitored	
HA-14	8/25/2009	23.47	--	--	10.41	13.06

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-14	3/22/2010	23.47	--	--	8.15	15.32
HA-14	8/23/2010	23.47	--	--	9.94	13.53
HA-14	2/7/2011	23.47	--	--	7.35	16.12
HA-14	5/27/2011	23.47	--	--	8.28	15.19
HA-14	8/8/2011	23.47	--	--	9.89	13.58
HA-14	11/14/2011	23.47	--	--	10.31	13.16
HA-14	2/20/2012	23.47	--	--	6.90	16.57
HA-14	8/22/2012	23.47	--	--	9.83	13.64
HA-14	11/5/2012	23.47			DRY	
HA-14	1/28/2013	23.47	--	--	7.34	16.13
HA-15	1/31/2003	22.87	--	--	5.56	17.31
HA-15	2/7/2003	22.87	--	--	5.31	17.56
HA-15	2/12/2003	22.87	--	--	5.64	17.23
HA-15	2/18/2003	22.87	--	--	6.09	16.78
HA-15	2/21/2003	22.87	--	--	7.92	14.95
HA-15	2/24/2003	22.87	--	--	6.04	16.83
HA-15	3/4/2003	22.87	--	--	6.62	16.25
HA-15	3/12/2003	22.87	--	--	6.02	16.85
HA-15	3/26/2003	22.87	--	--	5.46	17.41
HA-15	3/28/2003	22.87	--	--	5.96	16.91
HA-15	4/2/2003	22.87	--	--	5.91	16.96
HA-15	4/4/2003	22.87	--	--	6.22	16.65
HA-15	4/8/2003	22.87	--	--	6.42	16.45
HA-15	4/11/2003	22.87	--	--	6.63	16.24
HA-15	4/15/2003	22.87	--	--	6.28	16.59
HA-15	4/17/2003	22.87	--	--	6.49	16.38
HA-15	4/22/2003	22.87	--	--	6.66	16.21
HA-15	4/25/2003	22.87	--	--	7.07	15.80
HA-15	5/2/2003	22.87	--	--	7.06	15.81
HA-15	5/6/2003	22.87	--	--	7.32	15.55
HA-15	5/9/2003	22.87	--	--	7.52	15.35
HA-15	5/23/2003	22.87	--	--	7.83	15.04
HA-15	5/28/2003	22.87			DRY	
HA-15	6/13/2003	22.87			DRY	
HA-15	6/18/2003	22.87			DRY	
HA-15	6/27/2003	22.87			DRY	
HA-15	7/7/2003	22.87			DRY	
HA-15	7/16/2003	22.87			DRY	
HA-15	7/31/2003	22.87			DRY	
HA-15	8/5/2003	22.87			DRY	
HA-15	8/11/2003	22.87			DRY	
HA-15	8/22/2003	22.87			DRY	
HA-15	8/26/2003	22.87			DRY	
HA-15	9/2/2003	22.87			DRY	
HA-15	9/9/2003	22.87			DRY	
HA-15	9/19/2003	22.87			DRY	
HA-15	10/14/2003	22.87			DRY	
HA-15	11/20/2003	22.87			DRY	
HA-15	12/3/2003	22.87	--	--	6.08	16.79
HA-15	1/19/2004	22.87	--	--	5.49	17.38
HA-15	2/24/2004	22.87	--	--	6.32	16.55
HA-15	3/15/2004	22.87	--	--	7.32	15.55
HA-15	4/19/2004	22.87	--	--	7.80	15.07
HA-15	5/17/2004	22.87			DRY	
HA-15	6/22/2004	22.87			DRY	
HA-15	8/18/2004	22.87			DRY	
HA-15	9/21/2004	22.87			DRY	
HA-15	10/19/2004	22.87			DRY	
HA-15	11/23/2004	22.87			DRY	
HA-15	12/21/2004	22.87	--	--	6.03	16.84
HA-15	1/13/2005	22.87	--	--	6.73	16.14
HA-15	4/28/2005	22.87	--	--	5.93	16.94
HA-15	6/1/2005	22.87	--	--	6.06	16.81
HA-15	6/29/2005	22.87	--	--	7.53	15.34
HA-15	7/20/2005	22.87			DRY	
HA-15	8/22/2005	22.87			DRY	
HA-15	9/12/2005	22.87			DRY	
HA-15	10/12/2005	22.87			DRY	
HA-15	11/21/2005	22.87	--	--	7.65	15.22
HA-15	12/27/2005	22.87	--	--	6.63	16.24

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-15	1/30/2006	22.87	--	--	3.40	19.47
HA-15	2/16/2006	22.87	--	--	4.91	17.96
HA-15	3/13/2006	22.87	--	--	5.88	16.99
HA-15	4/18/2006	22.87	--	--	6.29	16.58
HA-15	5/12/2006	22.87	--	--	6.67	16.20
HA-15	6/9/2006	22.87	--	--	6.26	16.61
HA-15	7/13/2006	22.87	--	--	7.40	15.47
HA-15	8/16/2006	22.87			DRY	
HA-15	9/19/2006	22.87			DRY	
HA-15	10/13/2006	22.87			DRY	
HA-15	11/20/2006	22.87	--	--	4.87	18.00
HA-15	12/8/2006	22.87	--	--	4.53	18.34
HA-15	1/19/2007	22.87	--	--	4.21	18.66
HA-15	2/19/2007	22.87	--	--	6.55	16.32
HA-15	3/15/2007	22.87	--	--	5.30	17.57
HA-15	4/16/2007	22.87	--	--	5.83	17.04
HA-15	5/14/2007	22.87	--	--	7.30	15.57
HA-15	6/29/2007	22.87	--	--	7.83	15.04
HA-15	7/20/2007	22.87			DRY	
HA-15	8/21/2007	22.87	--	--	7.85	15.02
HA-15	9/10/2007	22.87			DRY	
HA-15	10/22/2007	22.87			DRY	
HA-15	11/28/2007	22.87	--	--	7.62	15.25
HA-15	12/13/2007	22.87	--	--	6.53	16.34
HA-15	1/21/2008	22.87	--	--	6.46	16.41
HA-15	2/24/2008	22.87	--	--	6.95	15.92
HA-15	3/24/2008	22.87	--	--	7.24	15.63
HA-15	8/25/2008	22.87			DRY	
HA-15	2/18/2009	22.87	--	--	7.35	15.52
HA-15	8/25/2009	22.87			DRY	
HA-15	3/22/2010	22.87	--	--	6.26	16.61
HA-15	8/23/2010	22.87			DRY	
HA-15	2/7/2011	22.87	--	--	5.90	16.97
HA-15	5/27/2011	22.87			Not Monitored	
HA-15	8/8/2011	22.87	--	--	6.30	16.57
HA-15	11/14/2011	22.87			DRY	
HA-15	2/20/2012	22.87	--	--	5.41	17.46
HA-15	8/22/2012	22.87	--	--	7.81	15.06
HA-15	11/5/2012	22.87	--	--	7.84	15.03
HA-15	1/28/2013	22.87	--	--	5.26	17.61
HA-16	12/5/2002	22.07	7.60	0.05	7.65	14.46
HA-16	12/11/2002	22.07	7.40	0.68	8.08	14.50
HA-16	12/13/2002	22.07	7.33	0.96	8.29	14.50
HA-16	12/17/2002	22.07	6.67	1.54	8.21	15.02
HA-16	1/2/2003	22.07	5.60	0.22	5.82	16.42
HA-16	1/6/2003	22.07	5.08	0.02	5.10	16.99
HA-16	1/7/2003	22.07	5.05	0.02	5.07	17.02
HA-16	1/8/2003	22.07	4.95	0.03	4.98	17.11
HA-16	1/9/2003	22.07	4.92	0.02	4.94	17.15
HA-16	1/10/2003	22.07	4.94	0.02	4.96	17.13
HA-16	1/14/2003	22.07	3.09	2.03	5.12	18.47
HA-16	1/15/2003	22.07	5.00	0.05	5.05	17.06
HA-16	1/16/2003	22.07	4.92	0.04	4.96	17.14
HA-16	1/17/2003	22.07	4.95	0.02	4.97	17.12
HA-16	1/20/2003	22.07	4.98	0.04	5.02	17.08
HA-16	5/28/2003	22.07	7.35	0.77	8.12	14.53
HA-16	12/21/2004	22.07	--	--	5.23	16.84
HA-16	1/13/2005	22.07	--	--	6.10	15.97
HA-16	4/28/2005	22.07	--	--	5.40	16.67
HA-16	6/1/2005	22.07	--	--	5.66	16.41
HA-16	6/29/2005	22.07	--	--	7.14	14.93
HA-16	7/20/2005	22.07	7.77	0.01	7.78	14.30
HA-16	8/22/2005	22.07	--	--	8.00	14.07
HA-16	9/12/2005	22.07	--	--	8.58	13.49
HA-16	10/12/2005	22.07	--	--	9.29	12.78
HA-16	11/21/2005	22.07	--	--	6.99	15.08
HA-16	12/27/2005	22.07	--	--	6.14	15.93
HA-16	1/31/2006	22.07	2.75	0.01	2.76	19.32
HA-16	2/16/2006	22.07	--	--	4.26	17.81
HA-16	3/13/2006	22.07	--	--	5.25	16.82

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-16	4/18/2006	22.07	--	--	5.71	16.36
HA-16	5/12/2006	22.07	--	--	6.10	15.97
HA-16	6/9/2006	22.07	--	--	5.75	16.32
HA-16	7/13/2006	22.07	--	--	7.00	15.07
HA-16	8/16/2006	22.07	--	--	8.00	14.07
HA-16	9/19/2006	22.07	--	--	8.60	13.47
HA-16	10/13/2006	22.07	--	--	8.36	13.71
HA-16	11/20/2006	22.07	--	--	4.42	17.65
HA-16	12/8/2006	22.07	--	--	3.96	18.11
HA-16	1/19/2007	22.07	--	--	3.66	18.41
HA-16	2/19/2007	22.07	--	--	5.84	16.23
HA-16	3/15/2007	22.07	--	--	4.60	17.47
HA-16	4/16/2007	22.07	--	--	5.13	16.94
HA-16	5/14/2007	22.07	--	--	6.70	15.37
HA-16	6/29/2007	22.07	--	--	7.91	14.16
HA-16	7/20/2007	22.07	--	--	8.37	13.70
HA-16	8/21/2007	22.07	--	--	9.05	13.02
HA-16	9/10/2007	22.07	--	--	9.11	12.96
HA-16	10/22/2007	22.07	--	--	7.95	14.12
HA-16	11/28/2007	22.07	--	--	7.20	14.87
HA-16	12/13/2007	22.07	5.77	0.01	5.78	16.30
HA-16	1/21/2008	22.07	--	--	5.75	16.32
HA-16	2/24/2008	22.07	--	--	6.32	15.75
HA-16	3/24/2008	22.07	--	--	6.65	15.42
HA-16	8/25/2008	22.07	--	--	8.60	13.47
HA-16	2/18/2009	22.07	--	--	6.64	15.43
HA-16	8/25/2009	22.07	--	--	9.87	12.20
HA-16	3/22/2010	22.07	--	--	5.53	16.54
HA-16	8/23/2010	22.07	--	--	8.08	13.99
HA-16	2/7/2011	22.07	--	--	5.18	16.89
HA-16	5/27/2011	22.07	--	--	6.08	15.99
HA-16	8/8/2011	22.07	--	--	8.15	13.92
HA-16	11/14/2011	22.07	--	--	7.85	14.22
HA-16	2/20/2012	22.07	--	--	4.61	17.46
HA-16	8/22/2012	22.07	--	--	7.85	14.22
HA-16	11/5/2012	22.07	--	--	7.17	14.90
HA-16	1/28/2013	22.07	--	--	4.73	17.34
HA-17	8/11/2003	21.92			DRY	
HA-17	3/15/2004	21.92	--	--	6.66	15.26
HA-17	9/21/2004	21.92	--	--	7.75	14.17
HA-17	12/21/2004	21.92	--	--	5.07	16.85
HA-17	1/13/2005	21.92	--	--	5.85	16.07
HA-17	4/28/2005	21.92	--	--	4.85	17.07
HA-17	6/1/2005	21.92	--	--	5.09	16.83
HA-17	6/29/2005	21.92	--	--	6.97	14.95
HA-17	7/20/2005	21.92	--	--	7.63	14.29
HA-17	8/22/2005	21.92	--	--	7.82	14.10
HA-17	9/12/2005	21.92			DRY	
HA-17	10/12/2005	21.92			DRY	
HA-17	11/21/2005	21.92	--	--	6.43	15.49
HA-17	12/27/2005	21.92	--	--	5.10	16.82
HA-17	1/30/2006	21.92	--	--	2.81	19.11
HA-17	2/16/2006	21.92	--	0.01	3.69	18.24
HA-17	3/13/2006	21.92	--	--	4.63	17.29
HA-17	4/18/2006	21.92	--	--	5.00	16.92
HA-17	5/12/2006	21.92	--	--	5.54	16.38
HA-17	6/9/2006	21.92	--	--	4.97	16.95
HA-17	7/13/2006	21.92	--	--	9.50	12.42
HA-17	8/16/2006	21.92	--	--	7.50	14.42
HA-17	9/19/2006	21.92			DRY	
HA-17	10/13/2006	21.92			DRY	
HA-17	11/20/2006	21.92	--	--	4.12	17.80
HA-17	12/8/2006	21.92	--	--	3.48	18.44
HA-17	1/19/2007	21.92	--	--	3.02	18.90
HA-17	2/19/2007	21.92	--	--	5.85	16.07
HA-17	3/15/2007	21.92	--	--	3.97	17.95
HA-17	4/16/2007	21.92	--	--	4.51	17.41
HA-17	5/14/2007	21.92	--	--	6.71	15.21
HA-17	6/29/2007	21.92	--	--	7.58	14.34
HA-17	7/20/2007	21.92			DRY	

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-17	8/21/2007	21.92			DRY	
HA-17	9/10/2007	21.92			DRY	
HA-17	10/22/2007	21.82	--	--	7.36	14.46
HA-17	11/28/2007	21.82	--	--	6.95	14.87
HA-17	12/13/2007	21.82	--	--	5.89	15.93
HA-17	1/21/2008	21.82	--	--	5.45	16.37
HA-17	2/24/2008	21.82	--	--	6.09	15.73
HA-17	3/24/2008	21.82	--	--	6.41	15.41
HA-17	8/25/2008	21.82			DRY	
HA-17	2/18/2009	21.82	--	--	6.68	15.14
HA-17	8/25/2009	21.82	--	--	8.10	13.72
HA-17	3/22/2010	21.82	--	--	4.92	16.90
HA-17	8/23/2010	21.82			DRY	
HA-17	2/7/2011	21.82	--	--	4.89	16.93
HA-17	5/27/2011	21.82			Not Monitored	
HA-17	8/8/2011	21.82			Dry	
HA-17	11/14/2011	21.82	--	--	7.69	14.13
HA-17	2/20/2012	21.82	--	--	4.91	16.91
HA-17	8/22/2012	21.82	--	--	7.61	14.21
HA-17	11/5/2012	21.82	--	--	7.31	14.51
HA-17	1/28/2013	21.82	--	--	4.33	17.49
HA-18	8/11/2003	21.51			DRY	
HA-18	3/15/2004	21.51	6.47	0.00	6.47	15.04
HA-18	12/21/2004	21.51	--	--	4.98	16.53
HA-18	1/13/2005	21.51	--	--	5.61	15.90
HA-18	4/28/2005	21.51	--	--	4.79	16.72
HA-18	6/1/2005	21.51	--	--	5.00	16.51
HA-18	6/29/2005	21.51	--	--	6.76	14.75
HA-18	7/20/2005	21.51	--	--	7.46	14.05
HA-18	8/22/2005	21.51	--	--	7.45	14.06
HA-18	9/12/2005	21.51	--	--	7.80	13.71
HA-18	10/12/2005	21.51			DRY	
HA-18	11/21/2005	21.51	--	--	7.00	14.51
HA-18	12/27/2005	21.51	--	--	5.88	15.63
HA-18	1/30/2006	21.51	--	--	2.52	18.99
HA-18	2/16/2006	21.51	--	--	3.59	17.92
HA-18	3/13/2006	21.51	--	--	4.52	16.99
HA-18	4/18/2006	21.51	--	--	5.11	16.40
HA-18	5/12/2006	21.51	--	--	5.39	16.12
HA-18	6/9/2006	21.51	--	--	5.15	16.36
HA-18	7/13/2006	21.51	--	--	6.21	15.30
HA-18	8/16/2006	21.51	--	--	7.21	14.30
HA-18	9/19/2006	21.51			DRY	
HA-18	10/13/2006	21.51	--	--	7.75	13.76
HA-18	11/20/2006	21.51	--	--	4.47	17.04
HA-18	12/8/2006	21.51	--	--	3.58	17.93
HA-18	1/19/2007	21.51	--	--	3.15	18.36
HA-18	2/19/2007	21.51	--	--	5.84	15.67
HA-18	3/15/2007	21.51	--	--	4.32	17.19
HA-18	4/16/2007	21.51	--	--	4.43	17.08
HA-18	5/14/2007	21.51	--	--	6.45	15.06
HA-18	6/29/2007	21.51	--	--	7.27	14.24
HA-18	7/20/2007	21.51	--	--	7.87	13.64
HA-18	8/21/2007	21.51			DRY	
HA-18	9/10/2007	21.51			DRY	
HA-18	10/22/2007	21.51			DRY	
HA-18	11/28/2007	21.51	--	--	6.92	14.59
HA-18	12/13/2007	21.51	--	--	5.86	15.65
HA-18	1/21/2008	21.51	--	--	5.62	15.89
HA-18	2/24/2008	21.51	--	--	4.36	17.15
HA-18	3/24/2008	21.51	--	--	6.29	15.22
HA-18	8/25/2008	21.51	--	--	8.07	13.44
HA-18	2/18/2009	21.51	--	--	6.32	15.19
HA-18	8/25/2009	21.51			DRY	
HA-18	3/22/2010	21.51	--	--	4.81	16.70
HA-18	8/23/2010	21.51	--	--	7.26	14.25
HA-18	2/7/2011	21.51	--	--	4.99	16.52
HA-18	5/27/2011	21.51			Not Monitored	
HA-18	8/8/2011	21.51	--	--	7.76	13.75
HA-18	11/14/2011	21.51	--	--	7.58	13.93

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-18	2/20/2012	21.51	--	--	5.24	16.27
HA-18	11/5/2012	21.51	--	--	7.74	13.77
HA-18	1/28/2013	21.51	--	--	4.34	17.17
HA-19	4/2/2003	22.92	--	--	4.61	18.31
HA-19	4/4/2003	22.92	7.10	--	7.13	15.79
HA-19	4/8/2003	22.92	6.61		6.62	16.31
HA-19	4/11/2003	22.92	5.69	0.00	5.69	17.23
HA-19	4/15/2003	22.92	--	--	4.26	18.66
HA-19	4/17/2003	22.92	--	--	5.62	17.30
HA-19	4/22/2003	22.92	7.21	0.01	7.22	15.71
HA-19	4/25/2003	22.92	7.23	0.00	7.23	15.69
HA-19	5/2/2003	22.92	--	--	7.87	15.05
HA-19	5/6/2003	22.92	--	--	7.80	15.12
HA-19	5/9/2003	22.92	--	--	8.00	14.92
HA-19	5/23/2003	22.92			DRY	
HA-19	5/28/2003	22.92			DRY	
HA-19	6/13/2003	22.92			DRY	
HA-19	6/18/2003	22.92			DRY	
HA-19	6/27/2003	22.92			DRY	
HA-19	7/7/2003	22.92			DRY	
HA-19	7/16/2003	22.92			DRY	
HA-19	7/31/2003	22.92			DRY	
HA-19	8/5/2003	22.92			DRY	
HA-19	8/11/2003	22.92			DRY	
HA-19	8/22/2003	22.92			DRY	
HA-19	8/26/2003	22.92			DRY	
HA-19	9/2/2003	22.92			DRY	
HA-19	9/9/2003	22.92			DRY	
HA-19	9/19/2003	22.92			DRY	
HA-19	10/14/2003	22.92			DRY	
HA-19	11/20/2003	22.92	--	--	4.74	18.18
HA-19	12/3/2003	22.92	--	--	5.35	17.57
HA-19	1/19/2004	22.92	5.51	0.005	5.52	17.41
HA-19	2/24/2004	22.92	7.18	0.005	7.19	15.74
HA-19	3/15/2004	22.92	--	--	7.94	14.98
HA-19	4/19/2004	22.92	--	--	8.01	14.91
HA-19	5/17/2004	22.92			DRY	
HA-19	6/22/2004	22.92			DRY	
HA-19	8/18/2004	22.92			DRY	
HA-19	9/21/2004	22.92	--	--	6.85	16.07
HA-19	10/19/2004	22.92	--	--	4.21	18.71
HA-19	11/23/2004	22.92			DRY	
HA-19	12/21/2004	22.92	--	--	5.13	17.79
HA-19	1/13/2005	22.92	--	--	7.35	15.57
HA-19	4/28/2005	22.92	--	--	6.97	15.95
HA-19	6/1/2005	22.92	--	--	7.39	15.53
HA-19	6/29/2005	22.92			DRY	
HA-19	7/20/2005	22.92			DRY	
HA-19	8/22/2005	22.92			DRY	
HA-19	9/12/2005	22.92			DRY	
HA-19	10/12/2005	22.92			DRY	
HA-19	11/21/2005	22.92	--	--	8.81	14.11
HA-19	12/27/2005	22.92	--	--	4.17	18.75
HA-19	1/30/2006	22.92	--	--	4.14	18.78
HA-19	2/16/2006	22.92	--	--	6.13	16.79
HA-19	3/13/2006	22.92	--	--	7.16	15.76
HA-19	4/18/2006	22.92	--	--	6.68	16.24
HA-19	5/12/2006	22.92	--	--	7.79	15.13
HA-19	6/9/2006	22.92	--	--	7.33	15.59
HA-19	7/13/2006	22.92	--	--	8.00	14.92
HA-19	8/16/2006	22.92			DRY	
HA-19	9/19/2006	22.92			DRY	
HA-19	10/16/2006	22.92			DRY	
HA-19	11/20/2006	22.92	--	--	4.40	18.52
HA-19	12/8/2006	22.92	--	--	5.54	17.38
HA-19	1/19/2007	22.92	--	--	5.20	17.72
HA-19	2/19/2007	22.92	--	--	7.20	15.72
HA-19	3/15/2007	22.92	--	--	6.09	16.83
HA-19	4/16/2007	22.92	--	--	6.99	15.93
HA-19	5/14/2007	22.92			DRY	

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-19	6/29/2007	22.92			DRY	
HA-19	7/20/2007	22.92			DRY	
HA-19	8/21/2007	22.92			DRY	
HA-19	9/10/2007	22.92			DRY	
HA-19	10/22/2007	22.92	--	--	3.99	18.93
HA-19	11/28/2007	22.92	--	--	5.71	17.21
HA-19	12/13/2007	22.92	--	--	4.60	18.32
HA-19	1/21/2008	22.92	--	--	6.37	16.55
HA-19	2/24/2008	22.92	--	--	7.41	15.51
HA-19	3/24/2008	22.92	--	--	4.37	18.55
HA-19	8/25/2008	22.92	--	--	6.02	16.90
HA-19	2/18/2009	22.92	--	--	7.75	15.17
HA-19	8/25/2009	22.92			DRY	
HA-19	3/22/2010	22.92	--	--	7.48	15.44
HA-19	8/23/2010	22.92			DRY	
HA-19	2/7/2011	22.92	--	--	6.55	16.37
HA-19	2/7/2011	22.92	--	--	7.10	15.82
HA-19	8/8/2011	22.92			Dry	
HA-19	11/14/2011	22.92	--	--	7.23	15.69
HA-19	2/20/2012	22.92	--	--	5.58	17.34
HA-19	8/22/2012	22.92	--	--	Dry	--
HA-19	11/5/2012	22.92	--	--	4.92	18.00
HA-19	1/28/2013	22.92	--	--	6.46	16.46
HA-20	11/24/2002	23.10	--	--	7.49	15.61
HA-20	11/27/2002	23.10	6.46	3.51	9.97	15.76
HA-20	12/5/2002	23.10	6.25	3.57	9.82	15.96
HA-20	12/11/2002	23.10	6.25	3.48	9.73	15.98
HA-20	12/13/2002	23.10	6.12	3.55	9.67	16.09
HA-20	12/17/2002	23.10	5.29	4.20	9.49	16.76
HA-20	1/3/2003	23.10	3.26	4.39	7.65	18.74
HA-20	1/6/2003	23.10	3.83	3.10	6.93	18.50
HA-20	1/7/2003	23.10	4.45	1.16	5.61	18.36
HA-20	1/8/2003	23.10	4.22	1.57	5.79	18.49
HA-20	1/9/2003	23.10	3.97	3.11	7.08	18.35
HA-20	1/10/2003	23.10	4.04	3.24	7.28	18.25
HA-20	1/13/2003	23.10	4.75	0.92	5.67	18.12
HA-20	1/14/2003	23.10	4.15	3.47	7.62	18.08
HA-20	1/15/2003	23.10	4.05	3.10	7.15	18.28
HA-20	1/16/2003	23.10	4.15	2.90	7.05	18.23
HA-20	1/17/2003	23.10	4.18	2.82	7.00	18.22
HA-20	1/20/2003	23.10	4.15	3.09	7.24	18.18
HA-20	1/22/2003	23.10	3.30	6.50	9.80	18.18
HA-20	1/23/2003	23.10	4.80	3.78	8.58	17.36
HA-20	1/24/2003	23.10	4.55	3.66	8.21	17.64
HA-20	1/27/2003	23.10	3.68	2.96	6.64	18.68
HA-20	1/28/2003	23.10	3.82	3.68	7.50	18.36
HA-20	1/29/2003	23.10	4.05	4.44	8.49	17.94
HA-20	1/30/2003	23.10	4.26	4.06	8.32	17.83
HA-20	2/3/2003	23.10	4.33	3.17	7.50	17.98
HA-20	2/6/2003	23.10	4.59	1.80	6.39	18.06
HA-20	2/11/2003	23.10	6.18	2.39	8.57	16.32
HA-20	2/18/2003	23.10	7.40	0.88	8.28	15.48
HA-20	2/21/2003	23.10	7.34	0.73	8.07	15.58
HA-20	2/26/2003	23.10	6.09	0.11	6.20	16.98
HA-20	3/4/2003	23.10	7.47	1.87	9.34	15.16
HA-20	3/12/2003	23.10	7.05	2.63	9.68	15.39
HA-20	3/14/2003	23.10	7.14	2.27	9.41	15.39
HA-20	3/26/2003	23.10	5.64	3.93	9.57	16.48
HA-20	3/28/2003	23.10	6.91	2.50	9.41	15.57
HA-20	4/2/2003	23.10	6.47	2.65	9.12	15.97
HA-20	4/4/2003	23.10	7.01	2.13	9.14	15.56
HA-20	4/8/2003	23.10	7.16	1.49	8.65	15.57
HA-20	4/11/2003	23.10	7.21	1.66	8.87	15.48
HA-20	4/15/2003	23.10	6.91	0.40	7.31	16.09
HA-20	4/17/2003	23.10	7.71	1.00	8.71	15.14
HA-20	4/22/2003	23.10	7.28	1.39	8.67	15.47
HA-20	4/25/2003	23.10	7.72	1.24	8.96	15.07
HA-20	5/2/2003	23.10	7.46	2.41	9.87	15.04
HA-20	5/6/2003	23.10	7.38	2.49	9.87	15.10
HA-20	5/9/2003	23.10	8.05	1.95	10.00	14.56

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-20	5/23/2003	23.10	8.69	1.76	10.45	13.97
HA-20	5/28/2003	23.10	8.50	1.49	9.99	14.23
HA-20	6/13/2003	23.10	8.75	1.46	10.21	13.99
HA-20	6/18/2003	23.10	8.68	1.57	10.25	14.03
HA-20	6/27/2003	23.10	8.70	1.64	10.34	13.99
HA-20	7/7/2003	23.10	9.64	0.73	10.37	13.28
HA-20	7/16/2003	23.10	9.11	1.43	10.54	13.63
HA-20	7/31/2003	23.10	9.40	1.48	10.88	13.33
HA-20	8/5/2003	23.10	9.50	1.25	10.75	13.29
HA-20	8/11/2003	23.10	10.65	1.37	12.02	12.11
HA-20	8/22/2003	23.10	10.91	1.29	12.20	11.87
HA-20	8/26/2003	23.10	--	--	9.81	13.29
HA-20	9/2/2003	23.10	9.94	1.33	11.27	12.83
HA-20	9/9/2003	23.10	10.40	0.36	10.76	12.61
HA-20	9/19/2003	23.10	10.38	0.24	10.62	12.66
HA-20	10/14/2003	23.10	10.26	0.75	11.01	12.65
HA-20	11/20/2003	23.10	--	--	7.20	15.90
HA-20	12/3/2003	23.10	--	--	6.21	16.89
HA-20	1/19/2004	23.10	--	--	5.84	17.26
HA-20	2/24/2004	23.10	--	--	7.46	15.64
HA-20	3/15/2004	23.10	--	--	8.44	14.66
HA-20	4/19/2004	23.10	--	--	8.51	14.59
HA-20	5/17/2004	23.10	--	--	8.99	14.11
HA-20	6/22/2004	23.10	--	--	8.83	14.27
HA-20	8/18/2004	23.10	--	--	10.02	13.08
HA-20	9/21/2004	23.10	--	--	9.03	14.07
HA-20	10/19/2004	23.10	--	--	8.17	14.93
HA-20	11/23/2004	23.10	--	--	8.44	14.66
HA-20	12/21/2004	23.10	--	--	6.50	16.60
HA-20	1/13/2005	23.10	--	--	7.35	15.75
HA-20	4/28/2005	23.10	--	--	6.80	16.30
HA-20	6/1/2005	23.10	--	--	7.10	16.00
HA-20	6/29/2005	23.10	--	--	9.72	13.38
HA-20	7/20/2005	23.10	--	--	9.92	13.18
HA-20	8/22/2005	23.10	--	--	9.10	14.00
HA-20	9/12/2005	23.10	--	--	9.73	13.37
HA-20	10/12/2005	23.10	--	--	10.26	12.84
HA-20	11/21/2005	23.10	--	--	8.09	15.01
HA-20	12/27/2005	23.10	--	--	7.20	15.90
HA-20	1/30/2006	23.10	--	--	4.50	18.60
HA-20	2/16/2006	23.10	6.23	0.01	6.24	16.87
HA-20	3/13/2006	23.10	--	--	7.14	15.96
HA-20	4/18/2006	23.10	--	--	7.40	15.70
HA-20	5/12/2006	23.10	--	--	7.69	15.41
HA-20	6/9/2006	23.10	--	--	7.38	15.72
HA-20	7/13/2006	23.10	--	--	8.37	14.73
HA-20	8/16/2006	23.10	--	--	9.13	13.97
HA-20	9/19/2006	23.10	--	--	9.75	13.35
HA-20	10/16/2006	23.10	--	--	9.55	13.55
HA-20	11/20/2006	23.10	--	--	5.70	17.40
HA-20	12/8/2006	23.10	--	--	5.71	17.39
HA-20	1/19/2007	23.10	--	--	5.42	17.68
HA-20	2/19/2007	23.10	--	--	7.20	15.90
HA-20	3/15/2007	23.10	--	--	6.37	16.73
HA-20	4/16/2007	23.10	--	--	6.78	16.32
HA-20	5/14/2007	23.10	--	--	8.00	15.10
HA-20	6/29/2007	23.10	--	--	9.11	13.99
HA-20	7/20/2007	23.10	--	--	9.46	13.64
HA-20	8/21/2007	23.10	--	--	10.09	13.01
HA-20	9/10/2007	23.10	--	--	10.13	12.97
HA-20	10/22/2007	23.10	--	--	9.04	14.06
HA-20	11/28/2007	23.10	--	--	8.30	14.80
HA-20	12/13/2007	23.10	--	--	7.10	16.00
HA-20	1/21/2008	23.10	--	--	7.31	15.79
HA-20	2/24/2008	23.10	--	--	7.83	15.27
HA-20	3/24/2008	23.10	--	--	8.08	15.02
HA-20	8/25/2008	23.10	--	--	8.34	14.76
HA-20	2/18/2009	23.10	--	--	7.90	15.20
HA-20	8/25/2009	23.10	--	--	10.30	12.80
HA-20	3/22/2010	23.10	--	--	8.07	15.03
HA-20	8/23/2010	23.10	--	--	9.67	13.43

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HA-20	2/7/2011	23.10	--	--	0.07	23.03
HA-20	5/27/2011	23.10	--	--	7.96	15.14
HA-20	8/8/2011	23.10	--	--	9.32	13.78
HA-20	11/14/2011	23.10	--	--	9.06	14.04
HA-20	2/20/2012	23.10	--	--	7.15	15.95
HA-20	8/22/2012	23.10	--	--	9.08	14.02
HA-20	11/5/2012	23.10	--	--	8.09	15.01
HA-20	1/28/2013	23.10	--	--	6.49	16.61
LAI-1	1/17/2003	20.94	--	--	4.17	16.77
LAI-1	1/20/2003	20.94	--	--	4.18	16.76
LAI-1	1/31/2003	20.94	--	--	4.28	16.66
LAI-1	2/7/2003	20.94	4.06	0.48	4.54	16.76
LAI-1	2/12/2003	20.94	4.38	1.08	5.46	16.29
LAI-1	2/18/2003	20.94	--	--	5.40	15.54
LAI-1	2/21/2003	20.94	--	--	5.52	15.42
LAI-1	2/24/2003	20.94	--	--	5.96	14.98
LAI-1	3/3/2003	20.94	--	--	5.76	15.18
LAI-1	3/12/2003	20.94	--	--	5.48	15.46
LAI-1	3/14/2003	20.94	--	--	5.09	15.85
LAI-1	3/26/2003	20.94	--	--	4.76	16.18
LAI-1	3/28/2003	20.94	--	--	4.86	16.08
LAI-1	4/2/2003	20.94	5.21	0.01	5.22	15.73
LAI-1	4/4/2003	20.94	5.19	0.01	5.20	15.75
LAI-1	4/8/2003	20.94	5.67	0.01	5.68	15.27
LAI-1	4/11/2003	20.94	5.07	0.01	5.08	15.87
LAI-1	4/15/2003	20.94	4.62	0.01	4.63	16.32
LAI-1	4/17/2003	20.94	6.14	0.01	6.15	14.80
LAI-1	4/22/2003	20.94	--	--	5.21	15.73
LAI-1	4/25/2003	20.94	--	--	5.43	15.51
LAI-1	5/2/2003	20.94	--	--	5.53	15.41
LAI-1	5/6/2003	20.94	--	--	5.66	15.28
LAI-1	5/9/2003	20.94	--	--	6.15	14.79
LAI-1	5/16/2003	20.94	--	--	6.40	14.54
LAI-1	5/23/2003	20.94	6.50	0.01	6.51	14.44
LAI-1	5/28/2003	20.94	6.45	0.01	6.46	14.49
LAI-1	6/13/2003	20.94	6.79	0.01	6.80	14.15
LAI-1	6/18/2003	20.94	--	--	6.78	14.16
LAI-1	6/27/2003	20.94	--	--	6.81	14.13
LAI-1	7/7/2003	20.94	--	--	7.41	13.53
LAI-1	7/16/2003	20.94	--	--	6.43	14.51
LAI-1	7/31/2003	20.94	--	--	7.49	13.45
LAI-1	8/5/2003	20.94	--	--	7.61	13.33
LAI-1	8/11/2003	20.94	--	--	8.80	12.14
LAI-1	8/22/2003	20.94	--	--	8.98	11.96
LAI-1	8/26/2003	20.94	--	--	7.91	13.03
LAI-1	9/2/2003	20.94	--	--	8.07	12.87
LAI-1	9/9/2003	20.94	8.39	0.01	8.40	12.55
LAI-1	9/19/2003	20.94	--	--	8.27	12.67
LAI-1	10/14/2003	20.94	--	--	8.34	12.60
LAI-1	11/20/2003	20.94	--	--	4.63	16.31
LAI-1	12/3/2003	20.94	--	--	4.10	16.84
LAI-1	1/19/2004	20.94	--	--	3.82	17.12
LAI-1	2/24/2004	20.94	--	--	5.22	15.72
LAI-1	3/15/2004	20.94	--	--	6.16	14.78
LAI-1	4/19/2004	20.94	--	--	6.29	14.65
LAI-1	5/17/2004	20.94	--	--	6.81	14.13
LAI-1	6/22/2004	20.94	--	--	6.64	14.30
LAI-1	8/18/2004	20.94	--	--	7.81	13.13
LAI-1	9/21/2004	20.94	--	--	6.90	14.04
LAI-1	10/19/2004	20.94	--	--	6.00	14.94
LAI-1	11/23/2004	20.94	--	--	6.25	14.69
LAI-1	12/21/2004	20.94	--	--	4.38	16.56
LAI-1	1/13/2005	20.94	--	--	5.22	15.72
LAI-1	4/28/2005	20.94	--	--	4.72	16.22
LAI-1	6/1/2005	20.94	--	--	4.98	15.96
LAI-1	6/29/2005	20.94	--	--	6.59	14.35
LAI-1	7/20/2005	20.94	--	--	6.77	14.17
LAI-1	8/22/2005	20.94	--	--	6.95	13.99
LAI-1	9/12/2005	20.94	--	--	7.50	13.44
LAI-1	10/12/2005	20.94	--	--	8.04	12.90

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-1	11/21/2005	20.94	--	--	5.89	15.05
LAI-1	12/27/2005	20.94	--	--	4.99	15.95
LAI-1	1/30/2006	20.94	--	--	2.50	18.44
LAI-1	2/16/2006	20.94	--	--	4.27	16.67
LAI-1	3/13/2006	20.94	--	--	5.07	15.87
LAI-1	4/18/2006	20.94	--	--	5.25	15.69
LAI-1	5/12/2006	20.94	--	--	5.52	15.42
LAI-1	6/9/2006	20.94	--	--	5.23	15.71
LAI-1	7/13/2006	20.94	--	--	6.20	14.74
LAI-1	8/16/2006	20.94	--	--	7.00	13.94
LAI-1	9/19/2006	20.94	--	--	7.54	13.40
LAI-1	10/13/2006	20.94	--	--	7.33	13.61
LAI-1	11/20/2006	20.94	--	--	3.62	17.32
LAI-1	12/8/2006	20.94	--	--	3.70	17.24
LAI-1	1/19/2007	20.94	--	--	3.57	17.37
LAI-1	2/19/2007	20.94	--	--	5.05	15.89
LAI-1	3/15/2007	20.94	--	--	4.50	16.44
LAI-1	4/16/2007	20.94	--	--	4.75	16.19
LAI-1	5/14/2007	20.94	--	--	4.82	16.12
LAI-1	6/29/2007	20.94	--	--	6.92	14.02
LAI-1	7/20/2007	20.94	--	--	7.22	13.72
LAI-1	8/21/2007	20.94	--	--	7.88	13.06
LAI-1	9/10/2007	20.94	--	--	7.91	13.03
LAI-1	10/22/2007	20.94	--	--	6.84	14.10
LAI-1	11/28/2007	20.94	--	--	6.11	14.83
LAI-1	12/13/2007	20.94	--	--	4.96	15.98
LAI-1	1/21/2008	20.94	--	--	5.19	15.75
LAI-1	2/24/2008	20.94	--	--	5.66	15.28
LAI-1	3/24/2008	20.94	--	--	5.90	15.04
LAI-1	8/25/2008	20.94	--	--	7.45	13.49
LAI-1	2/18/2009	20.94	--	--	5.89	15.05
LAI-1	8/25/2009	20.94	--	--	8.10	12.84
LAI-1	3/22/2010	20.94	--	--	6.10	14.84
LAI-1	8/23/2010	20.94	--	--	7.52	13.42
LAI-1	2/7/2011	20.94	--	--	4.78	16.16
LAI-1	5/27/2011	20.94			Not Monitored	
LAI-1	8/8/2011	20.94	--	--	7.13	13.81
LAI-1	11/14/2011	20.94	--	--	8.50	12.44
LAI-1	2/20/2012	20.94	--	--	5.47	15.47
LAI-1	8/22/2012	20.94	--	--	6.91	14.03
LAI-1	11/5/2012	20.94	--	--	5.84	15.10
LAI-1	1/28/2013	20.94	--	--	4.59	16.35
LAI-2	1/17/2003	20.89	--	--	4.14	16.75
LAI-2	1/20/2003	20.89	--	--	4.25	16.64
LAI-2	1/31/2003	20.89	--	--	4.55	16.34
LAI-2	2/7/2003	20.89	--	--	4.41	16.48
LAI-2	2/12/2003	20.89	--	--	4.71	16.18
LAI-2	2/18/2003	20.89	--	--	5.44	15.45
LAI-2	2/21/2003	20.89	--	--	5.61	15.28
LAI-2	2/24/2003	20.89	--	--	5.89	15.00
LAI-2	3/3/2003	20.89	--	--	5.17	15.72
LAI-2	3/12/2003	20.89	--	--	5.37	15.52
LAI-2	3/14/2003	20.89	--	--	5.24	15.65
LAI-2	3/26/2003	20.89	--	--	4.61	16.28
LAI-2	3/28/2003	20.89	--	--	4.72	16.17
LAI-2	4/2/2003	20.89	--	--	5.51	15.38
LAI-2	4/4/2003	20.89	--	--	5.48	15.41
LAI-2	4/8/2003	20.89	--	--	5.55	15.34
LAI-2	4/11/2003	20.89	--	--	5.19	15.70
LAI-2	4/15/2003	20.89	--	--	4.80	16.09
LAI-2	4/17/2003	20.89	--	--	5.96	14.93
LAI-2	4/22/2003	20.89	--	--	5.33	15.56
LAI-2	4/25/2003	20.89	--	--	5.49	15.40
LAI-2	5/2/2003	20.89	--	--	5.78	15.11
LAI-2	5/6/2003	20.89	--	--	5.42	15.47
LAI-2	5/9/2003	20.89	--	--	6.30	14.59
LAI-2	5/16/2003	20.89	--	--	6.54	14.35
LAI-2	5/23/2003	20.89	--	--	6.63	14.26
LAI-2	5/28/2003	20.89	--	--	6.51	14.38
LAI-2	6/13/2003	20.89	--	--	6.91	13.98

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-2	6/18/2003	20.89	--	--	6.86	14.03
LAI-2	6/27/2003	20.89	--	--	6.87	14.02
LAI-2	7/7/2003	20.89	--	--	7.40	13.49
LAI-2	7/16/2003	20.89	--	--	6.52	14.37
LAI-2	7/31/2003	20.89	--	--	7.48	13.41
LAI-2	8/5/2003	20.89	--	--	7.56	13.33
LAI-2	8/11/2003	20.89	--	--	8.81	12.08
LAI-2	8/22/2003	20.89	--	--	8.99	11.90
LAI-2	8/26/2003	20.89	--	--	7.86	13.03
LAI-2	9/2/2003	20.89	8.03	0.01	8.04	12.86
LAI-2	9/9/2003	20.89	--	--	8.46	12.43
LAI-2	9/19/2003	20.89	--	--	8.15	12.74
LAI-2	10/14/2003	20.89	--	--	8.25	12.64
LAI-2	11/20/2003	20.89	--	--	4.82	16.07
LAI-2	12/3/2003	20.89	--	--	4.13	16.76
LAI-2	1/19/2004	20.89	--	--	3.80	17.09
LAI-2	2/24/2004	20.89	--	--	5.26	15.63
LAI-2	3/15/2004	20.89	--	--	6.21	14.68
LAI-2	4/19/2004	20.89	--	--	6.31	14.58
LAI-2	5/17/2004	20.89	--	--	6.75	14.14
LAI-2	6/22/2004	20.89	--	--	6.61	14.28
LAI-2	8/18/2004	20.89	--	--	7.82	13.07
LAI-2	9/21/2004	20.89	--	--	6.81	14.08
LAI-2	10/19/2004	20.89	--	--	5.96	14.93
LAI-2	11/23/2004	20.89	--	--	6.34	14.55
LAI-2	12/21/2004	20.89	--	--	4.35	16.54
LAI-2	1/13/2005	20.89	--	--	5.15	15.74
LAI-2	4/28/2005	20.89	--	--	4.68	16.21
LAI-2	6/1/2005	20.89	--	--	4.95	15.94
LAI-2	6/29/2005	20.89	--	--	6.69	14.20
LAI-2	7/20/2005	20.89	--	--	6.80	14.09
LAI-2	8/22/2005	20.89	--	--	6.93	13.96
LAIx-2	9/12/2005	20.67	--	--	10.23	10.44
LAIx-2	10/12/2005	20.67	--	--	9.91	10.76
LAIx-2	11/21/2005	20.67	--	--	8.23	12.44
LAIx-2	12/27/2005	20.67	--	--	6.92	13.75
LAIx-2	1/30/2006	20.67	--	--	5.34	15.33
LAIx-2	2/16/2006	20.67	7.39	0.01	7.40	13.28
LAIx-2	3/13/2006	20.67	--	--	7.71	12.96
LAIx-2	4/18/2006	20.67	--	--	7.89	12.78
LAIx-2	5/12/2006	20.67	--	--	8.83	11.84
LAIx-2	6/9/2006	20.67	--	--	8.16	12.51
LAIx-2	7/13/2006	20.67	--	--	9.43	11.24
LAIx-2	8/16/2006	20.67	--	--	10.17	10.50
LAIx-2	9/19/2006	20.67	--	--	9.65	11.02
LAIx-2	10/13/2006	20.67	--	--	9.62	11.05
LAIx-2	11/20/2006	20.67	--	--	5.33	15.34
LAIx-2	12/8/2006	20.67	--	--	6.14	14.53
LAIx-2	1/19/2007	20.67	--	--	5.75	14.92
LAIx-2	2/19/2007	20.67	--	--	7.51	13.16
LAIx-2	3/15/2007	20.67	--	--	6.50	14.17
LAIx-2	4/16/2007	20.67	--	--	7.14	13.53
LAIx-2	5/14/2007	20.67	--	--	8.17	12.50
LAIx-2	6/29/2007	20.67	--	--	8.86	11.81
LAIx-2	7/20/2007	20.67	--	--	9.13	11.54
LAIx-2	8/21/2007	20.67	--	--	9.30	11.37
LAIx-2	9/10/2007	20.67	--	--	9.18	11.49
LAIx-2	10/22/2007	20.67	--	--	7.30	13.37
LAIx-2	11/28/2007	20.67	--	--	6.72	13.95
LAIx-2	12/13/2007	20.67	--	--	4.96	15.71
LAIx-2	1/21/2008	20.67	--	--	5.24	15.43
LAIx-2	2/24/2008	20.67	--	--	5.94	14.73
LAIx-2	3/24/2008	20.67	--	--	6.37	14.30
LAIx-2	8/25/2008	20.67	--	--	7.96	12.71
LAIx-2	2/18/2009	20.67	--	--	6.04	14.63
LAIx-2	8/25/2009	20.67	--	--	8.78	11.89
LAIx-2	3/22/2010	20.67	--	--	6.42	14.25
LAIx-2	8/23/2010	20.67	--	--	8.20	12.47
LAIx-2	2/7/2011	20.67	--	--	4.80	15.87
LAIx-2	5/27/2011	20.67	--	--	6.65	14.02

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-2	8/8/2011	20.67	--	--	7.41	13.26
LAIx-2	11/14/2011	20.67	--	--	6.94	13.73
LAIx-2	2/20/2012	20.67	--	--	5.54	15.13
LAIx-2	8/22/2012	20.67	--	--	6.94	13.73
LAIx-2	11/5/2012	20.67	--	--	5.65	15.02
LAIx-2	1/28/2013	20.67	--	--	4.64	16.03
LAI-3	1/17/2003	20.74	--	--	4.37	16.37
LAI-3	1/20/2003	20.74	--	--	4.28	16.46
LAI-3	1/31/2003	20.74	--	--	4.94	15.80
LAI-3	2/7/2003	20.74	--	--	4.41	16.33
LAI-3	2/12/2003	20.74	--	--	4.70	16.04
LAI-3	2/18/2003	20.74	--	--	5.21	15.53
LAI-3	2/21/2003	20.74	--	--	5.58	15.16
LAI-3	2/24/2003	20.74	--	--	5.66	15.08
LAI-3	3/3/2003	20.74	--	--	5.13	15.61
LAI-3	3/12/2003	20.74	--	--	5.32	15.42
LAI-3	3/14/2003	20.74	--	--	5.16	15.58
LAI-3	3/26/2003	20.74	--	--	4.65	16.09
LAI-3	3/28/2003	20.74	--	--	4.75	15.99
LAI-3	4/2/2003	20.74	--	--	5.57	15.17
LAI-3	4/4/2003	20.74	--	--	5.53	15.21
LAI-3	4/8/2003	20.74	--	--	5.69	15.05
LAI-3	4/11/2003	20.74	--	--	5.15	15.59
LAI-3	4/15/2003	20.74	--	--	4.75	15.99
LAI-3	4/17/2003	20.74	--	--	6.08	14.66
LAI-3	4/22/2003	20.74	--	--	5.27	15.47
LAI-3	4/25/2003	20.74	--	--	5.45	15.29
LAI-3	5/2/2003	20.74	--	--	5.76	14.98
LAI-3	5/6/2003	20.74	--	--	5.61	15.13
LAI-3	5/9/2003	20.74	--	--	6.30	14.44
LAI-3	5/16/2003	20.74	--	--	6.53	14.21
LAI-3	5/23/2003	20.74	--	--	6.57	14.17
LAI-3	5/28/2003	20.74	--	--	6.44	14.30
LAI-3	6/13/2003	20.74	--	--	6.85	13.89
LAI-3	6/18/2003	20.74	--	--	6.81	13.93
LAI-3	6/27/2003	20.74	--	--	6.83	13.91
LAI-3	7/7/2003	20.74	--	--	7.32	13.42
LAI-3	7/16/2003	20.74	--	--	6.47	14.27
LAI-3	7/31/2003	20.74	--	--	7.37	13.37
LAI-3	8/5/2003	20.74	--	--	7.49	13.25
LAI-3	8/11/2003	20.74	--	--	7.68	13.06
LAI-3	8/22/2003	20.74	--	--	8.74	12.00
LAI-3	8/26/2003	20.74	--	--	7.74	13.00
LAI-3	9/2/2003	20.74	--	--	8.03	12.71
LAI-3	9/9/2003	20.74	--	--	8.45	12.29
LAI-3	9/19/2003	20.74	--	--	8.10	12.64
LAI-3	10/14/2003	20.74	--	--	8.20	12.54
LAI-3	11/20/2003	20.74	--	--	4.77	15.97
LAI-3	12/3/2003	20.74	--	--	4.08	16.66
LAI-3	1/19/2004	20.74	--	--	3.55	17.19
LAI-3	2/24/2004	20.74	--	--	5.23	15.51
LAI-3	3/15/2004	20.74	--	--	6.20	14.54
LAI-3	4/19/2004	20.74	--	--	6.21	14.53
LAI-3	5/17/2004	20.74	--	--	6.66	14.08
LAI-3	6/22/2004	20.74	--	--	6.46	14.28
LAI-3	8/18/2004	20.74	--	--	7.76	12.98
LAI-3	9/21/2004	20.74	--	--	6.70	14.04
LAI-3	10/19/2004	20.74	--	--	5.82	14.92
LAI-3	11/23/2004	20.74	--	--	6.14	14.60
LAI-3	12/21/2004	20.74	--	--	4.22	16.52
LAI-3	1/13/2005	20.74	--	--	5.03	15.71
LAI-3	4/28/2005	20.74	--	--	4.55	16.19
LAI-3	6/1/2005	20.74	--	--	4.86	15.88
LAI-3	6/29/2005	20.74	--	--	6.69	14.05
LAI-3	7/20/2005	20.74	--	--	6.71	14.03
LAI-3	8/22/2005	20.74	--	--	6.82	13.92
LAI-3	5/27/2011	20.74			Not Monitored	
LAIx-3	9/12/2005	20.74	--	--	10.31	10.43
LAIx-3	10/12/2005	20.74	--	--	9.99	10.75

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-3	11/21/2005	20.74	8.31	0.01	8.32	12.43
LAIx-3	12/27/2005	20.74	--	--	7.15	13.59
LAIx-3	1/30/2006	20.74	6.00	0.01	6.01	14.74
LAIx-3	2/16/2006	20.74	--	--	7.85	12.89
LAIx-3	3/13/2006	20.74	--	--	8.18	12.56
LAIx-3	4/18/2006	20.74	--	--	8.36	12.38
LAIx-3	5/12/2006	20.74	--	--	8.87	11.87
LAIx-3	6/9/2006	20.74	--	--	8.65	12.09
LAIx-3	7/13/2006	20.74	--	--	9.90	10.84
LAIx-3	8/16/2006	20.74	--	--	10.63	10.11
LAIx-3	9/19/2006	20.74	--	--	10.25	10.49
LAIx-3	10/13/2006	20.74	--	--	10.28	10.46
LAIx-3	11/20/2006	20.74	--	--	7.14	13.60
LAIx-3	12/8/2006	20.74	--	--	7.84	12.90
LAIx-3	1/19/2007	20.74	--	--	7.61	13.13
LAIx-3	2/19/2007	20.74	--	--	7.86	12.88
LAIx-3	3/15/2007	20.74	--	--	7.34	13.40
LAIx-3	4/16/2007	20.74	--	--	7.86	12.88
LAIx-3	5/14/2007	20.74	--	--	8.61	12.13
LAIx-3	6/29/2007	20.74	--	--	9.27	11.47
LAIx-3	7/20/2007	20.74	--	--	9.59	11.15
LAIx-3	8/21/2007	20.74	--	--	9.80	10.94
LAIx-3	9/10/2007	20.74	--	--	9.92	10.82
LAIx-3	10/22/2007	20.74	--	--	8.48	12.26
LAIx-3	11/28/2007	20.74	--	--	8.10	12.64
LAIx-3	12/13/2007	20.74	--	--	6.13	14.61
LAIx-3	1/21/2008	20.74	--	--	6.73	14.01
LAIx-3	2/24/2008	20.74	--	--	7.31	13.43
LAIx-3	3/24/2008	20.74	--	--	7.45	13.29
LAIx-3	8/25/2008	20.74	--	--	9.91	10.83
LAIx-3	2/18/2009	20.74	--	--	7.68	13.06
LAIx-3	8/25/2009	20.74	--	--	9.83	10.91
LAIx-3	3/22/2010	20.74	--	--	7.60	13.14
LAIx-3	8/23/2010	20.74	--	--	9.31	11.43
LAIx-3	2/7/2011	20.74	--	--	5.73	15.01
LAIx-3	5/27/2011	20.74			Not Monitored	
LAIx-3	8/8/2011	20.74	--	--	9.06	11.68
LAIx-3	11/14/2011	20.74	--	--	7.17	13.57
LAIx-3	2/20/2012	20.74	--	--	7.30	13.44
LAIx-3	8/22/2012	20.74	--	--	9.11	11.63
LAIx-3	11/5/2012	20.74	--	--	6.55	14.19
LAIx-3	1/28/2013	20.74	--	--	6.09	14.65
LAI-4	1/22/2003	22.43	6.87	0.43	7.30	15.45
LAI-4	1/23/2003	22.43	7.48	0.20	7.68	14.90
LAI-4	1/24/2003	22.43	6.72	0.67	7.39	15.54
LAI-4	1/27/2003	22.43	4.47	4.67	9.14	16.79
LAI-4	1/28/2003	22.43	4.97	4.43	9.40	16.35
LAI-4	1/29/2003	22.43	7.40	0.05	7.45	15.02
LAI-4	1/30/2003	22.43	7.88	0.06	7.94	14.54
LAI-4	2/3/2003	22.43	6.25	2.16	8.41	15.64
LAI-4	2/6/2003	23.88	6.28	1.04	7.32	17.34
LAI-4	2/11/2003	23.88	7.54	1.44	8.98	15.98
LAI-4	2/18/2003	23.88	9.28	0.17	9.45	14.56
LAI-4	2/21/2003	23.88	9.11	0.09	9.20	14.75
LAI-4	2/26/2003	23.88	8.37	1.35	9.72	15.17
LAI-4	3/3/2003	23.88	8.57	0.86	9.43	15.10
LAI-4	3/12/2003	23.88	8.80	0.14	8.94	15.05
LAI-4	3/14/2003	23.88	8.68	0.14	8.82	15.17
LAI-4	3/26/2003	23.88	--	--	9.06	14.82
LAI-4	3/28/2003	23.88	--	--	9.28	14.60
LAI-4	4/2/2003	23.88	8.21	0.08	8.29	15.65
LAI-4	4/4/2003	23.88	8.58	0.04	8.62	15.29
LAI-4	4/8/2003	23.88	8.51	0.13	8.64	15.34
LAI-4	4/11/2003	23.88	8.78	0.14	8.92	15.07
LAI-4	4/15/2003	23.88	7.86	0.95	8.81	15.78
LAI-4	4/17/2003	23.88	9.19	0.02	9.21	14.69
LAI-4	4/22/2003	23.88	6.61	0.19	6.80	17.22
LAI-4	4/25/2003	23.88	8.96	0.25	9.21	14.86
LAI-4	5/2/2003	23.88	9.06	0.10	9.16	14.80
LAI-4	5/6/2003	23.88	8.56	1.85	10.41	14.86

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-4	5/9/2003	23.88	10.96	0.02	10.98	12.92
LAI-4	5/23/2003	23.88	10.17	0.02	10.19	13.71
LAI-4	5/28/2003	23.88	9.81	0.03	9.84	14.06
LAI-4	6/13/2003	23.88	10.09	0.03	10.12	13.78
LAI-4	6/18/2003	23.88	10.05	0.08	10.13	13.81
LAI-4	6/27/2003	23.88	9.92	0.82	10.74	13.76
LAI-4	7/7/2003	23.88	10.27	1.44	11.71	13.25
LAI-4	7/16/2003	23.88	9.92	2.10	12.02	13.44
LAI-4	7/31/2003	23.88	10.58	1.12	11.70	13.02
LAI-4	8/5/2003	23.88	10.32	1.97	12.29	13.07
LAI-4	8/11/2003	23.88	11.70	1.09	12.79	11.91
LAI-4	8/22/2003	23.88	11.96	1.28	13.24	11.60
LAI-4	8/26/2003	23.88	11.09	1.15	12.24	12.50
LAI-4	9/2/2003	23.88	11.04	1.32	12.36	12.51
LAI-4	9/9/2003	23.88	11.10	2.16	13.26	12.24
LAI-4	9/19/2003	23.88	11.14	1.35	12.49	12.40
LAI-4	10/14/2003	23.88	11.21	1.59	12.80	12.27
LAI-4	11/20/2003	23.88	8.21	0.09	8.30	15.65
LAI-4	12/3/2003	23.88	7.12	1.06	8.18	16.50
LAI-4	1/19/2004	23.88	6.84	0.72	7.56	16.86
LAI-4	2/24/2004	23.88	8.25	0.65	8.90	15.47
LAI-4	3/15/2004	23.88	9.42	0.09	9.51	14.44
LAI-4	4/19/2004	23.88	9.19	0.01	9.20	14.69
LAI-4	5/17/2004	23.88	--	--	10.05	13.83
LAI-4	6/22/2004	23.88	--	--	9.98	13.90
LAI-4	8/18/2004	23.88	11.20	0.05	11.25	12.67
LAI-4	9/21/2004	23.88	--	--	10.05	13.83
LAI-4	10/19/2004	24.88	--	--	9.23	15.65
LAI-4	11/23/2004	24.88	--	--	9.45	15.43
LAI-4	12/21/2004	24.88	--	--	7.60	17.28
LAI-4	1/13/2005	24.88	--	--	8.37	16.51
LAI-4	4/28/2005	24.88	--	--	8.57	16.31
LAI-4	6/1/2005	24.88	--	--	8.15	16.73
LAI-4	6/29/2005	24.88	--	--	10.05	14.83
LAI-4	7/20/2005	24.88	--	--	10.45	14.43
LAI-4	8/22/2005	24.88	--	--	10.12	14.76
LAI-4	5/27/2011	24.88			Not Monitored	
LAIx-4	9/12/2005	25.50	--	--	14.15	11.35
LAIx-4	10/12/2005	25.50	--	--	14.78	10.72
LAIx-4	11/21/2005	25.50	12.76	0.01	12.77	12.74
LAIx-4	12/27/2005	25.50	--	--	11.95	13.55
LAIx-4	1/30/2006	25.50	--	--	10.60	14.90
LAIx-4	2/16/2006	25.50	--	--	12.68	12.82
LAIx-4	3/13/2006	25.50	--	--	12.95	12.55
LAIx-4	4/18/2006	25.50	--	--	13.05	12.45
LAIx-4	5/12/2006	25.50	--	--	13.70	11.80
LAIx-4	6/9/2006	25.50	--	--	13.45	12.05
LAIx-4	7/13/2006	25.50	--	--	15.65	9.85
LAIx-4	8/16/2006	25.50	15.41	0.02	15.43	10.09
LAIx-4	9/19/2006	25.50	--	--	15.05	10.45
LAIx-4	10/13/2006	25.50	--	--	15.13	10.37
LAIx-4	11/20/2006	25.50	--	--	12.43	13.07
LAIx-4	12/8/2006	25.50	--	--	12.76	12.74
LAIx-4	1/19/2007	25.50	--	--	12.38	13.12
LAIx-4	2/19/2007	25.50	--	--	12.96	12.54
LAIx-4	3/15/2007	25.50	--	--	12.70	12.80
LAIx-4	4/16/2007	25.50	--	--	13.11	12.39
LAIx-4	5/14/2007	25.50	--	--	13.73	11.77
LAIx-4	6/29/2007	25.50	--	--	14.19	11.31
LAIx-4	7/20/2007	25.50	--	--	14.57	10.93
LAIx-4	8/21/2007	25.50	--	--	14.74	10.76
LAIx-4	9/10/2007	25.50	--	--	14.82	10.68
LAIx-4	10/22/2007	25.50	--	--	13.64	11.86
LAIx-4	11/28/2007	25.50	--	--	13.45	12.05
LAIx-4	12/13/2007	25.50	--	--	12.80	12.70
LAIx-4	1/21/2008	25.50	--	--	8.78	16.72
LAIx-4	2/24/2008	25.50	--	--	13.23	12.27
LAIx-4	3/24/2008	25.50	--	--	12.81	12.69
LAIx-4	8/25/2008	25.50	--	--	13.97	11.53
LAIx-4	2/18/2009	22.50	--	--	13.44	9.06

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-4	8/25/2009	22.50	--	--	15.09	7.41
LAIx-4	3/22/2010	22.50	--	--	13.20	9.30
LAIx-4	8/23/2010	25.50	--	--	12.67	12.83
LAIx-4	2/7/2011	25.50	--	--	12.68	12.82
LAIx-4	5/27/2011	25.50			Not Monitored	
LAI-5	1/22/2003	23.04	6.55	4.18	10.73	15.45
LAI-5	1/23/2003	23.04	6.54	4.02	10.56	15.50
LAI-5	1/24/2003	23.04	6.40	3.92	10.32	15.66
LAI-5	1/27/2003	23.04	5.51	3.66	9.17	16.62
LAI-5	1/28/2003	23.04	6.85	0.55	7.40	16.05
LAI-5	1/29/2003	23.04	6.20	4.20	10.40	15.79
LAI-5	1/30/2003	23.04	6.31	4.04	10.35	15.72
LAI-5	2/3/2003	23.04	6.36	3.29	9.65	15.86
LAI-5	2/6/2003	24.52	7.18	3.57	10.75	16.45
LAI-5	2/11/2003	24.52	7.53	3.64	11.17	16.08
LAI-5	2/18/2003	24.52	6.50	4.75	11.25	16.83
LAI-5	2/21/2003	24.52	8.21	3.30	11.51	15.49
LAI-5	2/26/2003	24.52	7.78	3.23	11.01	15.93
LAI-5	3/4/2003	24.52	7.78	3.23	11.01	15.93
LAI-5	3/12/2003	24.52	8.32	3.36	11.68	15.36
LAI-5	3/14/2003	24.52	8.36	3.08	11.44	15.39
LAI-5	3/26/2003	24.52	--	--	10.01	14.51
LAI-5	3/28/2003	24.52	--	--	9.96	14.56
LAI-5	4/2/2003	24.52	8.52	0.83	9.35	15.79
LAI-5	4/4/2003	24.52	8.90	0.68	9.58	15.45
LAI-5	4/8/2003	24.52	8.96	0.55	9.51	15.42
LAI-5	4/11/2003	24.52	8.72	1.62	10.34	15.40
LAI-5	4/15/2003	24.52	8.01	2.43	10.44	15.90
LAI-5	4/17/2003	24.52	9.60	0.16	9.76	14.88
LAI-5	4/22/2003	24.52	9.04	0.39	9.43	15.38
LAI-5	4/25/2003	24.52	9.05	2.10	11.15	14.95
LAI-5	5/2/2003	24.52	9.48	0.24	9.72	14.98
LAI-5	5/6/2003	24.52	8.94	2.24	11.18	15.02
LAI-5	5/9/2003	24.52	10.28	0.07	10.35	14.22
LAI-5	5/23/2003	24.52	10.65	0.02	10.67	13.87
LAI-5	5/28/2003	24.52	10.36	0.09	10.45	14.14
LAI-5	6/13/2003	24.52	10.58	0.05	10.63	13.93
LAI-5	6/18/2003	24.52	10.51	0.01	10.52	14.01
LAI-5	6/27/2003	24.52	10.08	1.63	11.71	14.03
LAI-5	7/7/2003	24.52	10.52	1.85	12.37	13.54
LAI-5	7/16/2003	24.52	10.30	2.15	12.45	13.68
LAI-5	7/31/2003	24.52	10.77	1.67	12.44	13.33
LAI-5	8/5/2003	24.52	11.30	2.35	13.65	12.63
LAI-5	8/11/2003	24.52	--	--	12.22	12.30
LAI-5	8/22/2003	24.52	--	--	12.34	12.18
LAI-5	8/26/2003	24.52	12.39	1.29	13.68	11.81
LAI-5	9/2/2003	24.52	11.57	0.03	11.60	12.94
LAI-5	9/9/2003	24.52	11.14	2.49	13.63	12.76
LAI-5	9/19/2003	24.52	11.89	0.57	12.46	12.49
LAI-5	10/14/2003	24.52	12.13	0.45	12.58	12.28
LAI-5	11/20/2003	24.52	--	--	8.72	15.80
LAI-5	12/3/2003	24.52	7.76	0.33	8.09	16.68
LAI-5	1/19/2004	24.52	7.38	0.07	7.45	17.12
LAI-5	2/24/2004	24.52	8.65	0.11	8.76	15.84
LAI-5	3/15/2004	24.52	--	--	9.94	14.58
LAI-5	4/19/2004	24.52	--	--	10.19	14.33
LAI-5	5/17/2004	24.52	--	--	11.14	13.38
LAI-5	6/22/2004	24.52	11.10	0.01	11.11	13.42
LAI-5	8/18/2004	24.52	--	--	12.17	12.35
LAI-5	9/21/2004	24.52	--	--	11.16	13.36
LAI-5	10/19/2004	25.52	--	--	10.29	15.23
LAI-5	11/23/2004	25.52	--	--	10.48	15.04
LAI-5	12/21/2004	25.52	--	--	8.99	16.53
LAI-5	1/13/2005	25.52	--	--	9.47	16.05
LAI-5	4/28/2005	25.52	--	--	9.32	16.20
LAI-5	6/1/2005	25.52	--	--	9.61	15.91
LAI-5	6/29/2005	25.52	--	--	11.40	14.12
LAI-5	7/20/2005	25.52	--	--	11.47	14.05
LAI-5	8/22/2005	25.52	--	--	11.44	14.08
LAI-5	5/27/2011	25.52			Not Monitored	

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-5	9/12/2005	25.63	--	--	14.18	11.45
LAIx-5	10/12/2005	25.63	--	--	14.58	11.05
LAIx-5	11/21/2005	25.63	--	--	12.08	13.55
LAIx-5	12/27/2005	25.63	11.10	0.05	11.15	14.52
LAIx-5	1/30/2006	25.63	7.33	2.73	10.06	17.62
LAIx-5	2/16/2006	25.63	12.10	0.00	12.10	13.53
LAIx-5	3/13/2006	25.63	--	--	12.71	12.92
LAIx-5	4/18/2006	25.63	10.60	2.69	13.29	14.36
LAIx-5	5/12/2006	25.63	11.10	3.33	14.43	13.70
LAIx-5	6/9/2006	25.63	12.54	0.01	12.55	13.09
LAIx-5	7/13/2006	25.63	13.10	0.15	13.25	12.49
LAIx-5	8/16/2006	25.63	--	--	13.80	11.83
LAIx-5	9/19/2006	25.63	--	--	14.35	11.28
LAIx-5	10/13/2006	25.63	--	--	13.80	11.83
LAIx-5	11/20/2006	25.63	9.82	0.27	10.09	15.74
LAIx-5	12/8/2006	25.63	9.92	0.80	10.72	15.51
LAIx-5	1/19/2007	25.63	8.94	1.31	10.25	16.36
LAIx-5	2/19/2007	25.63	10.04	0.25	10.29	15.53
LAIx-5	3/15/2007	25.63	9.29	0.25	9.54	16.28
LAIx-5	4/16/2007	25.63	10.46	0.16	10.62	15.13
LAIx-5	5/14/2007	25.63	11.63	0.02	11.65	14.00
LAIx-5	6/29/2007	25.63	--	--	11.88	13.75
LAIx-5	7/20/2007	25.63	--	--	12.59	13.04
LAIx-5	8/21/2007	25.63	--	--	13.18	12.45
LAIx-5	9/10/2007	25.63	--	--	15.47	10.16
LAIx-5	10/22/2007	25.63	--	--	11.95	13.68
LAIx-5	11/28/2007	25.63	--	--	11.37	14.26
LAIx-5	12/13/2007	25.63	10.82	0.13	10.95	14.78
LAIx-5	1/21/2008	25.63	--	--	11.68	13.95
LAIx-5	2/24/2008	25.63	--	--	10.13	15.50
LAIx-5	3/24/2008	25.63	--	--	11.11	14.52
LAIx-5	8/25/2008	25.63	--	--	12.30	13.33
LAIx-5	2/18/2009	25.63	--	--	10.65	14.98
LAIx-5	8/25/2009	25.63	--	--	12.92	12.71
LAIx-5	3/22/2010	25.63	10.79	0.01	10.80	14.84
LAIx-5	8/23/2010	25.63			DRY	
LAIx-5	2/7/2011	25.63	9.80	0.05	9.85	15.82
LAIx-5	5/27/2011	25.63			Not Monitored	
LAI-6	1/22/2003	22.86	6.67	3.78	10.45	15.25
LAI-6	1/23/2003	22.86	6.45	3.85	10.30	15.45
LAI-6	1/24/2003	22.86	6.32	4.00	10.32	15.54
LAI-6	1/27/2003	22.86	5.68	3.37	9.05	16.34
LAI-6	1/28/2003	22.86	6.91	0.93	7.84	15.72
LAI-6	1/29/2003	22.86	6.51	2.53	9.04	15.72
LAI-6	1/30/2003	22.86	6.36	3.60	9.96	15.60
LAI-6	2/3/2003	22.86	6.27	3.69	9.96	15.67
LAI-6	2/6/2003	22.86	5.79	3.79	9.58	16.12
LAI-6	2/11/2003	22.86	6.03	3.61	9.64	15.93
LAI-6	2/18/2003	22.86	7.98	0.42	8.40	14.78
LAI-6	2/21/2003	22.86	7.57	0.54	8.11	15.16
LAI-6	2/26/2003	22.86	7.15	0.47	7.62	15.59
LAI-6	3/3/2003	22.86	8.01	0.45	8.46	14.74
LAI-6	3/12/2003	22.86	7.46	0.23	7.69	15.34
LAI-6	3/14/2003	22.86	7.72	0.19	7.91	15.09
LAI-6	3/26/2003	22.86	6.37	1.45	7.82	16.13
LAI-6	3/28/2003	22.86	7.10	1.65	8.75	15.35
LAI-6	4/2/2003	22.86	6.65	2.15	8.80	15.67
LAI-6	4/4/2003	22.86	7.06	1.74	8.80	15.37
LAI-6	4/8/2003	22.86	7.13	1.70	8.83	15.31
LAI-6	4/11/2003	22.86	7.22	0.88	8.10	15.42
LAI-6	4/15/2003	22.86	6.56	1.82	8.38	15.85
LAI-6	4/17/2003	22.86	7.61	1.74	9.35	14.82
LAI-6	4/22/2003	22.86	7.16	1.65	8.81	15.29
LAI-6	4/25/2003	22.86	7.70	0.83	8.53	14.95
LAI-6	5/2/2003	22.86	7.61	1.65	9.26	14.84
LAI-6	5/6/2003	22.86	8.45	0.99	9.44	14.16
LAI-6	5/9/2003	22.86	8.00	1.95	9.95	14.37
LAI-6	5/23/2003	22.86	8.41	2.00	10.41	13.95
LAI-6	5/28/2003	22.86	8.23	1.78	10.01	14.19

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-6	6/13/2003	22.86	8.50	2.11	10.61	13.83
LAI-6	6/18/2003	22.86	8.46	2.10	10.56	13.88
LAI-6	6/27/2003	22.86	9.91	0.77	10.68	12.76
LAI-6	7/7/2003	22.86	8.98	2.08	11.06	13.36
LAI-6	7/16/2003	22.86	8.75	2.20	10.95	13.56
LAI-6	7/31/2003	22.86	9.14	2.06	11.20	13.21
LAI-6	8/5/2003	22.86	9.15	2.01	11.16	13.21
LAI-6	8/11/2003	22.86	10.24	1.97	12.21	12.13
LAI-6	8/22/2003	22.86	10.45	1.90	12.35	11.94
LAI-6	8/26/2003	22.86	9.78	0.02	9.80	13.08
LAI-6	9/2/2003	22.86	10.13	0.90	11.03	12.51
LAI-6	9/9/2003	22.86	10.48	0.79	11.27	12.18
LAI-6	9/19/2003	22.86	10.44	0.61	11.05	12.27
LAI-6	10/14/2003	22.86	9.11	0.91	10.02	13.52
LAI-6	11/20/2003	22.86	7.22	0.01	7.23	15.64
LAI-6	12/3/2003	22.86	6.30	0.35	6.65	16.47
LAI-6	1/19/2004	22.86	5.85	0.71	6.56	16.83
LAI-6	2/24/2004	22.86	7.52	0.11	7.63	15.31
LAI-6	3/15/2004	22.86	8.32	0.50	8.82	14.42
LAI-6	4/19/2004	22.86	8.52	0.02	8.54	14.34
LAI-6	5/17/2004	22.86	9.05	0.03	9.08	13.80
LAI-6	6/22/2004	22.86	--	--	8.85	14.01
LAI-6	8/18/2004	22.86	--	--	10.08	12.78
LAI-6	9/21/2004	22.86	--	--	8.95	13.91
LAI-6	10/19/2004	22.86	--	--	8.08	14.78
LAI-6	11/23/2004	22.86	--	--	8.49	14.37
LAI-6	12/21/2004	22.86	--	--	6.55	16.31
LAI-6	1/13/2005	22.86	7.26	0.01	7.27	15.60
LAI-6	4/28/2005	22.86	--	--	7.05	15.81
LAI-6	6/1/2005	22.86	--	--	7.68	15.18
LAI-6	6/29/2005	22.86	--	--	9.20	13.66
LAI-6	7/20/2005	22.86	--	--	9.43	13.43
LAI-6	8/22/2005	22.86	--	--	9.47	13.39
LAI-6	5/27/2011	22.86			Not Monitored	
LAIx-6	9/12/2005	25.25	--	--	11.56	13.69
LAIx-6	10/12/2005	25.25	--	--	12.27	12.98
LAIx-6	11/21/2005	25.25	--	--	10.37	14.88
LAIx-6	12/27/2005	25.25	--	--	9.88	15.37
LAIx-6	12/21/2004	25.25	--	--	9.88	15.37
LAIx-6	1/30/2006	25.25	7.28	0.01	7.29	17.97
LAIx-6	2/16/2006	25.25	--	--	8.81	16.44
LAIx-6	3/13/2006	25.25	9.54	0.54	10.08	15.58
LAIx-6	4/18/2006	25.25	--	--	9.80	15.45
LAIx-6	5/12/2006	25.25	--	--	10.11	15.14
LAIx-6	6/9/2006	25.25	--	--	9.77	15.48
LAIx-6	7/13/2006	25.25	--	--	10.75	14.50
LAIx-6	8/16/2006	25.25	--	--	11.43	13.82
LAIx-6	9/19/2006	25.25	--	--	12.00	13.25
LAIx-6	10/13/2006	25.25	--	--	11.84	13.41
LAIx-6	11/20/2006	25.25	--	--	8.31	16.94
LAIx-6	12/8/2006	25.25	--	--	8.28	16.97
LAIx-6	1/19/2007	25.25	--	--	7.89	17.36
LAIx-6	2/19/2007	25.25	--	--	9.58	15.67
LAIx-6	3/15/2007	25.25	--	--	8.85	16.40
LAIx-6	4/16/2007	25.25	--	--	9.25	16.00
LAIx-6	5/14/2007	25.25	--	--	10.30	14.95
LAIx-6	6/29/2007	25.25	--	--	11.93	13.32
LAIx-6	7/20/2007	25.25	--	--	12.50	12.75
LAIx-6	8/21/2007	25.25	--	--	12.97	12.28
LAIx-6	9/10/2007	25.25	--	--	13.00	12.25
LAIx-6	10/22/2007	25.25	--	--	11.44	13.81
LAIx-6	11/28/2007	25.25	--	--	10.84	14.41
LAIx-6	12/13/2007	25.25	--	--	10.82	14.43
LAIx-6	1/21/2008	25.25	--	--	10.11	15.14
LAIx-6	2/24/2008	25.25	--	--	10.45	14.80
LAIx-6	3/24/2008	25.25	--	--	10.59	14.66
LAIx-6	8/25/2008	25.25	--	--	11.98	13.27
LAIx-6	2/18/2009	25.25	--	--	10.38	14.87
LAIx-6	8/25/2009	25.25	--	--	12.63	12.62
LAIx-6	3/22/2010	25.25	--	--	10.67	14.58

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-6	8/23/2010	25.25	--	--	10.80	14.45
LAIx-6	2/7/2011	25.25	--	--	9.46	15.79
LAIx-6	5/27/2011	25.25			Not Monitored	
LAI-7	1/22/2003	21.82	8.10	1.10	9.20	13.45
LAI-7	1/23/2003	21.82	7.58	1.07	8.65	13.97
LAI-7	1/24/2003	21.82	6.99	2.36	9.35	14.24
LAI-7	1/27/2003	21.82	5.18	5.30	10.48	15.32
LAI-7	1/28/2003	21.82	7.08	0.90	7.98	14.52
LAI-7	1/29/2003	21.82	7.41	0.44	7.85	14.30
LAI-7	1/30/2003	21.82	8.11	0.26	8.37	13.65
LAI-7	2/3/2003	21.82	8.90	0.06	8.96	12.91
LAI-7	2/6/2003	24.28	7.82	1.56	9.38	16.07
LAI-7	2/11/2003	24.28	8.23	1.56	9.79	15.66
LAI-7	2/18/2003	24.28	9.45	0.20	9.65	14.78
LAI-7	2/21/2003	24.28	8.57	2.34	10.91	15.13
LAI-7	2/26/2003	24.28	8.53	3.18	11.71	14.96
LAI-7	3/3/2003	24.28	9.53	0.18	9.71	14.71
LAI-7	3/12/2003	24.28	8.99	0.19	9.18	15.24
LAI-7	3/14/2003	24.28	9.18	0.18	9.36	15.06
LAI-7	3/26/2003	24.28	--	--	9.97	14.31
LAI-7	3/28/2003	24.28	--	--	9.95	14.33
LAI-7	4/2/2003	24.28	8.79	0.08	8.87	15.47
LAI-7	4/4/2003	24.28	9.04	0.08	9.12	15.22
LAI-7	4/8/2003	24.28	8.53	0.10	8.63	15.73
LAI-7	4/11/2003	24.28	9.06	0.17	9.23	15.18
LAI-7	4/15/2003	24.28	8.41	0.94	9.35	15.64
LAI-7	4/17/2003	24.28	9.55	0.17	9.72	14.69
LAI-7	4/22/2003	24.28	9.03	0.34	9.37	15.17
LAI-7	4/25/2003	24.28	9.00	0.31	9.31	15.20
LAI-7	5/2/2003	24.28	9.60	0.05	9.65	14.67
LAI-7	5/6/2003	24.28	9.17	1.19	10.36	14.81
LAI-7	5/9/2003	24.28	10.04	0.06	10.10	14.23
LAI-7	5/23/2003	24.28	10.60	0.02	10.62	13.68
LAI-7	5/28/2003	24.28	10.21	0.01	10.22	14.07
LAI-7	6/13/2003	24.28	9.90	0.55	10.45	14.24
LAI-7	6/18/2003	24.28	10.57	0.02	10.59	13.71
LAI-7	6/27/2003	24.28	10.42	0.63	11.05	13.70
LAI-7	7/7/2003	24.28	10.85	0.52	11.37	13.30
LAI-7	7/16/2003	24.28	10.43	1.65	12.08	13.44
LAI-7	7/31/2003	24.28	11.06	0.31	11.37	13.14
LAI-7	8/5/2003	24.28	10.66	0.90	11.56	13.40
LAI-7	8/11/2003	24.28	12.45	0.01	12.46	11.83
LAI-7	8/22/2003	24.28	12.40	0.20	12.60	11.83
LAI-7	8/26/2003	24.28	11.32	1.43	12.75	12.60
LAI-7	9/2/2003	24.28	11.61	0.20	11.81	12.62
LAI-7	9/9/2003	24.28	11.66	1.64	13.30	12.21
LAI-7	9/19/2003	24.28	11.66	1.35	13.01	12.28
LAI-7	10/14/2003	24.28	11.59	1.46	13.05	12.33
LAI-7	11/20/2003	24.28	--	--	8.67	15.61
LAI-7	12/3/2003	24.28	7.98	0.23	8.21	16.24
LAI-7	1/19/2004	24.28	7.59	0.32	7.91	16.61
LAI-7	2/24/2004	24.28	--	--	8.72	15.56
LAI-7	3/15/2004	24.28	--	--	9.71	14.57
LAI-7	4/19/2004	24.28	--	--	9.65	14.63
LAI-7	5/17/2004	24.28	--	--	10.43	13.85
LAI-7	6/22/2004	24.28	10.33	0.01	10.34	13.95
LAI-7	8/18/2004	24.28	11.28	0.88	12.16	12.78
LAI-7	9/21/2004	24.28	10.57	0.23	10.80	13.65
LAI-7	10/19/2004	24.28	--	--	9.53	14.75
LAI-7	11/23/2004	24.28	9.85	0.19	10.04	14.38
LAI-7	12/21/2004	24.28	8.14	0.52	8.66	16.01
LAI-7	1/13/2005	24.28	8.83	0.19	9.02	15.40
LAI-7	4/28/2005	24.28	--	--	8.44	15.84
LAI-7	6/1/2005	24.28	--	--	8.72	15.56
LAI-7	6/29/2005	24.28	--	--	10.41	13.87
LAI-7	7/20/2005	24.28	--	--	10.93	13.35
LAI-7	8/22/2005	24.28	--	--	10.47	13.81
LAI-7	5/27/2011	24.28			Not Monitored	
LAIx-7	9/12/2005	25.24	--	--	13.81	11.43

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-7	10/12/2005	25.24	14.46	0.12	14.58	10.75
LAIx-7	11/21/2005	25.24	12.00	2.96	14.96	12.50
LAIx-7	12/27/2005	25.24	11.08	2.82	13.90	13.46
LAIx-7	1/30/2006	25.24	9.69	3.34	13.03	14.72
LAIx-7	2/16/2006	25.24	11.52	3.81	15.33	12.77
LAIx-7	3/13/2006	25.24	11.09	4.51	15.60	13.02
LAIx-7	4/18/2006	25.24	11.98	1.62	13.60	12.86
LAIx-7	5/12/2006	25.24	13.22	0.30	13.52	11.95
LAIx-7	6/9/2006	25.24	12.94	0.40	13.34	12.20
LAIx-7	7/13/2006	25.24	14.14	0.94	15.08	10.87
LAIx-7	8/16/2006	25.24	14.95	0.80	15.75	10.09
LAIx-7	9/19/2006	25.24	14.55	0.95	15.50	10.45
LAIx-7	10/13/2006	25.24	14.60	1.55	16.15	10.25
LAIx-7	11/20/2006	25.24	11.89	0.71	12.60	13.17
LAIx-7	12/8/2006	25.24	12.13	0.31	12.44	13.03
LAIx-7	1/19/2007	25.24	11.75	1.20	12.95	13.19
LAIx-7	2/19/2007	25.24	12.52	0.62	13.14	12.57
LAIx-7	3/15/2007	25.24	12.14	0.51	12.65	12.97
LAIx-7	4/16/2007	25.24	12.58	0.92	13.50	12.43
LAIx-7	5/14/2007	25.24	13.25	0.07	13.32	11.97
LAIx-7	6/29/2007	25.24	13.68	0.82	14.50	11.36
LAIx-7	7/20/2007	25.24	14.20	0.10	14.30	11.02
LAIx-7	8/21/2007	25.24	--	--	14.20	11.04
LAIx-7	9/10/2007	25.24	--	--	14.47	10.77
LAIx-7	10/22/2007	25.24	12.72	--	15.64	9.60
LAIx-7	11/28/2007	25.24	12.95	--	13.50	11.74
LAIx-7	12/13/2007	25.24	--	--	11.92	13.32
LAIx-7	1/21/2008	25.24	--	--	7.63	17.61
LAIx-7	2/24/2008	25.24	--	--	10.21	15.03
LAIx-7	3/24/2008	25.24	12.24	0.22	12.46	12.95
LAIx-7	8/25/2008	25.24	--	--	13.34	11.90
LAIx-7	2/18/2009	25.24	--	--	12.00	13.24
LAIx-7	8/25/2009	25.24	--	--	14.56	10.68
LAIx-7	3/22/2010	25.24	--	--	10.95	14.29
LAIx-7	8/23/2010	25.24	--	--	10.05	15.19
LAIx-7	2/7/2011	25.24	--	--	9.71	15.53
LAIx-7	5/27/2011	25.24			Not Monitored	
LAI-8	1/22/2003	23.08	8.10	0.91	9.01	14.75
LAI-8	1/23/2003	23.08	7.72	0.88	8.60	15.14
LAI-8	1/24/2003	23.08	7.50	1.55	9.05	15.19
LAI-8	1/27/2003	23.08	5.34	5.08	10.42	16.47
LAI-8	1/28/2003	23.08	6.90	1.75	8.65	15.74
LAI-8	1/29/2003	23.08	7.99	0.31	8.30	15.01
LAI-8	1/30/2003	23.08	7.90	0.69	8.59	15.01
LAI-8	2/3/2003	23.08	8.47	0.01	8.48	14.61
LAI-8	2/6/2003	24.50	6.46	2.95	9.41	17.30
LAI-8	2/11/2003	24.50	8.45	1.22	9.67	15.75
LAI-8	2/18/2003	24.50	6.85	5.75	12.60	16.21
LAI-8	2/21/2003	24.50	8.49	3.16	11.65	15.22
LAI-8	2/26/2003	24.50	7.92	4.02	11.94	15.58
LAI-8	3/4/2003	24.50	7.46	5.02	12.48	15.79
LAI-8	3/12/2003	24.50	8.67	3.03	11.70	15.07
LAI-8	3/14/2003	24.50	8.88	2.53	11.41	14.99
LAI-8	3/26/2003	24.50	8.63	0.88	9.51	15.65
LAI-8	3/28/2003	24.50	--	--	9.48	15.02
LAI-8	4/2/2003	24.50	8.97	0.14	9.11	15.50
LAI-8	4/4/2003	24.50	9.32	0.04	9.36	15.17
LAI-8	4/8/2003	24.50	9.25	0.03	9.28	15.24
LAI-8	4/11/2003	24.50	9.21	0.46	9.67	15.18
LAI-8	4/15/2003	24.50	8.57	1.13	9.70	15.65
LAI-8	4/17/2003	24.50	9.82	0.08	9.90	14.66
LAI-8	4/22/2003	24.50	9.28	0.23	9.51	15.16
LAI-8	4/25/2003	24.50	9.61	0.25	9.86	14.83
LAI-8	5/2/2003	24.50	9.71	0.40	10.11	14.69
LAI-8	5/6/2003	24.50	9.36	1.40	10.76	14.79
LAI-8	5/9/2003	24.50	--	--	10.23	14.27
LAI-8	5/23/2003	24.50	10.80	0.01	10.81	13.70
LAI-8	5/28/2003	24.50	10.51	0.03	10.54	13.98
LAI-8	6/13/2003	24.50	10.20	1.56	11.76	13.91
LAI-8	6/18/2003	24.50	10.35	1.85	12.20	13.69

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-8	6/27/2003	24.50	10.62	0.49	11.11	13.76
LAI-8	7/7/2003	24.50	10.67	2.18	12.85	13.29
LAI-8	7/16/2003	24.50	10.45	1.37	11.82	13.71
LAI-8	7/31/2003	24.50	10.96	1.79	12.75	13.09
LAI-8	8/5/2003	24.50	10.82	2.23	13.05	13.12
LAI-8	8/11/2003	24.50	12.12	1.57	13.69	11.99
LAI-8	8/22/2003	24.50	12.40	1.66	14.06	11.69
LAI-8	8/26/2003	24.50	11.44	1.44	12.88	12.70
LAI-8	9/2/2003	24.50	11.45	1.78	13.23	12.61
LAI-8	9/9/2003	24.50	11.54	1.68	13.22	12.54
LAI-8	9/19/2003	24.50	11.61	1.64	13.25	12.48
LAI-8	10/14/2003	24.50	11.58	1.60	13.18	12.52
LAI-8	11/20/2003	24.50	8.87	0.07	8.94	15.61
LAI-8	12/3/2003	24.50	8.01	0.41	8.42	16.39
LAI-8	1/19/2004	24.50	7.70	0.44	8.14	16.69
LAI-8	2/24/2004	24.50	--	--	9.15	15.35
LAI-8	3/15/2004	24.50	--	--	9.71	14.79
LAI-8	4/19/2004	24.50	--	--	9.91	14.59
LAI-8	5/17/2004	24.50	--	--	10.59	13.91
LAI-8	6/22/2004	24.50	10.48	0.030	10.51	14.01
LAI-8	8/18/2004	24.50	11.70	0.010	11.71	12.80
LAI-8	9/21/2004	24.50	--	--	10.60	13.90
LAI-8	10/19/2004	24.50	--	--	9.73	14.77
LAI-8	11/23/2004	24.50	--	--	10.04	14.46
LAI-8	12/21/2004	24.50	8.31	0.02	8.33	16.19
LAI-8	1/13/2005	24.50	--	--	8.89	15.61
LAI-8	4/28/2005	24.50	--	--	8.64	15.86
LAI-8	6/1/2005	24.50	--	--	8.88	15.62
LAI-8	6/29/2005	24.50	--	--	10.55	13.95
LAI-8	7/20/2005	24.50	--	--	11.05	13.45
LAI-8	8/22/2005	24.50	--	--	10.65	13.85
LAI-8	5/27/2011	24.50			Not Monitored	
LAIx-8	9/12/2005	25.59	--	--	12.48	13.11
LAIx-8	10/12/2005	25.59	--	--	14.08	11.51
LAIx-8	11/21/2005	25.59	10.74	0.01	10.75	14.85
LAIx-8	12/27/2005	25.59	--	--	10.11	15.48
LAIx-8	1/30/2006	25.59	--	--	7.88	17.71
LAIx-8	2/16/2006	25.59	--	--	9.34	16.25
LAIx-8	3/13/2006	25.59	--	--	10.00	15.59
LAIx-8	4/18/2006	25.59	--	--	9.72	15.87
LAIx-8	5/12/2006	25.59	--	--	10.59	15.00
LAIx-8	12/21/2004	25.59	--	--	10.59	15.00
LAIx-8	6/9/2006	25.59	--	--	10.10	15.49
LAIx-8	7/13/2006	25.59	--	--	11.30	14.29
LAIx-8	8/16/2006	25.59	--	--	11.95	13.64
LAIx-8	9/19/2006	25.59	--	--	12.49	13.10
LAIx-8	10/13/2006	25.59	--	--	12.30	13.29
LAIx-8	11/20/2006	25.59	--	--	8.90	16.69
LAIx-8	12/8/2006	25.59	--	--	8.92	16.67
LAIx-8	1/19/2007	25.59	--	--	8.57	17.02
LAIx-8	2/19/2007	25.59	--	--	10.06	15.53
LAIx-8	3/15/2007	25.59	--	--	9.35	16.24
LAIx-8	4/16/2007	25.59	--	--	9.75	15.84
LAIx-8	5/14/2007	25.59	--	--	10.77	14.82
LAIx-8	6/29/2007	25.59	--	--	12.07	13.52
LAIx-8	7/20/2007	25.59	--	--	12.52	13.07
LAIx-8	8/21/2007	25.59	--	--	12.97	12.62
LAIx-8	9/10/2007	25.59	--	--	13.24	12.35
LAIx-8	10/22/2007	25.59	--	--	11.91	13.68
LAIx-8	11/28/2007	25.59	--	--	11.50	14.09
LAIx-8	12/13/2007	25.59	11.55	0.08	11.63	14.02
LAIx-8	1/21/2008	25.59	--	--	11.04	14.55
LAIx-8	2/24/2008	25.59	--	--	11.19	14.40
LAIx-8	3/24/2008	25.59	--	--	11.15	14.44
LAIx-8	8/25/2008	25.59	--	--	7.67	17.92
LAIx-8	2/18/2009	25.59	--	--	11.02	14.57
LAIx-8	8/25/2009	25.59	--	--	12.95	12.64
LAIx-8	3/22/2010	25.59	--	--	10.86	14.73
LAIx-8	8/23/2010	25.59	--	--	10.18	15.41
LAIx-8	2/7/2011	25.59	--	--	9.73	15.86

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-8	5/27/2011	25.59			Not Monitored	
LAI-9	1/22/2003	22.48	--	--	7.90	14.58
LAI-9	1/23/2003	22.48	--	--	8.38	14.10
LAI-9	1/24/2003	22.48	7.10	0.04	7.14	15.37
LAI-9	1/27/2003	22.48	5.32	1.54	6.86	16.78
LAI-9	1/28/2003	22.48	5.90	1.50	7.40	16.21
LAI-9	1/29/2003	22.48	--	--	8.44	14.04
LAI-9	1/30/2003	22.48	--	--	8.40	14.08
LAI-9	2/3/2003	22.48	6.57	0.70	7.27	15.74
LAI-9	2/6/2003	23.93	7.53	0.15	7.68	16.36
LAI-9	2/11/2003	23.93	7.93	0.11	8.04	15.97
LAI-9	2/18/2003	23.93	5.50	2.50	8.00	17.81
LAI-9	2/21/2003	23.93	7.63	3.68	11.31	15.38
LAI-9	2/26/2003	23.93	6.94	3.54	10.48	16.11
LAI-9	3/4/2003	23.93	6.98	3.94	10.92	15.97
LAI-9	3/12/2003	23.93	7.82	3.39	11.21	15.26
LAI-9	3/14/2003	23.93	8.09	2.21	10.30	15.29
LAI-9	3/26/2003	23.93	--	--	8.95	14.98
LAI-9	3/28/2003	23.93	--	--	9.04	14.89
LAI-9	4/2/2003	23.93	8.08	0.32	8.40	15.77
LAI-9	4/4/2003	23.93	8.34	0.48	8.82	15.47
LAI-9	4/8/2003	23.93	8.10	0.49	8.59	15.71
LAI-9	4/11/2003	23.93	8.36	0.49	8.85	15.45
LAI-9	4/15/2003	23.93	7.81	0.21	8.02	16.07
LAI-9	4/17/2003	23.93	9.11	0.13	9.24	14.79
LAI-9	4/22/2003	23.93	8.41	0.35	8.76	15.43
LAI-9	4/25/2003	23.93	8.32	0.80	9.12	15.41
LAI-9	5/2/2003	23.93	8.99	0.01	9.00	14.94
LAI-9	5/6/2003	23.93	8.66	0.85	9.51	15.06
LAI-9	5/9/2003	23.93	9.75	0.02	9.77	14.18
LAI-9	5/23/2003	23.93	--	--	10.10	13.83
LAI-9	5/28/2003	23.93	10.50	0.01	10.51	13.43
LAI-9	6/13/2003	23.93	9.91	0.37	10.28	13.93
LAI-9	6/18/2003	23.93	9.81	0.51	10.32	13.99
LAI-9	6/27/2003	23.93	9.91	0.33	10.24	13.94
LAI-9	7/7/2003	23.93	10.21	0.83	11.04	13.51
LAI-9	7/16/2003	23.93	10.03	0.84	10.87	13.69
LAI-9	7/31/2003	23.93	10.44	0.95	11.39	13.25
LAI-9	8/5/2003	23.93	10.25	1.19	11.44	13.38
LAI-9	8/11/2003	23.93	11.89	0.12	12.01	12.01
LAI-9	8/22/2003	23.93	11.92	0.08	12.00	11.99
LAI-9	8/26/2003	23.93	11.03	0.64	11.67	12.74
LAI-9	9/2/2003	23.93	10.96	1.03	11.99	12.71
LAI-9	9/9/2003	23.93	11.12	0.51	11.63	12.68
LAI-9	9/19/2003	23.93	10.89	1.58	12.47	12.65
LAI-9	10/14/2003	23.93	11.75	1.07	12.82	11.91
LAI-9	11/20/2003	23.93	--	--	8.05	15.88
LAI-9	12/3/2003	23.93	7.21	0.01	7.22	16.72
LAI-9	1/19/2004	23.93	6.83	0.01	6.84	17.10
LAI-9	2/24/2004	23.93	--	--	8.11	15.82
LAI-9	3/15/2004	23.93	--	--	9.08	14.85
LAI-9	4/19/2004	23.93	--	--	8.85	15.08
LAI-9	5/17/2004	23.93	--	--	9.91	14.02
LAI-9	8/18/2004	23.93	--	--	11.10	12.83
LAI-9	8/18/2004	23.93	--	--	11.10	12.83
LAI-9	9/21/2004	23.93	10.91	0.53	11.44	12.89
LAI-9	10/19/2004	23.93	8.92	0.43	9.35	14.90
LAI-9	11/23/2004	23.93	9.03	0.31	9.34	14.82
LAI-9	12/21/2004	23.93	7.44	0.02	7.46	16.49
LAI-9	1/13/2005	23.93	--	--	8.19	15.74
LAI-9	4/28/2005	23.93	--	--	7.73	16.20
LAI-9	6/1/2005	23.93	--	--	8.10	15.83
LAI-9	6/29/2005	23.93	--	--	9.77	14.16
LAI-9	7/20/2005	23.93	--	--	10.10	13.83
LAI-9	8/22/2005	23.93	--	--	9.96	13.97
LAI-9	5/27/2011	23.93			Not Monitored	
LAIx-9	9/12/2005	25.55	--	--	14.13	11.42
LAIx-9	10/12/2005	25.55	--	--	14.79	10.76
LAIx-9	11/21/2005	25.55	--	--	12.98	12.57

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAIx-9	12/27/2005	25.55	--	--	11.42	14.13
LAIx-9	1/30/2006	25.55	--	--	10.27	15.28
LAIx-9	2/16/2006	25.55	12.35	0.03	12.38	13.19
LAIx-9	3/13/2006	25.55	--	--	12.78	12.77
LAIx-9	4/18/2006	25.55	--	--	12.34	13.21
LAIx-9	5/12/2006	25.55	--	--	13.33	12.22
LAIx-9	6/9/2006	25.55	--	--	12.86	12.69
LAIx-9	7/13/2006	25.55	14.48	0.06	14.57	11.03
LAIx-9	8/16/2006	25.55	--	--	15.30	10.25
LAIx-9	9/19/2006	25.55	--	--	14.98	10.57
LAIx-9	10/13/2006	25.55	--	--	15.01	10.54
LAIx-9	11/20/2006	25.55	--	--	11.77	13.78
LAIx-9	12/8/2006	25.55	11.72	0.06	11.78	13.82
LAIx-9	1/19/2007	25.55	11.24	0.04	11.28	14.30
LAIx-9	2/19/2007	25.55	12.23	0.04	12.27	13.31
LAIx-9	3/15/2007	25.55	12.55	0.05	12.60	12.99
LAIx-9	4/16/2007	25.55	12.30	0.03	12.33	13.24
LAIx-9	5/14/2007	25.55	--	--	13.41	12.14
LAIx-9	6/29/2007	25.55	--	--	13.92	11.63
LAIx-9	7/20/2007	25.55	--	--	14.34	11.21
LAIx-9	8/21/2007	25.55	--	--	14.25	11.30
LAIx-9	9/10/2007	25.55	--	--	14.52	11.03
LAIx-9	10/22/2007	25.55	--	--	13.31	12.24
LAIx-9	11/28/2007	25.55	--	--	12.50	13.05
LAIx-9	12/13/2007	25.55	--	--	11.40	14.15
LAIx-9	1/21/2008	25.55	--	--	8.61	16.94
LAIx-9	2/24/2008	25.55	--	--	12.30	13.25
LAIx-9	3/24/2008	25.55	--	--	12.06	13.49
LAIx-9	8/25/2008	25.55	--	--	13.30	12.25
LAIx-9	2/18/2009	25.55			Dry	
LAIx-9	8/25/2009	25.55	--	--	14.23	11.32
LAIx-9	3/22/2010	25.55	--	--	12.25	13.30
LAIx-9	8/23/2010	25.55			Dry	
LAIx-9	2/7/2011	25.55	--	--	11.71	13.84
LAIx-9	5/27/2011	25.55			Not Monitored	
LAI-10	1/31/2003	19.87	--	--	4.34	15.53
LAI-10	2/12/2003	19.87	--	--	3.93	15.94
LAI-10	2/18/2003	19.87	--	--	4.51	15.36
LAI-10	2/21/2003	19.87	--	--	4.50	15.37
LAI-10	2/24/2003	19.87	--	--	4.48	15.39
LAI-10	3/3/2003	19.87	--	--	4.38	15.49
LAI-10	3/12/2003	19.87	--	--	4.31	15.56
LAI-10	3/14/2003	19.87	--	--	4.08	15.79
LAI-10	3/26/2003	19.87	--	--	4.78	15.09
LAI-10	3/28/2003	19.87	--	--	4.82	15.05
LAI-10	4/2/2003	19.87	--	--	4.25	15.62
LAI-10	4/4/2003	19.87	--	--	4.21	15.66
LAI-10	4/8/2003	19.87	--	--	4.50	15.37
LAI-10	4/11/2003	19.87	--	--	4.48	15.39
LAI-10	4/15/2003	19.87	--	--	4.09	15.78
LAI-10	4/17/2003	19.87	--	--	4.50	15.37
LAI-10	4/22/2003	19.87	--	--	4.45	15.42
LAI-10	4/25/2003	19.87	--	--	4.58	15.29
LAI-10	5/2/2003	19.87	--	--	4.23	15.64
LAI-10	5/6/2003	19.87	--	--	4.86	15.01
LAI-10	5/9/2003	19.87	--	--	5.10	14.77
LAI-10	5/16/2003	19.87	--	--	5.38	14.49
LAI-10	5/23/2003	19.87	--	--	6.50	13.37
LAI-10	5/28/2003	19.87	--	--	5.55	14.32
LAI-10	6/13/2003	19.87	--	--	6.17	13.70
LAI-10	6/18/2003	19.87	--	--	5.86	14.01
LAI-10	6/27/2003	19.87	--	--	5.89	13.98
LAI-10	7/7/2003	19.87	--	--	6.51	13.36
LAI-10	7/16/2003	19.87	--	--	5.53	14.34
LAI-10	7/31/2003	19.87	--	--	6.61	13.26
LAI-10	8/5/2003	19.87	--	--	6.68	13.19
LAI-10	8/11/2003	19.87	--	--	7.15	12.72
LAI-10	8/22/2003	19.87	--	--	8.68	11.19
LAI-10	8/26/2003	19.87	--	--	7.03	12.84
LAI-10	9/2/2003	19.87	--	--	7.15	12.72

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-10	9/9/2003	19.87	7.33	0.01	7.34	12.54
LAI-10	9/19/2003	19.87	--	--	7.37	12.50
LAI-10	10/14/2003	19.87	--	--	7.75	12.12
LAI-10	11/20/2003	19.87	--	--	4.48	15.39
LAI-10	12/3/2003	19.87	--	--	3.58	16.29
LAI-10	1/19/2004	19.87	--	--	3.29	16.58
LAI-10	2/24/2004	19.87	--	--	4.16	15.71
LAI-10	3/15/2004	19.87	--	--	5.01	14.86
LAI-10	4/19/2004	19.87	--	--	5.30	14.57
LAI-10	5/17/2004	19.87	--	--	5.79	14.08
LAI-10	6/22/2004	19.87	--	--	5.71	14.16
LAI-10	8/18/2004	19.87	6.71	0.01	6.72	13.16
LAI-10	9/21/2004	19.87	--	--	6.10	13.77
LAI-10	10/19/2004	19.87	--	--	5.23	14.64
LAI-10	11/23/2004	19.87	--	--	5.45	14.42
LAI-10	12/21/2004	19.87	--	--	3.99	15.88
LAI-10	1/13/2005	19.87	--	--	4.64	15.23
LAI-10	4/28/2005	19.87	--	--	4.23	15.64
LAI-10	6/1/2005	19.87	4.40	0.03	4.43	15.46
LAI-10	6/29/2005	19.87	--	--	5.45	14.42
LAI-10	7/20/2005	19.87	--	--	5.75	14.12
LAI-10	8/22/2005	19.87	6.22	0.01	6.23	13.65
LAI-10	9/12/2005	19.87	6.62	0.01	6.61	13.27
LAI-10	10/12/2005	19.87	--	--	7.11	12.76
LAI-10	11/21/2005	19.87	5.08	0.01	5.09	14.79
LAI-10	12/27/2005	19.87	--	--	4.14	15.73
LAI-10	1/30/2006	19.87	--	--	2.45	17.42
LAI-10	2/16/2006	19.87	--	--	3.62	16.25
LAI-10	3/13/2006	19.87	--	--	4.37	15.50
LAI-10	4/18/2006	19.87	--	--	4.51	15.36
LAI-10	5/12/2006	19.87	--	--	4.82	15.05
LAI-10	6/9/2006	19.87	--	--	4.57	15.30
LAI-10	7/13/2006	19.87	--	--	5.41	14.46
LAI-10	8/16/2006	19.87	--	--	6.15	13.72
LAI-10	9/19/2006	19.87	--	--	5.80	14.07
LAI-10	10/13/2006	19.87	--	--	6.60	13.27
LAI-10	11/20/2006	19.87	--	--	3.16	16.71
LAI-10	12/8/2006	19.87	--	--	3.29	16.58
LAI-10	1/19/2007	19.87	--	--	3.39	16.48
LAI-10	2/19/2007	19.87	--	--	4.37	15.50
LAI-10	3/15/2007	19.87	--	--	3.90	15.97
LAI-10	4/16/2007	19.87	--	--	4.20	15.67
LAI-10	5/14/2007	19.87	--	--	5.07	14.80
LAI-10	6/29/2007	19.87	--	--	6.06	13.81
LAI-10	7/20/2007	19.87	--	--	6.32	13.55
LAI-10	8/21/2007	19.87	--	--	7.81	12.06
LAI-10	9/10/2007	19.87	--	--	6.92	12.95
LAI-10	10/22/2007	19.87	--	--	5.99	13.88
LAI-10	11/28/2007	19.87	--	--	4.95	14.92
LAI-10	12/13/2007	19.87	--	--	4.32	15.55
LAI-10	1/21/2008	19.87	--	--	4.49	15.38
LAI-10	2/24/2008	19.87	--	--	4.89	14.98
LAI-10	3/24/2008	19.87	--	--	4.96	14.91
LAI-10	8/25/2008	19.87	--	--	5.63	14.24
LAI-10	2/18/2009	19.87	--	--	5.10	14.77
LAI-10	8/25/2009	19.87	--	--	7.22	12.65
LAI-10	3/22/2010	19.87	--	--	4.90	14.97
LAI-10	8/23/2010	19.87	--	--	6.34	13.53
LAI-10	2/7/2011	19.87	--	--	4.21	15.66
LAI-10	5/27/2011	19.87	--	--	4.78	15.09
LAI-10	8/8/2011	19.87	--	--	8.15	11.72
LAI-10	11/14/2011	19.87	--	--	5.73	14.14
LAI-10	2/20/2012	19.87	--	--	4.25	15.62
LAI-10	8/22/2012	19.87	--	--	6.09	13.78
LAI-10	11/5/2012	19.87	--	--	5.43	14.44
LAI-10	1/28/2013	19.87	--	--	3.89	15.98
LAI-11	1/31/2003	20.61	--	--	4.55	16.06
LAI-11	2/12/2003	20.61	--	--	4.92	15.69
LAI-11	2/18/2003	20.61	--	--	5.41	15.20
LAI-11	2/21/2003	20.61	--	--	5.51	15.10

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-11	2/24/2003	20.61	--	--	5.48	15.13
LAI-11	3/3/2003	20.61	--	--	5.38	15.23
LAI-11	3/12/2003	20.61	--	--	5.32	15.29
LAI-11	3/14/2003	20.61	--	--	5.19	15.42
LAI-11	3/26/2003	20.61	--	--	4.81	15.80
LAI-11	3/28/2003	20.61	--	--	4.89	15.72
LAI-11	4/2/2003	20.61	--	--	5.28	15.33
LAI-11	4/4/2003	20.61	--	--	5.33	15.28
LAI-11	4/8/2003	20.61	--	--	5.41	15.20
LAI-11	4/11/2003	20.61	--	--	5.42	15.19
LAI-11	4/15/2003	20.61	--	--	5.08	15.53
LAI-11	4/17/2003	20.61	--	--	5.46	15.15
LAI-11	4/22/2003	20.61	--	--	5.47	15.14
LAI-11	4/25/2003	20.61	--	--	5.67	14.94
LAI-11	5/2/2003	20.61	--	--	5.12	15.49
LAI-11	5/6/2003	20.61	--	--	5.81	14.80
LAI-11	5/9/2003	20.61	--	--	6.00	14.61
LAI-11	5/16/2003	20.61	--	--	6.30	14.31
LAI-11	5/23/2003	20.61	--	--	6.58	14.03
LAI-11	5/28/2003	20.61	--	--	6.44	14.17
LAI-11	6/13/2003	20.61	--	--	6.70	13.91
LAI-11	6/18/2003	20.61	--	--	6.80	13.81
LAI-11	6/27/2003	20.61	--	--	6.81	13.80
LAI-11	7/7/2003	20.61	--	--	7.51	13.10
LAI-11	7/16/2003	20.61	--	--	6.42	14.19
LAI-11	7/31/2003	20.61	--	--	8.91	11.70
LAI-11	8/5/2003	20.61	--	--	8.51	12.10
LAI-11	8/11/2003	20.61	--	--	8.79	11.82
LAI-11	8/22/2003	20.61	--	--	8.43	12.18
LAI-11	8/26/2003	20.61	--	--	8.92	11.69
LAI-11	9/2/2003	20.61	--	--	8.95	11.66
LAI-11	9/9/2003	20.61	--	--	9.24	11.37
LAI-11	9/19/2003	20.61	--	--	8.99	11.62
LAI-11	10/14/2003	20.61	--	--	9.15	11.46
LAI-11	11/20/2003	20.61	--	--	5.31	15.30
LAI-11	12/3/2003	20.61	--	--	4.50	16.11
LAI-11	1/19/2004	20.61	--	--	4.33	16.28
LAI-11	2/24/2004	20.61	--	--	5.19	15.42
LAI-11	3/15/2004	20.61	--	--	5.94	14.67
LAI-11	4/19/2004	20.61	--	--	6.23	14.38
LAI-11	5/17/2004	20.61	--	--	6.80	13.81
LAI-11	6/22/2004	20.61	--	--	6.70	13.91
LAI-11	8/18/2004	20.61	--	--	8.19	12.42
LAI-11	9/21/2004	20.61	--	--	7.03	13.58
LAI-11	10/19/2004	20.61	--	--	6.10	14.51
LAI-11	11/23/2004	20.61	--	--	6.35	14.26
LAI-11	12/21/2004	20.61	--	--	4.81	15.80
LAI-11	1/13/2005	20.61	--	--	5.40	15.21
LAI-11	4/28/2005	20.61	--	--	5.13	15.48
LAI-11	6/1/2005	20.61	--	--	5.32	15.29
LAI-11	6/29/2005	20.61	--	--	6.28	14.33
LAI-11	7/20/2005	20.61	--	--	6.55	14.06
LAI-11	8/22/2005	20.61	6.94	0.01	6.95	13.67
LAI-11	9/12/2005	20.61	6.90	0.46	7.36	13.60
LAI-11	10/12/2005	20.61	8.185	0.005	8.19	12.42
LAI-11	11/21/2005	20.61	--	--	5.81	14.80
LAI-11	12/27/2005	20.61	--	--	5.24	15.37
LAI-11	1/30/2006	20.61	--	--	2.99	17.62
LAI-11	2/16/2006	20.61	--	--	4.44	16.17
LAI-11	3/13/2006	20.61	--	--	5.20	15.41
LAI-11	4/18/2006	20.61	--	--	5.43	15.18
LAI-11	5/12/2006	20.61	--	--	5.65	14.96
LAI-11	6/9/2006	20.61	--	--	5.48	15.13
LAI-11	7/13/2006	20.61	--	--	6.25	14.36
LAI-11	8/16/2006	20.61	--	--	7.05	13.56
LAI-11	9/19/2006	20.61	--	--	7.65	12.96
LAI-11	10/13/2006	20.61	--	--	7.46	13.15
LAI-11	11/20/2006	20.61	--	--	4.03	16.58
LAI-11	12/8/2006	20.61	--	--	4.12	16.49
LAI-11	1/19/2007	20.61	--	--	4.16	16.45
LAI-11	2/19/2007	20.61	--	--	5.31	15.30

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-11	3/15/2007	20.61	--	--	4.80	15.81
LAI-11	4/16/2007	20.61	--	--	5.10	15.51
LAI-11	5/14/2007	20.61	--	--	5.92	14.69
LAI-11	6/29/2007	20.61	--	--	6.82	13.79
LAI-11	7/20/2007	20.61	--	--	7.12	13.49
LAI-11	8/21/2007	20.61	--	--	7.76	12.85
LAI-11	9/10/2007	20.61	--	--	7.87	12.74
LAI-11	10/22/2007	20.61	--	--	7.26	13.35
LAI-11	11/28/2007	20.61	--	--	6.00	14.61
LAI-11	12/13/2007	20.61	--	--	5.06	15.55
LAI-11	1/21/2008	20.61	--	--	4.38	16.23
LAI-11	2/24/2008	20.61	--	--	5.71	14.90
LAI-11	3/24/2008	20.61	--	--	5.88	14.73
LAI-11	8/25/2008	20.61	--	--	6.40	14.21
LAI-11	2/18/2009	20.61	--	--	5.84	14.77
LAI-11	8/25/2009	20.61	--	--	7.95	12.66
LAI-11	3/22/2010	20.61	--	--	5.56	15.05
LAI-11	8/23/2010	20.61	--	--	7.36	13.25
LAI-11	2/7/2011	20.61	--	--	4.90	15.71
LAI-11	5/27/2011	20.61			Not Monitored	
LAI-11	8/8/2011	20.61	--	--	6.89	13.72
LAI-11	11/14/2011	20.61	--	--	6.63	13.98
LAI-11	2/20/2012	20.61	--	--	4.94	15.67
LAI-11	8/22/2012	20.61	--	--	6.86	13.75
LAI-11	11/5/2012	20.61	--	--	6.00	14.61
LAI-11	1/28/2013	20.61	--	--	4.63	15.98
LAI-12	1/31/2003	19.34	--	--	3.28	16.06
LAI-12	2/12/2003	19.34	--	--	3.98	15.36
LAI-12	2/18/2003	19.34	--	--	4.50	14.84
LAI-12	2/21/2003	19.34	--	--	4.60	14.74
LAI-12	2/24/2003	19.34	--	--	4.58	14.76
LAI-12	3/3/2003	19.34	--	--	4.61	14.73
LAI-12	3/12/2003	19.34	--	--	4.38	14.96
LAI-12	3/14/2003	19.34	--	--	4.17	15.17
LAI-12	3/26/2003	19.34	--	--	4.04	15.30
LAI-12	3/28/2003	19.34	--	--	4.10	15.24
LAI-12	4/2/2003	19.34	--	--	4.34	15.00
LAI-12	4/4/2003	19.34	--	--	4.45	14.89
LAI-12	4/8/2003	19.34	--	--	4.58	14.76
LAI-12	4/11/2003	19.34	--	--	4.65	14.69
LAI-12	4/15/2003	19.34	--	--	4.25	15.09
LAI-12	4/17/2003	19.34	--	--	4.69	14.65
LAI-12	4/22/2003	19.34	--	--	4.69	14.65
LAI-12	4/25/2003	19.34	--	--	4.81	14.53
LAI-12	5/2/2003	19.34	--	--	4.98	14.36
LAI-12	5/6/2003	19.34	--	--	5.22	14.12
LAI-12	5/9/2003	19.34	--	--	5.46	13.88
LAI-12	5/16/2003	19.34	--	--	5.74	13.60
LAI-12	5/23/2003	19.34	--	--	5.27	14.07
LAI-12	5/28/2003	19.34	--	--	5.88	13.46
LAI-12	6/13/2003	19.34	--	--	5.45	13.89
LAI-12	6/18/2003	19.34	--	--	6.18	13.16
LAI-12	6/27/2003	19.34	--	--	6.22	13.12
LAI-12	7/7/2003	19.34	--	--	6.95	12.39
LAI-12	7/16/2003	19.34	--	--	5.84	13.50
LAI-12	7/31/2003	19.34	--	--	6.97	12.37
LAI-12	8/5/2003	19.34	--	--	7.05	12.29
LAI-12	8/11/2003	19.34	--	--	6.80	12.54
LAI-12	8/22/2003	19.34	--	--	8.19	11.15
LAI-12	8/26/2003	19.34	--	--	7.33	12.01
LAI-12	9/2/2003	19.34	--	--	7.45	11.89
LAI-12	9/9/2003	19.34	--	--	7.64	11.70
LAI-12	9/19/2003	19.34	--	--	7.93	11.41
LAI-12	10/14/2003	19.34	--	--	7.48	11.86
LAI-12	11/20/2003	19.34	--	--	4.06	15.28
LAI-12	12/3/2003	19.34	--	--	3.37	15.97
LAI-12	1/19/2004	19.34	--	--	3.81	15.53
LAI-12	2/24/2004	19.34	--	--	4.32	15.02
LAI-12	3/15/2004	19.34	--	--	5.13	14.21
LAI-12	4/19/2004	19.34	--	--	5.61	13.73

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-12	5/17/2004	19.34	--	--	6.23	13.11
LAI-12	6/22/2004	19.34	--	--	6.14	13.20
LAI-12	8/18/2004	19.34	--	--	7.15	12.19
LAI-12	9/21/2004	19.34	--	--	6.18	13.16
LAI-12	10/19/2004	19.34	--	--	5.39	13.95
LAI-12	11/23/2004	19.34	--	--	5.68	13.66
LAI-12	12/21/2004	19.34	--	--	3.86	15.48
LAI-12	1/13/2005	19.34	--	--	4.95	14.39
LAI-12	4/28/2005	19.34	--	--	4.41	14.93
LAI-12	6/1/2005	19.34	--	--	4.61	14.73
LAI-12	6/29/2005	19.34	--	--	5.77	13.57
LAI-12	7/20/2005	19.34	9.15	0.01	9.16	10.19
LAI-12	8/22/2005	19.34	6.48	0.01	6.49	12.86
LAI-12	9/12/2005	19.34	--	--	6.90	12.44
LAI-12	10/12/2005	19.34	7.40	0.01	7.41	11.94
LAI-12	11/21/2005	19.34	--	--	4.48	14.86
LAI-12	12/27/2005	19.34	--	--	3.95	15.39
LAI-12	1/30/2006	19.34	--	--	2.33	17.01
LAI-12	2/16/2006	19.34	--	--	3.33	16.01
LAI-12	3/13/2006	19.34	--	--	4.34	15.00
LAI-12	4/18/2006	19.34	--	--	4.69	14.65
LAI-12	5/12/2006	19.34	--	--	4.99	14.35
LAI-12	6/9/2006	19.34	--	--	4.61	14.73
LAI-12	7/13/2006	19.34	--	--	5.68	13.66
LAI-12	8/16/2006	19.34	--	--	6.41	12.93
LAI-12	9/19/2006	19.34	--	--	6.98	12.36
LAI-12	10/13/2006	19.34	--	--	6.78	12.56
LAI-12	11/20/2006	19.34	--	--	3.18	16.16
LAI-12	12/8/2006	19.34	--	--	2.89	16.45
LAI-12	1/19/2007	19.34	--	--	2.85	16.49
LAI-12	2/19/2007	19.34	--	--	4.55	14.79
LAI-12	3/15/2007	19.34	--	--	3.73	15.61
LAI-12	4/16/2007	19.34	--	--	4.19	15.15
LAI-12	5/14/2007	19.34	--	--	5.37	13.97
LAI-12	6/29/2007	19.34	--	--	6.30	13.04
LAI-12	7/20/2007	19.34	--	--	6.56	12.78
LAI-12	8/21/2007	19.34	--	--	7.19	12.15
LAI-12	9/10/2007	19.34	--	--	7.21	12.13
LAI-12	10/22/2007	19.34	--	--	6.09	13.25
LAI-12	11/28/2007	19.34	--	--	5.34	14.00
LAI-12	12/13/2007	19.34	--	--	3.97	15.37
LAI-12	1/21/2008	19.34	--	--	5.24	14.10
LAI-12	2/24/2008	19.34	--	--	5.08	14.26
LAI-12	3/24/2008	19.34	--	--	6.25	13.09
LAI-12	8/25/2008	19.34	--	--	6.82	12.52
LAI-12	2/18/2009	19.34	--	--	5.32	14.02
LAI-12	8/25/2009	19.34	--	--	7.44	11.90
LAI-12	3/22/2010	19.34	--	--	4.70	14.64
LAI-12	8/23/2010	19.34	--	--	6.62	12.72
LAI-12	2/7/2011	19.34	--	--	9.65	9.69
LAI-12	5/27/2011	19.34	--	--	4.63	14.71
LAI-12	8/8/2011	19.34	--	--	6.39	12.95
LAI-12	11/14/2011	19.34	--	--	6.19	13.15
LAI-12	2/20/2012	19.34	--	--	3.86	15.48
LAI-12	8/22/2012	19.34	--	--	6.29	13.05
LAI-12	11/5/2012	19.34	--	--	4.71	14.63
LAI-12	1/28/2013	19.34	--	--	3.73	15.61
LAI-13	1/31/2003	21.53	--	--	5.25	16.28
LAI-13	2/12/2003	21.53	--	--	6.28	15.25
LAI-13	2/18/2003	21.53	--	--	6.15	15.38
LAI-13	2/21/2003	21.53	--	--	6.29	15.24
LAI-13	2/24/2003	21.53	--	--	6.65	14.88
LAI-13	3/3/2003	21.53	--	--	6.88	14.65
LAI-13	3/12/2003	21.53	--	--	6.87	14.66
LAI-13	3/14/2003	21.53	--	--	6.62	14.91
LAI-13	3/26/2003	21.53	6.16	0.00	6.16	15.37
LAI-13	3/28/2003	21.53	--	--	6.21	15.32
LAI-13	4/2/2003	21.53	--	--	6.25	15.28
LAI-13	4/4/2003	21.53	--	--	6.25	15.28
LAI-13	4/8/2003	21.53	--	--	6.69	14.84

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-13	4/11/2003	21.53	--	--	6.69	14.84
LAI-13	4/15/2003	21.53	--	--	6.61	14.92
LAI-13	4/17/2003	21.53	--	--	6.66	14.87
LAI-13	4/22/2003	21.53	--	--	6.87	14.66
LAI-13	4/25/2003	21.53	--	--	6.92	14.61
LAI-13	5/2/2003	21.53	--	--	6.71	14.82
LAI-13	5/6/2003	21.53	--	--	7.25	14.28
LAI-13	5/9/2003	21.53	--	--	7.36	14.17
LAI-13	5/16/2003	21.53	--	--	7.63	13.90
LAI-13	5/23/2003	21.53	--	--	7.78	13.75
LAI-13	5/28/2003	21.53	--	--	7.80	13.73
LAI-13	6/13/2003	21.53	--	--	8.01	13.52
LAI-13	6/18/2003	21.53	--	--	8.02	13.51
LAI-13	6/27/2003	21.53	--	--	8.06	13.47
LAI-13	7/7/2003	21.53	--	--	8.45	13.08
LAI-13	7/16/2003	21.53	--	--	7.71	13.82
LAI-13	7/31/2003	21.53	--	--	8.51	13.02
LAI-13	8/5/2003	21.53	--	--	8.54	12.99
LAI-13	8/11/2003	21.53	--	--	8.62	12.91
LAI-13	8/22/2003	21.53	--	--	9.81	11.72
LAI-13	8/26/2003	21.53	--	--	8.81	12.72
LAI-13	9/2/2003	21.53	--	--	8.88	12.65
LAI-13	9/9/2003	21.53	--	--	8.91	12.62
LAI-13	9/19/2003	21.53	--	--	10.94	10.59
LAI-13	10/14/2003	21.53	--	--	9.08	12.45
LAI-13	11/20/2003	21.53	--	--	5.94	15.59
LAI-13	12/3/2003	21.53	--	--	5.52	16.01
LAI-13	1/19/2004	21.53	--	--	5.39	16.14
LAI-13	2/24/2004	21.53	--	--	5.77	15.76
LAI-13	3/15/2004	21.53	--	--	6.66	14.87
LAI-13	4/19/2004	21.53	--	--	7.58	13.95
LAI-13	5/17/2004	21.53	--	--	8.05	13.48
LAI-13	6/22/2004	21.53	--	--	7.91	13.62
LAI-13	8/18/2004	21.53	--	--	8.57	12.96
LAI-13	9/21/2004	21.53	--	--	7.28	14.25
LAI-13	10/19/2004	21.53	--	--	7.10	14.43
LAI-13	11/23/2004	21.53	--	--	7.39	14.14
LAI-13	12/21/2004	21.53	--	--	5.69	15.84
LAI-13	1/13/2005	21.53	--	--	6.76	14.77
LAI-13	4/28/2005	21.53	--	--	6.71	14.82
LAI-13	6/1/2005	21.53	--	--	6.78	14.75
LAI-13	6/29/2005	21.53	--	--	7.51	14.02
LAI-13	7/20/2005	21.53	--	--	7.80	13.73
LAI-13	8/22/2005	21.53	--	--	8.17	13.36
LAI-13	9/12/2005	21.53	--	--	9.41	12.12
LAI-13	10/12/2005	21.53	--	--	8.63	12.90
LAI-13	11/21/2005	21.53	--	--	7.05	14.48
LAI-13	12/27/2005	21.53	--	--	5.70	15.83
LAI-13	1/30/2006	21.53	--	--	4.63	16.90
LAI-13	2/16/2006	21.53	--	--	5.42	16.11
LAI-13	3/13/2006	21.53	--	--	6.24	15.29
LAI-13	4/18/2006	21.53	--	--	6.82	14.71
LAI-13	5/12/2006	21.53	--	--	7.25	14.28
LAI-13	6/9/2006	21.53	--	--	6.86	14.67
LAI-13	7/13/2006	21.53	--	--	7.71	13.82
LAI-13	8/16/2006	21.53	--	--	8.16	13.37
LAI-13	9/19/2006	21.53	--	--	8.69	12.84
LAI-13	10/13/2006	21.53	--	--	8.37	13.16
LAI-13	11/20/2006	21.53	--	--	4.28	17.25
LAI-13	12/8/2006	21.53	--	--	4.01	17.52
LAI-13	1/19/2007	21.53	--	--	5.02	16.51
LAI-13	2/19/2007	21.53	--	--	6.60	14.93
LAI-13	3/15/2007	21.53	--	--	5.87	15.66
LAI-13	4/16/2007	21.53	--	--	6.35	15.18
LAI-13	5/14/2007	21.53	--	--	7.40	14.13
LAI-13	6/29/2007	21.53	--	--	8.05	13.48
LAI-13	7/20/2007	21.53	--	--	8.05	13.48
LAI-13	8/21/2007	21.53	--	--	8.22	13.31
LAI-13	9/10/2007	21.53	--	--	8.30	13.23
LAI-13	10/22/2007	21.53	--	--	7.27	14.26
LAI-13	11/28/2007	21.53	--	--	6.87	14.66

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-13	12/13/2007	21.53	--	--	5.06	16.47
LAI-13	1/21/2008	21.53	--	--	5.36	16.17
LAI-13	2/24/2008	21.53	--	--	6.51	15.02
LAI-13	3/24/2008	21.53	--	--	7.14	14.39
LAI-13	8/25/2008	21.53	--	--	7.89	13.64
LAI-13	2/18/2009	21.53	--	--	6.93	14.60
LAI-13	8/25/2009	21.53	--	--	8.60	12.93
LAI-13	3/22/2010	21.53	--	--	5.95	15.58
LAI-13	8/23/2010	21.53	--	--	7.76	13.77
LAI-13	2/7/2011	21.53	--	--	5.60	15.93
LAI-13	5/27/2011	21.53			Not Monitored	
LAI-13	8/8/2011	21.53	--	--	7.70	13.83
LAI-13	11/14/2011	21.53	--	--	7.40	14.13
LAI-13	2/20/2012	21.53	--	--	5.03	16.5
LAI-13	8/22/2012	21.53	--	--	7.86	13.67
LAI-13	11/5/2012	21.53	--	--	5.86	15.67
LAI-13	1/28/2013	21.53	--	--	5.79	15.74
LAI-14	1/31/2003	21.69	--	--	6.12	15.57
LAI-14	2/12/2003	21.69	--	--	7.11	14.58
LAI-14	2/18/2003	21.69	--	--	7.17	14.52
LAI-14	2/21/2003	21.69	--	--	7.25	14.44
LAI-14	2/24/2003	21.69	--	--	7.25	14.44
LAI-14	3/3/2003	21.69	--	--	7.50	14.19
LAI-14	3/12/2003	21.69	--	--	7.40	14.29
LAI-14	3/14/2003	21.69	--	--	7.23	14.46
LAI-14	3/26/2003	21.69	--	--	7.04	14.65
LAI-14	3/28/2003	21.69	--	--	7.07	14.62
LAI-14	4/2/2003	21.69	--	--	7.00	14.69
LAI-14	4/4/2003	21.69	--	--	7.24	14.45
LAI-14	4/8/2003	21.69	--	--	7.41	14.28
LAI-14	4/11/2003	21.69	--	--	7.36	14.33
LAI-14	4/15/2003	21.69	--	--	7.34	14.35
LAI-14	4/17/2003	21.69	--	--	7.39	14.30
LAI-14	4/22/2003	21.69	--	--	7.53	14.16
LAI-14	4/25/2003	21.69	--	--	7.62	14.07
LAI-14	5/2/2003	21.69	--	--	7.20	14.49
LAI-14	5/6/2003	21.69	--	--	7.82	13.87
LAI-14	5/9/2003	21.69	--	--	7.86	13.83
LAI-14	5/16/2003	21.69	--	--	8.00	13.69
LAI-14	5/23/2003	21.69	--	--	8.03	13.66
LAI-14	5/28/2003	21.69	--	--	8.14	13.55
LAI-14	6/13/2003	21.69	--	--	8.30	13.39
LAI-14	6/18/2003	21.69	--	--	8.33	13.36
LAI-14	6/27/2003	21.69	--	--	8.35	13.34
LAI-14	7/7/2003	21.69	--	--	8.65	13.04
LAI-14	7/16/2003	21.69	--	--	7.83	13.86
LAI-14	7/31/2003	21.69	--	--	8.41	13.28
LAI-14	8/5/2003	21.69	--	--	8.73	12.96
LAI-14	8/11/2003	21.69	--	--	8.80	12.89
LAI-14	8/22/2003	21.69	--	--	9.89	11.80
LAI-14	8/26/2003	21.69	--	--	9.04	12.65
LAI-14	9/2/2003	21.69	--	--	9.07	12.62
LAI-14	9/9/2003	21.69	--	--	9.14	12.55
LAI-14	9/19/2003	21.69	--	--	9.14	12.55
LAI-14	10/14/2003	21.69	--	--	9.30	12.39
LAI-14	11/20/2003	21.69	--	--	6.59	15.10
LAI-14	12/3/2003	21.69	--	--	6.53	15.16
LAI-14	1/19/2004	21.69	--	--	6.45	15.24
LAI-14	2/24/2004	21.69	--	--	7.03	14.66
LAI-14	3/15/2004	21.69	--	--	7.52	14.17
LAI-14	4/19/2004	21.69	--	--	8.03	13.66
LAI-14	5/17/2004	21.69	--	--	8.32	13.37
LAI-14	6/22/2004	21.69	--	--	8.26	13.43
LAI-14	8/18/2004	21.69	--	--	8.86	12.83
LAI-14	9/21/2004	21.69	--	--	8.00	13.69
LAI-14	10/19/2004	21.69	--	--	8.00	13.69
LAI-14	11/23/2004	21.69	--	--	8.00	13.69
LAI-14	12/21/2004	21.69	--	--	7.11	14.58
LAI-14	1/13/2005	21.69	--	--	7.68	14.01
LAI-14	4/28/2005	21.69	--	--	7.47	14.22

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-14	6/1/2005	21.69	--	--	7.58	14.11
LAI-14	6/29/2005	21.69	--	--	8.02	13.67
LAI-14	7/20/2005	21.69	8.23	0.01	8.24	13.46
LAI-14	8/22/2005	21.69	--	--	8.50	13.19
LAI-14	9/12/2005	21.69	--	--	8.63	13.06
LAI-14	10/12/2005	21.69	--	--	8.86	12.83
LAI-14	11/21/2005	21.69	--	--	7.41	14.28
LAI-14	12/27/2005	21.69	--	--	6.48	15.21
LAI-14	1/30/2006	21.69	--	--	4.68	17.01
LAI-14	2/16/2006	21.69	6.30	0.07	6.37	15.37
LAI-14	3/13/2006	21.69	--	--	7.43	14.26
LAI-14	4/18/2006	21.69	--	--	7.56	14.13
LAI-14	5/12/2006	21.69	--	--	7.75	13.94
LAI-14	6/9/2006	21.69	--	--	7.58	14.11
LAI-14	7/13/2006	21.69	--	--	8.10	13.59
LAI-14	8/16/2006	21.69	--	--	8.43	13.26
LAI-14	9/19/2006	21.69	--	--	8.70	12.99
LAI-14	10/13/2006	21.69	--	--	8.56	13.13
LAI-14	11/20/2006	21.69	--	--	5.64	16.05
LAI-14	12/8/2006	21.69	--	--	6.12	15.57
LAI-14	1/19/2007	21.69	--	--	6.12	15.57
LAI-14	2/19/2007	21.69	--	--	7.45	14.24
LAI-14	3/15/2007	21.69	--	--	6.95	14.74
LAI-14	4/16/2007	21.69	--	--	7.38	14.31
LAI-14	5/14/2007	21.69	--	--	7.84	13.85
LAI-14	6/29/2007	21.69	--	--	8.27	13.42
LAI-14	7/20/2007	21.69	--	--	8.31	13.38
LAI-14	8/21/2007	21.69	--	--	8.48	13.21
LAI-14	9/10/2007	21.69	--	--	8.59	13.10
LAI-14	10/22/2007	21.69	--	--	7.82	13.87
LAI-14	11/28/2007	21.69	--	--	5.50	16.19
LAI-14	12/13/2007	21.69	--	--	6.45	15.24
LAI-14	1/21/2008	21.69	--	--	6.77	14.92
LAI-14	2/24/2008	21.69	--	--	7.37	14.32
LAI-14	3/24/2008	21.69	--	--	7.59	14.10
LAI-14	8/25/2008	21.69	--	--	8.36	13.33
LAI-14	2/18/2009	21.69	--	--	7.60	14.09
LAI-14	8/25/2009	21.69	--	--	8.78	12.91
LAI-14	3/22/2010	21.69	--	--	7.17	14.52
LAI-14	8/23/2010	21.69	--	--	8.13	13.56
LAI-14	2/7/2011	21.69	--	--	6.71	14.98
LAI-14	5/27/2011	21.69	--	--	6.98	14.71
LAI-14	8/8/2011	21.69	--	--	8.06	13.63
LAI-14	11/14/2011	21.69	--	--	7.91	13.78
LAI-14	2/20/2012	21.69	--	--	6.39	15.30
LAI-14	8/22/2012	21.69	--	--	8.15	13.54
LAI-14	11/5/2012	21.69	--	--	6.60	15.09
LAI-14	1/28/2013	21.69	--	--	6.91	14.78
LAI-15	1/31/2003	19.76	--	--	6.13	13.63
LAI-15	2/12/2003	19.76	--	--	4.23	15.53
LAI-15	2/18/2003	19.76	--	--	4.51	15.25
LAI-15	2/21/2003	19.76	--	--	4.72	15.04
LAI-15	2/24/2003	19.76	--	--	4.74	15.02
LAI-15	3/3/2003	19.76	--	--	4.96	14.80
LAI-15	3/12/2003	19.76	--	--	4.81	14.95
LAI-15	3/14/2003	19.76	--	--	4.14	15.62
LAI-15	3/26/2003	19.76	--	--	3.82	15.94
LAI-15	3/28/2003	19.76	--	--	3.85	15.91
LAI-15	4/2/2003	19.76	--	--	4.40	15.36
LAI-15	4/4/2003	19.76	--	--	4.49	15.27
LAI-15	4/8/2003	19.76	--	--	4.71	15.05
LAI-15	4/11/2003	19.76	--	--	4.80	14.96
LAI-15	4/15/2003	19.76	--	--	4.75	15.01
LAI-15	4/17/2003	19.76	--	--	4.77	14.99
LAI-15	4/22/2003	19.76	--	--	4.99	14.77
LAI-15	4/25/2003	19.76	--	--	5.09	14.67
LAI-15	5/2/2003	19.76	--	--	5.13	14.63
LAI-15	5/6/2003	19.76	--	--	5.55	14.21
LAI-15	5/9/2003	19.76	--	--	5.68	14.08
LAI-15	5/16/2003	19.76	--	--	4.90	14.86

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-15	5/23/2003	19.76	--	--	6.12	13.64
LAI-15	5/28/2003	19.76	--	--	6.13	13.63
LAI-15	6/13/2003	19.76	--	--	6.33	13.43
LAI-15	6/18/2003	19.76	--	--	6.35	13.41
LAI-15	6/27/2003	19.76	--	--	6.39	13.37
LAI-15	7/7/2003	19.76	--	--	6.75	13.01
LAI-15	7/16/2003	19.76	--	--	6.03	13.73
LAI-15	7/31/2003	19.76	--	--	6.83	12.93
LAI-15	8/5/2003	19.76	--	--	6.85	12.91
LAI-15	8/11/2003	19.76	--	--	6.93	12.83
LAI-15	8/22/2003	19.76	--	--	8.04	11.72
LAI-15	8/26/2003	19.76	--	--	7.11	12.65
LAI-15	9/2/2003	19.76	--	--	7.21	12.55
LAI-15	9/9/2003	19.76	--	--	7.23	12.53
LAI-15	9/19/2003	19.76	--	--	--	NM
LAI-15	10/14/2003	19.76	--	--	7.45	12.31
LAI-15	11/20/2003	19.76	--	--	4.11	15.65
LAI-15	12/3/2003	19.76	--	--	3.65	16.11
LAI-15	1/19/2004	19.76	--	--	3.59	16.17
LAI-15	2/24/2004	19.76	--	--	4.26	15.50
LAI-15	3/15/2004	19.76	--	--	5.19	14.57
LAI-15	4/19/2004	19.76	--	--	5.97	13.79
LAI-15	5/17/2004	19.76	--	--	6.42	13.34
LAI-15	6/22/2004	19.76	--	--	6.09	13.67
LAI-15	8/18/2004	19.76	--	--	6.93	12.83
LAI-15	9/21/2004	19.76	--	--	6.05	13.71
LAI-15	10/19/2004	19.76	--	--	5.75	14.01
LAI-15	11/23/2004	19.76	--	--	5.91	13.85
LAI-15	12/21/2004	19.76	--	--	4.28	15.48
LAI-15	1/13/2005	19.76	--	--	5.32	14.44
LAI-15	4/28/2005	19.76	--	--	4.91	14.85
LAI-15	6/1/2005	20.03	--	--	5.17	14.86
LAI-15	6/29/2005	20.03	--	--	5.67	14.36
LAI-15	7/20/2005	20.03	--	--	6.32	13.71
LAI-15	8/22/2005	20.03	--	--	6.62	13.41
LAI-15	9/12/2005	20.03	--	--	6.82	13.21
LAI-15	10/12/2005	20.03	--	--	7.08	12.95
LAI-15	11/21/2005	20.03	--	--	5.04	14.99
LAI-15	12/27/2005	20.03	--	--	3.84	16.19
LAI-15	1/30/2006	20.03	--	--	1.11	18.92
LAI-15	2/16/2006	20.03	--	--	3.52	16.51
LAI-15	3/13/2006	20.03	--	--	4.92	15.11
LAI-15	4/18/2006	20.03	--	--	5.35	14.68
LAI-15	5/12/2006	20.03	--	--	5.61	14.42
LAI-15	6/9/2006	20.03	--	--	5.32	14.71
LAI-15	7/13/2006	20.03	--	--	6.20	13.83
LAI-15	8/16/2006	20.03	--	--	6.60	13.43
LAI-15	9/19/2006	20.03	--	--	7.05	12.98
LAI-15	10/13/2006	20.03	--	--	6.80	13.23
LAI-15	11/20/2006	20.03	--	--	2.53	17.50
LAI-15	12/8/2006	20.03	--	--	3.11	16.92
LAI-15	1/19/2007	20.03	--	--	3.12	16.91
LAI-15	2/19/2007	20.03	--	--	5.10	14.93
LAI-15	3/15/2007	20.03	--	--	4.32	15.71
LAI-15	4/16/2007	20.03	--	--	4.76	15.27
LAI-15	5/14/2007	20.03	--	--	5.88	14.15
LAI-15	6/29/2007	20.03	--	--	6.44	13.59
LAI-15	7/20/2007	20.03	--	--	6.55	13.48
LAI-15	8/21/2007	20.03	--	--	6.74	13.29
LAI-15	9/10/2007	20.03	--	--	6.84	13.19
LAI-15	10/22/2007	20.03	--	--	6.03	14.00
LAI-15	11/28/2007	20.03	--	--	5.34	14.69
LAI-15	12/13/2007	20.03	--	--	3.50	16.53
LAI-15	1/21/2008	20.03	--	--	4.12	15.91
LAI-15	2/24/2008	20.03	--	--	5.14	14.89
LAI-15	3/24/2008	20.03	--	--	5.52	14.51
LAI-15	8/25/2008	20.03	--	--	6.62	13.41
LAI-15	2/18/2009	20.03	--	--	5.50	14.53
LAI-15	8/25/2009	20.03	--	--	6.94	13.09
LAI-15	3/22/2010	20.03	--	--	4.71	15.32
LAI-15	8/23/2010	20.03	--	--	6.36	13.67

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-15	2/7/2011	20.03	--	--	4.20	15.83
LAI-15	5/27/2011	20.03			Not Monitored	
LAI-15	8/8/2011	20.03	--	--	6.30	13.73
LAI-15	11/14/2011	20.03	--	--	6.05	13.98
LAI-15	2/20/2012	20.03	--	--	3.88	16.15
LAI-15	8/22/2012	20.03	--	--	6.40	13.63
LAI-15	11/5/2012	20.03	--	--	4.71	15.32
LAI-15	1/28/2013	20.03	--	--	4.41	15.62
LAI-16	1/31/2003	20.59	--	--	6.28	14.31
LAI-16	2/12/2003	20.59	--	--	6.65	13.94
LAI-16	2/18/2003	20.59	--	--	6.70	13.89
LAI-16	2/21/2003	20.59	--	--	6.73	13.86
LAI-16	2/24/2003	20.59	--	--	6.74	13.85
LAI-16	3/3/2003	20.59	--	--	6.86	13.73
LAI-16	3/12/2003	20.59	--	--	6.52	14.07
LAI-16	3/14/2003	20.59	--	--	6.39	14.20
LAI-16	3/26/2003	20.59	--	--	6.48	14.11
LAI-16	3/28/2003	20.59	--	--	7.46	13.13
LAI-16	4/2/2003	20.59	--	--	6.63	13.96
LAI-16	4/4/2003	20.59	--	--	6.71	13.88
LAI-16	4/8/2003	20.59	--	--	6.90	13.69
LAI-16	4/11/2003	20.59	--	--	6.75	13.84
LAI-16	4/15/2003	20.59	--	--	6.68	13.91
LAI-16	4/17/2003	20.59	--	--	6.73	13.86
LAI-16	4/22/2003	20.59	--	--	6.87	13.72
LAI-16	4/25/2003	20.59	--	--	6.99	13.60
LAI-16	5/2/2003	20.59	--	--	6.78	13.81
LAI-16	5/6/2003	20.59	--	--	7.26	13.33
LAI-16	5/9/2003	20.59	--	--	7.35	13.24
LAI-16	5/16/2003	20.59	--	--	7.60	12.99
LAI-16	5/23/2003	20.59	--	--	8.08	12.51
LAI-16	5/28/2003	20.59	--	--	7.87	12.72
LAI-16	6/13/2003	20.59	--	--	8.31	12.28
LAI-16	6/18/2003	20.59	--	--	8.45	12.14
LAI-16	6/27/2003	20.59	--	--	8.08	12.51
LAI-16	7/7/2003	20.59			Not Monitored	
LAI-16	7/16/2003	20.59	--	--	8.00	12.59
LAI-16	7/31/2003	20.59			Dry	
LAI-16	8/5/2003	20.59			Dry	
LAI-16	8/11/2003	20.59			Dry	
LAI-16	8/22/2003	20.59			Dry	
LAI-16	8/26/2003	20.59			Dry	
LAI-16	9/2/2003	20.59			Dry	
LAI-16	9/9/2003	20.59			Dry	
LAI-16	9/19/2003	20.59			Dry	
LAI-16	10/14/2003	20.59			Dry	
LAI-16	11/20/2003	20.59	--	--	6.95	13.64
LAI-16	12/3/2003	20.59	--	--	6.68	13.91
LAI-16	1/19/2004	20.59	--	--	6.49	14.10
LAI-16	2/24/2004	20.59	--	--	6.62	13.97
LAI-16	3/15/2004	20.59	--	--	7.02	13.57
LAI-16	4/19/2004	20.59	--	--	7.64	12.95
LAI-16	5/17/2004	20.59	--	--	8.35	12.24
LAI-16	6/22/2004	20.59	--	--	8.52	12.07
LAI-16	8/18/2004	20.59			Dry	
LAI-16	9/21/2004	20.59			Dry	
LAI-16	10/19/2004	20.59	--	--	9.30	11.29
LAI-16	11/23/2004	20.59	--	--	8.38	12.21
LAI-16	12/21/2004	20.59	--	--	6.87	13.72
LAI-16	1/13/2005	20.59	--	--	7.12	13.47
LAI-16	4/28/2005	20.59	--	--	6.95	13.64
LAI-16	6/1/2005	20.59	--	--	7.35	13.24
LAI-16	6/29/2005	20.59	--	--	7.95	12.64
LAI-16	7/20/2005	20.59	--	--	8.78	11.81
LAI-16	8/22/2005	20.59			Dry	
LAI-16	9/12/2005	20.59			Dry	
LAI-16	10/12/2005	20.59			Dry	
LAI-16	11/21/2005	20.59	--	--	8.48	12.11
LAI-16	12/27/2005	20.59	--	--	6.71	13.88
LAI-16	1/30/2006	20.59			Dry	

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
LAI-16	2/16/2006	20.59	--	--	6.45	14.14
LAI-16	3/13/2006	20.59	--	--	6.75	13.84
LAI-16	4/18/2006	20.59	--	--	7.18	13.41
LAI-16	5/12/2006	20.59	--	--	7.50	13.09
LAI-16	6/9/2006	20.59	--	--	7.62	12.97
LAI-16	7/13/2006	20.59	--	--	6.10	14.49
LAI-16	8/16/2006	20.59			Dry	
LAI-16	9/19/2006	20.59			Dry	
LAI-16	10/13/2006	20.59			Dry	
LAI-16	11/20/2006	20.59	--	--	6.33	14.26
LAI-16	12/8/2006	20.59	--	--	6.45	14.14
LAI-16	1/19/2007	20.59	--	--	6.11	14.48
LAI-16	2/19/2007	20.59	--	--	6.67	13.92
LAI-16	3/15/2007	20.59	--	--	6.55	14.04
LAI-16	4/16/2007	20.59	--	--	6.89	13.70
LAI-16	5/14/2007	20.59	--	--	7.54	13.05
LAI-16	6/29/2007	20.59			Dry	
LAI-16	7/20/2007	20.59			Dry	
LAI-16	8/21/2007	20.59			Dry	
LAI-16	9/10/2007	20.59			Dry	
LAI-16	10/22/2007	20.59			Dry	
LAI-16	11/28/2007	20.59	--	--	8.41	12.18
LAI-16	12/13/2007	20.59	--	--	6.65	13.94
LAI-16	1/21/2008	20.59	--	--	6.43	14.16
LAI-16	2/24/2008	20.59	--	--	6.87	13.72
LAI-16	3/24/2008	20.59	--	--	6.95	13.64
LAI-16	8/25/2008	20.59	--	--	7.12	13.47
LAI-16	2/18/2009	20.59	--	--	7.00	13.59
LAI-16	8/25/2009	20.59			Dry	
LAI-16	3/22/2010	20.59	--	--	6.93	13.66
LAI-16	8/23/2010	20.59			Dry	
LAI-16	2/7/2011	20.59	--	--	6.45	14.14
LAI-16	5/27/2011	20.59	--	--	6.99	13.60
LAI-16	11/14/2011	20.59	--	--	9.15	11.44
LAI-16	2/20/2012	20.59	--	--	6.49	14.10
LAI-16	8/22/2012	20.59	--	--	Dry	--
LAI-16	11/5/2012	20.59	--	--	9.39	11.20
LAI-16	1/28/2013	20.59	--	--	6.52	14.07
RW-1	11/20/2002	24.60	8.25	0.95	9.20	16.11
RW-1	11/21/2002	24.60	8.25	1.15	9.40	16.06
RW-1	11/22/2002	24.60	8.22	1.20	9.42	16.08
RW-1	11/24/2002	24.60	8.35	1.06	9.41	15.99
RW-1	1/2/2003	24.60	5.61	0.21	5.82	18.94
RW-1	1/3/2003	24.60	5.51	0.21	5.72	19.04
RW-1	1/6/2003	24.60	5.35	0.29	5.64	19.18
RW-1	1/7/2003	24.60	5.68	0.28	5.96	18.85
RW-1	1/8/2003	24.60	5.95	0.28	6.23	18.58
RW-1	1/9/2003	24.60	6.03	0.29	6.32	18.50
RW-1	1/10/2003	24.60	6.20	0.30	6.50	18.33
RW-1	1/13/2003	24.60	6.00	0.32	6.32	18.52
RW-1	1/14/2003	24.60	5.72	0.73	6.45	18.70
RW-1	1/15/2003	24.60	5.99	0.19	6.18	18.56
RW-1	1/16/2003	24.60	6.10	0.30	6.40	18.43
RW-1	1/17/2003	24.60	6.15	0.30	6.45	18.38
RW-1	1/20/2003	24.60	6.34	0.35	6.69	18.17
RW-1	1/22/2003	24.60	5.60	0.29	5.89	18.93
RW-1	1/23/2003	24.60	5.80	0.35	6.15	18.71
RW-1	1/24/2003	24.60	5.37	0.38	5.75	19.14
RW-1	1/27/2003	24.60	4.68	0.47	5.15	19.80
RW-1	1/28/2003	24.60	4.66	0.45	5.11	19.83
RW-1	1/29/2003	24.60	4.67	0.46	5.13	19.82
RW-1	1/30/2003	24.60	4.90	0.44	5.34	19.59
RW-1	2/3/2003	24.60	5.65	0.41	6.06	18.85
RW-1	2/6/2003	24.24	6.76	0.40	7.16	17.38
RW-1	2/11/2003	24.24	7.35	0.42	7.77	16.79
RW-1	2/18/2003	24.24	--	--	6.55	17.69
RW-1	2/21/2003	24.24	7.90	0.93	8.83	16.11
RW-1	2/26/2003	24.24	7.70	0.81	8.51	16.34
RW-1	3/4/2003	24.24	7.11	0.63	7.74	16.97
RW-1	3/12/2003	24.24	7.30	0.46	7.76	16.83

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-1	3/14/2003	24.24	6.85	--	7.31	16.93
RW-1	3/26/2003	24.24	6.39	0.13	6.52	17.82
RW-1	3/28/2003	24.24	7.41	0.15	7.56	16.79
RW-1	4/2/2003	24.24	7.45	0.10	7.55	16.77
RW-1	4/4/2003	24.24	7.70	0.05	7.75	16.53
RW-1	4/8/2003	24.24	7.25	0.02	7.27	16.99
RW-1	4/11/2003	24.24	7.15	0.03	7.18	17.08
RW-1	4/15/2003	24.24	6.57	0.02	6.59	17.67
RW-1	4/17/2003	24.24	7.52	0.02	7.54	16.72
RW-1	4/22/2003	24.24	7.53	0.02	7.55	16.71
RW-1	4/25/2003	24.24	7.42	0.01	7.43	16.82
RW-1	5/2/2003	24.24	8.84	0.01	8.85	15.40
RW-1	5/6/2003	24.24	--	--	9.02	15.22
RW-1	5/9/2003	24.24	--	--	9.21	15.03
RW-1	5/23/2003	24.24	--	--	9.26	14.98
RW-1	5/28/2003	24.24	9.35	0.01	9.36	14.89
RW-1	6/13/2003	24.24	9.52	0.49	10.01	14.60
RW-1	6/18/2003	24.24	9.22	0.91	10.13	14.79
RW-1	6/27/2003	24.24	--	--	9.81	14.43
RW-1	7/7/2003	24.24	10.26	0.03	10.29	13.97
RW-1	7/16/2003	24.24	10.09	0.26	10.35	14.09
RW-1	7/31/2003	24.24	10.34	0.01	10.35	13.90
RW-1	8/5/2003	24.24	10.32	0.08	10.40	13.90
RW-1	8/11/2003	24.24	11.34	0.01	11.35	12.90
RW-1	8/22/2003	24.24	11.34	0.01	11.35	12.90
RW-1	8/26/2003	24.24	--	--	10.36	13.88
RW-1	9/2/2003	24.24	--	--	10.36	13.88
RW-1	9/9/2003	24.24	10.33	0.05	10.38	13.90
RW-1	9/19/2003	24.24	10.33	0.03	10.36	13.90
RW-1	10/14/2003	24.24	--	--	10.30	13.94
RW-1	11/20/2003	24.24	--	--	5.52	18.72
RW-1	12/3/2003	24.24	--	--	5.44	18.80
RW-1	1/19/2004	24.24	--	--	5.57	18.67
RW-1	2/24/2004	24.24	--	--	7.45	16.79
RW-1	3/15/2004	24.24	--	--	8.87	15.37
RW-1	4/19/2004	24.24	--	--	9.56	14.68
RW-1	5/17/2004	24.24	--	--	10.14	14.10
RW-1	6/22/2004	24.24	--	--	9.91	14.33
RW-1	8/18/2004	24.24	10.30	0.01	10.31	13.94
RW-1	9/21/2004	24.24	--	--	10.05	14.19
RW-1	10/19/2004	24.24	--	--	9.73	14.51
RW-1	11/23/2004	24.24	--	--	9.50	14.74
RW-1	12/21/2004	24.24	--	--	6.86	17.38
RW-1	1/13/2005	24.24	--	--	8.32	15.92
RW-1	4/28/2005	24.24	--	--	7.15	17.09
RW-1	6/1/2005	24.24	--	--	7.60	16.64
RW-1	6/29/2005	24.24			Not Monitored	
RW-1	7/20/2005	24.24			Not Monitored	
RW-1	8/22/2005	24.24	--	--	10.35	13.89
RW-1	9/12/2005	24.24	--	--	10.36	13.88
RW-1	10/12/2005	24.24	--	--	10.40	13.84
RW-1	11/21/2005	24.24	--	--	9.09	15.15
RW-1	12/27/2005	24.24	--	--	5.72	18.52
RW-1	1/30/2006	24.24	--	--	4.34	19.90
RW-1	2/16/2006	24.24	--	--	5.86	18.38
RW-1	3/13/2006	24.24	--	--	7.51	16.73
RW-1	4/18/2006	24.24	--	--	7.05	17.19
RW-1	5/12/2006	24.24	--	--	8.53	15.71
RW-1	6/9/2006	24.24	--	--	7.70	16.54
RW-1	7/13/2006	24.24	--	--	9.44	14.80
RW-1	8/16/2006	24.24	--	--	10.35	13.89
RW-1	9/19/2006	24.24	--	--	10.42	13.82
RW-1	10/13/2006	24.24	--	--	10.45	13.79
RW-1	11/20/2006	24.24	--	--	5.15	19.09
RW-1	12/8/2006	24.24	--	--	5.51	18.73
RW-1	1/19/2007	24.24	--	--	5.02	19.22
RW-1	2/19/2007	24.24	--	--	6.70	17.54
RW-1	3/15/2007	24.24	--	--	5.51	18.73
RW-1	4/16/2007	24.24	--	--	7.32	16.92
RW-1	5/14/2007	24.24	--	--	9.05	15.19
RW-1	6/29/2007	24.24	--	--	10.21	14.03

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-1	7/20/2007	24.24	--	--	Dry	NM
RW-1	8/21/2007	24.24	--	--	10.35	13.89
RW-1	9/10/2007	24.24	--	--	Dry	NM
RW-1	10/22/2007	24.24	--	--	7.38	16.86
RW-1	11/28/2007	24.24	--	--	7.98	16.26
RW-1	12/13/2007	24.24	--	--	6.57	17.67
RW-1	1/21/2008	24.24	--	--	5.97	18.27
RW-1	2/24/2008	24.24	--	--	8.78	15.46
RW-1	3/24/2008	24.24	--	--	5.95	18.29
RW-1	8/25/2008	24.24	--	--	6.02	18.22
RW-1	2/18/2009	24.24	--	--	9.13	15.11
RW-1	8/25/2009	24.24	--	--	10.39	13.85
RW-1	3/22/2010	24.24	--	--	7.96	16.28
RW-1	8/23/2010	24.24	--	--	10.37	13.87
RW-1	2/7/2011	24.24	--	--	5.69	18.55
RW-1	5/27/2011	24.24	--	--	7.56	16.68
RW-1	8/8/2011	24.24			Dry	
RW-1	11/14/2011	24.24	--	--	9.45	14.79
RW-1	2/20/2012	24.24	--	--	5.53	18.71
RW-1	8/22/2012	24.24	--	--	10.23	14.01
RW-1	11/5/2012	24.24	--	--	5.52	18.72
RW-1	1/28/2013	24.24	--	--	6.16	18.08
RW-2	11/20/2002	24.58	8.05	1.35	9.40	16.19
RW-2	11/21/2002	24.58	8.00	1.40	9.40	16.23
RW-2	11/22/2002	24.58	8.00	1.41	9.41	16.23
RW-2	11/24/2002	24.58	8.21	1.49	9.70	16.00
RW-2	1/2/2003	24.58	6.11	2.27	8.38	17.90
RW-2	1/6/2003	24.58	5.40	2.78	8.18	18.49
RW-2	1/7/2003	24.58	6.41	0.54	6.95	18.04
RW-2	1/8/2003	24.58	7.67	0.01	7.68	16.91
RW-2	1/9/2003	24.58	8.72	0.01	8.73	15.86
RW-2	1/10/2003	24.58	6.38	0.54	6.92	18.07
RW-2	1/13/2003	24.58	8.42	0.10	8.52	16.14
RW-2	1/14/2003	24.58	6.17	1.32	7.49	18.08
RW-2	1/15/2003	24.58	5.95	0.85	6.80	18.42
RW-2	1/16/2003	24.58	6.51	1.00	7.51	17.82
RW-2	1/17/2003	24.58	6.40	1.12	7.52	17.90
RW-2	1/20/2003	24.58	6.35	1.59	7.94	17.83
RW-2	1/22/2003	24.58	5.86	2.74	8.60	18.04
RW-2	1/23/2003	24.58	5.92	3.23	9.15	17.85
RW-2	1/24/2003	24.58	5.37	0.62	5.99	19.06
RW-2	1/27/2003	24.58	4.69	0.53	5.22	19.76
RW-2	1/28/2003	24.58	4.83	3.71	8.54	18.82
RW-2	1/29/2003	24.58	4.82	3.66	8.48	18.85
RW-2	1/30/2003	24.58	4.95	0.94	5.89	19.40
RW-2	2/3/2003	24.58	5.29	3.82	9.11	18.34
RW-2	2/6/2003	24.19	6.16	3.48	9.64	17.16
RW-2	2/11/2003	24.19	6.61	3.17	9.78	16.79
RW-2	2/18/2003	24.19	7.46	2.72	10.18	16.05
RW-2	2/21/2003	24.19	7.40	2.76	10.16	16.10
RW-2	2/26/2003	24.19	7.66	0.69	8.35	16.36
RW-2	3/4/2003	24.19	7.15	1.42	8.57	16.69
RW-2	3/12/2003	24.19	7.60	0.02	7.62	16.59
RW-2	3/14/2003	24.19	7.38	1.61	8.99	16.41
RW-2	3/26/2003	24.19	6.85	0.70	7.55	17.17
RW-2	3/28/2003	24.19	7.48	0.87	8.35	16.49
RW-2	4/2/2003	24.19	7.55	0.86	8.41	16.43
RW-2	4/4/2003	24.19	7.95	0.56	8.51	16.10
RW-2	4/8/2003	24.19	8.02	0.03	8.05	16.16
RW-2	4/11/2003	24.19	8.22	0.01	8.23	15.97
RW-2	4/15/2003	24.19	--	--	7.68	16.51
RW-2	4/17/2003	24.19	8.34	0.06	8.40	15.84
RW-2	4/22/2003	24.19	8.36	0.16	8.52	15.79
RW-2	4/25/2003	24.19	8.30	0.11	8.41	15.86
RW-2	5/2/2003	24.19	8.75	0.31	9.06	15.36
RW-2	5/6/2003	24.19	8.82	0.61	9.43	15.22
RW-2	5/9/2003	24.19	9.16	0.62	9.78	14.88
RW-2	5/23/2003	24.19	9.15	1.42	10.57	14.69
RW-2	5/28/2003	24.19	8.95	1.49	10.44	14.87
RW-2	6/13/2003	24.19	9.24	1.35	10.59	14.61

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-2	6/18/2003	24.19	9.20	1.31	10.51	14.66
RW-2	6/27/2003	24.19	9.23	1.26	10.49	14.65
RW-2	7/7/2003	24.19	10.01	0.42	10.43	14.08
RW-2	7/16/2003	24.19	9.83	0.71	10.54	14.18
RW-2	7/31/2003	24.19	10.31	0.15	10.46	13.84
RW-2	8/5/2003	24.19	10.28	0.22	10.50	13.86
RW-2	8/11/2003	24.19	--	--	11.38	12.81
RW-2	8/22/2003	24.19	--	--	11.38	12.81
RW-2	8/26/2003	24.19	--	--	11.26	12.93
RW-2	9/2/2003	24.19	--	--	10.40	13.79
RW-2	9/9/2003	24.19	10.34	0.06	10.40	13.84
RW-2	9/19/2003	24.19	--	--	10.70	13.49
RW-2	10/14/2003	24.19	--	--	10.38	13.81
RW-2	11/20/2003	24.19	--	--	7.66	16.53
RW-2	12/3/2003	24.19	--	--	6.65	17.54
RW-2	1/19/2004	24.19	--	--	7.13	17.06
RW-2	2/24/2004	24.19	--	--	7.92	16.27
RW-2	3/15/2004	24.19			Not Monitored	
RW-2	4/19/2004	24.19	--	--	10.01	14.18
RW-2	5/17/2004	24.19			Not Monitored	
RW-2	6/22/2004	24.19	--	--	10.08	14.11
RW-2	8/18/2004	24.19	--	--	10.44	13.75
RW-2	9/21/2004	24.19	9.95	0.18	10.13	14.20
RW-2	10/19/2004	24.19	9.04	0.08	9.12	15.13
RW-2	11/23/2004	24.19	7.82	0.50	8.32	16.25
RW-2	12/21/2004	24.19	--	--	6.95	17.24
RW-2	1/13/2005	24.19	--	--	8.39	15.80
RW-2	4/28/2005	24.19	--	--	8.20	15.99
RW-2	6/1/2005	24.19	--	--	9.62	14.57
RW-2	6/29/2005	24.19	--	--	10.41	13.78
RW-2	7/20/2005	24.19	--	--	10.90	13.29
RW-2	8/22/2005	24.19	10.94	0.04	10.98	13.24
RW-2	5/27/2011	24.19			Not Monitored	
RWx-2	9/12/2005	26.20	--	--	12.55	13.65
RWx-2	10/12/2005	26.20	13.81	0.61	14.42	12.24
RWx-2	11/21/2005	26.20	11.20	1.13	12.33	14.72
RWx-2	12/27/2005	26.20	--	--	9.50	16.70
RWx-2	1/30/2006	26.20	--	--	6.55	19.65
RWx-2	2/16/2006	26.20	--	--	9.00	17.20
RWx-2	3/13/2006	26.20	--	--	9.85	16.35
RWx-2	4/18/2006	26.20	--	--	10.16	16.04
RWx-2	5/12/2006	26.20	--	--	10.56	15.64
RWx-2	6/9/2006	26.20	--	--	10.13	16.07
RWx-2	7/13/2006	26.20	--	--	12.61	13.59
RWx-2	8/16/2006	26.20	12.28	0.62	12.90	13.77
RWx-2	9/19/2006	26.20	--	--	12.95	13.25
RWx-2	10/13/2006	26.20	12.66	0.97	13.63	13.30
RWx-2	11/20/2006	26.20	7.13	0.37	7.50	18.98
RWx-2	12/8/2006	26.20	7.83	0.34	8.17	18.29
RWx-2	1/19/2007	26.20	7.06	0.25	7.31	19.08
RWx-2	2/19/2007	26.20	9.95	0.30	10.25	16.18
RWx-2	3/15/2007	26.20	8.50	0.04	8.54	17.69
RWx-2	4/16/2007	26.20	--	--	9.57	16.63
RWx-2	5/14/2007	26.20	11.12	0.00	11.12	15.08
RWx-2	6/29/2007	26.20	--	--	12.04	14.16
RWx-2	7/20/2007	26.20	--	--	12.51	13.69
RWx-2	8/21/2007	26.20	--	--	13.80	12.40
RWx-2	9/10/2007	26.20	--	--	13.84	12.36
RWx-2	10/22/2007	26.20	--	--	12.33	13.87
RWx-2	11/28/2007	26.20	9.80	1.00	10.80	16.15
RWx-2	12/13/2007	26.20	--	--	10.56	15.64
RWx-2	1/21/2008	26.20	10.41	0.09	10.50	15.77
RWx-2	2/24/2008	26.20	--	--	11.17	15.03
RWx-2	3/24/2008	26.20	--	--	11.10	15.10
RWx-2	8/25/2008	26.20	12.48	0.02	12.50	13.72
RWx-2	2/18/2009	26.20	--	--	11.15	15.05
RWx-2	8/25/2009	26.20	--	--	13.81	12.39
RWx-2	3/22/2010	26.20	--	--	9.40	16.80
RWx-2	8/23/2010	26.20	--	--	10.60	15.60
RWx-2	2/7/2011	26.20	--	--	9.21	16.99

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RWx-2	5/27/2011	26.20			Not Monitored	
RW-3	11/20/2002	22.03	8.45	0.80	9.25	13.38
RW-3	11/21/2002	22.03	8.27	1.20	9.47	13.46
RW-3	11/22/2002	22.03	8.18	1.28	9.46	13.53
RW-3	11/24/2002	22.03	7.94	1.68	9.62	13.67
RW-3	1/2/2003	22.03	6.52	0.04	6.56	15.50
RW-3	1/3/2003	22.03	6.38	0.23	6.61	15.59
RW-3	1/6/2003	22.03	5.92	0.03	5.95	16.10
RW-3	1/7/2003	22.03	5.81	0.04	5.85	16.21
RW-3	1/8/2003	22.03	5.74	0.05	5.79	16.28
RW-3	1/9/2003	22.03	5.78	0.05	5.83	16.24
RW-3	1/10/2003	22.03	5.88	0.05	5.93	16.14
RW-3	1/13/2003	22.03	6.02	0.08	6.10	15.99
RW-3	1/14/2003	22.03	5.97	0.09	6.06	16.04
RW-3	1/15/2003	22.03	5.87	0.12	5.99	16.13
RW-3	1/16/2003	22.03	5.89	0.09	5.98	16.12
RW-3	1/17/2003	22.03	5.85	0.07	5.92	16.16
RW-3	1/20/2003	22.03	5.98	0.13	6.11	16.02
RW-3	1/22/2003	22.03	5.91	0.09	6.00	16.10
RW-3	1/23/2003	22.03	6.20	0.49	6.69	15.71
RW-3	1/24/2003	22.03	6.02	0.24	6.26	15.95
RW-3	1/27/2003	22.03	5.57	0.08	5.65	16.44
RW-3	1/28/2003	22.03	5.55	0.07	5.62	16.46
RW-3	1/29/2003	22.03	5.44	0.06	5.50	16.58
RW-3	1/30/2003	22.03	5.56	0.06	5.62	16.46
RW-3	2/3/2003	22.03	5.75	0.10	5.85	16.26
RW-3	2/6/2003	22.85	6.44	0.12	6.56	16.38
RW-3	2/11/2003	22.85	6.81	0.32	7.13	15.96
RW-3	2/18/2003	22.85	7.29	0.88	8.17	15.34
RW-3	2/21/2003	22.85	7.19	0.75	7.94	15.47
RW-3	2/26/2003	22.85	6.73	0.31	7.04	16.04
RW-3	3/4/2003	22.85	6.83	0.34	7.17	15.94
RW-3	3/12/2003	22.85	7.38	0.06	7.44	15.46
RW-3	3/14/2003	22.85	7.21	0.07	7.28	15.62
RW-3	3/26/2003	22.85	6.52	0.01	6.53	16.33
RW-3	3/28/2003	22.85	--	--	7.09	15.76
RW-3	4/2/2003	22.85	--	--	7.05	15.80
RW-3	4/4/2003	22.85	--	--	7.26	15.59
RW-3	4/8/2003	22.85	--	--	6.90	15.95
RW-3	4/11/2003	22.85	--	--	7.51	15.34
RW-3	4/15/2003	22.85	--	--	6.67	16.18
RW-3	4/17/2003	22.85	--	--	7.61	15.24
RW-3	4/22/2003	22.85	--	--	7.61	15.24
RW-3	4/25/2003	22.85	--	--	7.22	15.63
RW-3	5/2/2003	22.85	8.21	0.25	8.46	14.58
RW-3	5/6/2003	22.85	8.51	0.24	8.75	14.28
RW-3	5/9/2003	22.85	8.71	0.12	8.83	14.11
RW-3	5/23/2003	22.85	9.74	0.03	9.77	13.10
RW-3	5/28/2003	22.85	8.75	0.01	8.76	14.10
RW-3	6/13/2003	22.85	9.19	0.02	9.21	13.66
RW-3	6/18/2003	22.85	9.16	0.06	9.22	13.68
RW-3	6/27/2003	22.85	--	--	9.50	13.35
RW-3	7/7/2003	22.85	10.05	0.06	10.11	12.79
RW-3	7/16/2003	22.85	10.02	0.01	10.03	12.83
RW-3	7/31/2003	22.85	10.18	0.11	10.29	12.64
RW-3	8/5/2003	22.85	--	--	Dry	NM
RW-3	8/11/2003	22.85	11.00	0.30	11.30	11.78
RW-3	8/22/2003	22.85	10.98	0.29	11.27	11.80
RW-3	8/26/2003	22.85	--	--	11.14	11.71
RW-3	9/2/2003	22.85	--	--	10.28	12.57
RW-3	9/9/2003	22.85	--	--	10.29	12.56
RW-3	9/19/2003	22.85	--	--	10.29	12.56
RW-3	10/14/2003	22.85	--	--	10.30	12.55
RW-3	11/20/2003	22.85	7.16	1.29	8.45	15.37
RW-3	12/3/2003	22.85	6.72	0.05	6.77	16.12
RW-3	1/19/2004	22.85	--	--	6.26	16.59
RW-3	2/24/2004	22.85	--	--	6.72	16.13
RW-3	3/15/2004	22.85	--	--	7.78	15.07
RW-3	4/19/2004	22.85	--	--	8.71	14.14
RW-3	5/17/2004	22.85	9.73	0.01	9.74	13.12

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-3	6/22/2004	22.85	9.36	0.02	9.38	13.49
RW-3	8/18/2004	22.85	--	--	10.26	12.59
RW-3	9/21/2004	22.85	--	--	10.00	12.85
RW-3	10/19/2004	22.85	--	--	8.21	14.64
RW-3	11/23/2004	22.85	--	--	9.18	13.67
RW-3	12/21/2004	22.85	--	--	6.71	16.14
RW-3	1/13/2005	22.85	--	--	7.73	15.12
RW-3	4/28/2005	22.85	--	--	6.78	16.07
RW-3	6/1/2005	22.85	--	--	7.10	15.75
RW-3	6/29/2005	22.85	--	--	8.72	14.13
RW-3	7/20/2005	22.85	--	--	9.20	13.65
RW-3	8/22/2005	22.85	--	--	9.50	13.35
RW-3	9/12/2005	22.85	--	--	9.28	13.57
RW-3	10/12/2005	22.85	--	--	9.29	13.56
RW-3	11/21/2005	22.85	--	--	7.25	15.60
RW-3	12/27/2005	22.85	--	--	4.12	18.73
RW-3	1/30/2006	22.85	--	--	2.41	20.44
RW-3	2/16/2006	22.85	--	--	4.69	18.16
RW-3	3/13/2006	22.85	--	--	5.89	16.96
RW-3	4/18/2006	22.85	--	--	6.02	16.83
RW-3	5/12/2006	22.85	--	--	6.74	16.11
RW-3	6/9/2006	22.85	--	--	6.28	16.57
RW-3	7/13/2006	22.85	--	--	7.56	15.29
RW-3	8/16/2006	22.85	--	--	8.75	14.10
RW-3	9/19/2006	22.85	--	--	9.30	13.55
RW-3	10/13/2006	22.85	--	--	9.13	13.72
RW-3	11/20/2006	22.85	--	--	3.63	19.22
RW-3	12/8/2006	22.85	--	--	4.01	18.84
RW-3	1/19/2007	22.85	--	--	3.48	19.37
RW-3	2/19/2007	22.85	--	--	6.21	16.64
RW-3	3/15/2007	22.85	--	--	4.97	17.88
RW-3	4/16/2007	22.85	--	--	5.81	17.04
RW-3	5/14/2007	22.85	--	--	7.30	15.55
RW-3	6/29/2007	22.85	--	--	8.57	14.28
RW-3	7/20/2007	22.85	--	--	9.05	13.80
RW-3	8/21/2007	22.85	--	--	9.30	13.55
RW-3	9/10/2007	22.85	--	--	9.29	13.56
RW-3	10/22/2007	22.85	--	--	8.02	14.83
RW-3	11/28/2007	22.85	--	--	7.51	15.34
RW-3	12/13/2007	22.85	--	--	6.82	16.03
RW-3	1/21/2008	22.85	--	--	6.29	16.56
RW-3	2/24/2008	22.85	--	--	7.00	15.85
RW-3	3/24/2008	22.85	--	--	6.68	16.17
RW-3	8/25/2008	22.85	--	--	8.15	14.70
RW-3	2/18/2009	22.85	--	--	7.24	15.61
RW-3	8/25/2009	22.85	--	--	9.33	13.52
RW-3	3/22/2010	22.85	--	--	6.24	16.61
RW-3	8/23/2010	22.85	--	--	8.85	14.00
RW-3	2/7/2011	22.85	--	--	5.16	17.69
RW-3	5/27/2011	22.85	--	--	6.38	16.47
RW-3	8/8/2011	22.85	--	--	8.97	13.88
RW-3	11/14/2011	22.85	--	--	8.10	14.75
RW-3	2/20/2012	22.85	--	--	4.77	18.08
RW-3	8/22/2012	22.85	--	--	8.58	14.27
RW-3	11/5/2012	22.85	--	--	5.12	17.73
RW-3	1/28/2013	22.85	--	--	4.98	17.87
RW-4	11/20/2002	23.02	7.50	2.64	10.14	14.86
RW-4	11/21/2002	23.02	7.50	2.64	10.14	14.86
RW-4	11/22/2002	23.02	8.37	0.77	9.14	14.46
RW-4	11/24/2002	23.02	7.57	2.52	10.09	14.82
RW-4	1/3/2003	23.02	6.31	0.50	6.81	16.59
RW-4	1/6/2003	23.02	6.02	0.04	6.06	16.99
RW-4	1/7/2003	23.02	5.74	0.18	5.92	17.24
RW-4	1/8/2003	23.02	5.67	0.14	5.81	17.32
RW-4	1/9/2003	23.02	5.67	0.19	5.86	17.30
RW-4	1/10/2003	23.02	5.76	0.25	6.01	17.20
RW-4	1/13/2003	23.02	5.80	0.35	6.15	17.13
RW-4	1/14/2003	23.02	5.85	0.29	6.14	17.10
RW-4	1/15/2003	23.02	5.05	1.80	6.85	17.52
RW-4	1/16/2003	23.02	5.78	0.27	6.05	17.17

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-4	1/17/2003	23.02	5.72	0.27	5.99	17.23
RW-4	1/20/2003	23.02	5.84	0.30	6.14	17.11
RW-4	1/22/2003	23.02	5.82	0.34	6.16	17.12
RW-4	1/23/2003	23.02	6.12	0.58	6.70	16.76
RW-4	1/24/2003	23.02	5.97	0.38	6.35	16.96
RW-4	1/27/2003	23.02	5.51	0.13	5.64	17.48
RW-4	1/28/2003	23.02	5.50	0.10	5.60	17.50
RW-4	1/29/2003	23.02	5.36	0.07	5.43	17.64
RW-4	1/30/2003	23.02	5.45	0.13	5.58	17.54
RW-4	2/3/2003	23.02	5.66	0.21	5.87	17.31
RW-4	2/6/2003	23.78	6.35	0.28	6.63	17.36
RW-4	2/11/2003	23.78	6.75	0.39	7.14	16.93
RW-4	2/18/2003	23.78	7.22	1.07	8.29	16.29
RW-4	2/21/2003	23.78	7.10	0.97	8.07	16.44
RW-4	2/26/2003	23.78	6.74	0.84	7.58	16.83
RW-4	3/4/2003	23.78	7.08	0.14	7.22	16.67
RW-4	3/12/2003	23.78	7.34	0.41	7.75	16.34
RW-4	3/14/2003	23.78	7.20	0.64	7.84	16.42
RW-4	3/26/2003	23.78	6.61	0.40	7.01	17.07
RW-4	3/28/2003	23.78	7.15	0.47	7.62	16.51
RW-4	4/2/2003	23.78	7.21	0.24	7.45	16.51
RW-4	4/4/2003	23.78	7.52	0.15	7.67	16.22
RW-4	4/8/2003	23.78	--	--	7.26	16.52
RW-4	4/11/2003	23.78	7.72	0.03	7.75	16.05
RW-4	4/15/2003	23.78	7.14	0.06	7.20	16.63
RW-4	4/17/2003	23.78	7.82	0.08	7.90	15.94
RW-4	4/22/2003	23.78	7.87	0.08	7.95	15.89
RW-4	4/25/2003	23.78	7.91	0.11	8.02	15.84
RW-4	5/2/2003	23.78	8.32	0.13	8.45	15.43
RW-4	5/6/2003	23.78	8.50	0.31	8.81	15.20
RW-4	5/9/2003	23.78	8.72	0.36	9.08	14.97
RW-4	5/23/2003	23.78	8.92	1.11	10.03	14.58
RW-4	5/28/2003	23.78	8.80	0.02	8.82	14.98
RW-4	6/13/2003	23.78	8.90	1.72	10.62	14.45
RW-4	6/18/2003	23.78	8.85	1.96	10.81	14.44
RW-4	6/27/2003	23.78	9.40	1.42	10.82	14.03
RW-4	7/7/2003	23.78	9.54	1.27	10.81	13.92
RW-4	7/16/2003	23.78	9.41	1.40	10.81	14.02
RW-4	7/31/2003	23.78	9.95	0.85	10.80	13.62
RW-4	8/5/2003	23.78	9.82	0.98	10.80	13.72
RW-4	8/11/2003	23.78	10.84	0.94	11.78	12.71
RW-4	8/22/2003	23.78	10.87	0.92	11.79	12.68
RW-4	8/26/2003	23.78	10.36	0.44	10.80	13.31
RW-4	9/2/2003	23.78	10.22	0.58	10.80	13.42
RW-4	9/9/2003	23.78	--	--	10.80	12.98
RW-4	9/19/2003	23.78	--	--	10.81	12.97
RW-4	10/14/2003	23.78	--	--	10.80	12.98
RW-4	11/20/2003	23.78	7.96	1.54	9.50	15.44
RW-4	12/3/2003	23.78	6.75	1.03	7.78	16.77
RW-4	1/19/2004	23.78	6.18	0.06	6.24	17.59
RW-4	2/24/2004	23.78	6.97	0.06	7.03	16.80
RW-4	3/15/2004	23.78	--	--	8.10	15.68
RW-4	4/19/2004	23.78	--	--	8.71	15.07
RW-4	5/17/2004	23.78	--	--	9.73	14.05
RW-4	6/22/2004	23.78	--	--	9.57	14.21
RW-4	8/18/2004	23.78	10.35	0.42	10.77	13.33
RW-4	9/21/2004	23.78	9.53	0.19	9.72	14.20
RW-4	10/19/2004	23.78	8.63	0.39	9.02	15.05
RW-4	11/23/2004	23.78	8.94	0.05	8.99	14.83
RW-4	12/21/2004	23.78	6.68	0.08	6.76	17.08
RW-4	1/13/2005	23.78	--	--	7.74	16.04
RW-4	4/28/2005	23.78	--	--	6.77	17.01
RW-4	6/1/2005	23.78	--	--	7.02	16.76
RW-4	6/29/2005	23.78			Not Monitored	
RW-4	7/20/2005	23.78			Not Monitored	
RW-4	8/22/2005	23.78	--	--	9.50	14.28
RW-4	9/12/2005	23.78	--	--	10.31	13.47
RW-4	10/12/2005	23.78	10.69	0.13	10.82	13.06
RW-4	11/21/2005	23.78	--	--	8.40	15.38
RW-4	12/27/2005	23.78	--	--	5.14	18.64
RW-4	1/30/2006	23.78	--	--	3.40	20.38

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-4	2/16/2006	23.78	--	--	5.65	18.13
RW-4	3/13/2006	23.78	--	--	6.81	16.97
RW-4	4/18/2006	23.78	--	--	6.95	16.83
RW-4	5/12/2006	23.78	--	--	7.69	16.09
RW-4	6/9/2006	23.78	--	--	7.25	16.53
RW-4	7/13/2006	23.78	--	--	8.56	15.22
RW-4	8/16/2006	23.78	--	--	9.70	14.08
RW-4	9/19/2006	23.78	--	--	10.30	13.48
RW-4	10/13/2006	23.78	--	--	10.05	13.73
RW-4	11/20/2006	23.78	--	--	4.64	19.14
RW-4	12/8/2006	23.78	--	--	5.00	18.78
RW-4	1/19/2007	23.78	--	--	4.47	19.31
RW-4	2/19/2007	23.78	--	--	7.16	16.62
RW-4	3/15/2007	23.78	--	--	5.91	17.87
RW-4	4/16/2007	23.78	--	--	6.75	17.03
RW-4	5/14/2007	23.78	--	--	8.22	15.56
RW-4	6/29/2007	23.78	--	--	9.54	14.24
RW-4	7/20/2007	23.78	--	--	10.02	13.76
RW-4	8/21/2007	23.78	--	--	10.72	13.06
RW-4	9/10/2007	23.78	--	--	10.71	13.07
RW-4	10/22/2007	23.78	--	--	8.88	14.90
RW-4	11/28/2007	23.78			Not Monitored	
RW-4	12/13/2007	23.78	--	--	7.22	16.56
RW-4	1/21/2008	23.78	--	--	7.22	16.56
RW-4	2/24/2008	23.78	--	--	7.91	15.87
RW-4	3/24/2008	23.78	--	--	7.69	16.09
RW-4	8/25/2008	23.78	--	--	9.18	14.60
RW-4	2/18/2009	23.78	--	--	8.17	15.61
RW-4	8/25/2009	23.78	--	--	10.85	12.93
RW-4	3/22/2010	23.78	--	--	7.17	16.61
RW-4	8/23/2010	23.78	--	--	9.89	13.89
RW-4	2/7/2011	23.78	--	--	6.11	17.67
RW-4	5/27/2011	23.78			Not Monitored	
RW-4	8/8/2011	23.78	--	--	9.85	13.93
RW-4	11/14/2011	23.78	--	--	9.06	14.72
RW-4	2/20/2012	23.78	--	--	5.12	18.66
RW-4	8/22/2012	23.78	--	--	9.51	14.27
RW-4	11/5/2012	23.78	--	--	6.07	17.71
RW-4	1/28/2013	23.78	--	--	5.94	17.84
RW-5	11/20/2002	23.70	8.65	0.02	8.67	15.05
RW-5	11/21/2002	23.70	8.30	0.10	8.40	15.38
RW-5	11/22/2002	23.70	8.46	0.06	8.52	15.23
RW-5	11/24/2002	23.70	8.63	0.28	8.91	15.00
RW-5	1/2/2003	23.70	6.87	0.04	6.91	16.82
RW-5	1/3/2003	23.70	6.77	0.03	6.80	16.92
RW-5	1/6/2003	23.70	6.46	0.04	6.50	17.23
RW-5	1/7/2003	23.70	6.36	0.06	6.42	17.33
RW-5	1/8/2003	23.70	6.13	0.03	6.16	17.56
RW-5	1/9/2003	23.70	6.25	0.03	6.28	17.44
RW-5	1/10/2003	23.70	6.43	0.04	6.47	17.26
RW-5	1/13/2003	23.70	6.48	0.03	6.51	17.21
RW-5	1/14/2003	23.70	6.44	0.05	6.49	17.25
RW-5	1/15/2003	23.70	6.37	0.04	6.41	17.32
RW-5	1/16/2003	23.70	6.40	0.02	6.42	17.30
RW-5	1/17/2003	23.70	6.37	0.04	6.41	17.32
RW-5	1/20/2003	23.70	6.57	0.05	6.62	17.12
RW-5	1/22/2003	23.70	6.60	0.08	6.68	17.08
RW-5	1/23/2003	23.70	6.83	0.07	6.90	16.85
RW-5	1/24/2003	23.70	6.69	0.03	6.72	17.00
RW-5	1/27/2003	23.70	5.97	0.06	6.03	17.72
RW-5	1/28/2003	23.70	5.95	0.09	6.04	17.73
RW-5	1/29/2003	23.70	5.82	0.12	5.94	17.85
RW-5	1/30/2003	23.70	5.90	0.10	6.00	17.78
RW-5	2/3/2003	23.70	6.34	0.07	6.41	17.34
RW-5	2/6/2003	24.44	7.12	0.06	7.18	17.31
RW-5	2/11/2003	24.44	7.63	0.07	7.70	16.79
RW-5	2/18/2003	24.44	8.11	0.14	8.25	16.30
RW-5	2/21/2003	24.44	7.99	0.03	8.02	16.44
RW-5	2/26/2003	24.44	7.74	0.01	7.75	16.70
RW-5	3/4/2003	24.44	--	--	7.59	16.85

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-5	3/12/2003	24.44	8.04	0.01	8.05	16.40
RW-5	3/14/2003	24.44	7.84	0.01	7.85	16.60
RW-5	3/26/2003	24.44	--	--	7.19	17.25
RW-5	3/28/2003	24.44	--	--	7.71	16.73
RW-5	4/2/2003	24.44	--	--	7.85	16.59
RW-5	4/4/2003	24.44	--	--	8.16	16.28
RW-5	4/8/2003	24.44	7.71	0.00	7.72	16.73
RW-5	4/11/2003	24.44	--	--	7.78	16.66
RW-5	4/15/2003	24.44	7.44	0.01	7.45	17.00
RW-5	4/17/2003	24.44	--	--	7.91	16.53
RW-5	4/22/2003	24.44	--	--	7.75	16.69
RW-5	4/25/2003	24.44	--	--	7.84	16.60
RW-5	5/2/2003	24.44	--	--	8.78	15.66
RW-5	5/6/2003	24.44	9.05	0.01	9.06	15.39
RW-5	5/9/2003	24.44	9.06	0.05	9.11	15.37
RW-5	5/23/2003	24.44	9.08	0.01	9.09	15.36
RW-5	5/28/2003	24.44	9.27	0.01	9.28	15.17
RW-5	6/13/2003	24.44	9.85	0.06	9.91	14.58
RW-5	6/18/2003	24.44	9.81	0.08	9.89	14.61
RW-5	6/27/2003	24.44	9.26	0.22	9.48	15.13
RW-5	7/7/2003	24.44	10.51	0.19	10.70	13.88
RW-5	7/16/2003	24.44	10.29	0.16	10.45	14.11
RW-5	7/31/2003	24.44	--	--	10.68	13.76
RW-5	8/5/2003	24.44	--	--	10.68	13.76
RW-5	8/11/2003	24.44	--	--	11.68	12.76
RW-5	8/22/2003	24.44	11.57	0.08	11.65	12.85
RW-5	8/26/2003	24.44	--	--	10.68	13.76
RW-5	9/2/2003	24.44	--	--	10.67	13.77
RW-5	9/9/2003	24.44	--	--	10.68	13.76
RW-5	9/19/2003	24.44	--	--	10.68	13.76
RW-5	10/14/2003	24.44	--	--	10.65	13.79
RW-5	11/20/2003	24.44	--	--	8.20	16.24
RW-5	12/3/2003	24.44	--	--	7.15	17.29
RW-5	1/19/2004	24.44	--	--	6.71	17.73
RW-5	2/24/2004	24.44	--	--	7.68	16.76
RW-5	3/15/2004	24.44	--	--	8.58	15.86
RW-5	4/19/2004	24.44	--	--	9.47	14.97
RW-5	5/17/2004	24.44	--	--	10.28	14.16
RW-5	6/22/2004	24.44	--	--	9.76	14.68
RW-5	8/18/2004	24.44	10.69	0.01	10.70	13.75
RW-5	9/21/2004	24.44	--	--	9.35	15.09
RW-5	10/19/2004	24.44	--	--	8.55	15.89
RW-5	11/23/2004	24.44	--	--	8.94	15.50
RW-5	12/21/2004	24.44	--	--	7.48	16.96
RW-5	1/13/2005	24.44	--	--	8.38	16.06
RW-5	4/28/2005	24.44	--	--	7.78	16.66
RW-5	6/1/2005	24.44	--	--	8.08	16.36
RW-5	6/29/2005	24.44	--	--	9.28	15.16
RW-5	7/20/2005	24.44			Not Monitored	
RW-5	8/22/2005	24.44	--	--	10.45	13.99
RW-5	5/27/2011	24.44			Not Monitored	
RWx-5	9/12/2005	24.97	--	--	13.43	11.54
RWx-5	10/12/2005	24.97	--	--	13.32	11.65
RWx-5	11/21/2005	24.97	10.88	0.03	10.91	14.08
RWx-5	12/27/2005	24.97	8.39	0.21	8.60	16.53
RWx-5	1/30/2006	24.97	7.85	0.01	7.86	17.12
RWx-5	2/16/2006	24.97	7.77	0.21	7.98	17.15
RWx-5	3/13/2006	24.97	7.74	0.07	7.81	17.21
RWx-5	4/18/2006	24.97	8.95	0.23	9.18	15.96
RWx-5	5/12/2006	24.97	9.33	0.13	9.46	15.61
RWx-5	6/9/2006	24.97	8.87	0.03	8.90	16.09
RWx-5	7/13/2006	24.97	10.05	0.25	10.30	14.86
RWx-5	8/16/2006	24.97	11.10	0.27	11.37	13.80
RWx-5	9/19/2006	24.97	--	--	11.67	13.30
RWx-5	10/13/2006	24.97	11.45	0.15	11.60	13.48
RWx-5	11/20/2006	24.97	--	--	6.86	18.11
RWx-5	12/8/2006	24.97	--	--	7.25	17.72
RWx-5	1/19/2007	24.97	--	--	6.60	18.37
RWx-5	2/19/2007	24.97	--	--	8.90	16.07
RWx-5	3/15/2007	24.97	--	--	7.77	17.20

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RWx-5	4/16/2007	24.97	--	--	8.35	16.62
RWx-5	5/14/2007	24.97	--	--	9.77	15.20
RWx-5	6/29/2007	24.97	--	--	10.92	14.05
RWx-5	7/20/2007	24.97	--	--	11.37	13.60
RWx-5	8/21/2007	24.97	--	--	12.05	12.92
RWx-5	9/10/2007	24.97	12.10	--	12.11	12.86
RWx-5	10/22/2007	24.97	--	--	10.52	14.45
RWx-5	11/28/2007	24.97	--	--	9.95	15.02
RWx-5	12/13/2007	24.97	--	--	8.71	16.26
RWx-5	1/21/2008	24.97	--	--	8.75	16.22
RWx-5	2/24/2008	24.97	--	--	12.21	12.76
RWx-5	3/24/2008	24.97	--	--	9.36	15.61
RWx-5	8/25/2008	24.97	--	--	11.17	13.80
RWx-5	2/18/2009	24.97	--	--	9.92	15.05
RWx-5	8/25/2009	24.97	--	--	12.58	12.39
RWx-5	3/22/2010	24.97	--	--	9.02	15.95
RWx-5	8/23/2010	24.97	--	--	11.57	13.40
RWx-5	2/7/2011	24.97	--	--	8.15	16.82
RWx-5	5/27/2011	24.97	--	--	9.16	15.81
RWx-5	8/8/2011	24.97	--	--	11.63	13.34
RWx-5	11/14/2011	24.97	--	--	10.56	14.41
RWx-5	2/20/2012	24.97	--	--	8.21	16.76
RWx-5	8/22/2012	24.97	--	--	11.25	13.72
RWx-5	11/5/2012	24.97	--	--	8.52	16.45
RWx-5	1/28/2013	24.97	--	--	8.07	16.90
RW-6	11/20/2002	23.43	8.05	2.05	10.10	14.87
RW-6	11/21/2002	23.43	8.40	0.15	8.55	14.99
RW-6	11/22/2002	23.43	8.45	0.24	8.69	14.92
RW-6	11/24/2002	23.43	8.65	0.33	8.98	14.70
RW-6	1/2/2003	23.43	6.70	0.87	7.57	16.51
RW-6	1/7/2003	23.43	6.50	0.26	6.76	16.87
RW-6	1/8/2003	23.43	6.09	0.51	6.60	17.21
RW-6	1/9/2003	23.43	6.28	0.38	6.66	17.06
RW-6	1/10/2003	23.43	6.42	0.23	6.65	16.95
RW-6	1/13/2003	23.43	8.16	0.07	8.23	15.25
RW-6	1/14/2003	23.43	6.73	0.20	6.93	16.65
RW-6	1/15/2003	23.43	6.30	0.60	6.90	16.98
RW-6	1/16/2003	23.43	6.28	0.65	6.93	16.99
RW-6	1/17/2003	23.43	6.29	0.00	6.29	17.14
RW-6	1/20/2003	23.43	6.31	0.63	6.94	16.96
RW-6	1/22/2003	23.43	6.41	0.75	7.16	16.83
RW-6	1/23/2003	23.43	6.60	0.80	7.40	16.63
RW-6	1/24/2003	23.43	6.45	0.76	7.21	16.79
RW-6	1/27/2003	23.43	5.82	0.62	6.44	17.46
RW-6	1/28/2003	23.43	5.90	0.39	6.29	17.43
RW-6	1/29/2003	23.43	5.81	0.35	6.16	17.53
RW-6	1/30/2003	23.43	5.92	0.28	6.20	17.44
RW-6	2/3/2003	23.43	6.25	0.19	6.44	17.13
RW-6	2/6/2003	24.18	6.96	0.18	7.14	17.18
RW-6	2/11/2003	24.18	7.44	0.31	7.75	16.66
RW-6	2/18/2003	24.18	7.90	0.51	8.41	16.15
RW-6	2/21/2003	24.18	7.86	0.47	8.33	16.20
RW-6	2/26/2003	24.18	7.76	0.01	7.77	16.42
RW-6	3/4/2003	24.18	--	--	7.46	16.72
RW-6	3/12/2003	24.18	8.01	0.01	8.02	16.17
RW-6	3/14/2003	24.18	--	--	7.81	16.37
RW-6	3/26/2003	24.18	--	--	7.02	17.16
RW-6	3/28/2003	24.18	--	--	7.62	16.56
RW-6	4/2/2003	24.18	--	--	7.74	16.44
RW-6	4/4/2003	24.18	--	--	8.07	16.11
RW-6	4/8/2003	24.18	--	--	7.69	16.49
RW-6	4/11/2003	24.18	7.61	0.01	7.62	16.57
RW-6	4/15/2003	24.18	--	--	7.29	16.89
RW-6	4/17/2003	24.18	7.78	0.01	7.79	16.40
RW-6	4/22/2003	24.18	--	--	7.81	16.37
RW-6	4/25/2003	24.18	--	--	7.75	16.43
RW-6	5/2/2003	24.18	--	--	8.66	15.52
RW-6	5/6/2003	24.18	8.84	0.28	9.12	15.27
RW-6	5/9/2003	24.18	8.82	0.43	9.25	15.25
RW-6	5/23/2003	24.18	8.85	0.86	9.71	15.12

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-6	5/28/2003	24.18	8.93	1.08	10.01	14.98
RW-6	6/13/2003	24.18	9.28	0.81	10.09	14.70
RW-6	6/18/2003	24.18	9.22	1.53	10.75	14.58
RW-6	6/27/2003	24.18	9.60	1.22	10.82	14.28
RW-6	7/7/2003	24.18	9.90	0.91	10.81	14.05
RW-6	7/16/2003	24.18	9.68	1.08	10.76	14.23
RW-6	7/31/2003	24.18	10.34	0.42	10.76	13.74
RW-6	8/5/2003	24.18	10.30	0.45	10.75	13.77
RW-6	8/11/2003	24.18	11.35	0.39	11.74	12.73
RW-6	8/22/2003	24.18	11.10	0.64	11.74	12.92
RW-6	8/26/2003	24.18	10.71	0.05	10.76	13.46
RW-6	9/2/2003	24.18	10.61	0.14	10.75	13.54
RW-6	9/9/2003	24.18	--	--	10.76	13.42
RW-6	9/19/2003	24.18	--	--	10.76	13.42
RW-6	10/14/2003	24.18	--	--	10.75	13.43
RW-6	11/20/2003	24.18	--	--	8.50	15.68
RW-6	12/3/2003	24.18	--	--	7.08	17.10
RW-6	1/19/2004	24.18	--	--	6.62	17.56
RW-6	2/24/2004	24.18	--	--	7.58	16.60
RW-6	3/15/2004	24.18	--	--	8.57	15.61
RW-6	4/19/2004	24.18	--	--	9.36	14.82
RW-6	5/17/2004	24.18	--	--	10.15	14.03
RW-6	6/22/2004	24.18	--	--	9.91	14.27
RW-6	8/18/2004	24.18	10.72	0.01	10.73	13.46
RW-6	9/21/2004	24.18	--	--	9.73	14.45
RW-6	10/19/2004	24.18	--	--	8.83	15.35
RW-6	11/23/2004	24.18	--	--	8.86	15.32
RW-6	12/21/2004	24.18	--	--	7.33	16.85
RW-6	1/13/2005	24.18	--	--	8.22	15.96
RW-6	4/28/2005	24.18	--	--	7.65	16.53
RW-6	6/1/2005	24.18	--	--	7.95	16.23
RW-6	6/29/2005	24.18	--	--	9.21	14.97
RW-6	7/20/2005	24.18	--	--	9.81	14.37
RW-6	8/22/2005	24.18	--	--	10.20	13.98
RW-6	9/12/2005	24.18	--	--	10.77	13.41
RW-6	10/12/2005	24.18	--	--	10.77	13.41
RW-6	11/21/2005	24.18	--	--	9.96	14.22
RW-6	12/27/2005	24.18	--	--	7.45	16.73
RW-6	1/30/2006	24.18	--	--	4.72	19.46
RW-6	2/16/2006	24.18	--	--	6.86	17.32
RW-6	3/13/2006	24.18	--	--	7.82	16.36
RW-6	4/18/2006	24.18	--	--	8.04	16.14
RW-6	5/12/2006	24.18	--	--	8.52	15.66
RW-6	6/9/2006	24.18	--	--	8.10	16.08
RW-6	7/13/2006	24.18	--	--	9.26	14.92
RW-6	8/16/2006	24.18	--	--	10.25	13.93
RW-6	9/19/2006	24.18	--	--	10.77	13.41
RW-6	10/13/2006	24.18	--	--	10.56	13.62
RW-6	11/20/2006	24.18	--	--	6.05	18.13
RW-6	12/8/2006	24.18	--	--	6.39	17.79
RW-6	1/19/2007	24.18	--	--	5.68	18.50
RW-6	2/19/2007	24.18	--	--	7.95	16.23
RW-6	3/15/2007	24.18	--	--	6.96	17.22
RW-6	4/16/2007	24.18	--	--	7.61	16.57
RW-6	5/14/2007	24.18	--	--	8.90	15.28
RW-6	6/29/2007	24.18	--	--	10.10	14.08
RW-6	7/20/2007	24.18	--	--	10.53	13.65
RW-6	8/21/2007	24.18	--	--	10.75	13.43
RW-6	9/10/2007	24.18	--	--	10.76	13.42
RW-6	10/22/2007	24.18	--	--	9.22	14.96
RW-6	11/28/2007	24.18	--	--	8.94	15.24
RW-6	12/13/2007	24.18	--	--	7.47	16.71
RW-6	1/21/2008	24.18	--	--	7.79	16.39
RW-6	2/24/2008	24.18	--	--	10.61	13.57
RW-6	3/24/2008	24.18	--	--	8.45	15.73
RW-6	8/25/2008	24.18	--	--	9.80	14.38
RW-6	2/18/2009	24.18	--	--	8.85	15.33
RW-6	8/25/2009	24.18	--	--	10.80	13.38
RW-6	3/22/2010	24.18	--	--	8.19	15.99
RW-6	8/23/2010	24.18	--	--	10.20	13.98
RW-6	2/7/2011	24.18	--	--	7.25	16.93

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-6	5/27/2011	24.18		Not Monitored		
RW-6	8/8/2011	24.18	--	--	10.31	13.87
RW-6	11/14/2011	24.18	--	--	9.56	14.62
RW-6	2/20/2012	24.18	--	--	7.19	16.99
RW-6	8/22/2012	24.18	--	--	10.07	14.11
RW-6	11/5/2012	24.18	--	--	7.63	16.55
RW-6	1/28/2013	24.18	--	--	7.16	17.02
RW-7	11/20/2002	23.01	7.65	2.46	10.11	14.75
RW-7	11/21/2002	23.01	7.60	2.51	10.11	14.78
RW-7	11/22/2002	23.01	8.03	1.75	9.78	14.54
RW-7	11/24/2002	23.01	8.23	1.26	9.49	14.47
RW-7	1/2/2003	23.01	6.44	0.40	6.84	16.47
RW-7	1/3/2003	23.01	6.28	0.40	6.68	16.63
RW-7	1/6/2003	23.01	5.93	0.12	6.05	17.05
RW-7	1/7/2003	23.01	5.84	0.20	6.04	17.12
RW-7	1/8/2003	23.01	5.66	0.20	5.86	17.30
RW-7	1/9/2003	23.01	5.72	0.33	6.05	17.21
RW-7	1/10/2003	23.01	5.90	0.25	6.15	17.05
RW-7	1/13/2003	23.01	5.98	0.37	6.35	16.94
RW-7	1/14/2003	23.01	5.97	0.27	6.24	16.97
RW-7	1/15/2003	23.01	5.95	0.30	6.25	16.99
RW-7	1/16/2003	23.01	5.84	0.41	6.25	17.07
RW-7	1/17/2003	23.01	5.85	0.35	6.20	17.07
RW-7	1/20/2003	23.01	6.02	0.53	6.55	16.86
RW-7	1/22/2003	23.01	6.11	0.80	6.91	16.70
RW-7	1/23/2003	23.01	6.25	1.05	7.30	16.50
RW-7	1/24/2003	23.01	6.16	1.03	7.19	16.59
RW-7	1/27/2003	23.01	5.60	0.58	6.18	17.27
RW-7	1/28/2003	23.01	5.65	0.63	6.28	17.20
RW-7	1/29/2003	23.01	5.55	0.65	6.20	17.30
RW-7	1/30/2003	23.01	5.65	0.67	6.32	17.19
RW-7	2/3/2003	23.01	5.91	0.76	6.67	16.91
RW-7	2/6/2003	23.78	6.55	0.79	7.34	17.03
RW-7	2/11/2003	23.78	6.99	1.08	8.07	16.52
RW-7	2/21/2003	23.78	7.42	0.99	8.41	16.11
RW-7	2/26/2003	23.78	7.24	0.04	7.28	16.53
RW-7	3/4/2003	23.78	--	--	6.96	16.82
RW-7	3/12/2003	23.01	Trace	--	7.71	15.30
RW-7	3/14/2003	23.01	--	--	7.51	15.50
RW-7	3/26/2003	23.01	--	--	6.68	16.33
RW-7	3/28/2003	23.01	--	--	7.25	15.76
RW-7	4/2/2003	23.01	--	--	7.42	15.59
RW-7	4/4/2003	23.01	--	--	7.64	15.37
RW-7	4/8/2003	23.01	--	--	7.22	15.79
RW-7	4/11/2003	23.01	--	--	7.16	15.85
RW-7	4/15/2003	23.01	--	--	6.81	16.20
RW-7	4/17/2003	23.01	--	--	7.38	15.63
RW-7	4/22/2003	23.01	--	--	7.34	15.67
RW-7	4/25/2003	23.01	--	--	7.21	15.80
RW-7	5/2/2003	23.01	8.30	0.03	8.33	14.70
RW-7	5/6/2003	23.01	8.52	0.08	8.60	14.47
RW-7	5/9/2003	23.01	8.54	0.03	8.57	14.46
RW-7	5/23/2003	23.01	8.55	1.03	9.58	14.20
RW-7	5/28/2003	23.01	8.57	1.55	10.12	14.05
RW-7	6/13/2003	23.01	8.92	1.64	10.56	13.68
RW-7	6/18/2003	23.01	8.88	1.87	10.75	13.66
RW-7	6/27/2003	23.01	9.26	1.55	10.81	13.36
RW-7	7/7/2003	23.01	9.54	1.21	10.75	13.17
RW-7	7/16/2003	23.01	9.42	1.30	10.72	13.27
RW-7	7/31/2003	23.01	9.98	0.76	10.74	12.84
RW-7	8/5/2003	23.01	10.88	0.74	11.62	11.95
RW-7	8/11/2003	23.01	11.00	0.69	11.69	11.84
RW-7	8/22/2003	23.01	10.70	1.01	11.71	12.06
RW-7	8/26/2003	23.01	11.28	0.37	11.65	11.64
RW-7	9/2/2003	23.01	10.36	0.36	10.72	12.56
RW-7	9/9/2003	23.01	10.75	0.01	10.76	12.26
RW-7	9/19/2003	23.01	--	--	10.76	12.25
RW-7	10/14/2003	23.01	--	--	10.77	12.24
RW-7	11/20/2003	23.01	--	--	8.24	14.77
RW-7	12/3/2003	23.01	--	--	6.79	16.22

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
RW-7	1/19/2004	23.01	--	--	6.31	16.70
RW-7	2/24/2004	23.01	--	--	7.11	15.90
RW-7	3/15/2004	23.01	--	--	8.20	14.81
RW-7	4/19/2004	23.01	--	--	8.85	14.16
RW-7	5/17/2004	23.01	--	--	9.79	13.22
RW-7	6/22/2004	23.01	--	--	9.57	13.44
RW-7	8/18/2004	23.01	10.71	0.01	10.72	12.30
RW-7	9/21/2004	23.01	--	--	10.45	12.56
RW-7	10/19/2004	23.01	--	--	8.73	14.28
RW-7	11/23/2004	23.01	--	--	9.60	13.41
RW-7	12/21/2004	23.01	--	--	7.06	15.95
RW-7	1/13/2005	23.01	--	--	7.93	15.08
RW-7	4/28/2005	23.01	--	--	7.37	15.64
RW-7	6/1/2005	23.01	--	--	7.67	15.34
RW-7	6/29/2005	23.01	--	--	9.05	13.96
RW-7	7/20/2005	23.01	--	--	9.61	13.40
RW-7	8/22/2005	23.01	--	--	9.88	13.13
RW-7	5/27/2011	23.01			Not Monitored	
RWx-7	9/12/2005	24.71	--	--	11.99	12.72
RWx-7	10/12/2005	24.71	12.54	0.23	12.77	12.11
RWx-7	11/21/2005	24.71	9.83	0.13	9.96	14.85
RWx-7	12/27/2005	24.71	8.15	0.02	8.17	16.56
RWx-7	1/30/2006	24.71	5.31	0.01	5.32	19.40
RWx-7	2/16/2006	24.71	7.41	0.02	7.43	17.30
RWx-7	3/13/2006	24.71	--	--	8.46	16.25
RWx-7	4/18/2006	24.71	--	--	8.71	16.00
RWx-7	5/12/2006	24.71	--	--	9.18	15.53
RWx-7	6/9/2006	24.71	--	--	8.76	15.95
RWx-7	7/13/2006	24.71	--	--	10.10	14.61
RWx-7	8/16/2006	24.71	11.03	0.08	11.11	13.66
RWx-7	9/19/2006	24.71	--	--	11.60	13.11
RWx-7	10/13/2006	24.71	--	--	11.31	13.40
RWx-7	11/20/2006	24.71	--	--	6.61	18.10
RWx-7	12/8/2006	24.71	--	--	6.91	17.80
RWx-7	1/19/2007	24.71	--	--	6.22	18.49
RWx-7	2/19/2007	24.71	--	--	8.55	16.16
RWx-7	3/15/2007	24.71	--	--	7.52	17.19
RWx-7	4/16/2007	24.71	--	--	8.22	16.49
RWx-7	5/14/2007	24.71	--	--	9.52	15.19
RWx-7	6/29/2007	24.71	--	--	10.74	13.97
RWx-7	7/20/2007	24.71	--	--	11.16	13.55
RWx-7	8/21/2007	24.71	--	--	11.82	12.89
RWx-7	9/10/2007	24.71	--	--	11.90	12.81
RWx-7	10/22/2007	24.71	--	--	10.01	14.70
RWx-7	11/28/2007	24.71	--	--	9.54	15.17
RWx-7	12/13/2007	24.71	--	--	8.32	16.39
RWx-7	1/21/2008	24.71	--	--	8.34	16.37
RWx-7	2/24/2008	24.71	--	--	8.76	15.95
RWx-7	3/24/2008	24.71	--	--	9.06	15.65
RWx-7	8/25/2008	24.71	--	--	11.00	13.71
RWx-7	2/18/2009	24.71	--	--	9.39	15.32
RWx-7	8/25/2009	24.71	--	--	12.22	12.49
RWx-7	3/22/2010	24.71	--	--	8.80	15.91
RWx-7	8/23/2010	24.71	--	--	11.25	13.46
RWx-7	2/7/2011	24.71	--	--	7.85	16.86
RWx-7	5/27/2011	24.71	--	--	8.98	15.73
RWx-7	8/8/2011	24.71	--	--	11.15	13.56
RWx-7	11/14/2011	24.71	--	--	10.54	14.17
RWx-7	2/20/2012	24.71	--	--	7.79	16.92
RWx-7	8/22/2012	24.71	--	--	10.97	13.74
RWx-7	11/5/2012	24.71	--	--	8.69	16.02
RWx-7	1/28/2013	24.71	--	--	7.72	16.99
HW-1East	11/20/2003	20.35	--	--	4.61	15.74
HW-1East	12/3/2003	20.35	--	--	4.00	16.35
HW-1East	1/19/2004	20.35	3.56	0.005	3.57	16.79
HW-1East	2/24/2004	20.35	--	--	5.46	14.89
HW-1East	3/15/2004	20.35	--	--	5.84	14.51
HW-1East	4/19/2004	20.35	--	--	6.42	13.93
HW-1East	5/17/2004	20.35			Not Monitored	

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HW-1East	6/22/2004	20.35			Not Monitored	
HW-1East	8/18/2004	20.35			Dry	
HW-1East	9/21/2004	20.35	--	--	6.92	13.43
HW-1East	10/19/2004	20.35	--	--	6.02	14.33
HW-1East	11/23/2004	20.35	--	--	6.46	13.89
HW-1East	12/21/2004	20.35	--	--	4.45	15.90
HW-1East	1/13/2005	20.35	--	--	5.25	15.10
HW-1East	4/28/2005	20.35	--	--	4.82	15.53
HW-1East	6/1/2005	20.35	--	--	5.09	15.26
HW-1East	6/29/2005	20.35	--	--	6.83	13.52
HW-1East	7/20/2005	20.35	--	--	6.88	13.47
HW-1East	8/22/2005	20.35	--	--	7.03	13.32
HW-1East	12/21/2004	20.35	--	--	7.03	13.32
HW-1East	5/27/2011	20.35			Not Monitored	
HWx-1East	9/12/2005	20.44	--	--	10.27	10.17
HWx-1East	10/12/2005	20.44	--	--	9.57	10.87
HWx-1East	11/21/2005	20.44	--	--	5.71	14.73
HWx-1East	12/27/2005	20.44	--	--	4.51	15.93
HWx-1East	1/30/2006	20.44	--	--	2.23	18.21
HWx-1East	2/16/2006	20.44	--	--	4.10	16.34
HWx-1East	3/13/2006	20.44	--	--	4.94	15.50
HWx-1East	4/18/2006	20.44	--	--	4.95	15.49
HWx-1East	5/12/2006	20.44	--	--	5.23	15.21
HWx-1East	6/9/2006	20.44	--	--	4.96	15.48
HWx-1East	7/13/2006	20.44	--	--	5.45	14.99
HWx-1East	8/16/2006	20.44	--	--	6.75	13.69
HWx-1East	9/19/2006	20.44	--	--	9.20	11.24
HWx-1East	10/13/2006	20.44	8.65	2.85	11.50	11.08
HWx-1East	11/20/2006	20.44	--	--	3.25	17.19
HWx-1East	12/8/2006	20.44	--	--	3.40	17.04
HWx-1East	1/19/2007	20.44	--	--	3.07	17.37
HWx-1East	2/19/2007	20.44	--	--	4.74	15.70
HWx-1East	3/15/2007	20.44	--	--	3.91	16.53
HWx-1East	4/16/2007	20.44	--	--	4.42	16.02
HWx-1East	5/14/2007	20.44	--	--	5.45	14.99
HWx-1East	6/29/2007	20.44	--	--	6.58	13.86
HWx-1East	7/20/2007	20.44	--	--	8.38	12.06
HWx-1East	8/21/2007	20.44	--	--	8.79	11.65
HWx-1East	9/10/2007	20.44	--	--	8.95	11.49
HWx-1East	10/22/2007	20.44	--	--	6.45	13.99
HWx-1East	11/28/2007	20.44	--	--	5.72	14.72
HWx-1East	12/13/2007	20.44	--	--	4.68	15.76
HWx-1East	1/21/2008	20.44	--	--	4.88	15.56
HWx-1East	2/24/2008	20.44	--	--	5.17	15.27
HWx-1East	3/24/2008	20.44	--	--	5.54	14.90
HWx-1East	8/25/2008	20.44	--	--	8.95	11.49
HWx-1East	2/18/2009	20.44	--	--	5.15	15.29
HWx-1East	8/25/2009	20.44	--	--	10.05	10.39
HWx-1East	3/22/2010	20.44	--	--	10.45	9.99
HWx-1East	8/23/2010	20.44	--	--	10.20	10.24
HWx-1East	2/7/2011	20.44	--	--	4.60	15.84
HWx-1East	5/27/2011	20.44			Not Monitored	
HW-1West	11/20/2003	18.86	--	--	4.32	14.54
HW-1West	12/3/2003	18.86	--	--	3.56	15.30
HW-1West	1/19/2004	18.86	--	--	3.28	15.58
HW-1West	2/24/2004	18.86	--	--	4.96	13.90
HW-1West	3/15/2004	18.86	--	--	6.35	12.51
HW-1West	4/19/2004	18.86	--	--	5.90	12.96
HW-1West	5/17/2004	18.86			Not Monitored	
HW-1West	6/22/2004	18.86			Not Monitored	
HW-1West	8/18/2004	18.86	7.31	0.01	7.32	11.55
HW-1West	9/21/2004	18.86	--	--	6.43	12.43
HW-1West	10/19/2004	18.86	--	--	5.56	13.30
HW-1West	11/23/2004	18.86	--	--	5.82	13.04
HW-1West	12/21/2004	18.86	--	--	3.95	14.91
HW-1West	1/13/2005	18.86	--	--	4.66	14.20
HW-1West	4/28/2005	18.86	--	--	4.30	14.56
HW-1West	6/1/2005	18.86	--	--	5.60	13.26
HW-1West	6/29/2005	18.86	--	--	6.34	12.52

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
HW-1West	7/20/2005	18.86	--	--	6.40	12.46
HW-1West	8/22/2005	18.86	--	--	6.55	12.31
HW-1West	5/27/2011	18.86			Not Monitored	
HWx-1West	9/12/2005	19.96	--	--	10.16	9.80
HWx-1West	10/12/2005	19.96	9.22	0.01	9.23	10.74
HWx-1West	11/21/2005	19.96	5.42	0.01	5.43	14.54
HWx-1West	12/27/2005	19.96	--	--	4.01	15.95
HWx-1West	1/30/2006	19.96	--	--	1.72	18.24
HWx-1West	2/16/2006	19.96	3.79	0.01	3.80	16.17
HWx-1West	3/13/2006	19.96	--	--	4.52	15.44
HWx-1West	4/18/2006	19.96	--	--	4.48	15.48
HWx-1West	5/12/2006	19.96	--	--	4.80	15.16
HWx-1West	6/9/2006	19.96	--	--	4.52	15.44
HWx-1West	7/13/2006	19.96	--	--	9.89	10.07
HWx-1West	8/16/2006	19.96	--	--	6.20	13.76
HWx-1West	9/19/2006	19.96	--	--	6.87	13.09
HWx-1West	10/13/2006	19.96	--	--	6.57	13.39
HWx-1West	11/20/2006	19.96	--	--	2.76	17.20
HWx-1West	12/8/2006	19.96	--	--	2.91	17.05
HWx-1West	1/19/2007	19.96	--	--	2.60	17.36
HWx-1West	2/19/2007	19.96	--	--	4.26	15.70
HWx-1West	3/15/2007	19.96	--	--	3.42	16.54
HWx-1West	4/16/2007	19.96	--	--	3.95	16.01
HWx-1West	5/14/2007	19.96	--	--	4.95	15.01
HWx-1West	6/29/2007	19.96	--	--	9.06	10.90
HWx-1West	7/20/2007	19.96	--	--	6.43	13.53
HWx-1West	8/21/2007	19.96	--	--	8.05	11.91
HWx-1West	9/10/2007	19.96	--	--	8.11	11.85
HWx-1West	10/22/2007	19.96	--	--	5.98	13.98
HWx-1West	11/28/2007	19.96	--	--	5.23	14.73
HWx-1West	12/13/2007	19.96	--	--	4.18	15.78
HWx-1West	1/21/2008	19.96	--	--	4.38	15.58
HWx-1West	2/24/2008	19.96	--	--	4.72	15.24
HWx-1West	3/24/2008	19.96	--	--	5.06	14.90
HWx-1West	8/25/2008	19.96	--	--	6.90	13.06
HWx-1West	2/18/2009	19.96	--	--	5.02	14.94
HWx-1West	8/25/2009	19.96	--	--	7.21	12.75
HWx-1West	3/22/2010	19.96	--	--	9.60	10.36
HWx-1West	8/23/2010	19.96	--	--	9.24	10.72
HWx-1West	2/7/2011	19.96	--	--	4.13	15.83
HWx-1West	5/27/2011	19.96			Not Monitored	
MW-1	11/14/2011	20.51	--	--	8.45	12.06
MW-1	2/20/2012	20.51	--	--	6.96	13.55
MW-1	8/22/2012	20.51	--	--	9.60	10.91
MW-1	11/5/2012	20.51	--	--	7.91	12.60
MW-1	1/28/2013	20.51	--	--	7.41	13.10
MW-2	11/14/2011	20.29	--	--	8.71	11.58
MW-2	2/20/2012	20.29	--	--	7.35	12.94
MW-2	8/22/2012	20.29	--	--	9.39	10.90
MW-2	11/5/2012	20.29	--	--	7.71	12.58
MW-2	1/28/2013	20.29	--	--	7.61	12.68
MW-3	11/14/2011	21.21	--	--	8.91	12.30
MW-3	2/20/2012	21.21	--	--	6.09	15.12
MW-3	8/22/2012	21.21	--	--	10.30	10.91
MW-3	11/5/2012	21.21	--	--	7.30	13.91
MW-3	1/28/2013	21.21	--	--	6.10	15.11
MW-4	11/14/2011	20.44	--	--	8.31	12.13
MW-4	2/20/2012	20.44	--	--	7.28	13.16
MW-4	8/22/2012	20.44	--	--	9.41	11.03
MW-4	11/5/2012	20.44	--	--	7.52	12.92
MW-4	1/28/2013	20.44	--	--	7.29	13.15
MW-5	11/14/2011	21.32	--	--	9.02	12.30
MW-5	2/20/2012	21.32	--	--	8.21	13.11
MW-5	8/22/2012	21.32	--	--	10.29	11.03
MW-5	11/5/2012	21.32	--	--	8.60	12.72

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	Date	Top of Casing Elevation	Depth to Free Product	Product Thickness In Well	Depth to Groundwater	Groundwater Elevation
MW-5	1/28/2013	21.32	--	--	8.45	12.87
MW-6	11/14/2011	22.30	--	--	10.30	12.00
MW-6	2/20/2012	22.30	--	--	9.36	12.94
MW-6	8/22/2012	22.30	--	--	11.30	11.00
MW-6	11/5/2012	22.30	--	--	9.68	12.62
MW-6	1/28/2013	22.30	--	--	9.63	12.67
MW-7	11/14/2011	22.10	--	--	10.21	11.89
MW-7	2/20/2012	22.10	--	--	8.96	13.14
MW-7	8/22/2012	22.10	--	--	11.07	11.03
MW-7	11/5/2012	22.10	--	--	9.51	12.59
MW-7	1/28/2013	22.10	--	--	9.12	12.98
MW-8	11/14/2011	21.54	--	--	9.59	11.95
MW-8	2/20/2012	21.54	--	--	8.39	13.15
MW-8	8/22/2012	21.54	--	--	10.50	11.04
MW-8	11/5/2012	21.54	--	--	9.00	12.54
MW-8	1/28/2013	21.54	--	--	8.78	12.76
MW-9	11/14/2011	20.82	--	--	8.47	12.35
MW-9	2/20/2012	20.82	--	--	5.90	14.92
MW-9	8/22/2012	20.82	--	--	7.56	13.26
MW-9	11/5/2012	20.82	--	--	7.68	13.14
MW-9	1/28/2013	20.82	--	--	6.45	14.37
MW-10	11/14/2011	21.12	--	--	9.76	11.36
MW-10	2/20/2012	21.12	--	--	8.39	12.73
MW-10	8/22/2012	21.12	--	--	10.49	10.63
MW-10	11/5/2012	21.12	--	--	8.86	12.26
MW-10	1/28/2013	21.12	--	--	8.91	12.21
MW-11	2/20/2012	16.80	--	--	3.98	12.82
MW-11	8/22/2012	16.80	--	--	6.31	10.49
MW-11	11/5/2012	16.80	--	--	4.75	12.05
MW-11	1/28/2013	16.80	--	--	4.26	12.54
MW-12	2/20/2012	19.59	--	--	7.52	12.07
MW-12	8/22/2012	19.59	--	--	8.71	10.88
MW-12	11/5/2012	19.59	--	--	7.16	12.43
MW-13	2/20/2012	21.24	--	--	5.51	15.73
MW-13	8/22/2012	21.24	--	--	10.00	11.24
MW-13	11/5/2012	21.24	--	--	8.35	12.89
MW-13	1/28/2013	21.24	--	--	5.74	15.50
MW-14	11/14/2011	21.54	--	--	9.66	11.88
MW-14	2/20/2012	21.54	--	--	8.33	13.21
MW-14	8/22/2012	21.54	--	--	10.36	11.18
MW-14	11/5/2012	21.54	--	--	8.98	12.56
MW-14	1/28/2013	21.54	--	--	8.75	12.79
MW-15	11/14/2011	20.52	--	--	8.71	11.81
MW-15	2/20/2012	20.52	--	--	6.83	13.69
MW-15	8/22/2012	20.52	--	--	9.46	11.06
MW-15	11/5/2012	20.52	--	--	7.83	12.69
MW-15	1/28/2013	20.52	--	--	8.42	12.10
MW-16	2/20/2012	21.24	--	--	8.23	13.01
MW-16	8/22/2012	21.24	--	--	10.63	10.61
MW-16	11/5/2012	21.24	--	--	8.61	12.63
MW-16	1/28/2013	21.24	--	--	8.54	12.70
MW-17	8/22/2012	13.34	--	--	2.77	10.57
MW-17	11/5/2012	13.34	--	--	0.18	13.16
MW-17	1/28/2013	13.34	--	--	1.31	12.03
DW-1	11/14/2011	20.69	--	--	8.91	11.78
DW-1	2/20/2012	20.69	--	--	7.76	12.93
DW-1	8/22/2012	20.69	--	--	9.79	10.90
DW-1	11/5/2012	20.69	--	--	8.12	12.57

TABLE 5

GROUNDWATER ELEVATION DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	*Date*	*Top of Casing Elevation*	*Depth to Free Product*	*Product Thickness In Well*	*Depth to Groundwater*	*Groundwater Elevation*
DW-1	1/28/2013	20.69	--	--	8.06	12.63
DW-2	11/14/2011	21.36	--	--	9.79	11.57
DW-2	2/20/2012	21.36	--	--	8.40	12.96
DW-2	8/22/2012	21.36	--	--	10.45	10.91
DW-2	11/5/2012	21.36	--	--	8.96	12.40
DW-2	1/28/2013	21.36	--	--	8.87	12.49
DW-3	11/14/2011	21.75	--	--	10.26	11.49
DW-3	2/20/2012	21.75	--	--	8.95	12.80
DW-3	8/22/2012	21.75	--	--	11.01	10.74
DW-3	11/5/2012	21.75	--	--	9.38	12.37
DW-3	1/28/2013	21.75	--	--	9.39	12.36
DW-4	8/22/2012	16.61	--	--	5.91	10.70
DW-4	11/5/2012	16.61	--	--	4.08	12.53
DW-4	1/28/2013	16.61	--	--	4.69	11.92
BR-1	11/5/2012	19.55	--	--	8.18	11.37
BR-1	1/28/2013	19.55	--	--	9.60	9.95
BR-2	11/5/2012	18.08	--	--	6.73	11.35
BR-2	1/28/2013	18.08	--	--	8.02	10.06
WS-1		12.24				
WS-1	1/28/2013	12.24			DRY	
WS-2		12.03				
WS-2	1/28/2013	12.03			DRY	
WS-3		14.11				
WS-3	1/28/2013	14.11	--	--	2.13	16.24
WS-4		14.92				

Notes:

All measurement are recorded in feet.

-- Not Applicable. No free product detected.

TABLE 6

SURFACE WATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

			HYDROCARBONS			*PRIMARY VOCs*				*OXYGENATES*
Sample ID		***Date***	***TPHg***	***TPHd***	***TPHo***	***B***	***T***	***E***	***X***	***MTBE***
	MTCA Method A Screening Levels:		***800/1000***	***500***	***500***	***5***	***1,000***	***700***	***1,000***	***20***
			ug/L	***ug/L***	***ug/L***	***ug/L***	***ug/L***	***ug/L***	***ug/L***	***ug/L***
Retention Pond	SW corner of SE Rentention pond	6/3/04	**36,200**	**--**	**--**	**7,860**	**6,920**	792	**3,260**	--
Retention Pond	SW corner of SE Rentention pond	4/19/06	**38,000**	**2,800**	**<1000**	**2,100**	**4,400**	180	**3,300**	NA
Retention Pond	SW corner of SE Rentention pond	2/19/07	**16,000**	**1,400**	140	**1,600**	**2,500**	100	**1,500**	2
SW-1	NW corner of Site	3/22/12	<50.0	<77	<380	<1.0	<1.0	<1.0	<3.0	<1.0
SW-2	West of office building	3/22/12	<50.0	<77	<380	<1.0	<1.0	<1.0	<3.0	<1.0
SW-3	SW corner of SE retention pond	3/22/12	**13,300**	140	<380	**194**	**1,770**	181	**1,550**	<1.0
SW-4	NW portion of retention pond	3/22/12	<50.0	<76	<380	<1.0	<1.0	<1.0	<3.0	<1.0

Notes:
NA Not analyzed.
U Not detected above reporting limit.
J Estimated
µg/L micrograms per liter

TABLE 7

ADDITIONAL SURFACE WATER ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

			SEMI-VOLATILES		*METALS*		*VOCs*					
Sample Location		*Date*	*Naphthalenes*	*cPAHs*	*Arsenic*	*Lead*	*Methylene Chloride*	*PCE*	*TCE*	*Vinyl Chloride*	*EDB*	*EDC*
	MTCA Method A Screening Levels:		***160*** [(1)]	***0.1*** [(2)]	***5***	***15***	***5***	***5***	***5***	***0.2***	***0.01***	***5***
			ug/L	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*
SW-1	NW corner of Site	3/22/12	<1.192	<0.0725	2.7	1.7	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0
SW-2	West of office building	3/22/12	<1.19	<0.0715	0.99	0.55	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0
SW-3	SW corner of SE retention pond	3/22/12	55.6	<0.0715	1.5	0.55	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0
SW-4	NW portion of retention pond	3/22/12	<0.288	<0.0725	0.69	3.8	<5.0	<1.0	<1.0	<0.20	<1.0	<1.0

Notes:
NA Not analyzed.
U Not detected above reporting limit.
J Estimated
µg/L micrograms per liter
(1) Napthalenes equal the sum of 1-Methylnaphthalene, 2-Methylnaphthalene, and Naphthalene.
For sample that were non-detect for one or more of these constituents, the reporting limit was used in the summation
(2) cPAHs equal the sum of each cPAH analyte multiplied by the MTCA toxicity factor. For non-detect values, half the reporting limit was used in the calculation.

TABLE 8

WETLAND AND RETENTION BASIN SOIL ANALYTICAL DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

				HYDROCARBONS			*PRIMARY VOCS*					*METALS*		*SEMI-VOLATILES*	
Sample ID	*Sample Location*	*Sample Date*	*Sample Depth*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*MTBE*	*Lead*	*Arsenic*	*Naphthalenes*	*cPAHs*
		MTCA Method A Cleanup Level		***30/100***	***2,000***	***2,000***	***0.03***	***7***	***6***	***9***	***0.1***	***1,000***	***20***	***5***	***2***
			ft	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg dry)*	*(mg/kg)*
SE-042412-MD-SE-1	SE-1		0.5 - 1.0	<19.1	<35	<140	0.0222	0.0151	<0.0087	<0.0261	<0.0087	26.1	11.1	<0.0468	0.012728
SE-042412-MD-SE-2	SE-2		0.5 - 1.0	<16.4	<30.9	<124	0.0112	<0.0066	<0.0066	<0.02	<0.0066	56	18.5	<0.0393	0.021593
SE-042412-MD-SE-3	SE-3		0.5 - 1.0	<15.3	53.2	<114	0.0192	<0.0056	<0.0056	<0.017	<0.0056	71.9	7.3	0.0498	0.026098
SE-042412-MD-SE-4	SE-4		0.5 - 1.0	<10.8	<24.2	<97	<0.0052	<0.0052	<0.0052	<0.016	<0.0052	33.4	16	0.0627	0.03052
SE-042412-MD-SE-5	SE-5		0.5 - 1.0	<13.4	<26.7	<107	<0.0056	<0.0056	<0.0056	<0.017	<0.0056	20.2	13.4	<0.0351	0.0098785
SE-042412-MD-SE-6	SE-6		0.5 - 1.0	<10.9	<24.7	<98.8	<0.0047	<0.0047	<0.0047	<0.014	<0.0047	41.3	**20.2**	<0.0318	0.017436
SE-042512-MD-SE-7	SE-7		0.5 - 1.0	<15.6	<29.4	<118	**0.0549**	<0.007	<0.007	<0.021	<0.007	34.7	**22.5**	<0.0381	0.1504
SE-042512-MD-SE-8	SE-8		0.5 - 1.0	<15	<32.5	<130	<0.0067	<0.0067	<0.0067	<0.0202	<0.0067	10.9	8.8	<0.0411	0.0124935
SE-042512-MD-SE-9	SE-9		0.5 - 1.0	<18.5	<32.5	<130	0.0136	0.011	<0.0083	<0.025	<0.0083	55.1	16.4	<0.0426	0.047237
SE-042512-MD-SE-10	SE-10		0.5 - 1.0	6.5	<19.4	<77.8	0.0217	0.118	0.0406	0.155	<0.0028	3.2	<2.7	0.473	<0.006191
SE-042512-MD-SE-11	SE-11		0.5 - 1.0	9	<19	<76.2	0.0083	0.0179	0.0664	0.209	<0.0027	3.1	3.1	0.55	<0.00604
SE-042512-MD-SE-12	SE-12		0.5 - 1.0	<5.8	<18.9	<75.6	0.012	0.0383	0.0406	0.0929	<0.0032	2	<2.9	0.433	<0.006191
SE-042612-MD-SE-13	SE-13		0.5 - 1.0	<6.8	<19.3	<77.3	<0.0031	<0.0031	<0.0031	<0.0094	<0.0031	3.4	3	0.0332	<0.006342
SE-042612-MD-SE-14	SE-14		0.5 - 1.0	<5.8	<18.7	<74.6	<0.0027	<0.0027	<0.0027	<0.0082	<0.0027	4	<2.6	<0.024	<0.00604
SE-042612-MD-SE-15	SE-15		0.5 - 1.0	<7.3	<21.2	<84.9	<0.0032	<0.0032	<0.0032	<0.0095	<0.0032	12.3	3.8	<0.027	<0.006795
SE-042612-MD-SE-16	SE-16		0.5 - 1.0	<6.5	<18.8	<75.4	<0.0031	<0.0031	<0.0031	<0.0092	<0.0031	7.9	2.9	<0.0246	0.010991
SE-042612-MD-SE-17	SE-17		0.5 - 1.0	<6.5	<20.3	<81.2	<0.0028	<0.0028	<0.0028	<0.0083	<0.0028	3.6	3.3	<0.029	<0.0064175
SE-042612-MD-SE-18	SE-18		0.5 - 1.0	<7.4	<19.6	<78.5	<0.0028	<0.0028	<0.0028	<0.0084	<0.0028	10.4	<3.1	<0.0258	0.013305
SE-042512-MD-BG-1	BG-1		0.5 - 1.0	<7.6	<25.3	<101	<0.0047	<0.0047	<0.0047	<0.014	<0.0047	19	15.1	<0.0324	<0.008154

TABLE 9

SITE-WIDE SURVEY DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Survey Location	*Northing (Y)*	*Easting (Y)*	*Latitude*	*Longitude*	*Surface Elevation*	*Surface Completion Elevation*	*TOC Elevation*
Monitoring Wells							
B-1	169583.21	1296340.27	N47°27'22.96401"	W122°13'27.11510"	21.88	--	21.61
B-2	169613.62	1296209.74	N47°27'23.24073"	W122°13'29.02215"	22.12	--	21.82
B-3A	169652.76	1296211.87	N47°27'23.62733"	W122°13'29.00139"	22.25	--	21.85
B-4	169586.02	1296174.80	N47°27'22.96220"	W122°13'29.52321"	21.39	--	21.28
B-5	169602.66	1296144.05	N47°27'23.12094"	W122°13'29.97504"	21.32	--	20.95
B-6	169641.99	1296140.78	N47°27'23.50839"	W122°13'30.03295"	21.41	--	21.00
D-1R	169734.18	1296206.66	N47°27'24.42985"	W122°13'29.09872"	20.53	20.53	20.13
D-4	169591.79	1296415.76	N47°27'23.06207"	W122°13'26.01895"	21.34	--	21.09
D-4R	169621.43	1295981.22	N47°27'23.27702"	W122°13'32.34902"	21.70	21.72	21.27
D-5	169675.94	1296415.66	N47°27'23.89242"	W122°13'26.04256"	21.68	--	21.33
D-5R	169588.77	1296396.63	N47°27'23.02888"	W122°13'26.29645"	21.75	21.78	21.45
D-6	169648.36	1296095.92	N47°27'23.56328"	W122°13'30.68729"	21.19	--	20.61
D-7	169723.45	1296100.57	N47°27'24.30510"	W122°13'30.63935"	21.02	--	20.49
HA-1	169801.91	1296045.37	N47°27'25.06945"	W122°13'31.46311"	21.18	--	20.76
HA-2	169804.82	1296161.30	N47°27'25.11879"	W122°13'29.77726"	21.46	--	21.09
HA-3	169805.83	1296220.51	N47°27'25.13934"	W122°13'28.91602"	21.56	--	21.09
HA-4	169799.40	1296349.88	N47°27'25.09895"	W122°13'27.03205"	21.53	--	21.05
HA-5	169430.96	1296257.48	N47°27'21.44688"	W122°13'28.27945"	20.70	--	21.13
HA-6	169532.91	1296255.72	N47°27'22.45253"	W122°13'28.33195"	20.82	--	21.43
HA-7	169529.15	1296140.17	N47°27'22.39485"	W122°13'30.01211"	20.80	--	21.60
HA-8	169453.27	1296135.49	N47°27'21.64521"	W122°13'30.06030"	20.93	--	21.97
HA-9	169882.41	1296164.41	N47°27'25.88505"	W122°13'29.75236"	21.86	--	21.32
HA-10	169885.91	1296101.14	N47°27'25.90831"	W122°13'30.67385"	21.48	--	21.15
HA-11	169847.48	1296057.09	N47°27'25.52122"	W122°13'31.30462"	21.24	--	20.69
HA-12	169536.75	1296040.95	N47°27'22.45212"	W122°13'31.45767"	20.48	--	22.47
HA-13	169417.62	1296341.32	N47°27'21.33013"	W122°13'27.05619"	20.74	--	22.73
HA-14	169491.52	1296381.75	N47°27'22.06664"	W122°13'26.48748"	21.13	--	23.47
HA-15	169488.21	1296171.50	N47°27'21.99640"	W122°13'29.54546"	20.74	--	22.87
HA-16	169483.89	1296216.00	N47°27'21.96174"	W122°13'28.89694"	20.53	--	22.07
HA-17	169536.97	1296176.03	N47°27'22.47835"	W122°13'29.49246"	20.78	--	21.82
HA-18	169549.53	1296215.92	N47°27'22.60946"	W122°13'28.91540"	20.72	--	21.51
HA-19	169372.42	1296287.92	N47°27'20.87460"	W122°13'27.82124"	20.61	--	22.92
HA-20	169346.12	1296177.79	N47°27'20.59542"	W122°13'29.41659"	21.10	--	23.10
HWx-1E	169311.16	1296249.94	N47°27'20.26339"	W122°13'28.35772"	21.01	--	20.44
HWx-1W	169311.16	1296148.71	N47°27'20.24529"	W122°13'29.83057"	21.14	--	19.96
LAI-1	169318.97	1296153.32	N47°27'20.32313"	W122°13'29.76546"	20.82	--	20.94
LAIx-2	169316.15	1296180.43	N47°27'20.30018"	W122°13'29.37032"	21.18	--	20.67
LAIx-3	169317.44	1296192.90	N47°27'20.31515"	W122°13'29.18919"	21.08	--	20.74
LAIx-4	169347.28	1296191.48	N47°27'20.60931"	W122°13'29.21769"	20.92	--	25.50
LAIx-5	169360.81	1296216.66	N47°27'20.74738"	W122°13'28.85497"	20.64	--	25.63

TABLE 9

SITE-WIDE SURVEY DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Survey Location	*Northing (Y)*	*Easting (Y)*	*Latitude*	*Longitude*	*Surface Elevation*	*Surface Completion Elevation*	*TOC Elevation*
LAIx-6	169373.49	1296242.63	N47°27'20.87711"	W122°13'28.48047"	20.55	--	25.25
LAIx-7	169351.01	1296266.47	N47°27'20.65956"	W122°13'28.12769"	20.76	--	25.24
LAIx-8	169345.78	1296246.42	N47°27'20.60436"	W122°13'28.41797"	20.81	--	25.59
LAIx-9	169347.53	1296226.06	N47°27'20.61802"	W122°13'28.71468"	20.74	--	25.55
LAI-10	169297.30	1296133.17	N47°27'20.10569"	W122°13'30.05293"	20.67	--	19.87
LAI-11	169309.35	1296101.97	N47°27'20.21912"	W122°13'30.51010"	20.99	--	20.61
LAI-12	169314.44	1296055.48	N47°27'20.26101"	W122°13'31.18770"	21.08	--	19.34
LAI-13	169468.45	1295844.15	N47°27'21.74297"	W122°13'34.30298"	22.36	--	21.53
LAI-14	169406.73	1295843.32	N47°27'21.13383"	W122°13'34.29883"	22.34	--	21.69
LAI-15	169346.15	1295850.42	N47°27'20.53733"	W122°13'34.17944"	20.47	--	20.03
LAI-16	169240.02	1296264.39	N47°27'19.56390"	W122°13'28.12883"	20.92	--	20.59
R-1	169615.52	1296147.20	N47°27'23.24836"	W122°13'29.93257"	21.35	--	16.94
R-2	169871.02	1296115.51	N47°27'25.76394"	W122°13'30.46090"	21.80	--	17.52
RW-1	169400.64	1296122.08	N47°27'21.12346"	W122°13'30.24155"	21.52	--	24.24
RWx-2	169414.64	1296122.30	N47°27'21.26166"	W122°13'30.24197"	21.28	--	26.20
RW-3	169466.16	1296169.06	N47°27'21.77836"	W122°13'29.57525"	20.82	--	22.85
RW-4	169464.15	1296186.08	N47°27'21.76158"	W122°13'29.32705"	21.05	--	23.78
RWx-5	169446.26	1296215.21	N47°27'21.59029"	W122°13'28.89857"	20.96	--	24.97
RW-6	169436.95	1296225.70	N47°27'21.50027"	W122°13'28.74341"	21.31	--	24.18
RWx-7	169428.06	1296234.25	N47°27'21.41408"	W122°13'28.61667"	20.97	--	24.71
W-1	169677.46	1296213.37	N47°27'23.87133"	W122°13'28.98606"	22.29	--	21.89
W-2	169646.77	1296180.99	N47°27'23.56278"	W122°13'29.44909"	21.93	--	21.30
W-3	169873.78	1296151.29	N47°27'25.79748"	W122°13'29.94105"	19.92	--	19.95
W-4	169849.71	1296083.40	N47°27'25.54788"	W122°13'30.92247"	21.35	--	20.91
DW-1	169675.90	1296414.46	N47°27'23.89187"	W122°13'26.05998"	21.12	21.23	20.69
DW-2	169314.62	1296218.11	N47°27'20.29184"	W122°13'28.82174"	21.68	21.70	21.36
DW-3	169731.47	1296200.92	N47°27'24.40215"	W122°13'29.18150"	22.30	22.37	21.75
DW-4	169402.80	1295841.84	N47°27'21.09479"	W122°13'34.31928"	17.24	17.23	16.61
MW-1	169933.30	1296069.67	N47°27'26.37024"	W122°13'31.14417"	20.79	20.87	20.51
MW-2	170020.51	1296002.17	N47°27'27.21884"	W122°13'32.14930"	20.51	20.73	20.29
MW-3	169233.40	1296206.01	N47°27'19.48819"	W122°13'28.97645"	21.47	21.58	21.21
MW-4	169446.72	1296467.35	N47°27'21.63981"	W122°13'25.23021"	20.72	20.87	20.44
MW-5	169581.04	1296471.29	N47°27'22.96591"	W122°13'25.20830"	21.50	21.74	21.32
MW-6	169624.56	1296470.47	N47°27'23.39517"	W122°13'25.23168"	22.48	22.65	22.30
MW-7	169732.10	1296475.71	N47°27'24.45730"	W122°13'25.18357"	22.36	22.39	22.10
MW-8	169617.48	1296320.00	N47°27'23.29856"	W122°13'27.41897"	21.98	21.99	21.54
MW-9	169699.19	1296336.46	N47°27'24.10779"	W122°13'27.20098"	21.22	21.21	20.82
MW-10	169296.65	1296188.19	N47°27'20.10911"	W122°13'29.25226"	21.43	21.44	21.12
MW-11	169735.75	1295981.19	N47°27'24.40511"	W122°13'32.37950"	17.14	17.12	16.80
MW-12	169930.43	1296071.58	N47°27'26.34228"	W122°13'31.11560"	20.03	20.04	19.59
MW-13	170007.65	1296130.83	N47°27'27.11486"	W122°13'30.27395"	21.72	21.74	21.24

TABLE 9

SITE-WIDE SURVEY DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Survey Location	*Northing (Y)*	*Easting (Y)*	*Latitude*	*Longitude*	*Surface Elevation*	*Surface Completion Elevation*	*TOC Elevation*
MW-14	169981.60	1296276.74	N47°27'26.88390"	W122°13'28.14408"	21.90	21.88	21.54
MW-15	169837.19	1296316.84	N47°27'25.46598"	W122°13'27.52276"	20.84	20.94	20.52
MW-16	169497.81	1296028.76	N47°27'22.06571"	W122°13'31.62484"	21.60	21.63	21.24
MW-17	169967.10	1296413.01	N47°27'26.76503"	W122°13'26.15771"	13.82	13.88	13.34
TW-1	169727.66	1296061.18	N47°27'24.33962"	W122°13'31.21354"	21.71	21.74	21.40
TW-2	169731.71	1296204.27	N47°27'24.40512"	W122°13'29.13284"	21.72	21.75	21.19
TW-3	169731.56	1296207.46	N47°27'24.40413"	W122°13'29.08635"	21.62	21.64	21.20
TW-4	169748.66	1296204.22	N47°27'24.57228"	W122°13'29.13792"	21.66	21.67	21.27
TW-5	169748.25	1296207.89	N47°27'24.56895"	W122°13'29.08449"	21.75	21.79	21.35
TW-6	169732.94	1296224.68	N47°27'24.42083"	W122°13'28.83618"	21.80	21.83	21.35
TW-7	169729.58	1296224.70	N47°27'24.38766"	W122°13'28.83494"	21.83	21.87	21.31
TW-8	169720.02	1296204.17	N47°27'24.28966"	W122°13'29.13115"	21.85	21.87	21.36
AS-1	169720.14	1296207.56	N47°27'24.29147"	W122°13'29.08185"	21.68	21.70	21.24
EX-1	169731.08	1296244.86	N47° 27' 24.4062"	W122° 13' 28.5420"	--	--	21.54
P-1	169728.27	1296249.09	N47° 27' 24.3792"	W122° 13' 28.4797"	--	--	21.47
P-2	169716.88	1296252.89	N47° 27' 24.2675"	W122° 13' 28.4215"	--	--	21.60
Soil Borings							
B-1	169308.70	1296103.95	N47°27'20.21297"	W122°13'30.48099"	20.75	--	--
B-2	169317.59	1296195.91	N47°27'20.31718"	W122°13'29.14543"	21.04	--	--
B-3	169311.30	1296256.22	N47°27'20.26588"	W122°13'28.26635"	20.90	--	--
B-4	169237.59	1296173.56	N47°27'19.52373"	W122°13'29.44959"	20.80	--	--
B-5	169236.21	1296265.44	N47°27'19.52653"	W122°13'28.11244"	20.91	--	--
B-6	169409.06	1295843.53	N47°27'21.15686"	W122°13'34.29631"	22.27	--	--
B-7	169307.89	1296313.97	N47°27'20.24251"	W122°13'27.42526"	20.21	--	--
G-1	169592.30	1296084.80	N47°27'23.00806"	W122°13'30.83437"	21.07	--	--
G-2	169636.44	1296140.41	N47°27'23.45359"	W122°13'30.03678"	21.45	--	--
G-3	169618.45	1296176.93	N47°27'23.28258"	W122°13'29.50075"	21.82	--	--
G-4	169634.58	1296196.98	N47°27'23.44535"	W122°13'29.21324"	22.05	--	--
G-5	169654.93	1296179.24	N47°27'23.64298"	W122°13'29.47678"	21.98	--	--
G-6	169691.73	1296200.46	N47°27'24.00987"	W122°13'29.17766"	21.94	--	--
G-7	169737.40	1296205.77	N47°27'24.46149"	W122°13'29.11250"	21.64	--	--
G-8	169789.94	1296162.23	N47°27'24.97221"	W122°13'29.75974"	21.10	--	--
G-9	169419.40	1296122.69	N47°27'21.30871"	W122°13'30.23758"	21.32	--	--
G-10	169438.36	1296231.15	N47°27'21.51515"	W122°13'28.66449"	21.06	--	--
G-11	169486.32	1296174.50	N47°27'21.97830"	W122°13'29.50137"	20.75	--	--
G-12	169480.72	1296209.07	N47°27'21.92919"	W122°13'28.99689"	20.64	--	--
G-13	169357.52	1296230.21	N47°27'20.71726"	W122°13'28.65695"	20.91	--	--
G-14	169359.55	1296260.37	N47°27'20.74271"	W122°13'28.21862"	20.63	--	--
G-15	169460.42	1296139.00	N47°27'21.71645"	W122°13'30.01100"	20.72	--	--
G-16	169482.05	1296134.56	N47°27'21.92904"	W122°13'30.08139"	20.81	--	--

TABLE 9

SITE-WIDE SURVEY DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Survey Location	*Northing (Y)*	*Easting (Y)*	*Latitude*	*Longitude*	*Surface Elevation*	*Surface Completion Elevation*	*TOC Elevation*
G-17	169511.07	1296243.68	N47°27'22.23489"	W122°13'28.50141"	20.69	--	--
G-18	169453.73	1296217.55	N47°27'21.66442"	W122°13'28.86640"	20.57	--	--
G-19	169351.76	1296139.20	N47°27'20.64423"	W122°13'29.97951"	20.96	--	--
G-20	169391.92	1296231.67	N47°27'21.05699"	W122°13'28.64470"	21.02	--	--
G-21	169312.39	1296240.34	N47°27'20.27381"	W122°13'28.49766"	20.79	--	--
G-22	169353.78	1296258.09	N47°27'20.68532"	W122°13'28.25031"	20.63	--	--
G-23	169358.34	1296221.54	N47°27'20.72385"	W122°13'28.78330"	20.72	--	--
G-24	169345.49	1296174.55	N47°27'20.58864"	W122°13'29.46360"	21.24	--	--
G-25	169445.95	1296136.22	N47°27'21.57314"	W122°13'30.04775"	20.82	--	--
G-26	169483.27	1296212.33	N47°27'21.95497"	W122°13'28.95010"	20.41	--	--
G-27	169591.03	1296163.97	N47°27'23.00972"	W122°13'29.68212"	21.38	--	--
G-28	169610.67	1296130.14	N47°27'23.19741"	W122°13'30.17955"	21.36	--	--
G-29	169618.49	1296191.49	N47°27'23.28558"	W122°13'29.28888"	21.94	--	--
G-30	169606.59	1296226.35	N47°27'23.17439"	W122°13'28.77864"	21.69	--	--
G-31	169644.47	1296136.57	N47°27'23.53213"	W122°13'30.09485"	21.44	--	--
G-32	169667.08	1296210.08	N47°27'23.76835"	W122°13'29.03123"	22.41	--	--
G-33	169677.54	1296224.64	N47°27'23.87418"	W122°13'28.82214"	22.46	--	--
G-34	169695.55	1296172.80	N47°27'24.04266"	W122°13'29.58119"	21.55	--	--
G-36	169729.37	1296126.19	N47°27'24.36802"	W122°13'30.26816"	21.00	--	--
G-37	169792.55	1296166.35	N47°27'24.99865"	W122°13'29.70057"	20.90	--	--
G-38	169857.68	1296171.14	N47°27'25.64219"	W122°13'29.64800"	22.11	--	--
G-39	169852.10	1296099.41	N47°27'25.57434"	W122°13'30.69015"	21.85	--	--
G-40	169699.19	1296336.46	N47°27'24.10779"	W122°13'27.20098"	21.98	--	--
G-41	169617.48	1296320.00	N47°27'23.29856"	W122°13'27.41897"	22.36	--	--
G-42	169837.19	1296316.84	N47°27'25.46598"	W122°13'27.52276"	21.90	--	--
G-43	169588.77	1296396.63	N47°27'23.02888"	W122°13'26.29645"	21.70	--	--
SBTR2C	169855.18	1296108.65	N47°27'25.60641"	W122°13'30.55652"	21.91	--	--
Wetland and Retention Basin Soil Samples							
SE-1	169858.03	1296021.77	N47°27'25.61901"	W122°13'31.82127"	11.80	--	--
SE-10	169326.23	1296294.19	N47°27'20.41994"	W122°13'27.71790"	14.49	--	--
SE-11	169333.22	1296305.27	N47°27'20.49090"	W122°13'27.55853"	14.79	--	--
SE-12	169339.46	1296316.29	N47°27'20.55447"	W122°13'27.39976"	14.30	--	--
SE-13	169359.01	1296340.25	N47°27'20.75165"	W122°13'27.05636"	14.61	--	--
SE-14	169379.45	1296360.61	N47°27'20.95698"	W122°13'26.76552"	14.42	--	--
SE-15	169420.74	1296394.39	N47°27'21.37042"	W122°13'26.28487"	14.91	--	--
SE-16	169441.04	1296408.53	N47°27'21.57322"	W122°13'26.08454"	15.08	--	--
SE-17	169466.76	1296420.48	N47°27'21.82920"	W122°13'25.91749"	14.98	--	--
SE-18	169491.25	1296433.49	N47°27'22.07312"	W122°13'25.73461"	14.80	--	--
SE-2	169867.03	1296038.40	N47°27'25.71075"	W122°13'31.58167"	11.97	--	--
SE-3	169873.46	1296043.97	N47°27'25.77517"	W122°13'31.50237"	11.95	--	--

TABLE 9

SITE-WIDE SURVEY DATA
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Survey Location	*Northing (Y)*	*Easting (Y)*	*Latitude*	*Longitude*	*Surface Elevation*	*Surface Completion Elevation*	*TOC Elevation*
SE-4	169880.60	1296040.92	N47°27'25.84509"	W122°13'31.54857"	11.61	--	--
SE-5	169901.88	1296020.70	N47°27'26.05146"	W122°13'31.84843"	11.84	--	--
SE-6	169769.53	1295956.21	N47°27'24.73398"	W122°13'32.75183"	12.26	--	--
SE-7	169746.88	1295953.53	N47°27'24.51004"	W122°13'32.78483"	11.87	--	--
SE-8	169719.52	1295953.78	N47°27'24.24009"	W122°13'32.77409"	11.59	--	--
SE-9	169705.06	1295951.43	N47°27'24.09693"	W122°13'32.80435"	11.65	--	--
Surface Water Samples							
SW-1	--	--	--	--	--	--	--
SW-2	169735.01	1295952.39	N47°27'24.39271"	W122°13'32.79833"	11.76	--	--
SW-3	--	--	--	--	--	--	--
SW-4	--	--	--	--	--	--	--
Surface Water Gauges							
BR-1	169867.28	1295542.32	N47°27'25.62459"	W122°13'38.79945"	19.55	--	--
BR-2	169362.33	1295535.75	N47°27'20.64070"	W122°13'38.76190"	18.08	--	--
WS-1 = 1.0'	169878.59	1295971.72	N47°27'25.81296"	W122°13'32.55490"	12.24	--	--
WS-2 = 1.0'	169376.50	1295802.23	N47°27'20.82814"	W122°13'34.88857"	12.03	--	--
WS-3 = 1.0'	169324.97	1296355.14	N47°27'20.41841"	W122°13'26.83084"	14.11	--	--
WS-4 = 1.0'	169484.31	1296446.41	N47°27'22.00696"	W122°13'25.54486"	14.92	--	--

Notes:
-- = No data
Horizontal Coordinate System = NAD 83/ Cors 96 Epoch 2002.00, Washington North Zone 4601 in, U.S. survey feet, UTM zone 10
Vertical Datum = NAVD 88
Horizontal data was collected a GPS unit
Vertical data was collected using differential leveling

TABLE 10

SUMMARY OF LASER-INDUCED FLUORESCENCE SURVEY RESULTS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Location ID	*LIF Total Depth (ft bgs)*	*Max LIF Result (%RE)*	*Depth of Max LIF Result (ft bgs)*	*Avg LIF Result (%RE)*	*Overall Impacted Interval/ LIF Averaging Interval (ft bgs)*	*Approximate LNAPL Type(s) (inferred from LIF results)*	*Comments*
G-18	15.02	401.50	7.83	68.83	7.01-8.31	diesel range	
G-19	15.00	129.00	7.61	60.03	7.17-8.01	diesel range	
G-20	20.01	277.50	6.36	51.92	6.09-8.22	diesel range	
G-21	--	--	--	--	--	--	%RE < 10%, Clean
G-22	20.01	113.90	7.44	31.38	6.26-7.94	diesel range	
G-23	20.01	270.30	7.56	43.66	5.87-7.98	diesel range	
G-24	19.98	19.00	6.82	16.29	6.68-7.03	diesel range	
G-25	15.00	429.50	7.80	93.01	6.21-8.49	diesel range	
G-26	20.01	126.40	5.32	22.36	5.01-7.51	diesel range	
G-27	20.00	195.50	7.27	54.50	4.39-10.00	diesel and heavier oil range	
G-28	19.99	237.50	7.05	46.02	5.40-8.93	heavier oil range	
G-29	20.01	22.00	10.08	16.48	9.34-10.14	diesel and heavier oil range	
G-30	20.03	91.10	5.81	12.65	1.10-9.46	kerosene and heavier oil range	
G-31	19.99	339.50	8.94	32.64	6.07-9.58	heavier oil range	
G-32	20.00	142.20	5.81	25.70	5.77-8.78, 11.95-12.80	diesel range	
G-33	20.00	76.90	12.10	31.29	8.12-8.57, 11.01-13.07	diesel and heavier oil range	
G-34	20.00	121.90	8.90	29.50	4.17-9.46	diesel and heavier oil range	
G-35	20.00	198.50	5.10	57.08	4.93-7.08, 9.04-12.62	diesel and heavier oil range	
G-36	--	--	--	--	--	--	%RE < 10%, Clean
G-37	20.06	192.10	6.86	41.52	5.63-9.44	heavier oil range	
G-38	20.01	86.20	11.39	30.80	6.68-7.14, 10.53-12.49	diesel and heavier oil range	
G-39	20.03	192.40	8.09	33.84	4.89-8.88	heavier oil range	
G-40	20.00	47.80	8.43	14.35	5.42-8.66, 10.59-11.93	diesel and heavier oil range	
G-41	20.02	40.20	11.12	20.64	10.87-11.59	diesel range	
G-42	20.02	234.90	9.89	75.71	9.46-13.56	diesel and heavier oil range	
G-43	--	--	--	--	--	--	%RE < 10%, Clean

TABLE 11

SUMMARY OF LABORATORY TEST PROGRAM AND LNAPL SATURATION RESULTS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Soil Core ID	*Soil Core Sample Interval (ft bgs)*	*Soil Core Sub-Sample Selected for Respective Tests (ft bgs)*					*LNAPL Saturation Results*		*Potentially Mobile/Recoverable Fraction (% of in place LNAPL)*
		Grain Size Analysis	*Pore Fluids Saturation Test*	*Residual Saturation by Water Drive*	*Air/Water Capillary Pressure Test*	*van Genuchten Parameters*	*Initial Saturation (% of pore space)*	*Residual Saturation (% of pore space)*	
G-18	7.0-9.0	8.5	8.3	--	8.5	8.5	**10.1**	**--**	**0.0**[a]
G-19	8.0-10.0	--	9.3	--	--	--	**4.3**	**--**	**0.0**[a]
G-23	8.0-10.0	--	--	8.85	--	--	**8.0**	**>8.0**	**0.0**
G-25	8.0-10.0	--	--	9.1	--	--	**7.2**	**>7.2**	**0.0**
G-30	9.5-12.0	--	10.4	--	--	--	**4.7**	**--**	**0.0**[a]
G-31	6.0-8.0	--	--	7.2	--	--	**3.2**	**>3.2**	**0.0**
G-35	10.0-12.0	--	11.2	--	--	--	**6.0**	**--**	**0.0**[a]
G-39	7.0-9.0	--	--	8.7	--	--	**3.6**	**>3.6**	**0.0**
G-42	10.0-12.0	11.5	--	11.25	11.5	11.5	**5.6**	**>5.6**	**0.0**

Notes:

ft bgs = feet below ground surface

[a] Residual testing was not performed on these sub-samples. It is estimated that the LNAPL saturation level in these sub-samples is immobile and unrecoverable based on the residual LNAPL saturation values determined for the other sub-samples at these locations.

TABLE 12

LNAPL VELOCITY ESTIMATES

PHILLIPS 66 RENTON TERMINAL

RENTON, WASHINGTON

		G-18	G-19	G-23	G-25	G-30	G-31	G-35	G-39	G-42
Model Inputs	LNAPL Saturation (S_o)	0.101	0.043	0.080	0.072	0.047	0.032	0.060	0.036	0.056
	Water Saturation (S_w)	0.656	0.665	0.632	0.529	0.627	0.436	0.742	0.369	0.635
	Total Fluid Saturation (S_t)	0.757	0.708	0.712	0.601	0.674	0.468	0.802	0.405	0.691
	Irreducible Water Saturation (S_{wr})	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.111	0.111
	van Genuchten N (N)	2.115	2.115	2.115	2.115	2.115	2.115	2.115	2.115	2.115
	LNAPL Density (ρ_o) - (g/cm^3)[(1)]	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
	LNAPL Viscosity (μ_o) - (cp)[(1)]	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Total Soil Porosity (Φ)	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
	Hydraulic Gradient	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	Hydraulic Conductivity Water (K_w) - (cm/s)	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03	1.01E-03
Model Outputs	Model Parameter 1 (λ)	0.816	0.816	0.816	0.816	0.816	0.816	0.816	0.816	0.816
	Model Parameter 2 (M)	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527
	LNAPL Relative Permeability (k_{ro}) [(2),(3)]	1.50E-03	1.06E-04	6.45E-04	2.80E-04	1.19E-04	1.22E-05	4.06E-04	1.03E-05	2.12E-04
	LNAPL Conductivity (K_o) - (cm/s) [(3)]	6.84E-07	4.83E-08	2.93E-07	1.27E-07	5.39E-08	5.52E-09	1.85E-07	4.69E-09	9.65E-08
	LNAPL Mobility (M_o) - (cm/s) [(3)]	3.19E-05	5.30E-06	1.73E-05	8.34E-06	5.41E-06	8.14E-07	1.45E-05	6.14E-07	8.13E-06
	LNAPL Velocity (V_o) - (cm/s) [(3)]	**6.39E-08**	**1.06E-08**	**3.46E-08**	**1.67E-08**	**1.08E-08**	**1.63E-09**	**2.90E-08**	**1.23E-09**	**1.63E-08**
	Potentially Mobile (V_o>10^{-6} cm/s)?	No	No	No	No	No	No	No	No	No

Notes:

(1) - Values taken from American Petroleum Institute (API) Interactive LNAPL Guide (Version 2.0, Release 2.0.2, August 2004) - Assessment Tools - Parameter Tables.

(2) - LNAPL relative permeability calculation based on Burdine Equation 2.26 and Equation 2.27 in American Petroleum Institute (API) Publication Number 4729, *Models for Design of Free-Product Recovery Systems for Petroleum Hydrocarbon Liquids* , August 2003.

(3) - Calculations based on laboratory generated LNAPL saturation values.

TABLE 13

SLUG TEST DATA SUMMARY
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

	Initial Slug Test K Values		
Well ID	*Falling Head (cm/sec)*	*Rising Head (cm/sec)*	*Geometric Mean (cm/sec)*
MW-1	2.06E-05	1.68E-05	1.65E-05
	1.30E-05		
MW-2	2.78E-03	2.50E-03	2.15E-03
	1.72E-03	1.21E-03	
	2.14E-03	3.18E-03	
MW-3	7.04E-04	6.29E-04	5.76E-04
	6.35E-04	5.34E-04	
	5.73E-04	4.24E-04	
MW-4	2.83E-04	1.90E-04	2.37E-04
	2.39E-04	2.21E-04	
	2.78E-04	2.27E-04	
MW-5	3.76E-04	3.90E-04	3.47E-04
	3.06E-04	3.36E-04	
	3.21E-04	3.62E-04	
MW-6	8.70E-04	1.34E-03	9.42E-04
	7.81E-04	1.01E-03	
	7.41E-04	1.03E-03	
MW-7	2.48E-04	2.04E-04	2.68E-04
	2.86E-04	2.89E-04	
	2.99E-04	2.93E-04	
MW-8	5.90E-04	7.83E-04	7.08E-04
	6.16E-04	7.75E-04	
	6.69E-04	8.51E-04	
MW-9	8.83E-05	3.74E-05	5.72E-05
	8.18E-05		
	3.98E-05		
MW-10	3.78E-04	4.07E-04	3.94E-04
	3.85E-04	4.07E-04	
	3.87E-04	4.03E-04	

TABLE 13

SLUG TEST DATA SUMMARY
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

	Initial Slug Test K Values		
Well ID	*Falling Head (cm/sec)*	*Rising Head (cm/sec)*	*Geometric Mean (cm/sec)*
MW-11	1.59E-03	1.78E-03	1.65E-03
	1.56E-03	1.77E-03	
	1.48E-03	1.73E-03	
MW-12	1.05E-03	1.23E-03	1.16E-03
	1.04E-03	1.32E-03	
	1.02E-03	1.36E-03	
MW-13	1.98E-04	1.02E-04	1.13E-04
	1.60E-04	6.02E-05	
	1.07E-04	1.01E-04	
MW-14	3.91E-04	5.98E-04	4.09E-04
	3.32E-04	4.12E-04	
	3.86E-04	3.81E-04	
MW-15	3.49E-04	3.95E-04	3.63E-04
	3.25E-04	3.78E-04	
	3.39E-04	3.99E-04	
MW-16	3.90E-03	1.57E-03	2.02E-03
	1.92E-03	1.46E-03	
	2.68E-03	1.47E-03	
D-1R	5.41E-04	3.66E-04	4.18E-04
	4.11E-04	4.36E-04	
	4.14E-04	3.63E-04	
D-4R	2.33E-04	3.18E-04	2.91E-04
	2.86E-04	3.51E-04	
	2.06E-04	3.96E-04	
D-5R	1.60E-03	1.83E-03	1.75E-03
	1.80E-03	1.86E-03	
	1.56E-03	1.87E-03	
DW-1	1.69E-02	2.13E-02	2.34E-02
	2.43E-02	3.00E-02	
	2.43E-02	2.58E-02	

TABLE 13

SLUG TEST DATA SUMMARY
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

	Initial Slug Test K Values		
Well ID	*Falling Head (cm/sec)*	*Rising Head (cm/sec)*	*Geometric Mean (cm/sec)*
DW-2	2.87E-04	2.78E-04	2.77E-04
	2.82E-04	2.87E-04	
	2.58E-04	2.73E-04	
DW-3	3.17E-03	3.46E-03	3.22E-03
	3.09E-03	3.26E-03	
	3.13E-03	3.23E-03	
B-2	6.30E-05	6.16E-05	6.35E-05
	8.74E-05	4.81E-05	
B-5	1.30E-04	2.69E-04	1.61E-04
	1.71E-04	1.91E-04	
	1.11E-04	1.38E-04	
B-6	9.09E-05	7.11E-05	7.45E-05
	5.33E-05	7.94E-05	
	8.72E-05	7.20E-05	
D-7	6.41E-05	6.28E-05	6.42E-05
	9.25E-05	3.92E-05	
	6.53E-05	7.36E-05	
HA-1	2.48E-04	1.46E-04	1.71E-04
	1.66E-04	1.82E-04	
	1.37E-04	1.65E-04	
HA16	2.89E-05	1.63E-05	1.98E-05
	2.26E-05	1.69E-05	
	1.89E-05	1.78E-05	
LAIx-2	1.10E-04	6.43E-05	8.22E-05
	8.69E-05	7.67E-05	
	8.76E-05	7.43E-05	
LAI-10	4.05E-04	1.67E-04	1.39E-04
	4.32E-05	2.20E-04	
	7.22E-05	1.56E-04	

TABLE 13

SLUG TEST DATA SUMMARY
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

	Initial Slug Test K Values		
Well ID	*Falling Head (cm/sec)*	*Rising Head (cm/sec)*	*Geometric Mean (cm/sec)*
LAI-12	3.19E-04	3.81E-04	3.02E-04
	3.04E-04	2.42E-04	
	3.63E-04	2.31E-04	
LAI-14		5.98E-04	5.31E-04
		6.17E-04	
		4.05E-04	
LAI-15	2.52E-03	1.50E-03	1.85E-03
	2.15E-03	1.47E-03	
	2.22E-03	1.51E-03	
RW-3	8.79E-04	5.18E-04	7.91E-04
	8.64E-04	6.52E-04	
	1.55E-03	6.18E-04	
RW-6	7.95E-04	4.14E-04	5.89E-04
	7.76E-04	6.38E-04	
	5.16E-04	4.99E-04	
RWx-5	1.27E-04	6.81E-04	3.47E-04
	2.58E-04	4.77E-04	
	2.94E-04	5.54E-04	

Notes:
cm/sec Centimeters Per Second
NA Not applicable

TABLE 14

AS/SVE PILOT TEST MASS REMOVAL CALCULATIONS
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

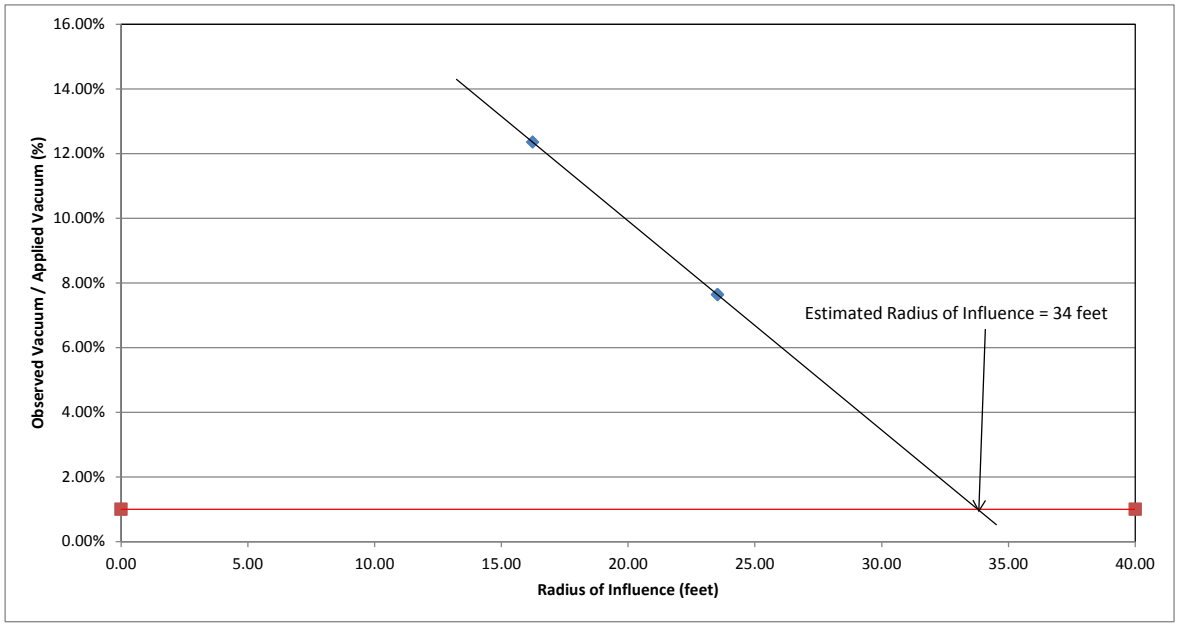
Well # Date/Time	*Cumulative Operation (hours)*	*Well Vacuum in WC*	*Well Temp °F*	*Well Flow (acfm)*	*Well Flow (scfm)*	*Hydrocarbon Concentrations (ppmv)*					*TPHg*		*Benzene*		*Toluene*		*Ethylbenzene*		*Xylenes*	
						TPHg	*Benzene*	*Toluene*	*Ethylbenzene*	*Xylenes*	*Removal Rate (lbs/day)*	*Cumulative Removed (lbs)*	*Removal Rate (lbs/day)*	*Cumulative Removed (lbs)*	*Removal Rate (lbs/day)*	*Cumulative Removed (lbs)*	*Removal Rate (lbs/day)*	*Cumulative Removed (lbs)*	*Removal Rate (lbs/day)*	*Cumulative Removed (lbs)*
TW-2																				
Step #1																				
10/10/12 13:40	01:00	32	69.0	10.0	9.2	31900	488	405	69.2	290.3	109	4.6	1.3	0.05	1.3	0.05	0.25	0.01	1.1	0.04
Step #2																				
10/10/12 15:05	01:25	55	70.0	20.0	17.2	38800	561	471	88.9	373	249	14.7	2.8	0.17	2.8	0.16	0.61	0.04	2.5	0.15
Step #3																				
10/10/12 16:05	01:00	70	69.5	25.0	20.6	46000	713	625	141	587	354	14.8	4.3	0.18	4.4	0.18	1.15	0.05	4.8	0.20
Constant Rate																				
10/12/12 8:50	02:30	60	70.0	20.0	17.0	70000	1110	969	162	699	444	46.2	5.5	0.57	5.6	0.59	1.09	0.11	4.7	0.49
10/12/12 9:50	01:00	60	70.0	20.0	17.0	117000	2160	1840	333	1412	741	30.9	10.7	0.44	10.7	0.45	2.24	0.09	9.5	0.40
10/12/12 10:45	00:55	60	70.0	20.0	17.0	75900	1030	1030	204	910	481	18.4	5.1	0.19	6.0	0.23	1.37	0.05	6.1	0.23
10/12/12 11:50	01:05	60	70.0	20.0	17.0	142000	2660	2480	467	2052	900	40.6	13.1	0.59	14.5	0.65	3.14	0.14	13.8	0.62
										Total Mass Removed (lbs)		**170**		**2.20**		**2.32**		**0.49**		**2.13**

Abreviations and Notes:
acfm = actual cubic feet per minute.
in Hg = inches of mercury
lbs = pounds
ppd = pounds per day
scfm = standard cubic feet per minute.
Atmospheric pressure = 406.86 in WC.
Absolute = atmospheric pressure - gauge vacuum (in WC).
scfm = acfm(406.86+gauge pressure)/460).
Removal/Emission Rate = C (ppmv) x Q (cfm) x (1lb-mole/386ft^3) x MW (lb/lb-mole) x 60 min/hr x 24 hr/day x 10^{-6},
where C = concentration, Q = flow, MW = molecular weight (100 lb/lb-mole for TPHg, 78 lb/lb-mole for benzene, 92 lb/lb-mole for toluene, 106 lb/lb-mole for ethylbenzene, 106 lb/lb-mole for xylene, 88 lb/lb-mol for MTBE).
Cumulative removal = removal rate multiplied by the hour-interval of operation.

TABLE 15

AS/SVE PILOT TEST RADIUS OF INFLUENCE CALCULATIONS
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Extraction Well	*Monitoring Wells*	*Rw (feet)*	*r (feet)*	*Pw*	*Pw(abs) inches water*	*P(obs) inches water*	*P(r)*	*Ri* [1] *(feet)*	*P(obs)/P(w) (%)*
TW-2	TW-4	0.250	17.0	60	467	4.58	411	23.53	**7.63**%
	TW-6	0.250	17.0	60	467	4.58	411	23.5	**7.63**%
	TW-8	0.250	10.0	60	467	7.41	414	16.2	**12.35**%



[1] Based on the steady-state radial pressure distribution equation from "A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil Venting Systems", P.C. Johnson, C.C. Stanley, M.W. Kemblowski, D.L. Byers, and J.D. Cothart, Groundwater Monitoring and Review, Spring 1990:

Ri = [Rw] / [r/Rw]^[(1-(Patm/Pw)^2)/(((P(r)/Pw)^2)-1)]

[2] Ratio of monitoring well gauge pressure to extraction well gauge pressure.

Rw = Radius of Extraction Well (feet)

r = Distance of observation well from extraction well (feet)

Pw = Pressure applied at extraction well (inches of water column)

P(obs) = Pressure at observation well (inches of water)

P(r) = Gage pressure at observation well (inches of water column)

Ri = Radius of Influence (feet)

"H_2O = Inches of water

bold = induced vacuum > 1% of applied vacuum

TABLE 16

GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA - EXTRACTION WELL EX-1
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Date	*Elapsed Time (Hrs)*	*Casing Vacuum (in Hg)*	*P-1*			*P-2*			*TW-6*			*TW-2*			*TW-8*			*TW-4*			*MW-8*			*MW-7*	
			DTW (ft)	*SPH Thickness (ft.)*	*Vacuum (in WC)*	*DTW (ft)*	*SPH Thickness (ft.)*	*Vacuum (in WC)*	*DTW (ft)*	*SPH Thickness (ft.)*	*Vacuum (in WC)*	*DTW (ft)*	*SPH Thickness (ft.)*	*Vacuum (in WC)*	*DTW (ft)*	*SPH Thickness (ft.)*	*Vacuum (in WC)*	*DTW (ft)*	*SPH Thickness (ft.)*	*Vacuum (in WC)*	*DTW (ft)*	*SPH Thickness (ft.)*	*Vacuum (in WC)*	*DTW (ft)*	*SPH Thickness (ft.)*	*Vacuum (in WC)*
	Total Depth (ft.)			*15.00*			*15.00*			*9.00*			*9.00*			*9.00*			*9.00*			*20.00*			*20.00*	
Initial readings																										
4/22/13 11:00	0.000	--	8.19	0.01	--	8.86	0.68	--	8.55	0.81	--	7.61	0.60	--	7.85	0.00	--	7.91	0.00	--	8.51	0.00	--	8.78	0.00	--
EX-1																										
Step #1a																										
4/22/13 17:00	0.000	6.9	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM
4/22/13 17:15	0.250	7.4	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM	--	--	NM
4/22/13 17:38	0.633	8.0	--	--	4.40	--	--	0.29	--	--	0.10	--	--	0.10	--	--	0.30	--	--	0.00	--	--	0.00	--	--	0.00
Step #2a																										
4/22/13 18:12	1.20	15.5	--	--	4.80	--	--	0.32	--	--	0.24	--	--	0.43	--	--	0.00	--	--	0.14	--	--	0.00	--	--	0.00
4/22/13 18:31	1.52	15.5	--	--	4.80	--	--	0.32	--	--	0.24	--	--	0.50	--	--	0.00	--	--	0.14	--	--	0.00	--	--	0.00
4/22/13 18:42	1.70	15.5	--	--	NM	--	--	NM	--	--	0.25	--	--	0.60	--	--	NM	--	--	NM	--	--	NM	--	--	NM
Step #3a																										
4/22/13 19:07	2.12	20.5	--	--	5.00	--	--	0.34	--	--	0.26	--	--	0.61	--	--	0.14	--	--	0.15	--	--	0.00	--	--	0.00
4/22/13 19:22	2.37	20.5	--	--	5.00	--	--	0.40	--	--	0.25	--	--	0.68	--	--	0.15	--	--	0.16	--	--	0.00	--	--	0.00
4/22/13 19:37	2.62	23.0	13.20	0.48	--	12.32	1.28	--	8.43	0.47	--	7.82	0.63	--	8.21	0.18	NM	8.52	0.17	--	--	--	--	--	--	--
Constant Rate																										
4/22/13 20:48	3.80	21.0	--	--	5.10	--	--	0.32	--	--	0.32	--	--	0.81	--	--	0.22	--	--	0.25	--	--	0.00	--	--	0.00
4/22/13 21:34	4.57	21.0	12.13	0.10	4.90	12.06	1.06	0.30	8.96	0.12	0.28	7.81	0.60	0.79	8.31	0.00	0.17	8.51	0.00	0.21	8.69	0.00	0.00	8.97	0.00	0.00
4/22/13 22:52	5.87	21.0	--	--	4.90	--	--	0.29	--	--	0.28	--	--	0.78	--	--	0.18	--	--	0.23	--	--	0.00	--	--	0.00
4/22/13 23:30	6.50	21.0	12.16	0.12	5.00	12.09	1.08	0.36	8.94	0.00	0.28	7.81	0.59	0.78	8.36	0.00	0.17	8.55	0.00	0.24	8.67	0.00	0.00	8.89	0.00	0.00
4/23/13 0:30	7.50	21.0	--	--	4.90	--	--	0.34	--	--	0.28	--	--	0.79	--	--	0.22	--	--	0.24	--	--	0.00	--	--	0.00
4/23/13 1:30	8.50	21.0	12.02	0.11	4.90	12.02	1.03	0.34	8.96	0.00	0.29	7.82	0.56	0.78	8.37	0.00	0.20	8.62	0.00	0.25	8.65	0.00	0.00	8.91	0.00	0.00
4/23/13 2:30	9.50	21.0	--	--	4.90	--	--	0.34	--	--	0.27	--	--	0.76	--	--	0.19	--	--	0.23	--	--	0.00	--	--	0.00
4/23/13 3:30	10.5	21.0	11.91	0.09	4.80	11.95	1.01	0.32	8.98	0.00	0.27	7.81	0.54	0.73	8.36	0.00	0.17	8.71	0.00	0.21	8.67	0.00	0.00	8.91	0.00	0.00
4/23/13 4:30	11.5	21.0	--	--	4.60	--	--	0.32	--	--	0.29	--	--	0.71	--	--	0.17	--	--	0.24	--	--	0.00	--	--	0.00
4/23/13 5:30	12.5	21.0	11.71	0.05	4.80	11.80	0.90	0.32	8.96	0.00	0.30	7.82	0.53	0.70	8.39	0.00	0.18	8.76	0.00	0.24	8.68	0.00	0.00	8.91	0.00	0.00
4/23/13 6:30	13.5	20.5	--	--	4.80	--	--	0.42	--	--	0.23	--	--	0.72	--	--	0.17	--	--	0.25	--	--	0.15 a	--	--	0.00
4/23/13 8:10	15.2	24.5	--	--	6.00	--	--	0.50	--	--	0.35	--	--	0.90	--	--	0.20	--	--	0.30	--	--	0.00	--	--	0.00
4/23/13 9:18	16.3	24.5	12.61	0.26	5.80	12.56	1.24	0.50	9.00	0.02	0.32	7.80	0.48	0.70	8.37	0.01	0.20	8.87	0.01	0.27	8.68	0.00	0.00	8.90	0.00	0.00
4/23/13 11:30	18.5	24.5	12.59	0.28	5.80	12.55	1.24	0.72	9.00	0.03	0.47	7.81	0.46	0.80	8.37	0.01	0.26	8.95	0.00	0.38	8.66	0.00	0.00	8.86	0.00	0.00
4/23/13 12:45	19.7	24.5	--	--	5.90	--	--	0.60	--	--	0.36	--	--	0.70	--	--	0.19	--	--	0.27	--	--	0.00	--	--	0.00
4/23/13 14:01	21.0	25.0	12.55	0.23	6.00	12.62	1.31	0.60	8.97	0.00	0.39	7.84	0.43	0.70	8.39	0.01	0.17	9.02	0.01	0.26	8.68	0.00	0.00	8.89	0.00	0.00
4/23/13 15:01	22.0	25.0	--	--	5.80	--	--	0.60	--	--	0.32	--	--	0.60	--	--	0.16	--	--	0.23	--	--	0.00	--	--	0.00
4/23/13 16:00	23.0	25.0	--	--	5.90	--	--	0.60	--	--	--	--	--	0.60	--	--	0.16	--	--	0.20	--	--	0.00	--	--	0.00
Recharge readings																										
4/23/13 17:30	--	--	10.07	0.02	--	10.51	0.52	--	8.49	0.00	--	7.61	0.40	--	8.31	0.00	--	9.00	0.00	--	8.55	0.00	--	8.79	0.00	--
Testing from EX-1				**P-1**			**P-2**			**TW-6**			**TW-2**			**TW-8**			**TW-4**			**MW-8**			**MW-7**	
Distance from EX-1 (ft.)				**4.58**			**14.8**			**18.9**			**36.2**			**38.0**			**39.5**			**96.6**			**137**	
Maximum DTW (ft)				**13.2**			**12.6**			**9.00**			**7.84**			**8.39**			**9.02**			**8.69**			**8.97**	
ıx Elevation Change (ft)				**5.01**			**3.76**			**0.570**			**0.230**			**0.540**			**1.11**			**0.180**			**0.190**	

Abbreviations and Notes
a = manometer error
in. WC = inches of water column
in. Hg = inches of mercury
Hrs = hours
DTW = depth to water
Ft = feet
-- = not measured

TABLE 17

GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA - EXTRACTION WELL RWX-2
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Date	Elapsed Time (Hrs)	Casing Vacuum (in Hg)	Casing Vacuum (in H2O)	RW-1		HW-W	LAIX-4		RWX-5		HW-N2	LAIX-5		RWX-7	
				DTW (ft)	Vacuum (in WC)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)
	Total Depth (ft.)			NA		NA	17.00		17.00		NA	15.00		17.00	
Initial readings															
4/23/13 15:30	0.00	--		5.25	--	--	12.72	--	7.38	--	--	8.18	--	7.20	--
RWX-2															
Step #1b															
4/23/13 23:00	0.00	7.5		--	--	--	--	--	--	--	--	--	--	--	--
4/23/13 23:45	0.75	8.5	9.90	--	--	--	--	--	--	--	--	--	--	--	--
			10.01												
Step #2b															
4/24/13 0:00	1.0	15.0		--	--	--	--	--	--	--	--	--	--	--	--
4/24/13 0:15	1.2	14.0		--	--	--	--	--	--	--	--	--	--	--	--
			10.43												
Step #3b			10.27												
4/24/13 0:30	1.5	23.0	10.48	--	--	--	--	--	--	--	--	--	--	--	--
4/24/13 0:45	1.7	23.0		--	--	--	--	--	--	--	--	--	--	--	--
Constant Rate			13.50												
4/24/13 1:45	2.7	23.0	13.64	6.08	2.5	0.00	12.02	0.00	7.74	0.00	0.00	8.21	0.00	7.34	0.00
4/24/13 2:45	3.8	23.0	13.40	--	2.9	0.00	--	0.00	--	0.00	0.13	--	0.00	--	0.00
4/24/13 3:45	4.7	23.0		6.15	3.1	0.00	12.02	0.00	7.77	0.00	0.13	8.21	0.00	7.38	0.00
4/24/13 4:45	5.7	23.0		--	3.2	0.00	--	0.00	--	0.00	0.13	--	0.00	--	0.00
4/24/13 5:45	6.8	23.0	18.4	6.15	3.4	0.00	12.04	0.00	7.81	0.00	0.13	8.21	0.00	7.40	0.020
4/24/13 6:45	7.7	23.0	18.6	--	3.6	0.00	--	0.00	--	0.00	0.00	--	0.00	--	0.00
4/24/13 7:45	8.7	23.0	18.9	6.19	4.5	0.00	12.02	0.00	7.86	0.00	0.00	8.24	0.00	7.42	0.00
Recharge readings															
4/24/13 14:20	--	--		6.21	--	--	11.95	--	7.86	--	--	8.26	--	7.41	--

Testing from RWX-2	RW-1	HW-W	LAIX-4	RWX-5	HW-N2	LAIX-5	RWX-7
Distance from RWX-2 (ft.)	**14.0**	**25.0**	**96.5**	**98.1**	**98.1**	**109**	**113**
Maximum DTW (ft)	**6.21**	**NA**	**12.04**	**7.86**	**NA**	**8.26**	**7.42**
Max Elevation Change (ft)	**0.00**	**NA**	**0.700**	**0.00**	**NA**	**0.00**	**0.00**

in. WC = inches of water column
in. Hg = inches of mercury
Hrs = hours
DTW = depth to water
Ft = feet
-- = not measured

TABLE 18

INDUCED VACUUM DATA - EXTRACTION WELL HW-W
PHILLIPS 66
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Date	*Elapsed Time (Hrs)*	*Casing Vacuum (in Hg)*	*RWX-2 Vacuum (in WC)*	*RW-1 Vacuum (in WC)*	*HW-N1 Vacuum (in WC)*	*RWX-5 Vacuum (in WC)*	*LAIX-4 Vacuum (in WC)*	*LAIX-5 Vacuum (in WC)*	*RWX-7 Vacuum (in WC)*
		Total Depth (ft.)	*15.00*	*NA*	*NA*	*17.00*	*17.00*	*17.00*	*17.00*
HW-W									
Constant Rate									
4/24/13 14:00	0.50	22.5	0.00	0.00	0.00	0.00	0.00	0.22	0.00
		Testing from HW-W	**RWX-2**	**RW-1**	**HW-N1**	**RW-5**	**LAIX-4**	**LAIX-5**	**RWX-7**
		Distance from HW-W (ft.)	**25.0**	**47.7**	**87.8**	**106**	**110**	**124**	**125**
		Maximum DTW (ft)	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**
		x Elevation Change (ft)	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**

in. WC = inches of water column
in. Hg = inches of mercury
Hrs = hours
DTW = depth to water
Ft = feet
-- = not measured
a = depth to water measurements were not taken due to pump stuck in well
b = water levels rose because extraction took place previously on LAIX-5

TABLE 19

INDUCED VACUUM DATA - EXTRACTION WELL HW-N1
DPE PILOT TEST
PHILLIPS 66
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Date	*Elapsed Time (Hrs)*	*Casing Vacuum (in Hg)*	*RW-4*	*HW-N2*	*RWX-2*	*RWX-5*	*RWX-7*	*LAIX-5*	*LAIX-4*
			Vacuum (in WC)	*Vacuum (in WC)*	*Vacuum (in WC)*	*Vacuum (in WC)*	*Vacuum (in WC)*	*Vacuum (in WC)*	*Vacuum (in WC)*
		Total Depth (ft.)	***NA***	***NA***	***15.00***	***17.00***	***17.00***	***15.00***	***15.00***
HW-N1									
Constant Rate									
4/24/13 15:10	0.42	22.5	150	136	0.00	0.02	0.00	0.50	0.00
		Testing from HW-N1	**RW-4**	**HW-N2**	**RWX-2**	**RWX-5**	**RWX-7**	**LAIX-5**	**LAIX-4**
		Distance from HW-N1 (ft.)	**32.3**	**41.6**	**62.0**	**73.8**	**99.6**	**119**	**120**
		Maximum DTW (ft)	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**
		x Elevation Change (ft)	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**	**NM**

in. WC = inches of water column
in. Hg = inches of mercury
Hrs = hours
DTW = depth to water
Ft = feet
-- = not measured
a = depth to water measurements were not taken due to pump stuck in well
b = water levels rose because extraction took place previously on LAIX-5

TABLE 20

GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA - EXTRACTION WELL RWX-5
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Date	Elapsed Time (Hrs)	Casing Vacuum (in Hg)	Casing Vacuum (in H2O)	HW-N2	RWX-7		RW-4		HW-E	RW-3		LAIX-6		LAIX-5		RWX-2	
				Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)
	Total Depth (ft.)			NA	17.00		NA		NA	NA		17.00		15.00		17.00	
Initial readings																	
4/24/13 14:20	--	--		--	7.41	--	6.09	--	--	6.29	--	8.05	--	8.26	--	9.49	--
RWX-5																	
Step #1c																	
4/24/13 17:00	0.00	7.9	12.7	0.00	--	0.80	--	0.00	0.00	--	0.00	--	0.00	--	0.62	--	0.00
4/24/13 17:15	0.25	7.9	12.7	0.00	--	0.60	--	0.00	0.01	--	0.00	--	0.00	--	0.59	--	0.00
4/24/13 17:30	0.50	8.0	12.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
			12.6														
Step #2c																	
4/24/13 18:05	1.1	13.0		0.00	--	0.80	--	0.00	0.03	--	0.00	--	0.00	--	0.46	--	0.00
4/24/13 20:30	1.2	13.0	12.8	0.00	--	1.2	--	0.00	0.25	--	0.00	--	0.00	--	0.38	--	0.00
4/24/13 20:45	3.5	13.0	12.5	0.00	--	1.0	--	0.00	0.20	--	0.00	--	0.00	--	0.32	--	0.00
			12.6														
Step #3c			12.4														
4/24/13 21:00	4.0	22.0	12.4	0.00	--	1.5	--	0.00	0.23	--	0.00	--	0.00	--	0.24	--	0.00
4/24/13 21:15	4.2	22.5	12.5	0.00	--	1.5	--	0.00	0.22	--	0.00	--	0.00	--	0.24	--	0.00
			12.6														
Constant Rate			12.4														
4/24/13 22:30	6.5	22.0	12.5	0.00	7.53	1.3	6.83	0.00	0.16	5.96	0.00	8.23	0.00	8.22	0.22	9.12	0.00
4/24/13 23:30	7.5	22.0	12.4	0.00	--	1.5	--	0.00	0.38	--	0.00	--	0.00	--	0.23	--	0.00
4/25/13 0:30	8.5	22.0	12.6	0.00	7.53	1.6	6.83	0.00	0.38	5.93	0.00	8.23	0.00	8.22	0.21	9.12	0.00
4/25/13 1:30	9.0	22.0	12.6	0.00	--	1.8	--	0.00	0.41	--	0.00	--	0.00	--	0.20	--	0.00
4/25/13 2:30	9.5	22.0	12.7	0.00	7.53	2.0	6.82	0.00	0.42	5.92	0.00	8.26	0.00	8.22	0.19	9.12	0.00
4/25/13 3:30	11	22.0	12.5	0.00	--	2.0	--	0.00	0.43	--	0.00	--	0.00	--	0.17	--	0.00
4/25/13 4:30	11	22.0	12.5	0.00	7.53	2.2	6.81	0.00	0.44	5.91	0.00	8.26	0.00	8.23	0.14	9.14	0.00
4/25/13 5:30	12	22.0	12.4	0.00	--	2.3	--	0.00	0.45	--	0.00	--	0.00	--	0.10	--	0.00
4/25/13 6:15	13	22.0	12.6	0.00	7.53	2.3	6.81	0.00	0.44	5.89	0.10	8.26	0.05	8.24	0.10	9.14	0.00
4/25/13 7:13	14	22.0	12.5	0.00	--	2.5	--	0.00	0.45	--	0.10	--	0.15	--	0.10	--	0.00
Recharge readings																	
4/25/13 7:15	--	--		--	7.55	--	6.61	--		5.71	--	8.29	--	8.06	--	9.24	--

Testing from RWX-5	HW-N2	RWX-7	RW-4	HW-E	RW-3	LAIX-6	LAIX-5	RWX-2
Distance from RWX-5 (ft.)	**17.8**	**26.4**	**34.0**	**43.8**	**50.3**	**77.8**	**85.5**	**98.1**
Maximum DTW (ft)	**NA**	**7.53**	**6.83**	**NA**	**6.29**	**8.26**	**8.26**	**9.49**
Max Elevation Change (ft)	**NA**	**0.120**	**0.740**	**NA**	**0.400**	**0.210**	**0.0400**	**0.370**

in. WC = inches of water column
in. Hg = inches of mercury
Hrs = hours
DTW = depth to water
Ft = feet
-- = not measured

TABLE 21

GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA - EXTRACTION WELL LAIX-5
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Date	*Elapsed Time (Hrs)*	*Casing Vacuum (in Hg)*	*LAIX-9*		*LAIX-4*		*LAIX-6*		*LAIX-8*		*LAIX-3*		*LAIX-7*		*HWX-1W*		*RWX-2*	
			DTW (ft)	*Vacuum (in WC)*	*DTW (ft)*	*Vacuum (in WC)*	*DTW (ft)*	*Vacuum (in WC)*	*DTW (ft)*	*Vacuum (in WC)*	*DTW (ft)*	*Vacuum (in WC)*	*DTW (ft)*	*Vacuum (in WC)*	*DTW (ft)*	*Vacuum (in WC)*	*DTW (ft)*	*Vacuum (in WC)*
	Total Depth (ft.)		*10.00*		*17.00*		*17.00*		*17.00*		*19.00*		*17.00*		*19.00*		*17.00*	
Initial readings																		
4/24/13 2:20	--	--	9.28	--	11.84	--	8.23	--	NM a	--	3.68	--	7.77	--	3.46	--	9.12	--
LAIX-5																		
Constant Rate																		
4/25/13 12:15	0.0	17.0	--	ERR	--	1.3	--	7.5	--	6.0	--	0.00	--	0.00	--	0.00	--	0.02
4/25/13 12:45	0.5	17.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4/25/13 13:30	1.3	23.0	9.49	20.0	11.84	1.0	7.75	8.3	--	10	--	0.00	8.37	0.00	--	0.00	9.25	0.01
4/25/13 14:00	1.8	23.0		--	--	--	--	--	--	--	--	--	--	--		--	--	--
Recharge readings																		
4/25/13 15:15	--	--	9.36	--	11.91	--	7.55	--	NM a	--	5.53	--	8.15	--	3.33	--	9.30	--

Testing from LAIX-5	**LAIX-9**	**LAIX-4**	**LAIX-6**	**LAIX-8**	**LAIX-3**	**LAIX-7**	**HWX-1W**	**RWX-2**
Distance from LAIX-5 (ft.)	**16.3**	**28.5**	**28.9**	**33.4**	**49.5**	**50.8**	**84.2**	**109**
Maximum DTW (ft)	**9.49**	**11.91**	**8.23**	**NA**	**5.53**	**8.37**	**3.46**	**9.30**
x Elevation Change (ft)	**0.210**	**0.070**	**0.480**	**NA**	**NA**	**0.600**	**NA**	**0.180**

in. WC = inches of water column
in. Hg = inches of mercury
Hrs = hours
DTW = depth to water
Ft = feet
-- = not measured
a = depth to water measurements were not taken due to pump stuck in well
ERR = erroneous data point due to malfunctioning magnehelic gauge

TABLE 22

GROUNDWATER DRAWDOWN AND INDUCED VACUUM DATA - EXTRACTION WELL LAIX-2
DPE PILOT TEST
PHILLIPS 66
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Date	Elapsed Time (Hrs)	Casing Vacuum (in Hg)	LAIX-3		LAI-1		HWX-1W		LAIX-4		LAI-10		LAIX-9		LAIX-5		LAIX-7	
			DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)	DTW (ft)	Vacuum (in WC)
	Total Depth (ft.)		19.00		9.50		19.00		17.00		10.00		17.00		15.00		17.00	
Initial readings																		
4/25/13 15:15	--	--	5.53	--	4.40	--	3.33	--	11.91	--	3.72	--	9.36	--	17.35 b	--	8.15	--
LAIX-2																		
Constant Rate																		
4/25/13 17:30	0.7	5.0	5.83	0.0	4.51	0.20	3.59	0.0	NM	0.3	3.73	0.0	NM	0.0	5.62 b	0.25	NM	0.0
4/25/13 22:30	5.7	5.0	5.65	0.0	4.71	0.00	3.82	0.3	NM	NM	3.76	0.0	NM	NM	NM	NM	NM	NM
Recharge readings																		
4/26/13 9:30	--	--	5.90	--	4.60	--	3.75	--	12.00	--	3.92	--	9.42	--	9.28 b	--	8.32	--

Testing from LAIX-2	LAIX-3	LAI-1	HWX-1W	LAIX-4	LAIX-10	LAIX-9	LAIX-5	LAIX-7
Distance from LAIX-2 (ft.)	**12.5**	**27.3**	**32.7**	**33.2**	**50.9**	**55.2**	**57.5**	**92.6**
Maximum DTW (ft)	**5.90**	**4.71**	**3.82**	**12.0**	**3.92**	**9.42**	**17.4**	**8.32**
x Elevation Change (ft)	**0.370**	**0.310**	**0.490**	**0.0900**	**0.200**	**0.0600**	**-11.7 b**	**0.170**

in. WC = inches of water column
in. Hg = inches of mercury
Hrs = hours
DTW = depth to water
Ft = feet
-- = not measured
a = depth to water measurements were not taken due to pump stuck in well
b = water levels rose because extraction took place previously on LAIX-5

TABLE 23

GROUNDWATER OPERATIONAL AND MASS REMOVAL DATA
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # Date/Time	*Hour Meter (hours)*	*Flow Meter Reading (gal)*	*Period Volume (gal)*	*Cumulative Volume (gal)*	*Flow Rate (gpm)*	*TPHg Conc. (ug/L)*	*TPHg Period Removal (lbs)*	*TPHg Cumulative Removal (lbs)*	*Benzene Conc. (ug/L)*	*Benzene Period Removal (lbs)*	*Benzene Cumulative Removal (lbs)*	*Toluene Conc. (ug/L)*	*Toluene Period Removal (lbs)*	*Toluene Cumulative Removal (lbs)*	*Ethylbenzene Conc. (ug/L)*	*Ethylbenzene Period Removal (lbs)*	*Ethylbenzene Cumulative Removal (lbs)*	*Xylene Conc. (ug/L)*	*Xylene Period Removal (lbs)*	*Xylene Cumulative Removal (lbs)*	*MTBE Conc. (ug/L)*	*MTBE Period Removal (lbs)*	*MTBE Cumulative Removal (lbs)*
EX-1 pumping test:																							
Initial																							
4/22/13 15:00	NM	4.0	0.0	0.0	NA	147,000			33,100			23,700			3,040			19,700			<200		
Step #1a																							
4/22/13 17:00	3620	4.0	0.0	0.0	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM
4/22/13 17:15	3620	NM	NM	NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM
4/22/13 17:38	3620	NM	NM	NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM
Step #2a																							
4/22/13 18:20	3620	454	450	450	5.63		0.755	0.76		0.121	0.12		0.089	0.09		0.012	0.012		0.072	0.07		0.0008	0.0008
4/22/13 18:31	3621	492	37.3	488	3.39		0.0626	0.82		0.010	0.13		0.007	0.10		0.001	0.013		0.006	0.08		0.0001	0.0009
4/22/13 18:42	3621	525	33.9	521	3.08		0.0569	0.87		0.009	0.14		0.007	0.10		0.001	0.014		0.005	0.08		0.0001	0.0010
Step #3a																							
4/22/13 19:07	3621	597	71.6	593	2.86		0.120	0.99		0.019	0.16		0.014	0.12		0.002	0.016		0.011	0.09		0.0001	0.0011
4/22/13 19:22	3622	638	41.4	634	2.76		0.0694	1.06		0.011	0.17		0.008	0.13		0.001	0.017		0.007	0.10		0.0001	0.0012
4/22/13 19:37	3622	681	42.4	677	2.83		0.0711	1.14		0.011	0.18		0.008	0.13		0.001	0.018		0.007	0.11		0.0001	0.0013
Constant rate																							
4/22/13 20:48	3624	765	84.2	761	1.19		0.141	1.28		0.023	0.20		0.017	0.15		0.002	0.021		0.013	0.12		0.0002	0.0014
4/22/13 21:34	3624	863	98.0	859	2.13		0.164	1.44		0.026	0.23		0.019	0.17		0.003	0.023		0.016	0.14		0.0002	0.0016
4/22/13 22:52	3626	1,000	137	996	1.76		0.230	1.67		0.037	0.27		0.027	0.20		0.004	0.027		0.022	0.16		0.0003	0.0019
4/22/13 23:30	3626	1,053	53.0	1,049	1.39		0.0889	1.76		0.014	0.28		0.010	0.21		0.001	0.029		0.008	0.17		0.0001	0.0020
4/23/13 0:30	3627	1,168	115	1,164	1.92		0.193	1.95		0.031	0.31		0.023	0.23		0.003	0.032		0.018	0.19		0.0002	0.0022
4/23/13 1:30	3628	1,261	93.0	1,257	1.55		0.156	2.11		0.025	0.34		0.018	0.25		0.003	0.034		0.015	0.20		0.0002	0.0024
4/23/13 2:30	3629	1,352	91.0	1,348	1.52		0.153	2.26		0.024	0.36		0.018	0.27		0.002	0.037		0.015	0.22		0.0002	0.0025
4/23/13 3:30	3630	1,452	100	1,448	1.67		0.168	2.43		0.027	0.39		0.020	0.29		0.003	0.039		0.016	0.23		0.0002	0.0027
4/23/13 4:30	3631	1,535	83.0	1,531	1.38		0.139	2.57		0.022	0.41		0.016	0.30		0.002	0.042		0.013	0.24		0.0002	0.0029
4/23/13 5:30	3632	1,632	97.0	1,628	1.62		0.163	2.73		0.026	0.44		0.019	0.32		0.003	0.044		0.016	0.26		0.0002	0.0031
4/23/13 6:30	3633	1,720	88.0	1,716	1.47		0.148	2.88		0.024	0.46		0.017	0.34		0.002	0.047		0.014	0.27		0.0002	0.0032
4/23/13 8:10	3635	1,904	184	1,900	1.84		0.309	3.19		0.049	0.51		0.036	0.37		0.005	0.052		0.029	0.30		0.0003	0.0036
4/23/13 9:18	3636	2,017	113	2,013	1.66		0.190	3.38		0.030	0.54		0.022	0.40		0.003	0.055		0.018	0.32		0.0002	0.0038
4/23/13 11:30	3638	2,246	229	2,242	1.73		0.384	3.76		0.061	0.60		0.045	0.44		0.006	0.061		0.037	0.36		0.0004	0.0042
4/23/13 12:45	3639	2,400	154	2,396	2.05		0.258	4.02		0.041	0.64		0.030	0.47		0.004	0.065		0.025	0.38		0.0003	0.0045
4/23/13 14:01	3642	2,595	195	2,591	2.57		0.327	4.35		0.052	0.70		0.038	0.51		0.005	0.071		0.031	0.41		0.0004	0.0049
4/23/13 15:01	3642	2,696	101	2,692	1.68		0.169	4.52		0.027	0.72		0.020	0.53		0.003	0.073		0.016	0.43		0.0002	0.0051
4/23/13 16:00	3643	2,793	96.5	2,789	1.64		0.162	4.68		0.026	0.75		0.019	0.55		0.003	0.076		0.015	0.45		0.0002	0.0052
4/23/13 16:20	NM	2,803	10.5	2,799	0.525	255,000	0.000	4.68	31,200	0.000	0.75	23,600	0.000	0.55	3,490	0.000	0.076	18,600	0.000	0.45	<250	0.0000	0.0052
Total Gallons Recovered		**2,799**	**gallons**			**Total Mass Removed**		**4.68**	**pounds**		**0.748**	**pounds**		**0.550**	**pounds**		**0.076**	**pounds**		**0.446**	**pounds**		**0.0052**	**pounds**
Averaged Daily Yield Rate		**2,921**	**gpd**			**Averaged Mass Removal Rate**		**4.88**	**ppd**		**0.781**	**ppd**		**0.574**	**ppd**		**0.079**	**ppd**		**0.465**	**ppd**		**0.0055**	**ppd**
		2.03	**gpm**																				
RWX-2																							
4/23/13 22:15	NM	2,803	NA	NA	NA	9,420			539			1,350			215			1,370			<10.0		

TABLE 23

GROUNDWATER OPERATIONAL AND MASS REMOVAL DATA
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # Date/Time	*Hour Meter (hours)*	*Flow Meter Reading (gal)*	*Period Volume (gal)*	*Cumulative Volume (gal)*	*Flow Rate (gpm)*	*TPHg Conc. (ug/L)*	*TPHg Period Removal (lbs)*	*TPHg Cumulative Removal (lbs)*	*Benzene Conc. (ug/L)*	*Benzene Period Removal (lbs)*	*Benzene Cumulative Removal (lbs)*	*Toluene Conc. (ug/L)*	*Toluene Period Removal (lbs)*	*Toluene Cumulative Removal (lbs)*	*Ethylbenzene Conc. (ug/L)*	*Ethylbenzene Period Removal (lbs)*	*Ethylbenzene Cumulative Removal (lbs)*	*Xylene Conc. (ug/L)*	*Xylene Period Removal (lbs)*	*Xylene Cumulative Removal (lbs)*	*MTBE Conc. (ug/L)*	*MTBE Period Removal (lbs)*	*MTBE Cumulative Removal (lbs)*
Step #1b																							
4/23/13 23:00	3644	2,815	12.0	2,811	NA		0.003	0.003		0.0001	0.0001		0.000	0.000		0.0001	0.0001		0.000	0.000		0.00000	0.00000
4/23/13 23:45	3645	2,905	90.0	2,901	2.00		0.021	0.024		0.0006	0.0007		0.003	0.004		0.0004	0.0004		0.003	0.003		0.00002	0.00003
Step #2b																							
4/24/13 0:00	3645	NM	NM	NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM
4/24/13 0:15	3645	NM	NM	NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM
Step #3b																							
4/24/13 0:30	3645	2,977	72.0	2,973	4.80		0.017	0.041		0.0005	0.0012		0.003	0.006		0.0003	0.0008		0.002	0.006		0.00002	0.00004
4/24/13 0:45	3646	3,001	24.0	2,997	1.60		0.006	0.047		0.0002	0.0014		0.001	0.007		0.0001	0.0009		0.001	0.007		0.00001	0.00005
Constant Rate																							
4/24/13 1:45	3647	3,215	214	3,211	3.57		0.051	0.098		0.0015	0.0029		0.008	0.015		0.0009	0.0018		0.007	0.014		0.00005	0.00010
4/24/13 2:45	3648	3,342	127	3,338	2.12		0.030	0.128		0.0009	0.0038		0.005	0.020		0.0006	0.0023		0.004	0.018		0.00003	0.00013
4/24/13 3:45	3649	3,500	158	3,496	2.63		0.038	0.166		0.0011	0.0049		0.006	0.026		0.0007	0.0030		0.005	0.023		0.00004	0.00017
4/24/13 4:45	3650	3,661	161	3,657	2.68		0.038	0.204		0.0011	0.0060		0.006	0.032		0.0007	0.0037		0.005	0.029		0.00004	0.00021
4/24/13 5:45	3651	3,803	142	3,799	2.37		0.034	0.238		0.0010	0.0070		0.005	0.037		0.0006	0.0043		0.005	0.033		0.00004	0.00025
4/24/13 6:45	3652	4,027	224	4,023	3.73		0.053	0.291		0.0016	0.0085		0.008	0.045		0.0010	0.0053		0.007	0.041		0.00006	0.00031
4/24/13 7:45	3653	4,126	99.0	4,122	1.65		0.024	0.315		0.0007	0.0092		0.004	0.049		0.0004	0.0057		0.003	0.044		0.00002	0.00033
4/24/13 8:45	NM	Generator stopped working.					0.000	0.315		0.0000	0.0092		0.000	0.049		0.0000	0.0057		0.000	0.044		0.00000	0.00033
4/24/13 13:00	NM	4,388	262	4,384	0.83	47,600	0.000	0.315	1,130	0.0000	0.0092	7,490	0.000	0.049	826	0.0000	0.0057	6,650	0.000	0.044	<50.0	0.00000	0.00033
Total Gallons Recovered		**1,585**	**gallons**				**Total Mass Removed**	**0.31**	**pounds**		**0.009**	**pounds**		**0.05**	**pounds**		**0.006**	**pounds**		**0.04**	**pounds**		**0.0003**	**pounds**
Averaged Daily Yield Rate		**4,347**	**gpd**				**Averaged Mass Removal Rate**	**0.86**	**ppd**		**0.025**	**ppd**		**0.13**	**ppd**		**0.016**	**ppd**		**0.12**	**ppd**		**0.0009**	**ppd**
		3.02	**gpm**																				
RWX-5																							
Initial																							
4/24/03 16:25	NM	4,388	NA	NA	NA	881			61.3			166			46.3			234			<1.00		
Step #1c																							
4/24/13 17:00	3658	4,398	10.0	4,394	0.018		0.001	0.001		0.0000	0.0000		0.0001	0.0001		0.0000	0.0000		0.0001	0.0001		0.000001	0.000001
4/24/13 17:15	3658	4,415	17.0	4,411	1.13		0.001	0.001		0.0001	0.0001		0.0002	0.0004		0.0000	0.0000		0.0001	0.0002		0.000002	0.000003
4/24/13 17:30	3659	4,429	14.0	4,425	0.93		0.001	0.002		0.0001	0.0001		0.0002	0.0006		0.0000	0.0001		0.0001	0.0004		0.000002	0.000004
Step #2b																							
4/24/13 18:00	3659	NM	NM	NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM
4/24/13 18:15	3659	Pump not working. Troubleshooted and restarted at 20:30					NM	NM		NM	NM		NM	NM		NM	NM		NM	NM		NM	NM
4/24/13 20:30	3661	4,484	55.0	4,480	0.367		0.003	0.005		0.0002	0.0003		0.0008	0.0013		0.0001	0.0002		0.0005	0.0008		0.000006	0.000010
4/24/13 20:45	3662	4,500	16.0	4,496	1.07		0.001	0.006		0.0001	0.0004		0.0002	0.0015		0.0000	0.0002		0.0001	0.0010		0.000002	0.000012
Step #3b																							
4/24/13 21:00	3662	4,530	30.0	4,526	2.00		0.002	0.007		0.0001	0.0005		0.0004	0.0020		0.0000	0.0002		0.0003	0.0012		0.000003	0.000015
4/24/13 21:15	3662	4,561	31.0	4,557	2.07		0.002	0.009		0.0001	0.0006		0.0004	0.0024		0.0000	0.0003		0.0003	0.0015		0.000003	0.000019

TABLE 23

GROUNDWATER OPERATIONAL AND MASS REMOVAL DATA
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # Date/Time	*Hour Meter (hours)*	*Flow Meter Reading (gal)*	*Period Volume (gal)*	*Cumulative Volume (gal)*	*Flow Rate (gpm)*	*TPHg Conc. (ug/L)*	*TPHg Period Removal (lbs)*	*TPHg Cumulative Removal (lbs)*	*Benzene Conc. (ug/L)*	*Benzene Period Removal (lbs)*	*Benzene Cumulative Removal (lbs)*	*Toluene Conc. (ug/L)*	*Toluene Period Removal (lbs)*	*Toluene Cumulative Removal (lbs)*	*Ethylbenzene Conc. (ug/L)*	*Ethylbenzene Period Removal (lbs)*	*Ethylbenzene Cumulative Removal (lbs)*	*Xylene Conc. (ug/L)*	*Xylene Period Removal (lbs)*	*Xylene Cumulative Removal (lbs)*	*MTBE Conc. (ug/L)*	*MTBE Period Removal (lbs)*	*MTBE Cumulative Removal (lbs)*
Constant rate																							
4/24/13 22:30	3663	4,671	110	4,667	1.47		0.006	0.015		0.0004	0.0010		0.0015	0.0039		0.0002	0.0004		0.0010	0.0024		0.000012	0.000031
4/24/13 23:30	3664	4,767	96.0	4,763	1.60		0.005	0.020		0.0003	0.0014		0.0013	0.0052		0.0002	0.0006		0.0008	0.0033		0.000010	0.000041
4/25/13 0:30	3665	4,871	104	4,867	1.73		0.005	0.025		0.0004	0.0017		0.0014	0.0066		0.0002	0.0008		0.0009	0.0042		0.000011	0.000052
4/25/13 1:30	3666	4,978	107	4,974	1.78		0.006	0.031		0.0004	0.0021		0.0015	0.0081		0.0002	0.0009		0.0009	0.0051		0.000012	0.000064
4/25/13 2:30	3667	5,075	97.0	5,071	1.62		0.005	0.036		0.0004	0.0025		0.0013	0.0094		0.0002	0.0011		0.0008	0.0059		0.000011	0.000075
4/25/13 3:30	3668	5,171	96.0	5,167	1.60		0.005	0.041		0.0003	0.0028		0.0013	0.0108		0.0002	0.0012		0.0008	0.0068		0.000010	0.000085
4/25/13 4:30	3669	5,260	89.0	5,256	1.48		0.005	0.046		0.0003	0.0032		0.0012	0.0120		0.0001	0.0014		0.0008	0.0075		0.000010	0.000095
4/25/13 5:30	3670	5,387	127	5,383	2.12		0.007	0.052		0.0005	0.0036		0.0017	0.0137		0.0002	0.0016		0.0011	0.0086		0.000014	0.000108
4/25/13 6:15	3671	5,442	55.0	5,438	1.22		0.003	0.055		0.0002	0.0038		0.0008	0.0145		0.0001	0.0017		0.0005	0.0091		0.000006	0.000114
4/25/13 7:13	3672	5,543	101	5,539	1.74		0.005	0.061		0.0004	0.0042		0.0014	0.0159		0.0002	0.0018		0.0009	0.0100		0.000011	0.000125
4/25/13 7:30	NM	5,575	32.0	5,571	1.88	11,700	0.000	0.061	805	0.0000	0.0042	3,130	0.0000	0.0159	332	0.0000	0.0018	1,840	0.0000	0.0100	<25.0	0.000000	0.000125
Total Gallons Recovered		**1,187**	**gallons**		**Total Mass Removed**		**0.06**	**pounds**		**0.004**	**pounds**		**0.016**	**pounds**		**0.002**	**pounds**		**0.010**	**pounds**		**0.00013**	**pounds**
Averaged Daily Yield Rate		**2,004**	**gpd**		**Averaged Mass Removal Rate**		**0.10**	**ppd**		**0.007**	**ppd**		**0.026**	**ppd**		**0.003**	**ppd**		**0.017**	**ppd**		**0.00021**	**ppd**
		1.39	**gpm**																				
LAIX-5																							
Initial																							
4/25/13 11:40	NM	5,575	NA	NA	NA	33,600			2,660			5,910			418			5,070			<50.0		
Constant rate																							
4/25/13 12:15	3677	5,727	152	5,723	NM		0.130	0.130		0.010	0.010		0.017	0.017		0.0014	0.0014		0.017	0.017		0.00016	0.00016
4/25/13 12:45	3677	5,748	21.0	5,744	0.700		0.018	0.148		0.001	0.011		0.002	0.020		0.0002	0.0016		0.002	0.019		0.00002	0.00018
4/25/13 13:30	3678	5,774	26.0	5,770	0.578		0.022	0.171		0.002	0.013		0.003	0.023		0.0002	0.0018		0.003	0.022		0.00003	0.00021
4/25/13 14:00	3679	5,797	23.0	5,793	0.767		0.020	0.190		0.001	0.014		0.003	0.025		0.0002	0.0020		0.003	0.024		0.00002	0.00023
4/25/13 14:45	NM	5,846	49.0	5,842	1.09	172,000	0.000	0.190	12,600	0.000	0.014	21,200	0.000	0.025	1,730	0.0000	0.0020	21,100	0.000	0.024	<200	0.00000	0.00023
Total Gallons Recovered		**271**	**gallons**		**Total Mass Removed**		**0.19**	**pounds**		**0.014**	**pounds**		**0.025**	**pounds**		**0.002**	**pounds**		**0.024**	**pounds**		**0.0002**	**pounds**
Averaged Daily Yield Rate		**2,602**	**gpd**		**Averaged Mass Removal Rate**		**2.61**	**ppd**		**0.194**	**ppd**		**0.344**	**ppd**		**0.027**	**ppd**		**0.332**	**ppd**		**0.0032**	**ppd**
		1.807	**gpm**																				
LAIX-2																							
Initial																							
4/25/14 16:15	NM	5,846	NA	NA	NA	13,100			334			786			656			3,930			19.4		
Constant rate																							
4/25/13 17:30	3682	5,868	22.0	5,864	NA		0.003	0.003		0.0002	0.0002		0.0002	0.0002		0.0002	0.0002		0.0007	0.0007		0.000004	0.000004
4/25/13 19:00	NM	5,895	27.0	5,891	0.300		0.004	0.007		0.0003	0.0006		0.0003	0.0005		0.0002	0.0003		0.0008	0.0015		0.000004	0.000008
4/25/13 22:00	NM	Pump stopped working at 19:00. Restarted at 22:00.					0.000	0.007		0.0000	0.0006		0.0000	0.0005		0.0000	0.0003		0.0000	0.0015		0.000000	0.000008
4/25/13 22:30	3687	5,971	76.0	5,967	0.362		0.011	0.019		0.0009	0.0014		0.0008	0.0013		0.0005	0.0009		0.0023	0.0038		0.000012	0.000021
4/25/13 23:30	NM	Pump stopped working. Troubleshot but could not restart.					0.000	0.007		0.0000	0.0014		0.0000	0.0013		0.0000	0.0009		0.0000	0.0038		0.000000	0.000021
4/26/13 1:00	NM	NM	NA	NA	NA	22,600	0.000	0.019	2,360	0.0000	0.0014	1,800	0.0000	0.0013	1,050	0.0000	0.0009	3,340	0.0000	0.0038	<20.0	0.000000	0.000021
Total Gallons Recovered		**125**	**gallons**		**Total Mass Removed**		**0.02**	**pounds**		**0.001**	**pounds**		**0.001**	**pounds**		**0.001**	**pounds**		**0.004**	**pounds**		**0.00002**	**pounds**

TABLE 23

GROUNDWATER OPERATIONAL AND MASS REMOVAL DATA
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # Date/Time	*Hour Meter (hours)*	*Flow Meter Reading (gal)*	*Period Volume (gal)*	*Cumulative Volume (gal)*	*Flow Rate (gpm)*	*TPHg Conc. (ug/L)*	*TPHg Period Removal (lbs)*	*TPHg Cumulative Removal (lbs)*	*Benzene Conc. (ug/L)*	*Benzene Period Removal (lbs)*	*Benzene Cumulative Removal (lbs)*	*Toluene Conc. (ug/L)*	*Toluene Period Removal (lbs)*	*Toluene Cumulative Removal (lbs)*	*Ethylbenzene Conc. (ug/L)*	*Ethylbenzene Period Removal (lbs)*	*Ethylbenzene Cumulative Removal (lbs)*	*Xylene Conc. (ug/L)*	*Xylene Period Removal (lbs)*	*Xylene Cumulative Removal (lbs)*	*MTBE Conc. (ug/L)*	*MTBE Period Removal (lbs)*	*MTBE Cumulative Removal (lbs)*
Averaged Daily Yield Rate		**600**	**gpd**		**Averaged Mass Removal Rate**		**0.09**	**ppd**		**0.007**	**ppd**		**0.006**	**ppd**		**0.004**	**ppd**		**0.018**	**ppd**		**0.00010**	**ppd**
		0.417	**gpm**																				
For All Pilot Test Work:	**Total Gallons Extracted:**	**5,967**		**Total Pounds Removed:**			**5.26**			**0.777**			**0.641**			**0.0864**			**0.528**			**0.00594**	
				Total Gallons Removed:			**0.86**			**0.11**			**0.09**			**0.01**			**0.07**			**0.001**	

Abbreviations and Notes:
min = Minutes
gal = Gallons
lbs= Pounds
NM = Not Measured
NA = Not Applicable
ug/L = Microgram per liter
gpm = Gallons per minute
TPHg = Total petroleum hydrocarbons as gasoline
MTBE = Methyl tert-butyl ether
a = Initial 31 gallons was purged during SPH removal by diaphragm pump
Mass removal (pounds) based on the formula: volume extracted (gal) x Concentration (ug/L) x ($g/10^6$ ug/L) x pound/453.6g) x (3.785 L/gal)
Volume removal (gallons) data based on the formula: mass (pounds) x $(density)^{-1}$ (cc/g) x 453.6 (g/pound) x (L/1000 cc) x (gal/3.785 L)
Density inputs: TPHg = 0.73 g/cc, Benzene = 0.88 g/cc, Toluene = 0.87 g/cc, Ethylbenzene = 0.87 g/cc, Xylene= 0.87 g/cc, MTBE= 0.74 g/cc.
VOCs analyzed by EPA Method 8260B and TPHg analyzed NWTPH-Gx 8021.

TABLE 24

VAPOR PHASE OPERATIONAL AND MASS REMOVAL DATA - INDIVIDUAL WELLS
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # / Date/Time	Cumulative Operation (hours)	Well Vacuum in Hg	Well Temp °F	Well Flow (acfm)	Well Flow (scfm)	INF1 Vapor (ppmv)	INF1 Vacuum in Hg	INF1 Temp °F	INF1 Flow (acfm)	INF1 Flow (scfm)	INF1 Vapor (ppmv)	VOC Removal Rate (lbs/day)	VOC Cumulative Removed (lbs)	Hydrocarbon Concentrations (ppmv) TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	TPHg Removal Rate (lbs/day)	TPHg Cumulative Removed (lbs)	Benzene Removal Rate (lbs/day)	Benzene Cumulative Removed (lbs)	Toluene Removal Rate (lbs/day)	Toluene Cumulative Removed (lbs)	Ethylbenzene Removal Rate (lbs/day)	Ethylbenzene Cumulative Removed (lbs)	Xylenes Removal Rate (lbs/day)	Xylenes Cumulative Removed (lbs)
Initial																													
	0.00	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM																
EX-1																													
Step #1a																													
4/22/13 17:00	0.00	6.95	72.0	50.8	49.6	ERR	NM	NM	NM	NM	NM	ERR	0.00							218	0.0	8.6	0.00	7.8	0.00	0.80	0.00	3.7	0.00
4/22/13 17:15	0.25	7.35	76.9	53.2	51.4	29,000	NM	NM	NM	NM	NM	556	5.79							226	2.4	8.9	0.09	8.1	0.08	0.83	0.009	3.8	0.04
4/22/13 17:38	0.63	8.00	73.9	42.3	41.0	35,000	9.00	NM	NM	NM	NM	536	14.3							181	5.2	7.1	0.21	6.4	0.19	0.67	0.019	3.0	0.09
4/22/13 17:50	0.83	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	11,800	594	457	41.0	188	253	181	6.7	7.1	0.26	6.4	0.24	0.67	0.025	3.0	0.11
Step #2a																													
4/22/13 18:12	1.2	15.5	75.3	74.0	70.2	17,420	16.0	NM	NM	NM	NM	456	25.1							200	9.8	7.9	0.39	7.7	0.36	0.72	0.036	3.6	0.17
4/22/13 18:31	1.5	15.5	65.2	75.8	73.3	27,000	16.5	NM	NM	NM	NM	738	34.9							209	13	8.3	0.50	8.1	0.46	0.76	0.046	3.7	0.22
4/22/13 18:42	1.7	15.5	64.8	77.5	75.0	24,700	16.0	NM	NM	NM	NM	691	40.1							214	14	8.5	0.56	8.2	0.53	0.77	0.052	3.8	0.25
4/22/13 19:00	2.0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	7,640	389	320	26.1	129	158	214	17	8.5	0.67	8.2	0.63	0.77	0.061	3.8	0.30
Step #3a																													
4/22/13 19:07	2.1	20.5	64.2	77.0	73.7	23,360	21.0	NM	NM	NM	NM	642	51.3							265	18	11	0.72	9.4	0.68	0.88	0.066	3.9	0.31
4/22/13 19:22	2.4	20.5	62.1	79.0	75.9	25,050	21.0	NM	NM	NM	NM	709	58.7							273	21	11	0.83	9.7	0.78	0.91	0.075	4.0	0.36
4/22/13 19:37	2.6	23.0	59.2	80.0	76.8	25,000	23.5	NM	NM	NM	NM	716	66.1							276	24	11	0.95	9.8	0.88	0.92	0.085	4.1	0.40
4/22/13 19:54	2.9	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	9,630	495	371	30.3	135	202	276	27	11	1.1	9.8	1.0	0.9	0.10	4.1	0.45
Constant Rate																													
4/22/13 20:48	3.8	21.0	59.3	79.0	76.2	29,000	22.0	NM	NM	NM	NM	824	107							304	39	12	1.5	11	1.4	1.0	0.13	4.4	0.61
4/22/13 21:34	4.6	21.0	55.4	76.0	73.8	25,000	21.0	NM	NM	NM	NM	689	129							295	48	12	1.9	11	1.7	1.0	0.16	4.3	0.75
4/22/13 22:15	5.3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	10,700	540	419	32.6	147	231	297	56	12	2.2	11	2.0	1.0	0.19	4.3	0.87
4/22/13 22:52	5.9	21.0	53.6	77.0	75.1	24,500	21.0	NM	NM	NM	NM	686	166							294	64	12	2.5	11	2.3	1.0	0.22	4.5	1.0
4/22/13 23:30	6.5	21.0	51.5	75.0	73.4	26,700	21.0	NM	NM	NM	NM	731	185							288	72	11	2.8	11	2.6	1.0	0.24	4.4	1.1
4/23/13 0:30	7.5	21.0	48.8	76.0	74.8	25,500	21.0	NM	NM	NM	NM	712	215							293	84	12	3.3	11	3.1	1.0	0.28	4.5	1.3
4/23/13 1:30	8.5	21.0	47.5	75.0	74.0	24,000	21.0	NM	NM	NM	NM	663	242							290	96	12	3.8	11	3.5	1.0	0.32	4.5	1.5
4/23/13 2:00	9.0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	10,300	531	432	34.2	159	54.9	286	102	11	4.0	11	3.7	1.0	0.34	4.7	1.6
4/23/13 2:30	9.5	21.0	42.8	75.0	74.7	25,800	21.0	NM	NM	NM	NM	719	272	**Methane = 22,100 ppmv**						283	108	11	4.3	5.9	3.9	1.0	0.36	4.6	1.7
4/23/13 3:30	11	21.0	42.1	74.0	73.8	25,000	21.0	NM	NM	NM	NM	688	301							279	119	11	4.7	5.8	4.1	1.0	0.41	4.5	1.9
4/23/13 4:30	11	21.0	42.7	74.0	73.7	25,900	21.0	NM	NM	NM	NM	712	331							279	131	11	5.2	5.8	4.4	1.0	0.45	4.5	2.1
4/23/13 5:30	12	21.0	42.0	75.0	74.8	26,000	21.0	NM	NM	NM	NM	726	361							283	143	11	5.7	5.9	4.6	1.0	0.49	4.6	2.2
4/23/13 6:30	14	20.5	44.1	75.0	74.6	NM	21.0	NM	NM	NM	NM	NM	361							282	154	11	6.1	5.9	4.8	1.0	0.53	4.6	2.4
4/23/13 8:10	15	24.5	49.0	76.0	74.1	15,800	25.0	NM	NM	NM	NM	437	391							280	174	11	6.9	5.8	5.3	1.0	0.60	4.5	2.7
4/23/13 9:18	16	24.5	54.8	74.0	71.3	27,000	25.0	NM	NM	NM	NM	718	425							270	187	11	7.4	5.6	5.5	0.9	0.64	4.4	2.9
4/23/13 10:35	18	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	9,980	508	27	33	150	191	262	201	10	8.0	0.65	5.6	0.9	0.69	4.2	3.2
4/23/13 11:30	18	24.5	68.4	74.0	69.5	30,000	25.0	NM	NM	NM	NM	778	497							286	212	11	8.4	5.9	5.8	1.0	0.73	4.8	3.4
4/23/13 12:45	20	24.5	75.6	75.0	69.5	26,000	25.0	NM	NM	NM	NM	674	532							286	227	11	9.0	5.9	6.1	1.0	0.78	4.8	3.6
4/23/13 14:01	21	25.0	78.6	73.0	67.2	29,000	25.0	NM	NM	NM	NM	727	570							277	241	11	10	5.7	6.4	1.0	0.84	4.7	3.9
4/23/13 15:01	22	25.0	90.5	75.0	67.5	33,000	25.0	NM	NM	NM	NM	831	605							278	253	11	10	5.8	6.6	1.0	0.88	4.7	4.0
4/23/13 16:00	23	25.0	91.6	75.0	67.4	31,300	25.0	NM	NM	NM	NM	787	637							278	264	11	10	5.7	6.9	1.0	0.92	4.7	4.2
4/23/13 16:05	23	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	12,100	586	470	41.0	201	230	304	265	11	10	11	6.9	1.1	0.92	5.4	4.3
																			Total Mass Removed (lbs)		**265**		**10**		**6.9**		**0.92**		**4.3**
																			Averaged Mass Removal Rate (ppd)	**276**		**11**		**7.2**		**1.0**		**4.4**	
RWX-2*																													

TABLE 24

VAPOR PHASE OPERATIONAL AND MASS REMOVAL DATA - INDIVIDUAL WELLS
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # Date/Time	Cumulative Operation (hours)	Well Vacuum in Hg	Well Temp °F	Well Flow (acfm)	Well Flow (scfm)	INF1 Vapor (ppmv)	INF1 Vacuum in Hg	INF1 Temp °F	INF1 Flow (acfm)	INF1 Flow (scfm)	INF1 Vapor (ppmv)	VOC Removal Rate (lbs/day)	VOC Cumulative Removed (lbs)	Hydrocarbon Concentrations (ppmv) TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	TPHg Removal Rate (lbs/day)	TPHg Cumulative Removed (lbs)	Benzene Removal Rate (lbs/day)	Benzene Cumulative Removed (lbs)	Toluene Removal Rate (lbs/day)	Toluene Cumulative Removed (lbs)	Ethylbenzene Removal Rate (lbs/day)	Ethylbenzene Cumulative Removed (lbs)	Xylenes Removal Rate (lbs/day)	Xylenes Cumulative Removed (lbs)
Step #1b																													
4/23/13 23:00	0.0	7.50	NM	NM	NM	NM	10.0	53.7	85.0	85.8	50	1.60	0.47							4.7	0.00	0.057	0.00	0.480	0.00	0.071	0.00	0.47	0.00
4/23/13 23:45	0.75	8.50	NM	NM	NM	NM	10.0	49.0	85.0	86.3	43	1.38	0.51							4.7	0.15	0.058	0.0018	0.483	0.015	0.072	0.0022	0.48	0.015
4/23/13 23:55	0.92	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	146	2.30	16.3	2.1	14	<0.10	4.7	0.18	0.058	0.0022	0.483	0.018	0.072	0.0027	0.48	0.018
Step #2b																													
4/24/13 0:00	1.0	15.0	NM	NM	NM	NM	14.5	46.0	96.0	96.5	35	1.26	0.52							1.3	0.18	0.028	0.0023	0.142	0.019	0.042	0.0029	0.28	0.019
4/24/13 0:15	1.2	14.0	NM	NM	NM	NM	14.5	47.0	100	101	32	1.20	0.54	37.4	1.0	4.3	1.1	7.4	<0.10	1.4	0.20	0.029	0.0026	0.148	0.020	0.044	0.0033	0.29	0.022
Step #3b																													
4/24/13 0:30	1.5	23.0	NM	NM	NM	NM	24.0	46.0	110	108	25	1.01	0.55							0.44	0.20	0.013	0.0027	0.048	0.021	0.015	0.0035	0.088	0.023
4/24/13 0:43	1.7	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	10.8	0.42	1.3	0.34	2.06	<0.10	0.44	0.21	0.013	0.0029	0.048	0.021	0.015	0.0036	0.088	0.024
4/24/13 0:45	1.7	23.0	NM	NM	NM	NM	24.0	45.0	110	109	23	0.931	0.56							0.44	0.21	0.013	0.0029	0.048	0.021	0.015	0.0036	0.088	0.024
Constant Rate																													
4/24/13 1:45	2.7	23.0	NM	NM	NM	NM	24.0	44.0	110	109	51	2.07	0.64	Sample collected at 1:45 arrived flat at the laboratory						0.44	0.23	0.013	0.0034	0.049	0.024	0.015	0.0043	0.089	0.028
4/24/13 2:45	3.8	23.0	NM	NM	NM	NM	24.0	41.4	110	109	45	1.83	0.72							0.44	0.24	0.013	0.0040	0.049	0.026	0.015	0.0049	0.089	0.032
4/24/13 3:45	4.7	23.0	NM	NM	NM	NM	24.0	39.9	110	110	50	2.04	0.80							0.44	0.26	0.013	0.0046	0.049	0.028	0.015	0.0055	0.089	0.035
4/24/13 4:45	5.7	23.0	NM	NM	NM	NM	24.0	37.5	110	110	40	1.64	0.87							0.44	0.28	0.013	0.0051	0.049	0.030	0.015	0.0061	0.090	0.039
4/24/13 5:45	6.8	23.0	NM	NM	NM	NM	24.0	35.8	108	109	42	1.70	0.94							0.44	0.30	0.013	0.0057	0.048	0.032	0.015	0.0067	0.088	0.043
4/24/13 6:45	7.7	23.0	NM	NM	NM	NM	24.0	42.4	112	111	33	1.37	1.0							0.45	0.32	0.014	0.0062	0.050	0.034	0.015	0.0073	0.090	0.046
4/24/13 7:45	8.7	23.0	NM	NM	NM	NM	24.0	53.7	111	108	32	1.30	1.1							0.43	0.34	0.013	0.0068	0.048	0.036	0.014	0.0079	0.088	0.050
4/24/13 8:45	9.7	Generator shutdown. Sample was unable to be taken due to the unexpedted shutdown.																		0.43	0.35	0.013	0.0073	0.048	0.038	0.014	0.0085	0.088	0.054
																			Total Mass Removed (lbs)		**0.35**		**0.0073**		**0.038**		**0.009**		**0.054**
																			Averaged Mass Removal Rate (ppd)	**0.87**		**0.018**		**0.093**		**0.021**		**0.13**	
HW-W*																													
Constant rate																													
4/24/13 13:30	0.0	22.5	NM	NM	NM	NM	23.0	81.0	104	95.9	5.0	0.179	0.043							0.19	0.00	0.0028	0.00	0.018	0.00	0.0061	0.00	0.046	0.00
4/24/13 14:10	0.67	22.5	NM	NM	NM	NM	25.5	72.0	110	103	2.0	0.077	0.045							0.20	0.0057	0.0030	0.000083	0.019	0.00054	0.0065	0.00018	0.050	0.0014
4/24/13 14:40	1.2	22.5	NM	NM	NM	NM	25.0	79.0	109	101	9.0	0.339	0.052	5.3	<0.10	0.55	0.16	1.22	<0.10	0.20	0.010	0.0029	0.00014	0.019	0.00094	0.0064	0.00031	0.049	0.0024
																			Total Mass Removed (lbs)		**0.010**		**0.00014**		**0.00094**		**0.00031**		**0.0024**
																			Averaged Mass Removal Rate (ppd)	**0.20**		**0.0030**		**0.019**		**0.0065**		**0.049**	
HW-N1*																													
Constant rate																													
4/24/13 14:45	0.0	14.0	No data or sample results available since the vacuum line was filled with water and a sample was unable to be taken.																	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
4/24/13 15:45	1.0	14.0	No data or sample results available since the vacuum line was filled with water and a sample was unable to be taken.																	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
RWX-5*																													
Step #1c																													
4/24/13 17:00	0.0	7.90	NM	NM	NM	NM	10.0	85.0	82.0	77.9	25	0.727	0.071							0.20	0.00	0.0070	0.00	0.029	0.00	0.0052	0.00	0.050	0.00
4/24/13 17:15	0.25	7.90	NM	NM	NM	NM	10.0	82.0	79.0	75.5	27	0.760	0.079							0.20	0.0021	0.0068	0.000071	0.028	0.00030	0.0051	0.00005	0.0483	0.00050
4/24/13 17:30	0.50	8.00	NM	NM	NM	NM	10.0	76.0	80.0	77.3	19	0.548	0.084							0.20	0.0042	0.0070	0.00014	0.029	0.00060	0.0052	0.00011	0.0495	0.0010
4/24/13 18:00	1.0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	7.0	0.31	1.1	<0.17	1.62	<0.17	0.20	0.0084	0.0070	0.00029	0.029	0.0012	0.0052	0.00022	0.0495	0.0021
Step #2c																													
4/24/13 18:05	1.1	13.0	NM	NM	NM	NM	15.0	73.0	110	105	15	0.590	0.10							0.31	0.0094	0.0074	0.00031	0.038	0.0013	0.0090	0.00025	0.078	0.0023

TABLE 24

VAPOR PHASE OPERATIONAL AND MASS REMOVAL DATA - INDIVIDUAL WELLS
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # / Date/Time	Cumulative Operation (hours)	Well Vacuum in Hg	Well Temp °F	Well Flow (acfm)	Well Flow (scfm)	INF1 Vapor (ppmv)	INF1 Vacuum in Hg	INF1 Temp °F	INF1 Flow (acfm)	INF1 Flow (scfm)	INF1 Vapor (ppmv)	VOC Removal Rate (lbs/day)	VOC Cumulative Removed (lbs)	Hydrocarbon Concentrations (ppmv) TPHg	Benzene	Toluene	Ethylbenzene	Xylenes	MTBE	TPHg Removal Rate (lbs/day)	TPHg Cumulative Removed (lbs)	Benzene Removal Rate (lbs/day)	Benzene Cumulative Removed (lbs)	Toluene Removal Rate (lbs/day)	Toluene Cumulative Removed (lbs)	Ethylbenzene Removal Rate (lbs/day)	Ethylbenzene Cumulative Removed (lbs)	Xylenes Removal Rate (lbs/day)	Xylenes Cumulative Removed (lbs)
4/24/13 18:15	1.2	Pump not operating but SVE was continued while the pump was being fixed, which was restarted at 20:30.																		0.31	0.012	0.0074	0.00037	0.038	0.0016	0.0090	0.00031	0.078	0.0029
4/24/13 20:30	3.5	13.0	NM	NM	NM	NM	15.0	57.0	111	110	21	0.860	0.19							0.32	0.042	0.0077	0.0011	0.040	0.0053	0.0093	0.0012	0.081	0.010
4/24/13 20:45	3.8	13.0	NM	NM	NM	NM	15.0	58.0	113	112	23	0.957	0.20	Sample collected at 20:45 arrived flat at the laboratory						0.33	0.045	0.0078	0.0012	0.040	0.0057	0.0095	0.0013	0.082	0.011
Step #3c																													
4/24/13 21:00	4.0	22.0	NM	NM	NM	NM	24.0	57.0	123	119	20	0.887	0.20							0.39	0.049	0.0059	0.0012	0.041	0.0062	0.012	0.0014	0.099	0.012
4/24/13 21:15	4.2	22.5	NM	NM	NM	NM	24.0	57.0	121	117	19	0.827	0.21							0.38	0.053	0.0058	0.0013	0.040	0.0066	0.012	0.0015	0.097	0.013
4/24/13 21:30	4.5	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	8.7	0.17	1.0	0.26	2.1	<0.10	0.38	0.057	0.0058	0.0013	0.040	0.0070	0.012	0.0017	0.097	0.014
Constant Rate																													
4/24/13 22:30	5.5	22.0	NM	NM	NM	NM	24.0	54.8	120	116	36	1.56	0.29							0.26	0.068	0.0046	0.0015	0.028	0.0081	0.008	0.0020	0.060	0.017
4/24/13 23:30	6.5	22.0	NM	NM	NM	NM	24.0	54.5	117	114	30	1.27	0.35							0.25	0.078	0.0045	0.0017	0.027	0.0093	0.008	0.0023	0.058	0.019
4/25/13 0:30	7.5	22.0	NM	NM	NM	NM	24.0	49.8	116	114	9.0	0.382	0.36							0.25	0.089	0.0045	0.0019	0.027	0.010	0.008	0.0027	0.058	0.022
4/25/13 1:30	8.5	22.0	NM	NM	NM	NM	24.0	46.6	115	113	12	0.508	0.38							0.25	0.10	0.0045	0.0021	0.027	0.012	0.008	0.0030	0.058	0.024
4/25/13 2:00	9.0	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	3.3	<0.10	0.39	<0.10	0.49	<0.10	0.14	0.10	0.0034	0.0022	0.016	0.012	0.005	0.0031	0.023	0.025
4/25/13 2:30	9.5	22.0	NM	NM	NM	NM	24.0	45.9	121	119	15	0.668	0.41	**Methane = 34.4 ppmv**						0.70	0.12	0.011	0.0024	0.057	0.013	0.008	0.0033	0.041	0.025
4/25/13 3:30	11	22.0	NM	NM	NM	NM	24.0	44.8	126	125	17	0.791	0.45							0.73	0.15	0.011	0.0029	0.060	0.016	0.008	0.0036	0.043	0.027
4/25/13 4:30	11	22.0	NM	NM	NM	NM	24.0	42.1	120	119	14	0.623	0.47							0.69	0.18	0.011	0.0033	0.057	0.018	0.008	0.0039	0.041	0.029
4/25/13 5:30	12	22.0	NM	NM	NM	NM	24.0	40.9	111	111	21	0.867	0.51							0.64	0.20	0.010	0.0037	0.053	0.020	0.007	0.0042	0.038	0.030
4/25/13 6:15	13	22.0	NM	NM	NM	NM	24.0	40.1	119	119	13	0.576	0.53							0.69	0.22	0.011	0.0041	0.057	0.022	0.008	0.0044	0.041	0.032
4/25/13 7:00	14	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	27.9	0.53	2.4	0.22	1.25	<0.10	1.3	0.26	0.019	0.0047	0.10	0.025	0.011	0.0048	0.060	0.034
4/25/13 7:13	14	22.0	NM	NM	NM	NM	24.0	41.1	124	124	9.0	0.415	0.54							1.3	0.28	0.019	0.0048	0.10	0.026	0.011	0.0049	0.061	0.034
														Total Mass Removed (lbs)							**0.28**		**0.0048**		**0.026**		**0.0049**		**0.034**
														Averaged Mass Removal Rate (ppd)						**0.47**		**0.0082**		**0.044**		**0.0082**		**0.058**	
LAIX-5*																													
Constant Rate																													
4/25/13 12:15	0.0	17.0	NM	NM	NM	NM	19.5	83.0	123	115	15	0.641	0.13							46	0.00	0.35	0.00	4.0	0.00	1.2	0.00	14.0	0.00
4/25/13 12:45	0.50	17.0	NM	NM	NM	NM	24.5	82.0	126	118	290	12.7	0.40	1,080	10.6	102	25.5	308	<10.0	47	1.0	0.36	0.008	4.1	0.086	1.2	0.0	14.3	0.30
4/25/13 13:30	1.3	23.0	NM	NM	NM	NM	24.5	90.0	119	108	200	8.04	0.65	**Methane = 335 ppmv**						36	2.1	0.32	0.018	3.3	0.19	0.88	0.052	10.5	0.63
4/25/13 14:00	1.8	23.0	NM	NM	NM	NM	25.0	83.0	117	107	74	2.96	0.71							36	2.8	0.32	0.024	3.3	0.26	0.88	0.071	10.5	0.84
4/25/13 14:35	2.3	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	696	<10.0	75.6	16.0	184	<10.0	28	3.5	0.31	0.032	2.8	0.32	0.68	0.087	7.8	1.03
														Total Mass Removed (lbs)							**3.5**		**0.032**		**0.32**		**0.087**		**1.0**
														Averaged Mass Removal Rate (ppd)						**36**		**0.33**		**3.3**		**0.90**		**10.6**	
LAIX-2*																													
Mini step test																													
4/25/13 16:47	0.0	11.0	NM	NM	NM	NM	NM	NM	111	106	NM	NM	NM							1.3	0.00	0.0077	0.00	0.077	0.00	0.0071	0.00	0.053	0.00
4/25/13 16:49	0.033	12.0	NM	NM	NM	NM	NM	NM	115	110	NM	NM	NM							1.4	0.0019	0.0080	0.00001	0.079	0.00011	0.0074	0.00001	0.055	0.00008
4/25/13 16:56	0.15	13.0	NM	NM	NM	NM	NM	NM	125	119	NM	NM	NM							1.5	0.0091	0.0087	0.00005	0.086	0.00053	0.0080	0.00005	0.060	0.00037
4/25/13 16:58	0.18	14.0	No data available since vacuum line was filled with water and silt/sludge buildup.																	1.5	0.011	0.0087	0.00007	0.086	0.00065	0.0080	0.00006	0.060	0.00045
Constant Rate																													
4/25/13 17:30	0.72	5.00	NM	NM	NM	NM	9.00	94.0	96.0	90.4	65	2.19	0.94							1.1	0.036	0.0066	0.00021	0.065	0.0021	0.0061	0.00020	0.045	0.0015
4/25/13 18:25	1.6	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	33.2	0.25	2.1	0.17	1.27	0.26	1.1	0.078	0.0065	0.00046	0.064	0.0045	0.0060	0.00042	0.045	0.0032
4/25/13 19:00	2.2	Pump not operating but SVE was continued while the pump was being fixed, which was restarted at 20:00.																		1.1	0.10	0.0065	0.00062	0.064	0.0061	0.0060	0.00057	0.045	0.0042
4/25/13 22:30	5.7	5.00	NM	NM	NM	NM	10.0	59.6	87.0	87.3	22	0.717	1.1							1.1	0.26	0.0064	0.0015	0.063	0.015	0.0059	0.0014	0.044	0.0106
4/25/13 23:30	6.7	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM							1.1	0.31	0.0064	0.0018	0.063	0.018	0.0059	0.0017	0.044	0.0125

TABLE 24

VAPOR PHASE OPERATIONAL AND MASS REMOVAL DATA - INDIVIDUAL WELLS
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Well # / Date/Time	Cumulative Operation (hours)	Well Vacuum in Hg	Well Temp °F	Well Flow (acfm)	Well Flow (scfm)	INF1 Vapor (ppmv)	INF1 Vacuum in Hg	INF1 Temp °F	INF1 Flow (acfm)	INF1 Flow (scfm)	INF1 Vapor (ppmv)	VOC Removal Rate (lbs/day)	VOC Cumulative Removed (lbs)	Hydrocarbon Concentrations TPHg (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylenes (ppmv)	MTBE (ppmv)	TPHg Removal Rate (lbs/day)	TPHg Cumulative Removed (lbs)	Benzene Removal Rate (lbs/day)	Benzene Cumulative Removed (lbs)	Toluene Removal Rate (lbs/day)	Toluene Cumulative Removed (lbs)	Ethylbenzene Removal Rate (lbs/day)	Ethylbenzene Cumulative Removed (lbs)	Xylenes Removal Rate (lbs/day)	Xylenes Cumulative Removed (lbs)
Total Mass Removed (lbs)																					**0.31**		**0.0018**		**0.018**		**0.0017**		**0.012**
Averaged Mass Removal Rate (ppd)																				**1.1**		**0.0065**		**0.064**		**0.0060**		**0.045**	

Abreviations and Notes:

acfm = actual cubic feet per minute.
ERR = cannot measure or erroneous data.
INF1 = System readings
in Hg = inches of mercury
lbs = pounds
NA = Not Applicable
NM = Not Measured
PID = Photoionization Detector
ppd = pounds per day
scfm = standard cubic feet per minute.
* = no measurements for temperature, flow, and concentration were taken at the wellhead during extraction from the noted wells due to the explosive hazard of instruments. Readings were from the system only during this time.
Atmospheric pressure = 406.86 in WC.
Absolute = atmospheric pressure - gauge vacuum (in WC).
System flow rates and vacuum readings taken from three inch system header pipes.
scfm = acfm(406.86+gauge pressure)/460).
Removal/Emission Rate = C (ppmv) x Q (cfm) x (1lb-mole/386ft^3) x MW (lb/lb-mole) x 60 min/hr x 24 hr/day x 10^{-6},
where C = concentration, Q = flow, MW = molecular weight (100 lb/lb-mole for TPHg, 78 lb/lb-mole for benzene, 92 lb/lb-mole for toluene, 106 lb/lb-mole for ethylbenzene, 106 lb/lb-mole for xylene, 88 lb/lb-mol for MTBE).
Cumulative removal = removal rate multiplied by the hour-interval of operation plus the previous total.

TABLE 25

RADIUS OF INFLUENCE ESTIMATES
DPE PILOT TEST
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Extraction Well	*Monitoring Wells*	*Rw (feet)*	*r (feet)*	*Pw*	*Pw(abs)*	*P(obs)*	*P(r)*	*Ri* [1] *(feet)*	*P(obs)/P(w) (%)*
					inches water				
EX-1	P-1	0.250	4.58	340	747	5.80	413	4.75	**1.71%**
	P-2	0.250	14.8	340	747	0.600	407	14.8	0.18%
	TW-2	0.250	36.2	340	747	0.800	408	36.5	0.24%
	TW-4	0.250	39.5	340	747	0.270	407	39.6	0.08%
	TW-6	0.250	18.9	340	747	0.360	407	19.0	0.11%
	TW-8	0.250	38.0	340	747	0.200	407	38.1	0.06%
	MW-7	0.250	137	340	747	0.000	407	137	0.00%
	MW-8	0.250	96.6	340	747	0.000	407	96.6	0.00%
RWX-2	RW-1	0.167	14.0	313	720	4.50	411	14.7	**1.44%**
	RWX-5	0.167	98.1	313	720	0.000	407	98.1	0.00%
	RWX-7	0.167	113	313	720	0.000	407	113	0.00%
	LAIX-4	0.167	96.5	313	720	0.000	407	96.5	0.00%
	LAIX-5	0.167	109	313	720	0.000	407	109	0.00%
	HW-W	0.167	25.0	313	720	0.000	407	25.0	0.00%
	HW-N2	0.167	98.1	313	720	0.130	407	98.3	0.04%
RWX-5	RWX-2	0.167	98.1	299	706	0.000	407	98.1	0.00%
	RW-3	0.167	50.3	299	706	0.100	407	50.3	0.03%
	RW-4	0.167	34.0	299	706	0.000	407	34.0	0.00%
	RWX-7	0.167	26.4	299	706	2.50	409	27.2	0.84%
	LAIX-5	0.167	85.5	299	706	0.200	407	85.7	0.07%
	LAIX-6	0.167	77.8	299	706	0.150	407	77.9	0.05%
	HW-N2	0.167	17.8	299	706	0.000	407	17.8	0.00%
	HW-E	0.167	43.8	299	706	0.450	407	44.0	0.15%
LAIX-5	RWX-2	0.167	109	313	720	0.0200	407	109	0.01%
	LAIX-3	0.167	49.5	313	720	0.000	407	49.5	0.00%
	LAIX-4	0.167	28.5	313	720	1.30	408	29.0	0.42%
	LAIX-6	0.167	28.9	313	720	8.30	415	32.0	**2.65%**
	LAIX-7	0.167	50.8	313	720	0.000	407	50.8	0.00%
	LAIX-8	0.167	33.4	313	720	10.0	417	37.9	**3.20%**
	LAIX-9	0.167	16.3	313	720	20.0	427	20.4	**6.39%**
	HWX-1W	0.167	84.2	313	720	0.000	407	84.2	0.00%
LAIX-2	LAI-1	0.167	27.3	68	475	0.200	407	27.6	0.29%
	LAIX-3	0.167	12.5	68	475	0.000	407	12.5	0.00%
	LAIX-4	0.167	33.2	68	475	0.300	407	33.9	0.44%
	LAIX-9	0.167	55.2	68	475	0.000	407	55.2	0.00%
	HWX-1W	0.167	32.7	68	475	0.300	407	33.4	0.44%
	LAIX-5	0.167	57.5	68	475	0.250	407	58.7	0.37%
	LAIX-7	0.167	92.6	68	475	0.000	407	92.6	0.00%
	LAI-10	0.167	50.9	68	475	0.000	407	50.9	0.00%

[1] Based on the steady-state radial pressure distribution equation from "A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil Venting Systems", P.C. Johnson, C.C. Stanley, M.W. Kemblowski, D.L. Byers, and J.D. Cothart, Groundwater Monitoring and Review, Spring 1990:

Ri = [Rw] / [r/Rw]^[(1-(Patm/Pw)^2)/(((P(r)/Pw)^2)-1)]

[2] Ratio of monitoring well gauge pressure to extraction well gauge pressure.

Rw = Radius of Extraction Well (feet)
r = Distance of observation well from extraction well (feet)
Pw = Pressure applied at extraction well (inches of water column)
P(obs) = Pressure at observation well (inches of water)
P(r) = Gage pressure at observation well (inches of wate
Ri = Radius of Influence (feet)
"H_2O = Inches of water
bold = induced vacuum > 1% of applied vacuum

TABLE 26

PRELIMINARY SCREENING OF REMEDIAL TECHNOLOGIES
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Potential Remedial Technology	*Description*	*Effectiveness*	*Implementability*	*Short-term Risk*	*Cost*
Monitored Natural Attenuation	Petroleum hydrocarbons in soil and groundwater will naturally degrade over time without treatment. MNA does not include any active remediation to remove or treat hydrocarbons in the subsurface. Natural attenuation is monitored through collection of groundwater concentration data until cleanup objectives have been met.	Is eventually effective, but considering the magntitude of hydrocarbon impacts, it will take an unacceptably long time. It also will do nothing to prevent migration of the current impacts offsite, potentially impacting the sensitive wetland	Easily implementable, but is not considered an effective remedy.	Would likely affect human health or the environment through impact to the adjacent wetland receptor.	Low
Groundwater Extraction	A network of groundwater extraction wells would be operated within the main area of the plume to remove source and at the site boundaries to hydraulically control the plume from migrating offsite and impacting the adjacent wetlands. Extracted groundwater is conveyed to a fixed system for treatment prior to discharge under permit to the sanitary sewer or to surface water.	Effective at eliminating risk, but would not reduce concentrations quickly.	Not difficult to implement, but would require construction of groundwater extraction wells, conveyance piping, and treatment system. Operation would be extremely lengthy given the magnitude of the existing LNAPL source.	May be some risk during construction of system. Minimal risk to human health and environment during operation.	Low to Moderate
Excavation	Removal of impacted soil source with treatment of soil and/or off-site disposal	Highly effective	Not feasible unless existing site use is curtailed and overlying structures are demolished	May be some risk during execution of the excavation work. May still affect human health or the environment without proper dissolved plume controls.	High*
Multi-Phase Extraction	Remedy includes groundwater extraction in the area of soil source to dewater and expose soil source concurrent with soil vapor extraction to volatilize and remove petroleum hydrocarbon impacts. Extracted groundwater and soil vapor will be treated aboveground at a fixed treatment compound located	Based on results of operation of existing interim remediation systems and on results of additional feasibility testing, MPE will be moderately effective at reducing source mass.	System will be reasonably easy to implement, but the spacing of extraction wells may be limited due to the existence of current buildings and other features at the facility.	May be some risk during construction of system. Minimal risk to human health and environment during operation.	Moderate to High
Biological Treatment with Surfactant Flushing Pre-Treatment and Limited Groundwater Recovery	In-situ bioremediation (aerobic or anaerobic) is a treatment process whereby contaminants are metabolized into less toxic or non-toxic compounds by naturally occurring microorganisms. Biological treatment would not be effective in the presence of significant LNAPL source; therefore, surfactant flushing would be implemented to mitigate LNAPL source prior to implementing biological treatment.	The likelihood of success for surfactant flushing to adequately mitigate LNAPL source is very low. In addition, the likelihood of success with biological treatment is also considered very low.	Both surfactant application and biological treatment are reasonably easy to implement, although it may take many applications of both treatments to achieve cleanup objectives, or to determine it is technically infeasible.	There may be some risk during treatment applications. There is also risk to human health and environment due to increased mobilization of hydrocarbon plume in groundwater. A series of groundwater extraction wells downgradient of the source area and at the plume boundaries adjacent to the wetlands would be required to mitigate impact to	Moderate to High
Chemical Oxidation	The use of strong oxidizing agents to oxidize contaminants into non-toxic byproducts.	Effective in reducing groundwater concentrations, but would likely be ineffective at treating LNAPL source in soil. Chemical oxidation is also not considered safe to implement with the presence of significant LNAPL source.	Relatively easy to implement, but it would not be considered safe to implement this technology at this site due to the presence of significant LNAPL source in soil.	Highly risky to implement in the presence of significant LNAPL source in soil. May affect human health or the environment without proper controls	Moderate
Soil Vapor Extraction / Air-sparging	Removes hydrocarbon compounds from soil beneath the water table by injecting air into the substrate to volatilize compounds and extracting vapors from the vadose zone to remove volatilized compounds. Extracted soil vapor is treated aboveground at a fixed treatment compound.	Will not be effective at this site based on lithology beneath the facility. A lithologic barrier exists above the soil source that will limit the migration of volatilized hydrocarbons into the vadose zone	System would be reasonably easy to implement, but this is not considered an effective remedy	May be some risk during construction of system. May affect human health or the environment due to lack of hydraulic control of plume.	Moderate to High

* The cost evaluation of excavation is based current facility use. Excavation of all impacted soil would require removal of the existing buildings, and construction of a new structure. If and when the facility use changes, the cost will change from high to moderate.

DISPROPORTIONATE COST ANALYSIS
PHILLIPS 66 TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Alternative No.	1	2	3
Remediation Type	Dual-Phase Extraction	Groundwater Extraction	In-Situ Enhanced Biodegradation (with Surfactant Pre-Treatment and Limited Groundwater Recovery)
Ranking Criteria			
1. Meets All Cleanup Action Objectives	Yes	Yes	Yes
2. Compliance with MTCA Threshold Criteria [WAC 173-340-360 (2)(a)]			
- Protect Human health and the environment	Yes	Yes	Yes
- Comply with cleanup standards	Yes	Yes	Yes
- Comply with applicable state/federal laws	Yes	Yes	Yes
- Provide for compliance monitoring	Yes	Yes	Yes
3. Restoration Timeframe [WAC 173-340-360 (2)(b)(ii) and WAC 173-340-360 (4)]			
- Potential risks posed by the site to human health and the environment	Low	Low	Low
- Practicability of achieving a shorter restoration time frame	See DCA below	See DCA below	See DCA below
- Affect on current site use, surrounding areas and associated resources	Low, Industrial Site	Low, Industrial Site	Low, Industrial Site
- Affect on future site use, surrounding areas and associated resources	Low, Industrial Site	Low, Industrial Site	Low, Industrial Site
- Availability of alternative water supplies	Water supplied by City of Renton	Water supplied by City of Renton	Water supplied by City of Renton
- Likely effectiveness and reliability of institutional controls	High	High	High
- Ability to control and monitor migration of hazardous substances from the site	High	High	High
- Toxicity of the hazardous substances at the site	Low	Low	Low
- Natural processes that reduce concentration of hazardous substances	Low to Moderate	Low to Moderate	Low to Moderate
Overall Reasonable Restoration Timeframe	Yes	Yes	Yes

4. Relative Benefits Ranking for DCA [WAC 173-340-360 (2)(b)(i) and WAC 173-340-360(3)(f)]												
	Comparative ranking	Score	Weighing factor	Weighted Score	Comparative ranking	Score	Weighing factor	Weighted Score	Comparative ranking	Score	Weighing factor	Weighted Score
- Overall Protectiveness	Medium High	8	0.3	2.4	Medium	6	0.3	1.8	Medium Low to Mediu	5	0.3	1.5
- Permanence	Medium High	8	0.2	1.6	Medium	6	0.2	1.2	Medium Low	4	0.2	0.8
- Long-term effectiveness	dium High to H	7	0.2	1.4	Medium Low to Mediur	5	0.2	1	Low to Medium Low	3	0.2	0.6
- Manageability of Short Term Risk	dium High to H	7	0.1	0.7	Medium Low	4	0.1	0.4	Low	2	0.1	0.2
- Implementability	Medium High	8	0.1	0.8	Medium High	8	0.1	0.8	Medium to Medium Hig	7	0.1	0.7
- Consideration of Public Concerns	Medium High	8	0.1	0.8	Medium High to High	7	0.1	0.7	Medium	6	0.1	0.6
Comparative Overall Benefit				7.7				5.9				4.4
5. Disproportionate Cost Analysis												
- Estimated Remedy Cost	$3,856,000				$14,969,000				$8,504,000			
- Magnitude of Cost Compared to Lowest Cost Alternative	---				388%				221%			
- Relative Remedy Costs	1.00				3.88				2.21			
- Magnitude of relative benefit to most permanent alternative	100%				77%				75%			
- Relative Comparative Benefit	1.75				1.34				1.00			
- Ratio of Relative Remedy Cost to Relative comparative benefit	0.57				2.90				2.21			
- Costs disproportionate to incremental benefits?	No				Yes				Yes			
- Remedy permanent to the maximum extent practicable?	Yes				Yes				Yes			
Preferred Alternative for Cleanup?	**Yes**				**No**				**No**			

Comparative Ranking Scale

Very Low	1
Low	2
Low to Medium Low	3
Medium Low	4
Medium Low to Medium	5
Medium	6
Medium to Medium High	7
Medium High	8
Medium High to High	9
High	10

APPENDIX A

EXAMPLE LIF OUTPUT

UVOST Log Reference Guide

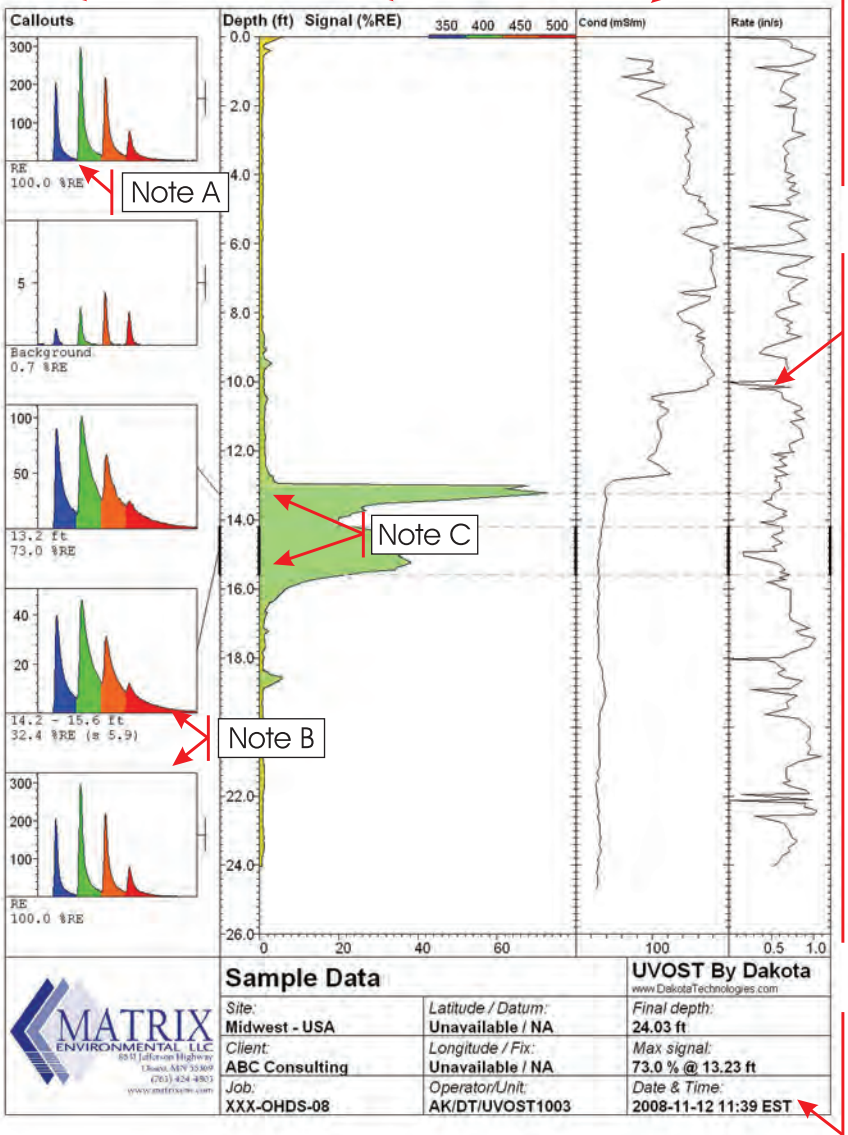
Main Plot :
Signal (total fluorescence) versus depth where signal is relative to the Reference Emitter (RE).The total area of the waveform is divided by the total area of the Reference Emitter yielding the %RE.This %RE scales with the NAPL fluorescence. The fill color is based on relative contribution of each channel's area to the total waveform area (see callout waveform).The channel-to-color relationship and corresponding wavelengths are given in the upper right corner of the main plot.

Callouts :
Waveforms from selected depths or depth ranges showing the multi-wavelength waveform for that depth.

The four peaks are due to fluorescence at four wavelengths and referred to as “channels”. Each channel is assigned a color.

Various NAPLs will have a unique waveform “fingerprint” due to the relative amplitude of the four channels and/or broadening of one or more channels.

Basic waveform statistics and any operator notes are given below the callout.



Conductivity Plot :
The Electrical Conductivity (EC) of the soil can be logged simultaneously with the UVOSTdata. EC often provides insight into the stratigraphy.
Note the drop in EC from 10 - 13 ft, indicating a shift from consolidated to unconsolidated stratigraphy.This correlates with the observed NAPL distribution.

Rate Plot :
The rate of probe advancement. ~ 0.8 in (2cm) per second is preferred.

A noticeable decrease in the rate of advancement may be indicative of difficult probing conditions (gravel, angular sands, etc.).

Notice that this log was terminated arbitrarily, not due to "refusal", which would have been indicated by a sudden rate drop at final depth.

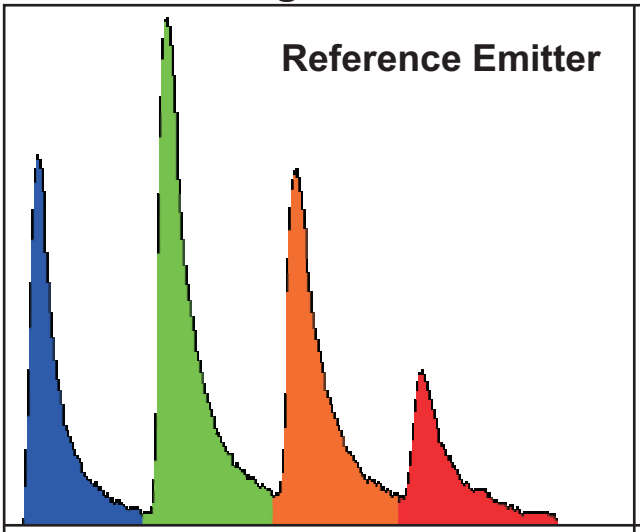
Info Box :
Contains pertinent log info including name and location.

NoteA:
Time is along the x axis. No scale is given, but it is a consistent 320ns wide.
The y axis is in mV and directly corresponds to the amount of light striking the photodetector.

Note B :
These two waveforms are clearly different.The first is weathered diesel from the log itself while the second is the Reference Emitter (a blend of NAPLs) always taken before each log for calibration.

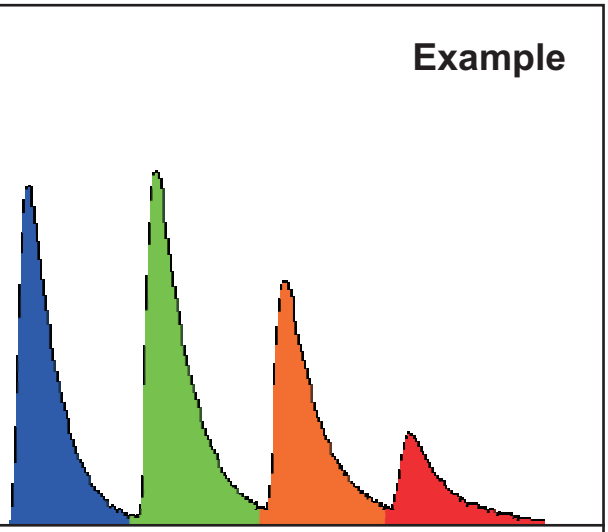
Note C :
Callouts can be a single depth (see 3rd callout) or a range (see 4th callout).The range is noted on the depth axis by a bold line. When the callout is a range, the average and standard deviation in %RE is given below the callout.

Waveform Signal Calculation



CH1		CH2		CH3		CH4		Total
4820	+	8108	+	6249	+	2984	=	**22161**
21.7		36.6		28.2		13.5		**100%**

Channel Area (pVs) Percent RE

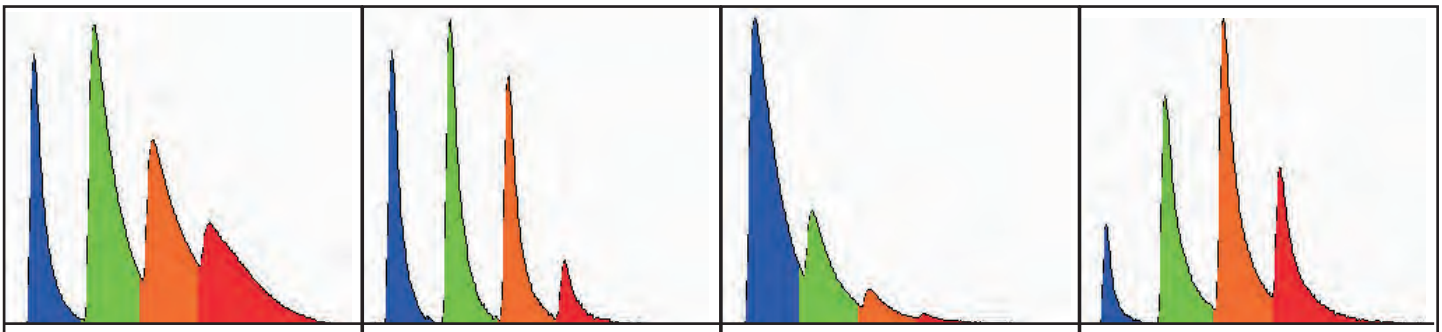


CH1		CH2		CH3		CH4		Total
4923	+	5743	+	4166	+	1735	=	**16587**
22.3		25.9		18.8		7.8		**75%**

Data Files

***.lif.raw.bin**	Raw data file. Header is ASCII format and contains information stored when the file was initially written (e.g. date, total depth, max signal, gps, etc., and any information entered by the operator). All raw waveforms are appended to the bottom of the file in a binary format.
***.lif.plt**	Stores the plot scheme history (e.g. callout depths) for associated Raw file. Transfer along with the Raw file in order to recall previous plots.
***.lif.jpg**	A jpg image of the OST log including the main signal vs. depth plot, callouts, information, etc.
***.lif.dat.txt**	Data export of a single Raw file. ASCII tab delimited format. No string header is provided for the columns (to make importing into other programs easier). Each row is a unique depth reading. The columns are: Depth, Total Signal (%RE), Ch1%, Ch2%, Ch3%, Ch4%, Rate, Conductivity Depth, Conductivity Signal. Summing channels 1 to 4 yields the Total Signal.
***.lif.sum.txt**	A summary file for a number of Raw files. ASCII tab delimited format. The file contains a string header. The summary includes one row for each Raw file and contains information for each file including: the file name, gps coordinates, max depth, max signal, and depth at which the max signal occured.
***.lif.log.txt**	An activity log generated automatically located in the OST application directory in the 'log' subfolder. Each OST unit the computer operates will generate a separate log file per month. A log file contains much of the header information contained within each separate Raw file, including: date, total depth, max signal, etc.

Common Waveforms (highly dependent on soil, weathering, etc.)



Diesel	Gas	Kerosene	Motor Oil

APPENDIX B

LNAPL EQUATIONS

LNAPL BEHAVIOR EQUATIONS AND MODELS

TABLE OF CONTENTS

Page

1.0 INTRODUCTION TO LNAPL BEHAVIOR EQUATIONS / THEORY....1

2.0 PRESSURE CONDITIONS NECESSARY FOR LNAPL MOVEMENT....2
- 2.1 CAPILLARY PRESSURE....2
- 2.2 SOIL RESISTIVE FORCES....5
- 2.3 PORE ENTRY DISPLACEMENT PRESSURE....7

3.0 SOIL DRAINAGE CHARACTERISTICS....10

4.0 LNAPL MOBILITY AND VELOCITY EQUATIONS....14
- 4.1 LNAPL MOBILITY EQUATIONS....14
- 4.2 LNAPL SPECIFIC DISCHARGE AND VELOCITY EQUATIONS....22
- 4.3 LNAPL IMMOBILITY....23

5.0 LNAPL SPECIFIC VOLUME AND RECOVERABLE VOLUME....25

REFERENCES....27

LIST OF FIGURES

FIGURE 1	RELATIONSHIP BETWEEN IN-WELL LNAPL THICKNESS AND FORMATION THICKNESS
FIGURE 2	PRESSURE GRAPH WITH REFERENCE ELEVATIONS/DEPTHS FOR LNAPL AND WATER
FIGURE 3	SOIL RESISTIVE FORCES FOR LNAPL DISPLACEMENT OF PORE WATER
FIGURE 4	THRESHOLD CAPILLARY PRESSURE EQUAL TO PORE ENTRY DISPLACEMENT PRESSURE
FIGURE 5	SOIL DRAINAGE CHARACTERISTIC MODELS
FIGURE 6	CAPILLARY PRESSURE TEST FOR LNAPL-WATER
FIGURE 7	IDEALIZED LNAPL SATURATION AND RELATIVE PERMEABILITY PROFILES

LIST OF SYMBOLS/ACRONYMS

α	van Genuchten α
α_{ow}	Capillary Pressure Head Parameter – Oil/Water (ft^{-1})
α_{ao}	Capillary Pressure Head parameter – Air/Oil (ft^{-1})
b_o	LNAPL Thickness (ft)
ϕ	Total Soil Porosity
ϕ_{eff}	Effective Porosity (Effective Free Oil Porosity)
g	Gravitational Constant (kg m/s^2)
h	Water Pressure Head in van Genuchten Drainage Model
h_c	Critical height/head of LNAPL
i	Reference Point Along Vertical LNAPL Saturation Profile
i_w	Water Hydraulic Gradient (assumed equal to oil gradient)
k	Soil Permeability (cm^2)
k_{ro}	LNAPL Relative Permeability
k_{ro-b}	LNAPL Relative Permeability from Burdine Equation
k_{ro-m}	LNAPL Relative Permeability from Mualem Equation
K_w	Hydraulic Conductivity Water (cm/s or ft/day)
K_o	LNAPL Conductivity (cm/s)
λ	Model Fitting Parameter
μ_o	LNAPL Viscosity (cp)
μ_w	Water Viscosity (cp)
M	Model Fitting Parameter
M_o	LNAPL Mobility (cm/s or ft/day)
n	Number of Equally Spaced Points on the Z-Axis
N	van Genuchten N
ρ_o	LNAPL Density (g/cm^3)
ρ_w	Water Density (g/cm^3)

P_C Capillary Pressure

P_D Pore Displacement Entry Pressure

P_o Oil/LNAPL Pressure

P_R Resistive Soil Pressure/Force

P_w Water Pressure

q_o LNAPL Specific Discharge (cm/s or ft/day)

r Radius of Curvature at Fluid Interface

σ_{aw} Air-Water Interfacial Tension (dynes/cm)

σ_{ow} Oil-Water Interfacial Tension (dynes/cm)

σ_{ao} Air-Oil Interfacial Tension (dynes/cm)

S_o LNAPL Saturation

S_{or} LNAPL Residual Saturation

S_{ors} LNAPL Residual Saturation – Saturated Zone

S_{orv} LNAPL Residual Saturation – Vadose Zone

S_t Total (LNAPL plus Water) Saturation

S_w Water Saturation

S_{wr} Water Residual (Irreducible) Saturation

θ Contact Angle between Fluid Interface and Soil Particle

T_o LNAPL Transmissivity (cm^2/s or ft^2/day)

V_o LNAPL Specific Volume (ft^3/ft^2)

υ_o LNAPL Velocity (cm/s or ft/day)

z Reference Elevation on the Vertical LNAPL Saturation Profile (ft)

z_{ao} Air-Oil Elevation (ft)

z_{aw} Air-Water Elevation (ft)

z_{ow} Oil-Water Elevation (ft)

$z_{\max}$ Maximum Elevation of LNAPL (above residual saturation) in Smear Zone (ft)

1.0 INTRODUCTION TO LNAPL BEHAVIOR EQUATIONS / THEORY

This Appendix presents some of the basic LNAPL concepts and mathematical expressions or equations that describe the occurrence, behavior and migration of LNAPL in the subsurface. Specifically, this section addresses LNAPL behavior at the water table and includes the vertical impacted soil zone typically referred to as the smear zone. The smear zone is where potentially mobile LNAPL may reside at sites where the source(s) of the LNAPL impacts have ceased for some time (i.e., no ongoing sources). The behavior of LNAPL in the vadose or unsaturated zone (above the smear zone) is not addressed here.

The analytical equations/models presented herein are based on a number of assumptions including: the fluids (LNAPL and water) are in vertical equilibrium and the soil conditions are homogeneous. These conditions are required for in-well or apparent LNAPL thicknesses to be considered representative of the spatial (vertical) distribution of LNAPL in the formation. Situations where these conditions are not met include sites with:

- Water table fluctuations
- Confined conditions
- Sump wells in a perched setting
- On-going LNAPL release(s)
- Heterogeneous conditions

Although in a real world setting, there are often times when vertical equilibrium of liquids and homogeneous soil conditions do not exist; LNAPL analytical equations and models may still be used to generate qualitative information about LNAPL behavior. The degree to which model results are quantitatively valid and defensible will be based on actual site conditions and the accuracy of the LNAPL Conceptual Site Model (LCSM). Where possible, the use of site-specific model inputs (as determined from field and/or laboratory testing) is preferred over the use of default literature look-up values.

2.0 PRESSURE CONDITIONS NECESSARY FOR LNAPL MOVEMENT

LNAPL requires pressure to move in the subsurface at the water table. More specifically, the capillary pressure must be sufficient to overcome the soil resistive forces to enable the displacement of groundwater from unimpacted saturated soil pores. The following sections provide a discussion regarding capillary pressure, soil resistive forces and pore entry displacement pressure. A figure illustrating the idealized relationship between LNAPL in a well versus LNAPL in a formation, based on the principles of capillary pressure and LNAPL saturation, is provided in Figure 1.

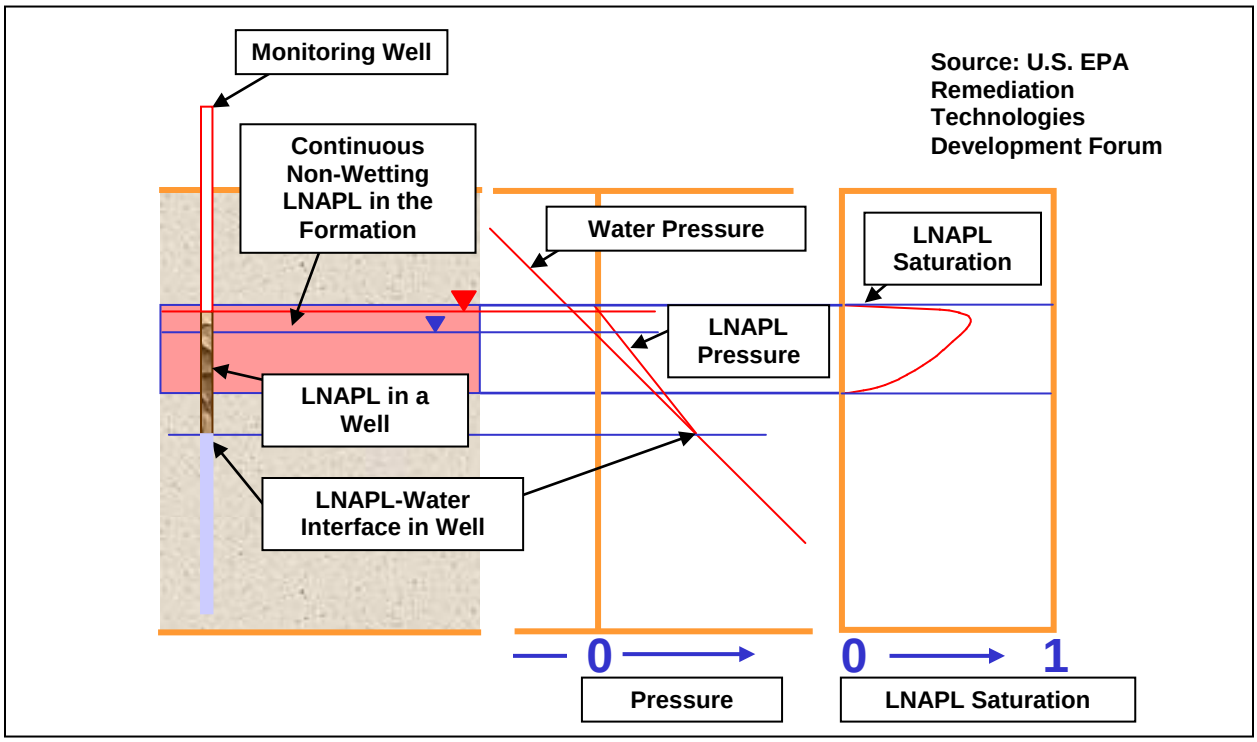


Figure 1 – Idealized Relationship Between In-Well LNAPL Thickness and Formation Thickness

2.1 CAPILLARY PRESSURE

Capillary pressure, which is sometimes referred to as "excess pressure", is defined as the difference between the fluid pressure in the non-wetting phase (typically LNAPL) and the pressure in the wetting phase (typically water) at a given reference point. The larger the capillary pressure (i.e., pressure difference between the two fluids), the greater the LNAPL saturation, and the greater the potential for LNAPL mobility. For LNAPL

movement or migration to occur, LNAPL capillary pressure must exceed the resistive forces in the soil formation.

Any object submerged in a fluid is subject to a fluid pressure based on the depth of submersion beneath the top of fluid (or air/fluid interface). The greater the depth of submersion, the greater the pressure at that point. The fluid pressure is a function of the density of the fluid, the depth of submersion, and the gravitational constant. In a subsurface environment, LNAPL and water exhibit pressures depending on the depth beneath the fluid or phreatic surface. As shown in the middle panel in Figure 1, LNAPL pressure is zero at the top surface of the LNAPL, and increases in a linear manner with increasing depth below the surface. Similarly, water pressure is zero at the top surface of the water, and increase linearly with increasing depth. The prime difference, however, is that the tops of the fluid (LNAPL and water) surfaces are at different elevations, based on the density differences between the fluids. Figure 2 provides the pressure graph from Figure 1 along with the elevation or depth scale for the fluids, with the zero reference being at different locations for the LNAPL and water.

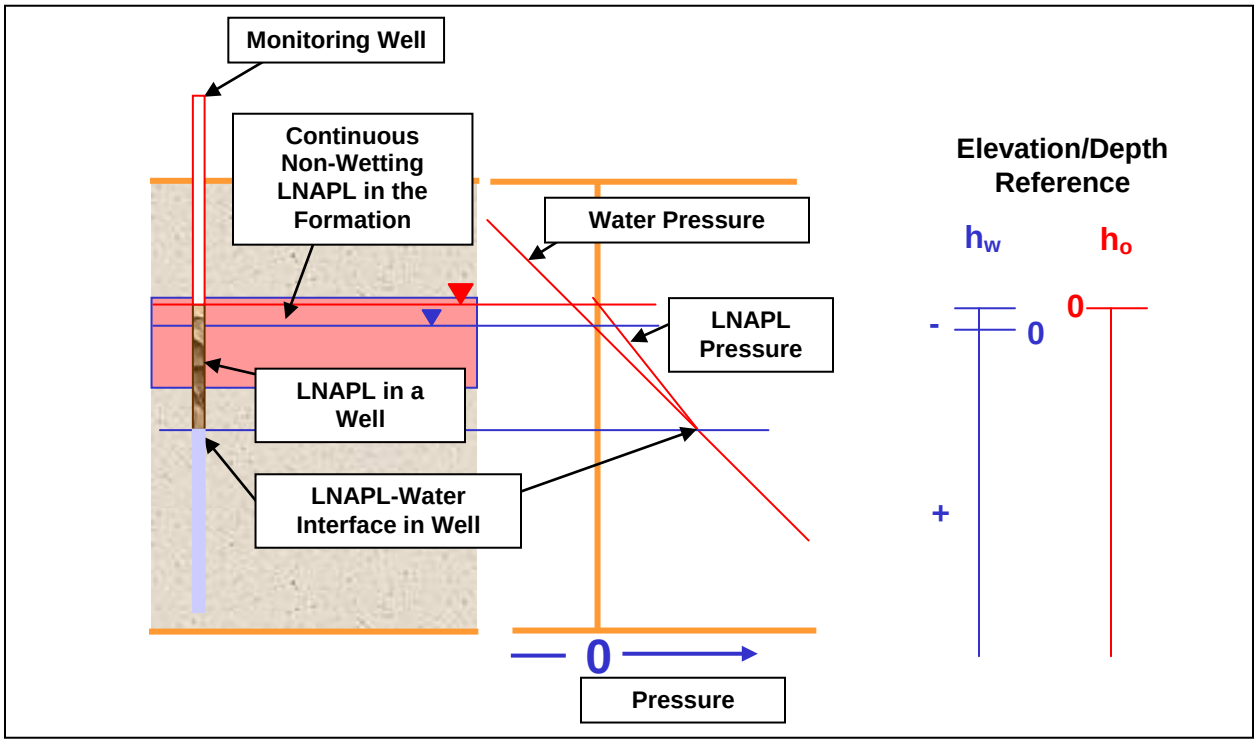


Figure 2 – Pressure Graph with Reference Elevations/Depths for LNAPL and Water

As shown above in Figure 2, the LNAPL and water pressures are equal at the elevation of the LNAPL/water interface in the adjacent monitoring well. Graphically, the

capillary pressure represents the difference between the LNAPL and water pressure lines, for a given reference point or elevation/height.

As shown on the left hand panel in Figure 2, the LNAPL within the well extends below the LNAPL in the formation. This occurs because the well behaves as a large macropore, and the LNAPL at the bottom of the well lacks the necessary capillary pressure at this elevation to displace water in the adjacent formation. The degree to which the LNAPL in a well extends below the LNAPL in the formation is more pronounced in fine textured soils (silts and clays) (USEPA, 2005).

It is important to note that the water pressure line extends up into the capillary fringe, where the elevation reference becomes negative, resulting in a negative pressure or vacuum. This vacuum represents the negative pressure experienced in the water phase within the capillary fringe. Hence, the zero pressure at the surface of the LNAPL minus the negative pressure of the water in the capillary fringe, still results in a positive capillary pressure.

The capillary pressure is represented mathematically by the following equation:

$$P_C = P_o - P_w \qquad (2.1)$$

Where:

P_C = Capillary pressure at reference point below fluid surface
P_o = Oil/LNAPL pressure at reference point below LNAPL surface
P_w = Water pressure at reference point below (or above) water surface

The pressure of the fluid in each fluid phase is a function of the following:

$$P = \rho g h \qquad (2.2)$$

Where:

ρ = Density of the fluid
g = Gravitational constant
h = Height or depth of fluid with respect to reference point

Hence, capillary pressure can be expressed as:

$$P_C = (\rho_o gh) - (\rho_w gh) \quad (2.3)$$

$$P_C = (\rho_o - \rho_w) gh \quad (2.4)$$

2.2 SOIL RESISTIVE FORCES

For LNAPL to enter a water-saturated porous media and displace water from the pore space, the LNAPL (and more specifically, the capillary pressure) must exert sufficient pressure to overcome the resistive forces of the soil. The resistive forces of the soil are based on the soil pore size, the interfacial tension between the LNAPL and water at the fluid interface, the curvature formed between the fluids at the fluid interface, and the contact angle between the fluid interface and soil particles. When two fluids are in contact with one another in small confines, the fluid interface forms a curvature based on the properties of the fluids. The smaller the confines, the greater the curvature of the interface. Hence, on a microscopic pore scale level, the smaller the effective soil pore size, the greater the curvature of the fluid interface, and the smaller the radius of curvature. The pressure conditions created when two fluids are present in the soil pore space can be represented by the equation (API, 2003):

$$P_R = \frac{2\sigma_{ow}}{r} \quad (2.5)$$

Where:

P_R = Resistive pressure
σ_{ow} = Oil/LNAPL-water interfacial tension
r = Effective soil pore size/radius of curvature of interface between fluids

This resistive pressure effectively works to prevent or resist the movement of one fluid in the presence of the other. As inferred from Equation 2.5, soils with very small pore sizes (i.e., silts and clays) will have fluid interfaces with very small radii of curvature resulting in very large resistive pressures working to prevent LNAPL movement. Conversely, soils with larger pore sizes will have larger radii of curvature resulting in lower resistive pressures working to prevent LNAPL movement.

At the source of a release, where LNAPL has migrated down to and penetrated vertically into the water table, the downward movement of LNAPL in the saturated

zone results in the lateral displacement of water. The horizontal component of the displacement is based on the contact angle between the fluid interface and the soil particles. Figure 3 provides a conceptual drawing illustrating the primary forces and contact angles involved during the displacement of water by LNAPL.

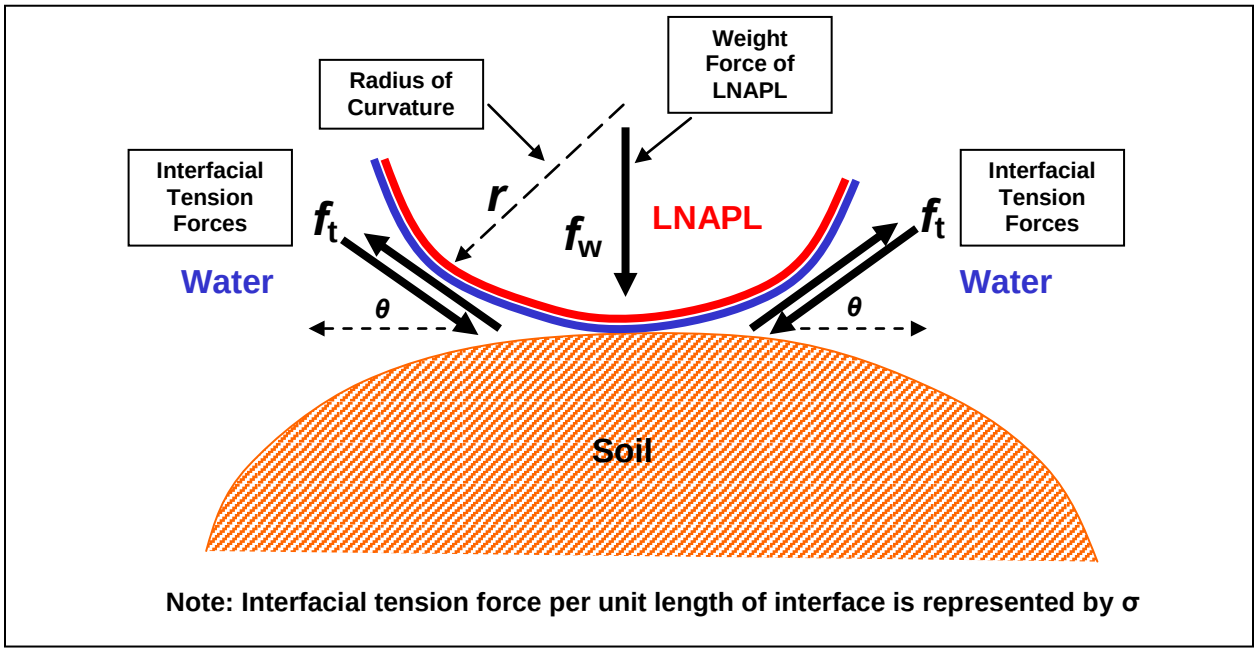


Figure 3 – Soil Resistive Forces for LNAPL Displacement of Pore Water

From Figure 3, the soil resistive force or pressure working to prevent LNAPL from displacing water can be expressed as:

$$P_R = \frac{2\sigma \cos\theta}{r} \qquad (2.6)$$

Where:

θ = Contact angle between the two fluids (based on degree of fluid wettability)
$\cos\theta$ = Perpendicular or horizontal component of the resistive force/pressure

The doubling of the forces in the numerator is to account for the mirror image of interfacial tension forces shown in Figure 3 on both the right and left-hand sides.

The following expressions may therefore be used to summarize when LNAPL movement into a water-saturated porous medium may or may not occur:

- If $P_C > P_R$, LNAPL will displace water from soil pore
- If $P_C \leq P_R$, LNAPL will not displace water from soil pore

2.3 PORE ENTRY DISPLACEMENT PRESSURE

The pore entry displacement pressure represents the specific threshold pressure necessary for one fluid to enter into a porous medium occupied by another fluid, thereby displacing the initial fluid (Mercer and Cohen, 1990). Pore entry displacement pressures may account for air displacing groundwater, LNAPL displacing groundwater, air displacing LNAPL, etc. In a water-saturated soil, the capillary pressure must equal or exceed the pore entry displacement pressure, for the LNAPL to move into the pore and displace water.

The specific capillary pressure threshold necessary for LNAPL to displace water in a water-saturated porous medium can be established by setting the capillary pressure equal to the soil resistive forces equation above as follows (API, 2007, Adamson, 1982):

$$P_C = \frac{2\sigma_{ow}\cos\theta}{r} \qquad (2.7)$$

Using the conceptual drawings in Figures 1 and 2, the capillary pressure threshold necessary to displace pore water is identified in Figure 4.

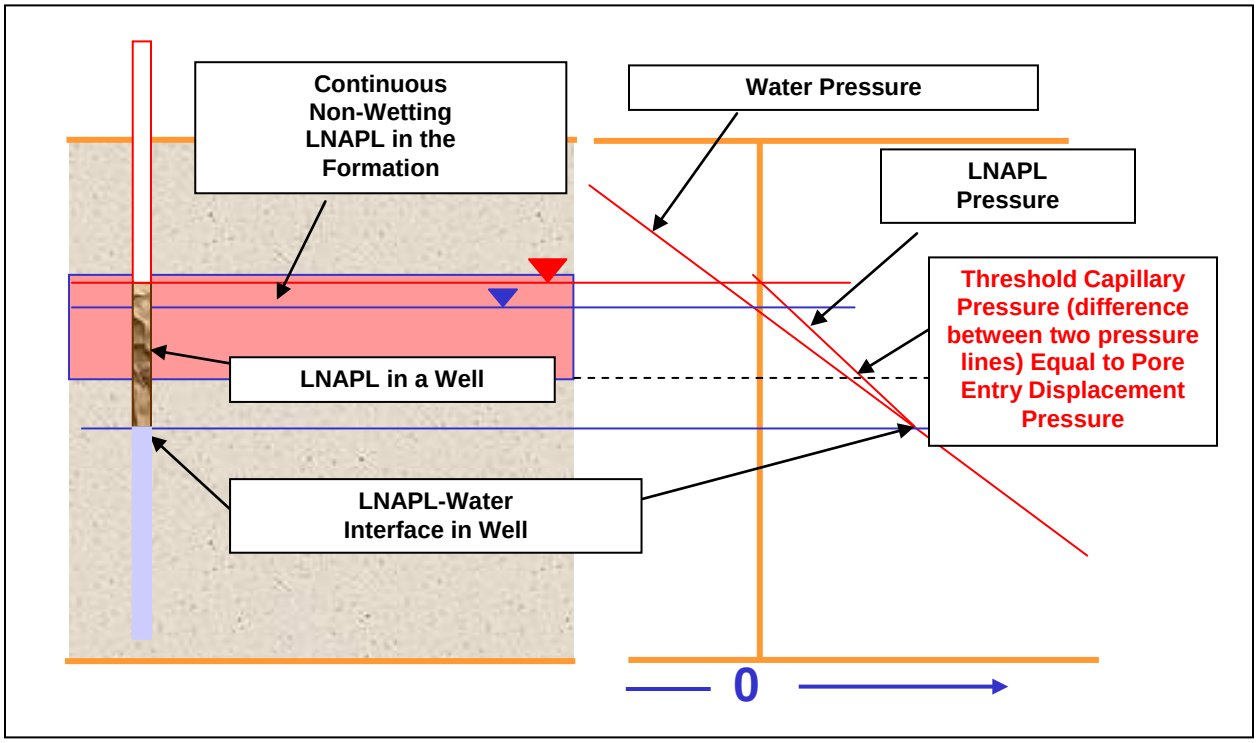


Figure 4 – Threshold Capillary Pressure Equal to Pore Entry Displacement Pressure

Although the situation illustrated in Figure 3 was for LNAPL migrating vertically into the water table, Equations 2.6 and 2.7 may also be used to assess the potential for horizontal LNAPL migration in the saturated zone at the periphery or leading edge of the LNAPL body. Further, Equations 2.6 and 2.7 may be used to determine the critical height or head of LNAPL necessary to exceed the pore entry displacement pressure and result in the displacement of groundwater.

Combining Equations 2.4 and 2.7 yields the following expression:

$$(\rho_o - \rho_w)gh = \frac{2\sigma_{ow}\cos\theta}{r} \qquad (2.8)$$

Equation 2.8 can be rearranged to solve for the critical height (or head) of LNAPL necessary for displacement of water to occur, as follows:

$$h_c = \frac{2\sigma_{ow}\cos\theta}{rg\left|(\rho_o - \rho_w)\right|} \qquad (2.9)$$

Where:

h_c = Critical height of LNAPL necessary to generate a capillary pressure equal to the pore entry displacement pressure, whereby LNAPL will displace water

It is important to note that the expressions used to describe capillary pressure, soil resistive forces, and the pore entry displacement pressure identified above are simplified analytical expressions used to describe LNAPL movement in an idealized situation (i.e., homogeneous soil with fluids at vertical equilibrium). This expression of critical head will often be compared to in-well LNAPL thickness data to assess the potential for LNAPL mobility. However, fluctuations in the water table elevation and heterogeneous soil conditions have a significant effect on in-well LNAPL thickness. Therefore, caution must be used when attempting to use the expressions above in relation to in-well LNAPL thickness to assess the potential for LNAPL movement or migration.

3.0 soil drainage characteristics

Two primary models are used to represent soil drainage characteristics with respect to LNAPL mobility. The first is the Brooks and Corey (1964) soil characteristic model which assumes that some minimum amount of threshold pressure buildup is necessary to initiate the drainage of water from a saturated soil. The threshold pressure is the pore entry displacement pressure (Mercer and Cohen, 1990) discussed in Section 2.0 as it applies to an air/water setting. The second is the van Genuchten model, which assumes that drainage or fluid displacement will occur (albeit at a minor amount) as soon as a pressure is applied by one fluid to the other. The difference between the models is shown conceptually in Figure 5.

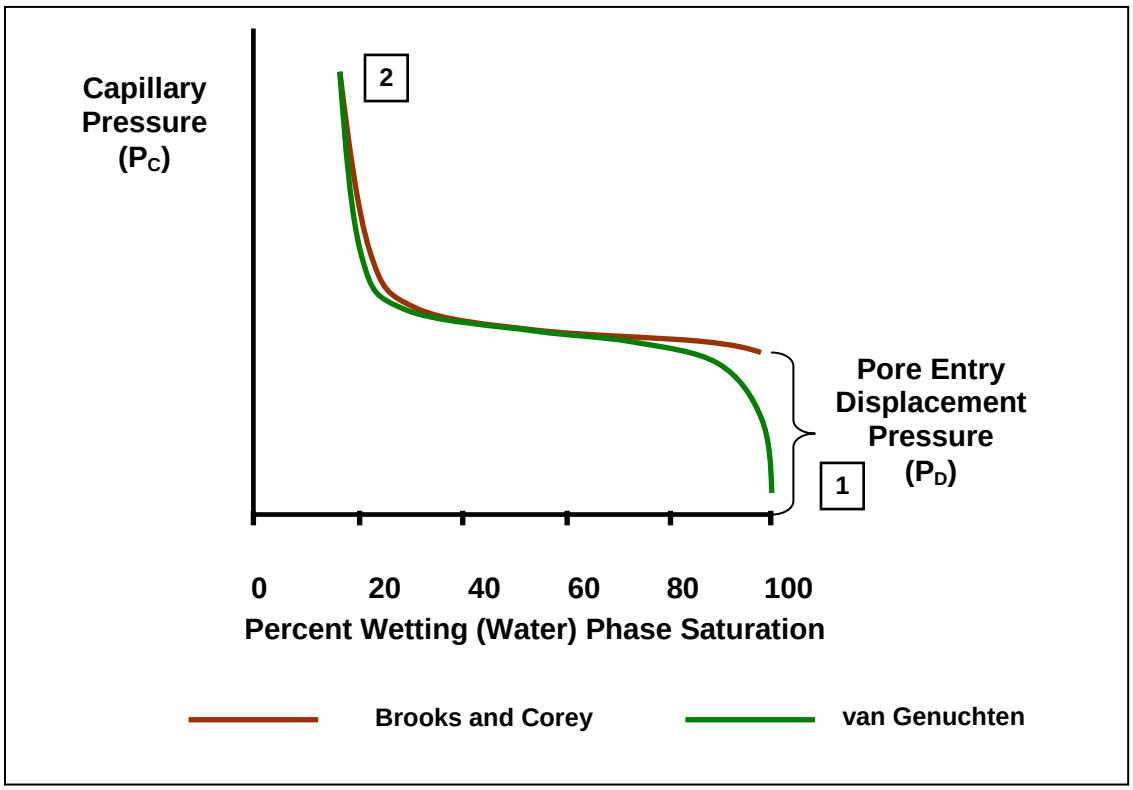


Figure 5 – Soil Drainage Characteristic Models

According to the van Genuchten (1980) model, the water saturation S_w is related to the suction pressure head h by the following expression (API, 2003):

$$S_w(h) = S_{wr} + (1 - S_{wr})\left[\frac{1}{1+(\alpha h)^N}\right]^M \qquad (3.1)$$

Where:

S_w = Water saturation (as percent of soil pore space)
S_{wr} = Residual (or irreducible) water saturation
h = Water pressure head
α, M, N = Model or curve fitting parameters (refer to Section 4.0)

The Brooks and Corey (1964) model may be expressed as (API, 2007):

$$S_e = \left(\frac{P_D}{P_C}\right)^{\lambda} \quad ; \quad P_C > P_D \tag{3.2}$$

$$S_e = 1 \quad ; \quad P_C < P_D \tag{3.3}$$

Where:

S_e = Wetting (water) phase saturation for capillary pressures greater than displacement pressure
P_D = Displacement pressure head
P_C = Capillary pressure head
λ = Brooks and Corey pore size distribution parameter

Equation 3.2 can be further expressed as (API, 2001):

$$S_e = \left[\frac{S_w - S_{wr}}{1 - S_{wr}}\right] \tag{3.4}$$

The soil drainage characteristic curves in Figure 5 are based on air displacing water, and are generated in an air-water drainage capillary pressure test. Capillary pressure tests are typically conducted in a laboratory with the use of a centrifuge. For an air-water capillary pressure test, the test commences with a fully water saturated soil core (see point "1 "in Figure 5). The core is placed in the centrifuge and spun at increasing speeds to induce increasing pressure conditions. As the core is spun, the water drains out of the core, under the influence of the centrifugal force/pressure, and is replaced with air. The mass of water released is recorded for each distinct pressure condition (to be added to the final water saturation at the conclusion of the test to determine water saturations at each point in the test). The test concludes when no more water drains from the core,

despite increases in pressure. The remaining water at this point (see point "2" in Figure 5) is referred to as the irreducible water saturation or the residual water saturation.

As shown in Figure 5, the primary difference between the Brooks and Corey model versus the van Genuchten model occurs only at very high water saturations, with the Brooks and Corey drainage of water not commencing until the pore entry displacement pressure is obtained.

Capillary pressure tests may also be conducted for LNAPL and water as illustrated in Figure 6.

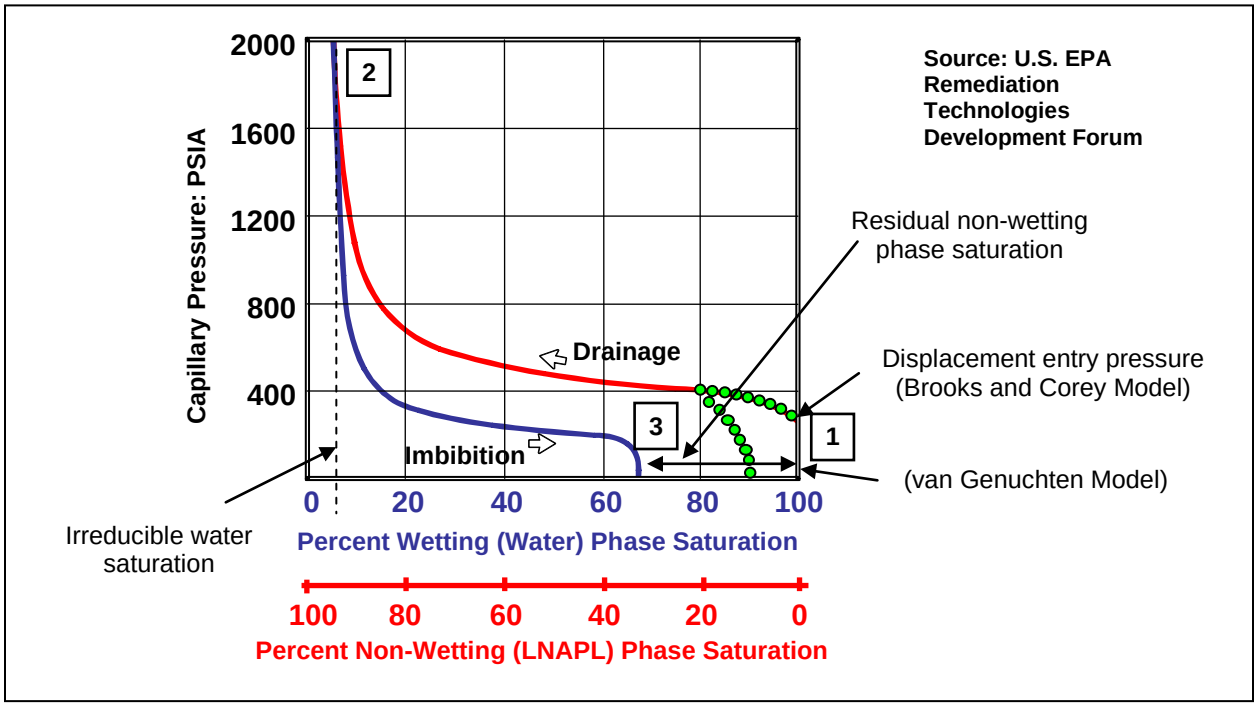


Figure 6 – Capillary Pressure Test for LNAPL-Water

As shown in Figure 6, the LNAPL-water capillary pressure test consists of three parts. The test commences with a fully water saturated soil core (again, placed in a centrifuge – see point "1"). As the core is spun, water drains from the core and is replaced by LNAPL (hence, the water and LNAPL saturation scales on the x-axis). The LNAPL displacing water is represented by the red line in Figure 6. The term "Drainage" refers to the phase of the test when the wetting fluid (water) is being drained from the core during the initial spin phase. Spinning continues until no further water drainage occurs with increased pressure (see point "2"). At this point, spinning ceases and water is

reintroduced as the displacing fluid. The second spin phase results in LNAPL being drained from the core and being replaced by water, and is represented by the blue line in Figure 6. This phase of the test is referred to as "Imbibition", which refers to the wetting fluid (water) being imbibed or reintroduced into the core. Spinning continues until no further LNAPL drainage occurs with increasing pressure. The LNAPL saturation at this point is referred to as the LNAPL residual saturation (Note: The capillary pressure test is only one method for determining the LNAPL residual saturation).

As shown in Figure 6, the Drainage curves (red line) for both the Brooks and Corey and van Genuchten model are essentially the same, except at very low LNAPL saturations. In practice, the differences in the estimates provided by the different methods will most often be negligible.

The Brooks and Corey and van Genuchten equations shown above may be used for other fluid combinations if appropriate scaling relationships for density and interfacial tensions are introduced (API, 2001, 2003, 2007). These equations, as well as the concepts discussed in Section 2.0, are used in Section 4.0 to generate expressions for LNAPL saturation (refer to right-hand panel in Figure 1) and relative permeability, which in turn are used to determine LNAPL conductivity, mobility and velocity. For additional information pertaining to capillary pressure scaling relationships, refer to API 2001, API 2003 and API 2007.

The API models provided in the LNAPL Interactive Guide (API, 2004) allow for the use of either the Brooks and Corey or van Genuchten models. However, the more recent API LDRM model (API, 2007) relies solely on the van Genuchten model. The van Genuchten model has found wide use because it provides a smooth function in predicting the vertical saturation distribution and may readily be fit to both laboratory and field data (API, 2007). However, the van Genuchten model is contrary to the fact that a positive capillary pressure is required for LNAPL to displace groundwater in previously unimpacted soil pores, which is accounted for in the Brooks and Corey model. Hence, the van Genuchten model is considered appropriate for LNAPL migration in LNAPL impacted areas, whereas the Brooks and Corey model is considered more appropriate for potential LNAPL migration into previously unimpacted soil areas (API, 2007).

4.0 LNAPL MOBILITY AND VELOCITY EQUATIONS

4.1 LNAPL MOBILITY EQUATIONS

As described in the API Interactive LNAPL Guide (API, 2004), inherent oil mobility was defined by Parker (1996) and others as the ratio of free oil transmissivity to specific oil volume at a given location. These two parameters can be measured with core analyses or estimated through baildown test analyses. The oil transmissivity is the product of the oil conductivity and the thickness of the free oil zone. The specific volume is the product of oil saturation, total porosity, and the thickness of the free oil zone. The inherent oil mobility is expressed as:

$$M_o = \frac{T_o}{V_o} \qquad (4.1)$$

Where:

M_o = inherent oil mobility (ft/day)
V_o = specific oil volume per unit area (ft^3/ft^2)
T_o = oil transmissivity (ft^2/day)

The specific oil volume is a function of the oil saturation along the vertical profile and is expressed as:

$$V_o = \int_{z_1}^{z_2} \phi S_o dz \qquad (4.2)$$

Where:

ϕ = total porosity (dimensionless)
S_o = oil saturation (dimensionless)
z = vertical thickness of oil impacts where z_1 is typically considered to be the oil-water interface elevation and z_2 is considered to be the maximum elevation of LNAPL above the air-oil interface (ft)

Oil saturation is a function of capillary pressure (the difference between the pressure in the non-wetting phase and the pressure in the wetting phase) and varies across the vertical impacted zone in a non-linear manner as shown in Figure 7.

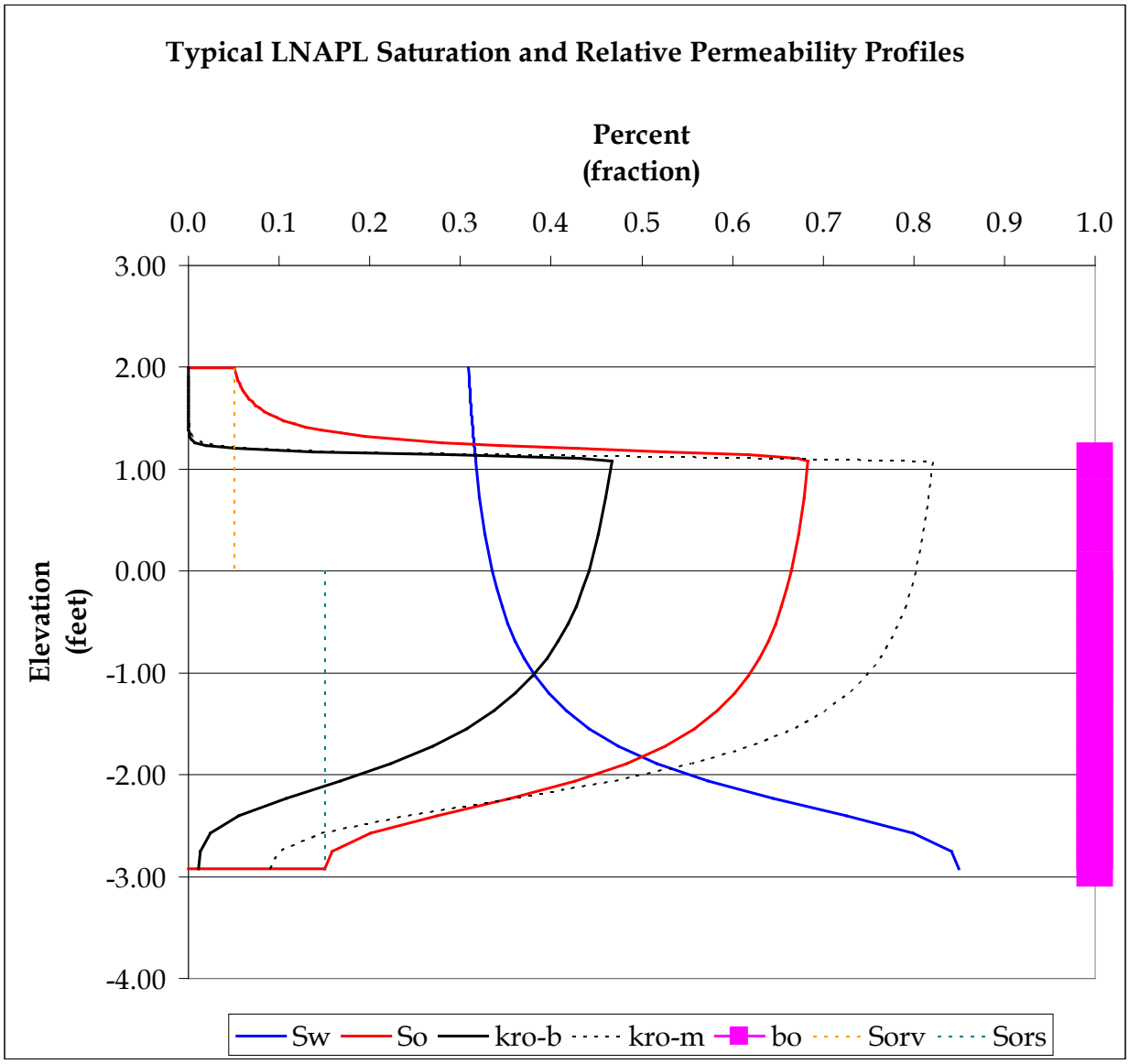


Figure 7 – Idealized LNAPL Saturation and Relative Permeability Profiles

Sw	=	Water Saturation Profile
So	=	Oil/LNAPL Saturation Profile
kro-b	=	Oil/LNAPL Relative Permeability Profile using Burdine Calculation
kro-m	=	Oil/LNAPL Relative Permeability Profile using Mualem Calculation
bo	=	In-Well Oil/LNAPL Thickness
Sorv	=	Oil/LNAPL Residual Saturation in the Vadose Zone
Sors	=	Oil/LNAPL Residual Saturation in the Saturated Zone

Note: the "Elevation" axis is referred to as the z-axis, with the theoretical water table elevation set at 0.00 feet, and the following elevation references:

zmax/z2	=	Maximum Oil/LNAPL Elevation in the Capillary Fringe
zow/z1	=	Minimum Oil/LNAPL Elevation, equivalent to the Oil/Water Elevation in Well
zao	=	Maximum Oil/LNAPL Elevation in the Well, or the Air/Oil Interface Elevation

Hence, Equation 4.2 cannot be evaluated analytically. However, a simplified expression of the specific oil volume averaged across the vertical LNAPL saturation profile can be expressed as (API, 2004):

$$\overline{V_o} = b_o \phi \overline{S_o} \qquad (4.3)$$

Where:

$\overline{V_o}$ = mean oil specific volume averaged across the saturation profile (ft^3/ft^2)
b_o = vertical extent of LNAPL impacts (ft)
$\overline{S_o}$ = mean oil saturation averaged across the saturation profile (dimensionless)

The oil transmissivity is expressed as:

$$T_o = \frac{\rho_o}{\rho_w}\frac{\mu_w}{\mu_o}\int_{z_1}^{z_2} k_{ro} K_w dz \qquad (4.4)$$

Where:

ρ_o = oil density (g/cm^3)
ρ_w = water density (g/cm^3)
μ_o = oil viscosity (cp)
μ_w = water viscosity (cp)
k_{ro} = oil relative permeability (dimensionless)
K_w = water hydraulic conductivity (cm/s)

Oil relative permeability is a function of oil saturation and varies across the vertical impacted zone in a non-linear manner as shown in Figure 7. Hence, Equation 4.4 cannot be evaluated analytically. However, a simplified expression of the free oil transmissivity averaged across the vertical LNAPL saturation profile can be expressed as (API, 2004):

$$\overline{T_o} = b_o \overline{K_o} \qquad (4.5)$$

Where:

$\overline{T_o}$ = mean oil transmissivity averaged across the saturation profile (ft^2/day)
$\overline{K_o}$ = mean oil conductivity averaged across the saturation profile (ft/day)

Substituting Equations 4.3 and 4.5 into Equation 4.1 results in a simplified expression to determine inherent mobility at any location within an LNAPL body:

$$\overline{M_o} = \frac{b_o \overline{K_o}}{b_o \phi \overline{S_o}} = \frac{\overline{K_o}}{\phi \overline{S_o}} \qquad (4.6)$$

Where:

$\overline{M_o}$ = mean inherent oil mobility (ft/day)

Therefore, the mean inherent oil mobility is equivalent to the ratio of the average oil conductivity to the effective free oil porosity (API, 2004).

It is important to recognize that the inherent LNAPL mobility only defines the potential for LNAPL movement (API, 2004). Although described in terms of "length per time" (feet per day, centimeters per second), it does not explicitly define LNAPL migration. To determine the movement of a LNAPL requires defining the oil gradient in addition to inherent mobility, both of which are needed to evaluate LNAPL body stability.

Equation 4.6 is expressed as a function of "mean" or "average" saturation and oil conductivity to yield a mean mobility value. A mean value is typically used for mobility calculations because LNAPL saturation, conductivity and relative permeability vary across the vertical LNAPL impacted zone both above and below the water table. The use of mean or average values for LNAPL saturation, relative permeability and conductivity is deemed to represent the inherent mobility of LNAPL on a macro-scale or plume-scale.

The mean oil conductivity is expressed as:

$$\overline{K_o} = \frac{\rho_o}{\mu_o} \overline{k_{ro}} kg \qquad (4.7)$$

Where:

$\overline{K_o}$ = mean oil conductivity (ft/day)
$\overline{k_{ro}}$ = mean oil relative permeability (dimensionless)
k = soil permeability (ft^2)
g = gravitational constant (ft/day^2)

The permeability of the soil is expressed as:

$$k = \frac{K_w \mu_w}{\rho_w g} \tag{4.8}$$

Consequently, Equation 4.7 can be re-written as:

$$\overline{K_o} = \overline{k_{ro}} K_w \frac{\rho_o \mu_w}{\rho_w \mu_o} \tag{4.9}$$

The density and viscosity values for water are close to one, and therefore may be eliminated from Equation 4.9.

The relative permeability of LNAPL represents the ability of the LNAPL to flow in the presence of water. Assuming that the LNAPL residual saturation in both the vadose zone and saturated zone are zero, LNAPL relatively permeability can be expressed as a function of LNAPL saturation and water saturation based on the following three phase integration of the Burdine (1953) equations and Brooks and Corey (1964) soil characteristic model (API, 2003):

$$k_{ro}(S_w, S_o) = S_o^2 \left[\left(\frac{S_t - S_{wr}}{1 - S_{wr}} \right)^{\frac{\lambda+2}{\lambda}} - \left(\frac{S_w - S_{wr}}{1 - S_{wr}} \right)^{\frac{\lambda+2}{\lambda}} \right] \tag{4.10}$$

Where:

S_w = water saturation (dimensionless)
S_o = oil saturation (dimensionless)
S_t = total saturation ($S_w + S_o$)
λ = pore size distribution index (dimensionless)
S_{wr} = water residual (or irreducible) saturation (dimensionless)

The pore distribution size index is expressed as (API, 2003):

$$\lambda = \frac{M}{1 - M}(1 - 0.5^{1/M}) \tag{4.11}$$

Where:

M = model fitting parameter (dimensionless)

M is determined from the expression (API, 2003, 2007):

$$M = 1 - \frac{2}{N} \quad ; \quad N > 2 \quad \text{Burdine} \qquad (4.12)$$

$$M = 1 - \frac{1}{N} \quad ; \quad N > 1 \quad \text{Mualem (see below)} \qquad (4.12)$$

Where:

N = van Genuchten model fitting parameter (dimensionless)

Alternatively, LNAPL relative permeability can be expressed as a function of LNAPL saturation and water saturation based on the following three phase integration of the Mualem (1976) equation with van Genuchten's soil characteristics function (Parker et al., 1987; API, 2003):

$$k_{ro}(S_w, S_o) = S_o^{1/2}\left\{\left[1 - \left(\frac{S_w - S_{wr}}{1 - S_{wr}}\right)^{1/M}\right]^M - \left[1 - \left(\frac{S_t - S_{wr}}{1 - S_{wr}}\right)^{1/M}\right]^M\right\}^2 \qquad (4.13)$$

Equations 4.10 and 4.13 predict different distributions of LNAPL relative permeability for the same set of fluid saturation values, with Equation 4.10 generally predicting smaller values for LNAPL relative permeability. Generally speaking, the Mualem equation (Equation 4.13) is believed to better predict LNAPL relative permeability in fine-grained soils (e.g., clays), whereas the Burdine equation (Equation 4.10) is believed to better predict LNAPL relative permeability in sands (U.S. EPA, 2005).

The mean (or effective) relative permeability of the LNAPL may be calculated from:

$$\overline{k_{ro}} = \frac{1}{b_o}\int_{z_1}^{z_2} k_{ro}\, dz \qquad (4.14)$$

Equation 4.14 cannot be evaluated analytically. However, the mean oil relative permeability may be approximated from the relative oil permeability profile (graph) by:

$$\overline{k_{ro}} = \frac{1}{n}\sum_{i=1}^{n} k_{roi} \qquad (4.15)$$

Where:

n = number of equally spaced points between z_1 and z_2 (on z-axis) where the oil relative permeability is read off the relative permeability graph

k_{roi} = LNAPL relative permeability value (dimensionless) at point 'i' on the LNAPL relative permeability profile

i = the specific point number on the relative permeability profile

Alternatively, the mean oil relative permeability may be approximated using a piecewise linear function (Note: some computer models including the API Interactive LNAPL Guide software calculate a mean oil relative permeability value).

As shown in Figure 7, LNAPL or oil saturation varies as a function of depth across the vertical LNAPL impacted zone. Assuming vertical equilibrium of the LNAPL and water, the water saturation across the LNAPL impacted zone may be expressed as (API, 2003):

$$S_w(z) = S_{wr} + (1 - S_{wr} - S_{ors})\left[\frac{1}{1 + (\alpha_{ow}(z - z_{ow}))^N}\right]^M \qquad (4.16)$$

Where:

S_{ors} = oil residual saturation in the saturated zone (dimensionless)

α_{ow} = capillary pressure head parameter between LNAPL and water (1/ft)

z_{ow} = elevation of the oil-water interface in a monitoring well (ft)

The capillary pressure head between LNAPL and water is scaled appropriately to reflect the densities and interfacial tensions of the two fluids and is expressed as (API, 2003):

$$\alpha_{ow} = \left(1 - \frac{\rho_0}{\rho_w}\right)\left(\frac{\sigma_{aw}}{\sigma_{ow}}\right)\alpha \qquad (4.17)$$

Where:

σ_{aw} = air-water interfacial tension (dynes/cm)
σ_{ow} = oil-water interfacial tension (dynes/cm)
α = van Genuchten model fitting parameter (dimensionless)

The total liquid saturation (LNAPL plus water) across the LNAPL impacted zone is expressed as (API, 2003):

$$S_t(z) = S_{wr} + S_{orv} + (1 - S_{wr} - S_{orv})\left[\frac{1}{1 + (\alpha_{ao}(z - z_{ao}))^N}\right]^M \quad (4.18)$$

Where:

S_{orv} = oil residual saturation in the vadose zone (dimensionless)
α_{ao} = capillary pressure head parameter between air and LNAPL (1/ft)
z_{ao} = elevation of the air-oil interface in a monitoring well (ft)

The capillary pressure head between air and LNAPL is scaled appropriately to reflect the densities and interfacial tensions of the two fluids and is expressed as (API, 2003):

$$\alpha_{ao} = \frac{\rho_o}{\rho_w}\left(\frac{\sigma_{aw}}{\sigma_{ao}}\right)\alpha \quad (4.19)$$

Where:

σ_{ao} = air-LNAPL interfacial tension (dynes/cm)

Hence, the LNAPL saturation is obtained from the expression (API, 2003):

$$S_o(z) = S_t(z) - S_w(z) \quad (4.20)$$

A typical LNAPL saturation profile (as determined by Equations 4.16 through 4.20), and relative permeability profile (as determined by Equations 4.10 through 4.13), corresponding to an in-well LNAPL thickness of 4.0 feet in a sandy soil, is illustrated in Figure 7.

The mean oil saturation may be calculated from:

$$\overline{S_o} = \frac{1}{b_o}\int_{z_1}^{z_2} S_o\,dz \qquad (4.21)$$

Equation 4.21 cannot be evaluated analytically. However, the mean oil saturation may be approximated from the oil saturation profile (graph) by:

$$\overline{S_o} = \frac{1}{n}\sum_{i=1}^{n} S_{oi} \qquad (4.22)$$

Where:

n = number of equally spaced points between z_1 and z_2 (on z-axis) where the oil saturation is read off the oil saturation graph

S_{oi} = LNAPL saturation value (dimensionless) at point 'i' on the LNAPL saturation profile

i = the specific point number on the saturation profile

Alternatively, the mean oil saturation may be approximated using a piecewise linear function (Note: some computer models including the API Interactive LNAPL Guide software calculate a mean oil saturation value).

As shown in Figure 7, the LNAPL saturation varies across the LNAPL impacted zone. For the purposes of calculating LNAPL mobility, one can use "mean" or "average" values for relative permeability, conductivity and saturation to calculate (using Equation 4.6) the average LNAPL mobility across the vertical LNAPL impacted zone. Alternatively, if one determines the maximum LNAPL saturation value, either through calculation or a combination of field and laboratory techniques, then an approximate "worst-case" scenario for LNAPL mobility may be calculated using Equation 4.6.

4.2 LNAPL SPECIFIC DISCHARGE AND VELOCITY EQUATIONS

As previously mentioned, to determine the movement of a LNAPL requires defining the oil gradient in addition to inherent mobility, both of which are needed to evaluate LNAPL body stability. The LNAPL specific discharge is expressed as:

$$\overline{q_o} = \overline{K_o} i_o \tag{4.23}$$

Where:

$\overline{q_o}$ = mean oil specific discharge (ft/year)
i_o = oil gradient (often assumed to be equal to the water table gradient)

The seepage velocity of the LNAPL is based on the specific discharge while correcting for the effective porosity of the formation. The seepage velocity is the potential average velocity of the LNAPL within connected or continuous pore throats and is expressed as:

$$v_o = \frac{\overline{q_o}}{\phi_{eff}} \tag{4.24}$$

Where:

v_o = oil seepage velocity (ft/year)
ϕ_{eff} = effective porosity (dimensionless)

The effective porosity of the oil or the free oil porosity is expressed as:

$$\phi_{eff} = \phi \overline{S_o} \tag{4.25}$$

Consequently, equation 4.24 may be re-written as:

$$v_o = \frac{\overline{K_o}}{\phi \overline{S_o}} \cdot i_o \tag{4.26}$$

Which represents the inherent oil mobility (M_o) from Equation 4.6, multiplied by the LNAPL gradient.

4.3 LNAPL IMMOBILITY

LNAPL bodies are spatially self-limiting unless continually supplied from an on-going release, thus distinguishing LNAPLs from dissolved and vapor plumes that may migrate significant distances (API, 2004). Typically, once the release of free product stops, LNAPL in the water table region will eventually cease to move as the resistive

forces in the saturated soils balance the driving forces in the LNAPL pool (Huntley and Beckett, 2001). The endpoint of this movement is when the LNAPL reaches field residual saturation, a condition where effective hydraulic conductivity of the LNAPL is zero (Huntley and Beckett, 2001).

The LNAPL velocity from Equation 4.26 does not account for the resistive forces impeding LNAPL movement at the body periphery (i.e., it does not recognize the fact that the Darcy flow equations for multi-phase fluid flow do not apply outside of a stable LNAPL body). This may lead to misleading calculations of LNAPL velocities that are not evident in the field.

When evaluating LNAPL velocities within the confines of a stable LNAPL body and/or at the periphery of a migrating LNAPL body, it is recommended that a lower limit to velocity potential be used as a screening value. For instance, landfill liners may have allowable seepage potentials of 1×10^{-6} cm/s (ASTM, 2005). Hence, an LNAPL velocity of 1×10^{-6} cm/s or less can be used as a *de minimis* mobility level for LNAPL (ASTM, 2007).

5.0 LNAPL SPECIFIC VOLUME AND RECOVERABLE VOLUME

The specific volume of LNAPL defined by Equation 4.2 represents the area beneath (to the left of) the LNAPL saturation curve (see Figure 7) multiplied by the total soil porosity. As previously stated, Equation 4.2 cannot be evaluated analytically. However, Equation 4.3 provides an expression to solve for the mean oil specific volume (averaged across the saturation profile) as a function of mean LNAPL saturation, vertical extent of LNAPL impacts, and soil porosity. Mean LNAPL saturation can be determined graphically as defined by Equation 4.22. Once the mean LNAPL saturation is calculated, the LNAPL specific volume may be determined using Equation 4.3. Alternatively, the LNAPL specific volume may be determined graphically from the expression:

$$\overline{V_o} = \left(z_{\max} + \left|z_{ow}\right|\right)\frac{1}{n}\sum_{i=1}^{n}\phi S_{oi} \qquad (4.27)$$

Where:

V_o = LNAPL specific volume (ft^3/ft^2)

z_{max} = z_2, representing maximum elevation of LNAPL above the air-oil interface (ft)

z_{ow} = elevation of LNAPL/water interface (ft)

n = number of equally spaced points between z_1 and z_2 (on z-axis) where the oil saturation is read off the oil saturation graph

S_{oi} = LNAPL saturation value (dimensionless) at point 'i' on the LNAPL saturation profile

i = the specific point number on the saturation profile

ϕ = total soil porosity

Equation 4.27 is approximately equal to the simplified expression for specific volume provided in Equation 4.3.

It is important to note that the LNAPL specific volume includes both the recoverable LNAPL (at saturations above residual saturation) and non-recoverable LNAPL (at saturations equal to or less than residual saturation). Recoverable LNAPL includes only LNAPL at saturations above residual saturation. On the LNAPL saturation profile (Figure 7), the recoverable LNAPL is represented by that portion of the area beneath (to the left of) the saturation curve and to the right of the vertical residual saturation lines (vadose and saturated). When residual saturations (vadose and saturated) are set equal to zero, the LNAPL specific volume is equal to the LNAPL recoverable volume.

LNAPL recoverable volume is equal to the LNAPL specific volume minus the volume of LNAPL at saturations less than residual. Hence, the LNAPL recoverable volume is defined by:

$$\overline{V_r} = \left(z_{\max} + \left|z_{ow}\right|\right)\frac{1}{n}\sum_{i=1}^{n}\phi S_{oi} - \left\{z_{\max}\left(S_{orv}\right)\phi + \left|z_{ow}\right|\left(S_{ors}\right)\phi\right\} \quad (4.28)$$

or:

$$\overline{V_r} = \overline{V_o} - \left\{z_{\max}\left(S_{orv}\right)\phi + \left|z_{ow}\right|\left(S_{ors}\right)\phi\right\}$$

Where:

V_r = LNAPL recoverable volume (ft^3/ft^2)

If the approximate dimensions of an LNAPL body are known (length and width), then the approximate total volume of LNAPL may be determined by multiplying the area of the body by the LNAPL specific volume. Similarly, the recoverable volume of LNAPL may be determined by multiplying the area of the body by the LNAPL recoverable volume. However, it is important to note that the calculations of total and recoverable LNAPL volumes are based on vertical equilibrium assumptions for the fluids and homogeneous soils (refer to Section 1.0), and may not be indicative of actual site conditions. Hence, LNAPL specific volume and recoverable volume calculations should be viewed, at best, as rough order of magnitude approximations for qualitative screening purposes.

REFERENCES

Adamson, A.W. 1982. Physical Chemistry of Surfaces. 4th Edition, Wiley-Interscience, New York.

American Petroleum Institute (API). July 2001. Methods for Determining Inputs to Environmental Petroleum Hydrocarbon Mobility and recovery Models. American Petroleum Institute Publication Number 4711, prepared by Tom Sale, Ph.D., Research Scientist, Department of Chemical and Bioresource Engineering, Colorado State University.

American Petroleum Institute (API). August 2003. Models for Design of Free-Product Recovery Systems for Petroleum Hydrocarbon Liquids. American Petroleum Institute Publication Number 4729, prepared by Randall J. Charbeneau, Ph.D., Environmental and Water Resources Engineering Program, College of Engineering, The University of Texas at Austin.

American Petroleum Institute (API). August, 2004. API Interactive LNAPL Guide, Version 2.0. American Petroleum Institute, Washington, District of Columbia.

American Petroleum Institute (API). January 2007. LNAPL Distribution and Recovery Model (LDRM). American Petroleum Institute Publication Number 4760, prepared by Randall J. Charbeneau, Ph.D., Environmental and Water Resources Engineering Program, College of Engineering, The University of Texas at Austin.

Brooks, R.H. and A.T. Corey. 1964. *Hydraulic properties of porous media*, Hydrol. Pap. 3, Colo. State Univ., Fort Collins.

Burdine, N.T. 1953. *Relative permeability calculations from pore-size data*, Trans A.I.M.E. 198, pp. 71-77.

Huntley, D. and G.D. Beckett. 2001. *Evaluating hydrocarbon removal from source zones: tools to access concentration reduction*. Submitted for API Review.

Mercer, J.W. and Cohen, R.M. 1990. *A review of immiscible fluids in the subsurface: properties, models, characterization and remediation.* J. Contaminant Hydrology, v. 6, pp. 107-163.

Mualem, Y. 1976. *A new model for predicting the hydraulic conductivity of unsaturated porous media*, Water Resources Research, 12, pp. 513-522.

Parker, J.C., R.J. Lenhard, and T. Kuppusamy. 1987. *A Parametric Model of Constitutive Properties Governing Multiphase Flow in Porous Media*. Water Resources Research, vol. 23, no. 4, pp. 618-624.

U.S. Environmental Protection Agency. 2005. *The basics, understanding the behavior of light non-aqueous phase liquids (LNAPLs) in the subsurface*. Remediation Technologies Development Forum, U. S. Environmental Protection Agency Technology Innovation and Field Services Division. February 2005 course notes, 111 p.

van Genuchten, M.T. 1980. *A closed form equation for predicting the hydraulic conductivity of unsaturated soil*, Soil Sci. Soc. Am. J., vol. 44, pp. 892-898.

APPENDIX C

PREVIOUS INVESTIGATIONS SUMMARY

SUMMARY OF PREVIOUS INVESTIGATIONS

Hart Crowser's *Subsurface Petroleum Product Assessment*, July 31, 1986 -Petroleum impacts were identified in soils during a July 1986 underground storage tank (UST) removal in the vicinity of the loading rack. Six monitoring wells (B-1 through B-6) were installed at locations chosen by Mobil Oil and Hart Crowser, to complete a preliminary assessment of the extent of free-phase petroleum product beneath the facility. The distribution of product thickness and the estimated groundwater flow direction indicate that the source of the product was within the bulk fuel storage area and was migrating to the northeast. The results of the subsequent investigation and testing suggested the source of contamination was spilled petroleum products entering the subsurface soils through cracks in the loading rack containment system. The petroleum product was identified primarily as leaded gasoline. Hart Crowser (Mobil's consultant) recommended the monitoring and installation of additional wells down-gradient and within the suspected source location. Soil and/or groundwater samples were not analyzed during this investigation. In 1986, additional monitoring wells, HA-1 through HA-11, were installed to further delineate impacts.

Hart Crowser's *Subsurface Petroleum Recovery System* reports, November 1987 to September 1992 – A product recovery system was installed in 1987. Several monitoring wells (D-1 through D-8; W-1 through W-4; R-1, R-2; and, HA-12 through HA-14) were installed in 1987. Progress reports document fairly stable trends in product thickness documented near the truck loading rack and recovery trench (north of the Site). In 1991, Hart Crowser installed a Groundwater Treatment System using the R-1 and R-2 recovery trenches from the original product recovery system.

Monitoring of the system was conducted periodically from September 1991 to December 1992, when the system was shut down due to a leak in the piping. The system was repaired in January 1993 but system operation was on hold due to frozen pipes (Hart Crowser, 1993). No reports were available indicating that the system was operated or monitored subsequent to the freezing event.

ConocoPhillips' *Release Notification Report*, February 11, 2003 – On November 13, 2002, a release from AST #2 was discovered. The release was estimated to be 14,800 gallons of super-unleaded gasoline. Immediate action was taken to recover product from recovery trenches and wells. A dual-phase vacuum extraction (DPVE) remediation system was installed in February 2003 to remediate the November 2002 release. The remediation system has been operated and maintained consistently since startup. Additional monitoring wells (HA-15 through HA-20, LAI-1 through LAI-16, HW-1, HW-2, and RW-1 through RW-7) were installed shortly after installation of the remediation system.

In June 2004, Landau and Associates (Landau) installed 3 soil borings (B-1, B-2, D-1) along the inside edge of the southwest corner of the retention pond. Laboratory analytical results indicated shallow soil and sediment impacts in the vicinity of the retention pond.

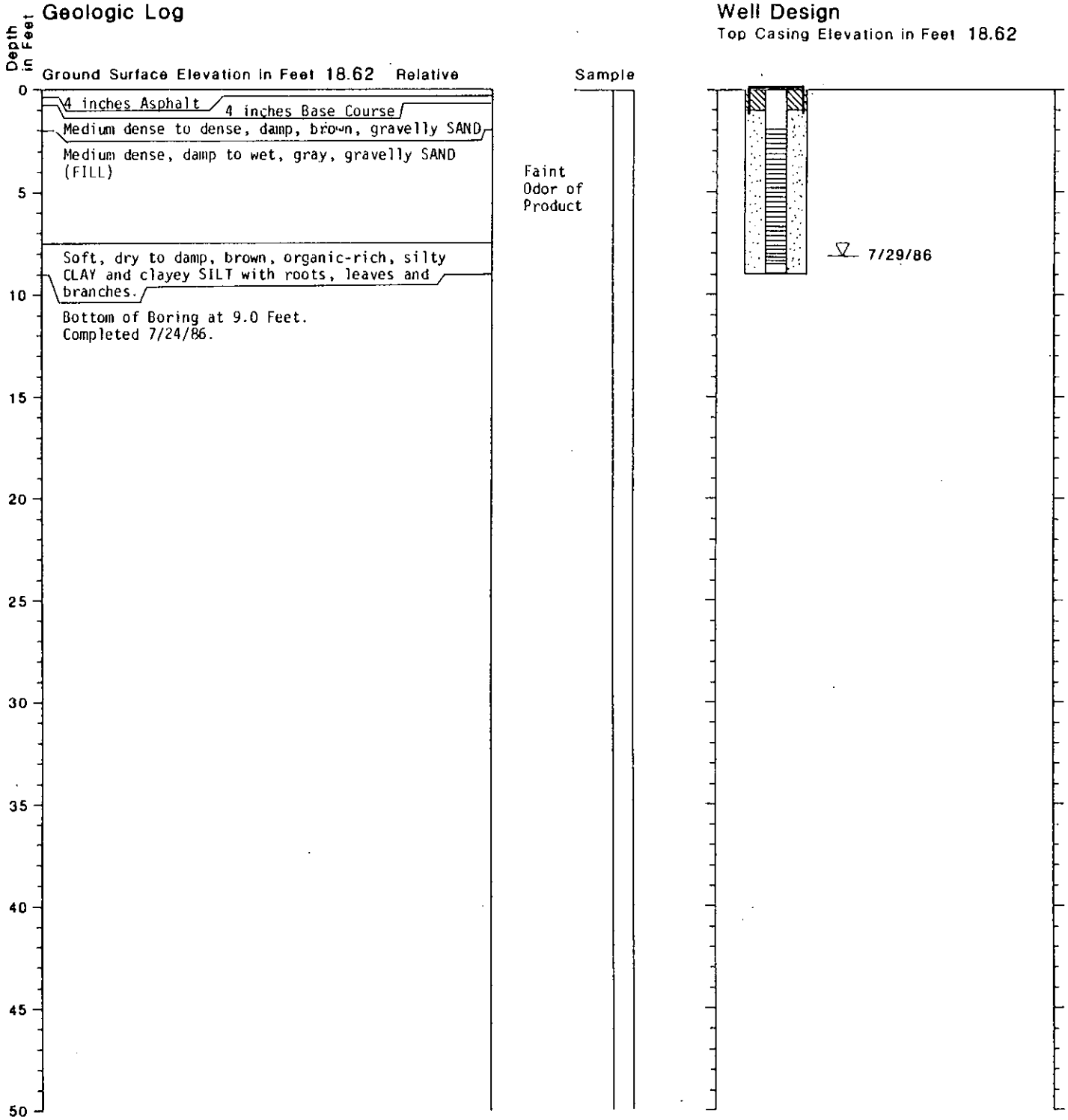
In April 2005, Secor International Incorporated (now Stantec) installed seven borings (B-1 through B-7) to further assess soil impacts in south of Tank 2. Laboratory analytical results indicated no soil impacts in the vicinity of these borings.

Stantec's *Soil Investigation Report*, October 7, 2009 – In April 2009, Stantec conducted a soil investigation to further define subsurface soil impacts throughout the Site and to supplement historical assessment data. At the request of ConocoPhillips, 17 soil borings (G-1 through G-17) were advanced in the loading rack and tank farm areas. Soil borings were advanced to a maximum depth of 10 feet. Soil impacts were observed at depths from 1 to 9 feet with the majority of the impacts being to the west and northwest of the loading racks.

APPENDIX D

STRATIGRAPHY LOGS

Boring Log and Construction Data for Well B-1



NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

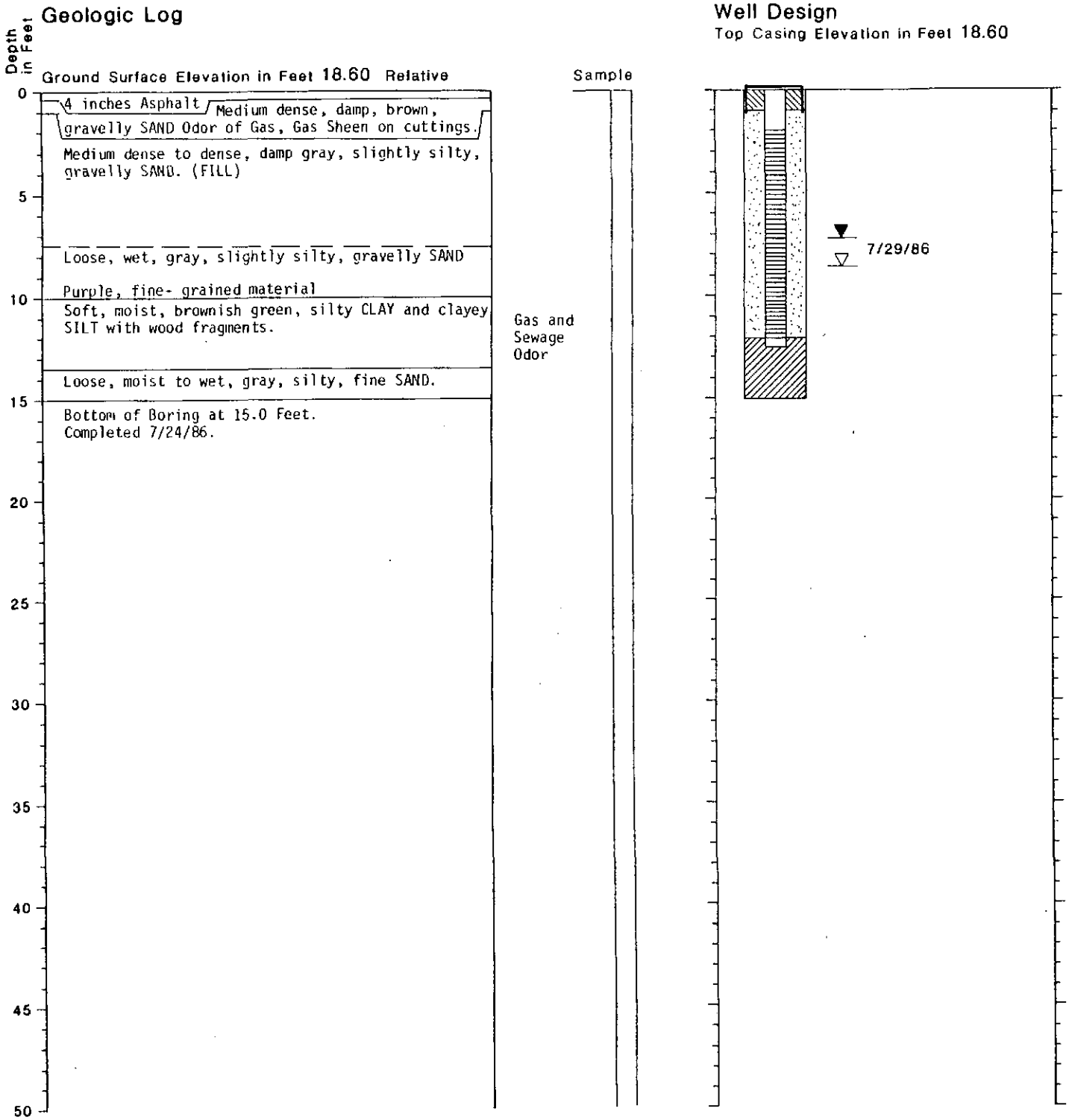
J-1784 July 1986

HART-CROWSER & associates, inc.

Figure 3

COPY TO BP

Boring Log and Construction Data for Well B-2



NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

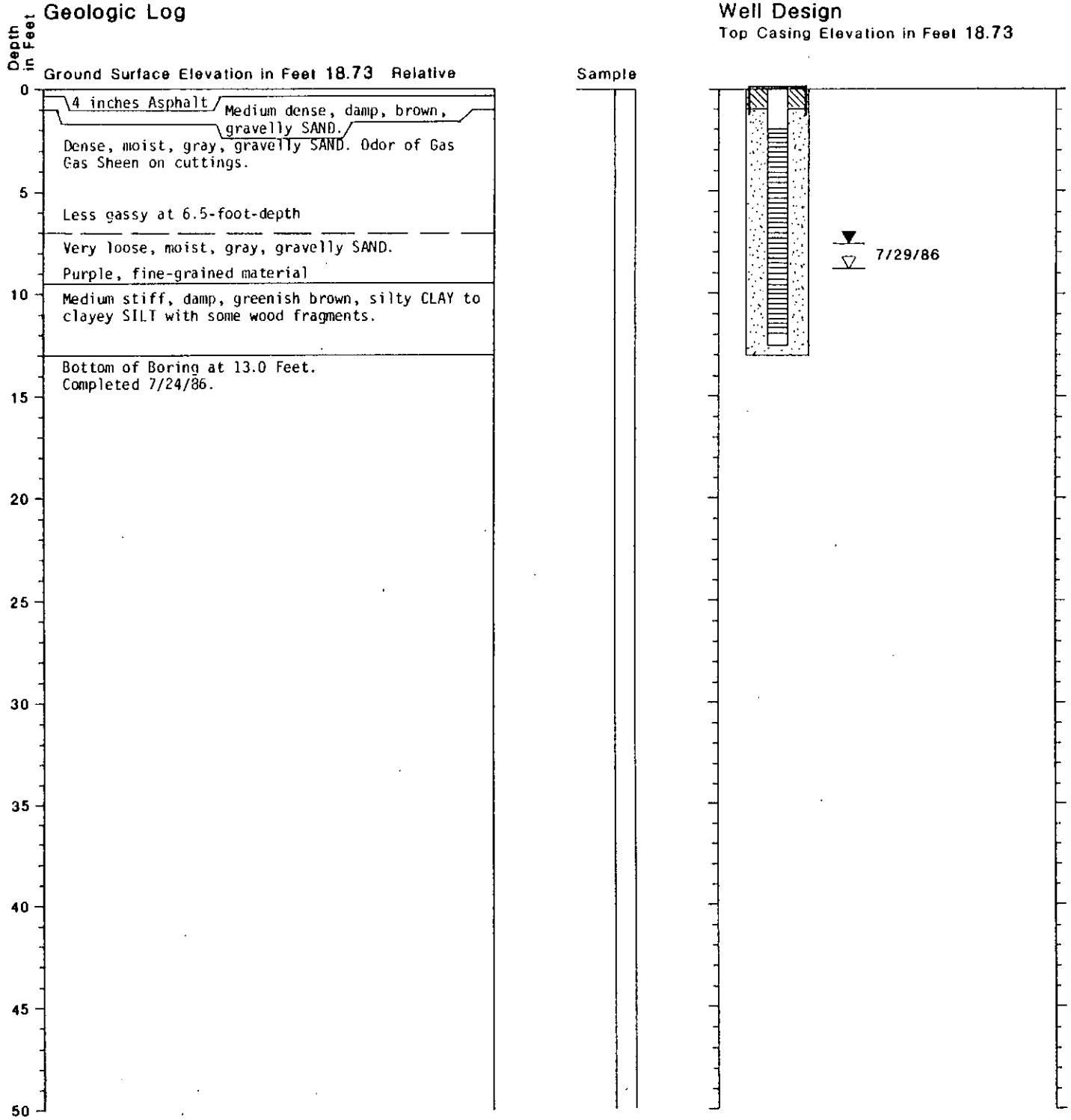
J-1784 July 1986

HART-CROWSER & associates, inc.

Figure 4

COPY TO BP

Boring Log and Construction Data for Well B-3



NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

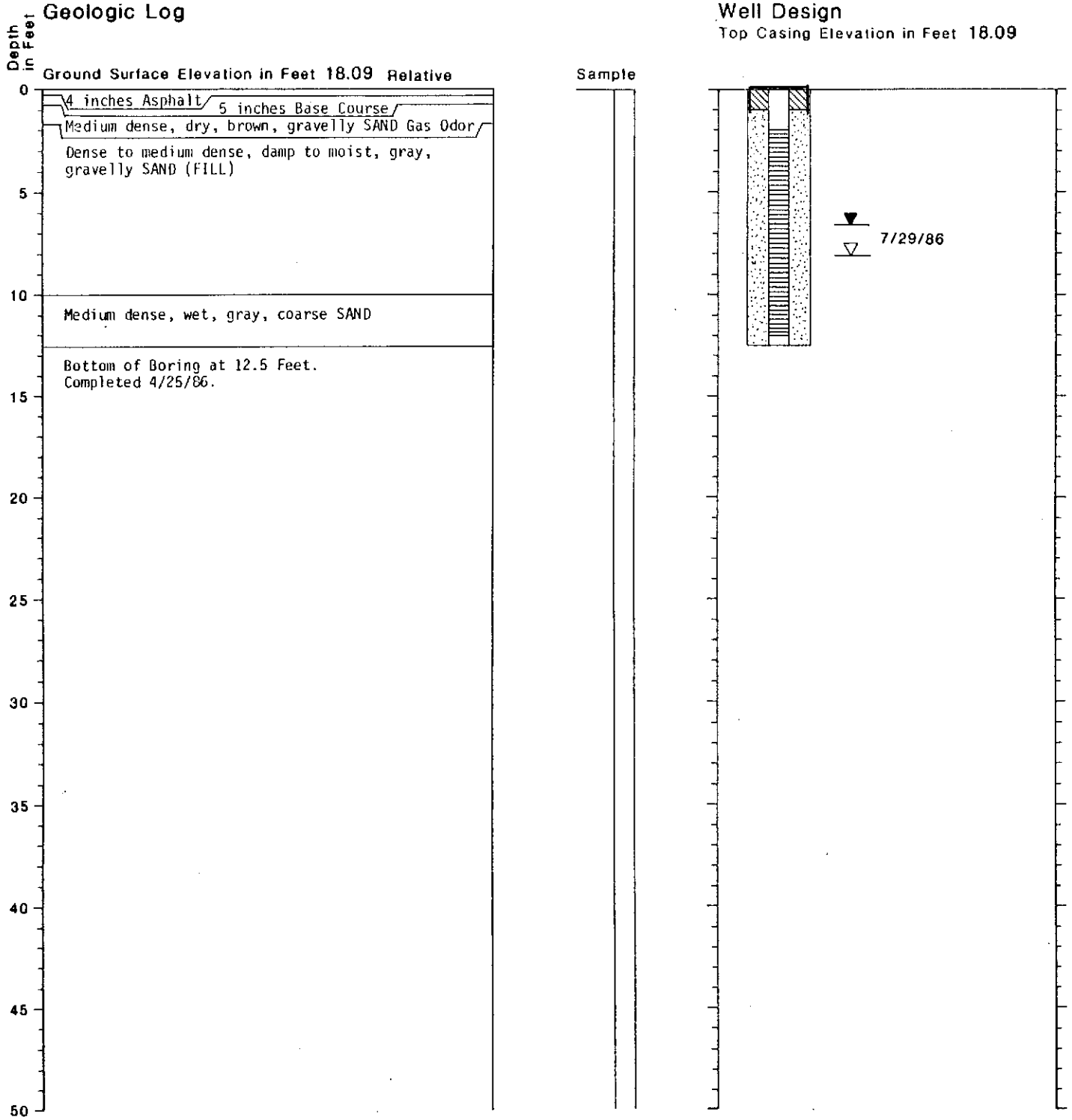
J-1784 July 1986

HART-CROWSER & associates, inc.

COPY TO BP

Figure 5

Boring Log and Construction Data for Well B-4



NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

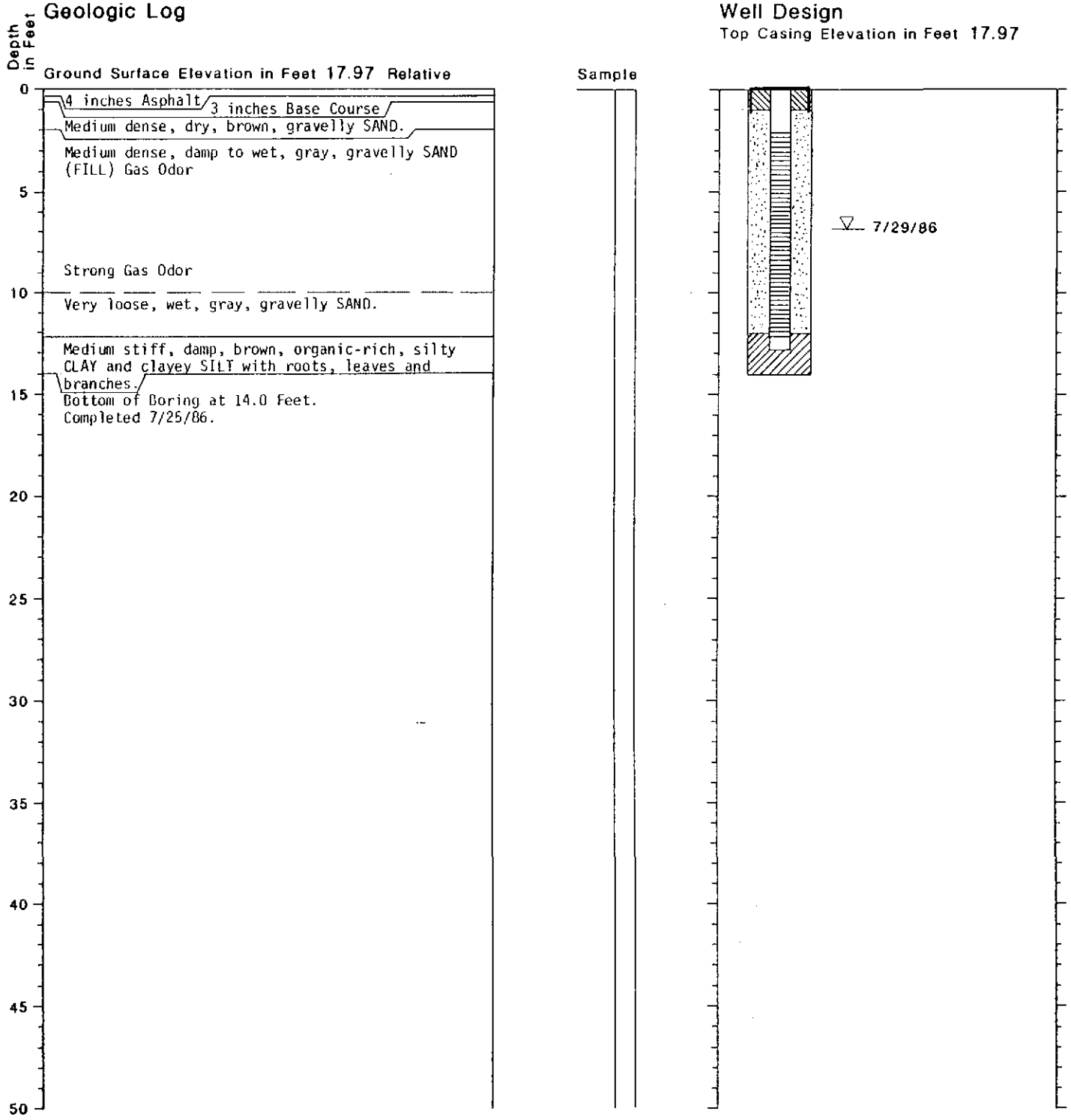
J-1784 July 1986

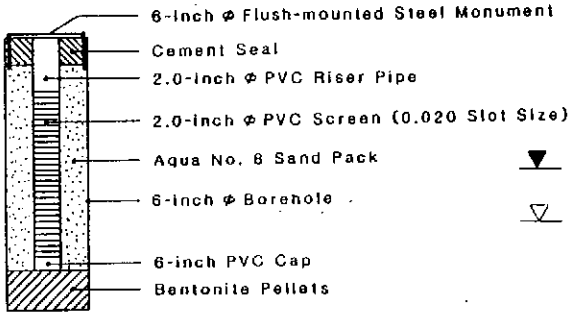
HART-CROWSER & associates, inc.

COPY TO BP

Figure 6

Boring Log and Construction Data for Well B-5





Free Product Level

Water Level

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

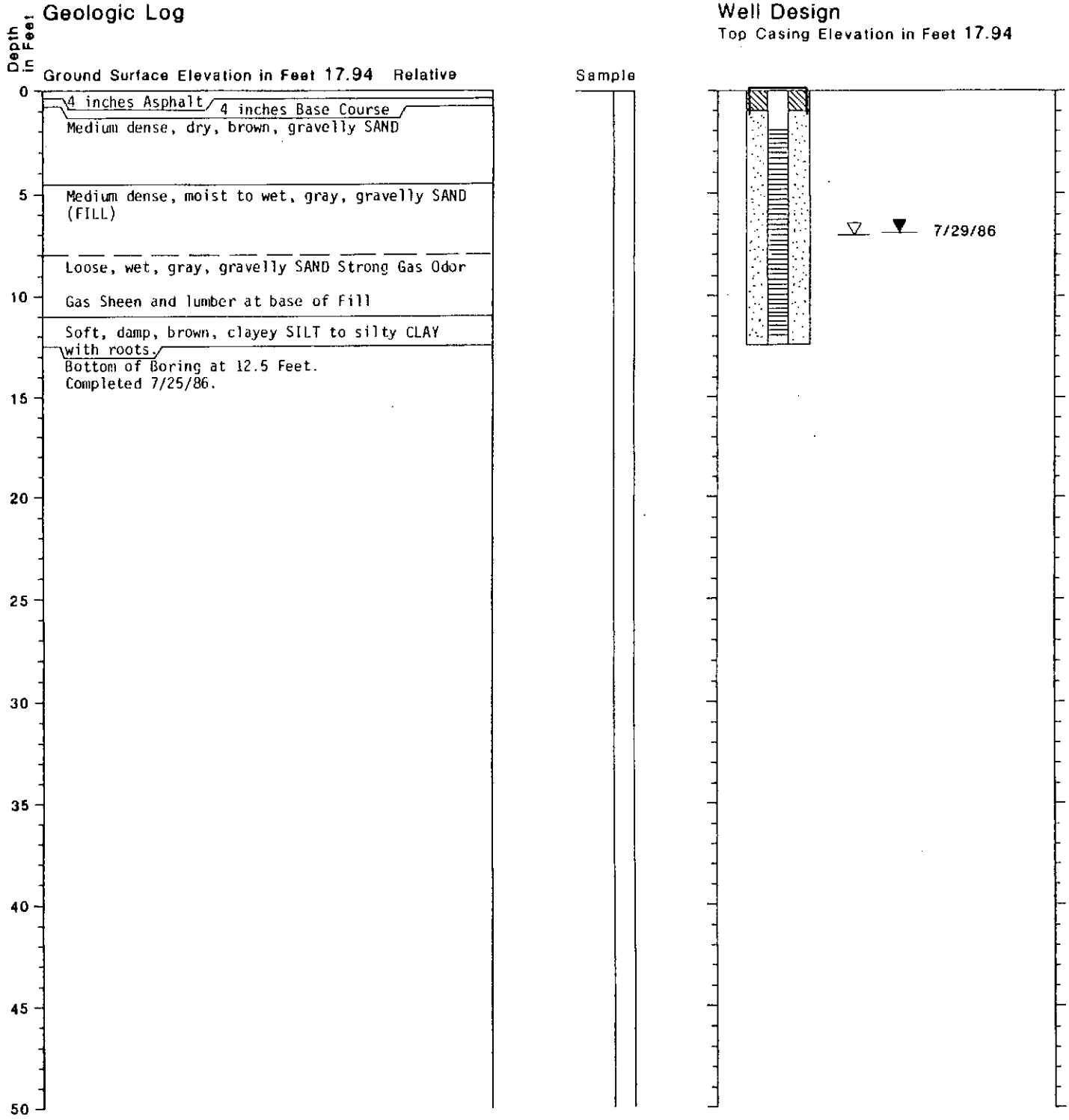
J-1784 July 1986

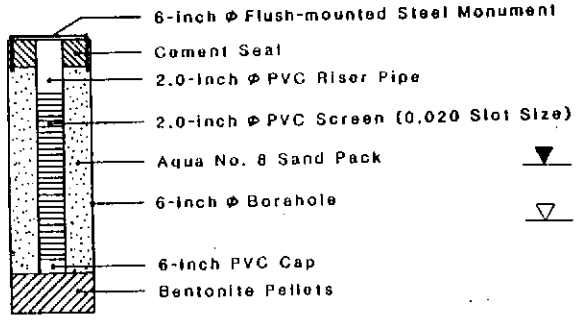
HART-CROWSER & associates, inc.

Figure 7

COPY TO BP

Boring Log and Construction Data for Well B-6





NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with time of year. ATD:At Time of Drilling

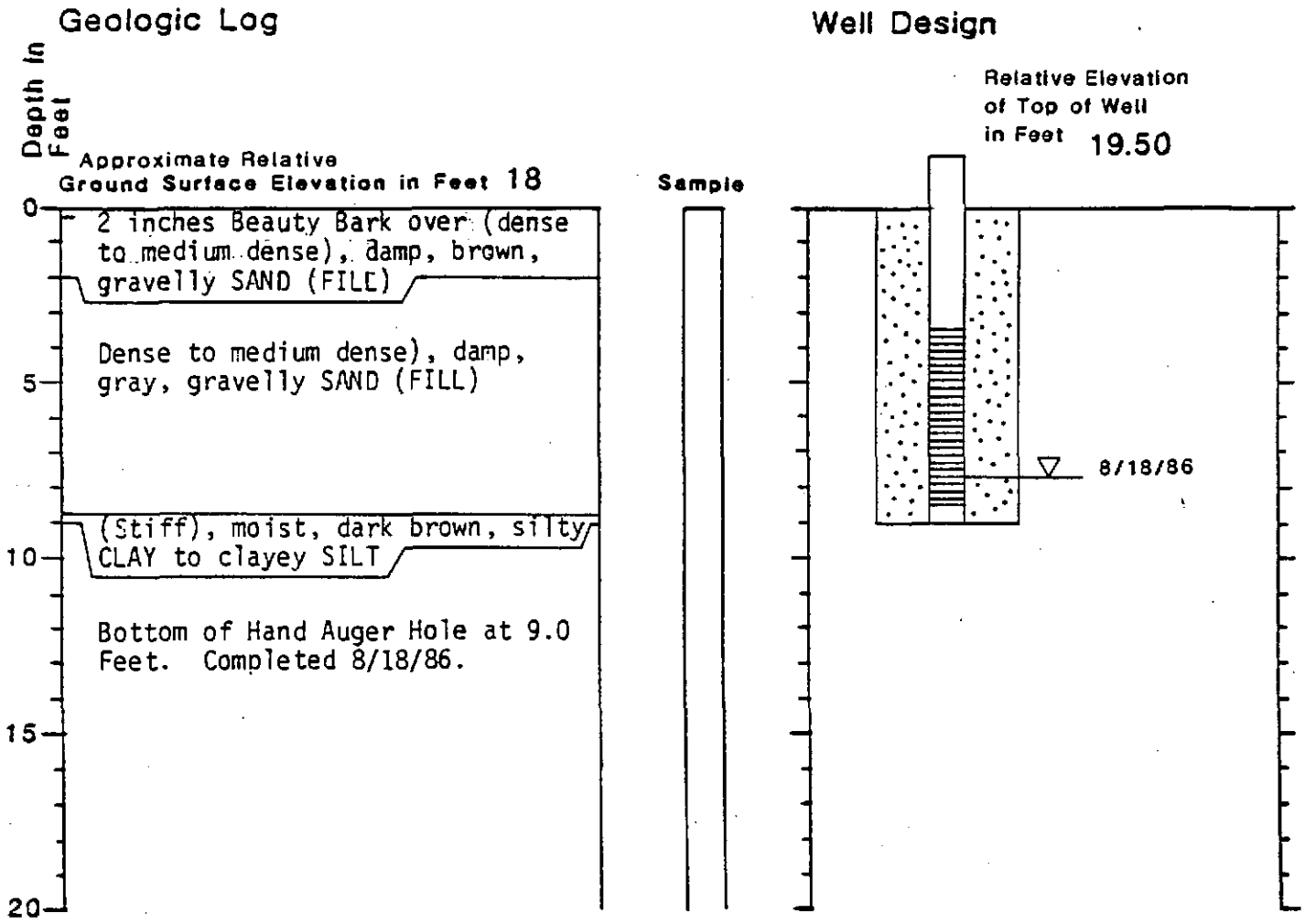
J-1784 July 1986

HART-CROWSER & associates, inc.

COPY TO BP

Figure 8

Boring Log and Construction Data for Observation Well HA-1



Water Level

On-site SAND Backfill

2-inch ⌀ PVC Riser Pipe

2-inch ⌀ PVC Screen (0.020-inch Slot Size)

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

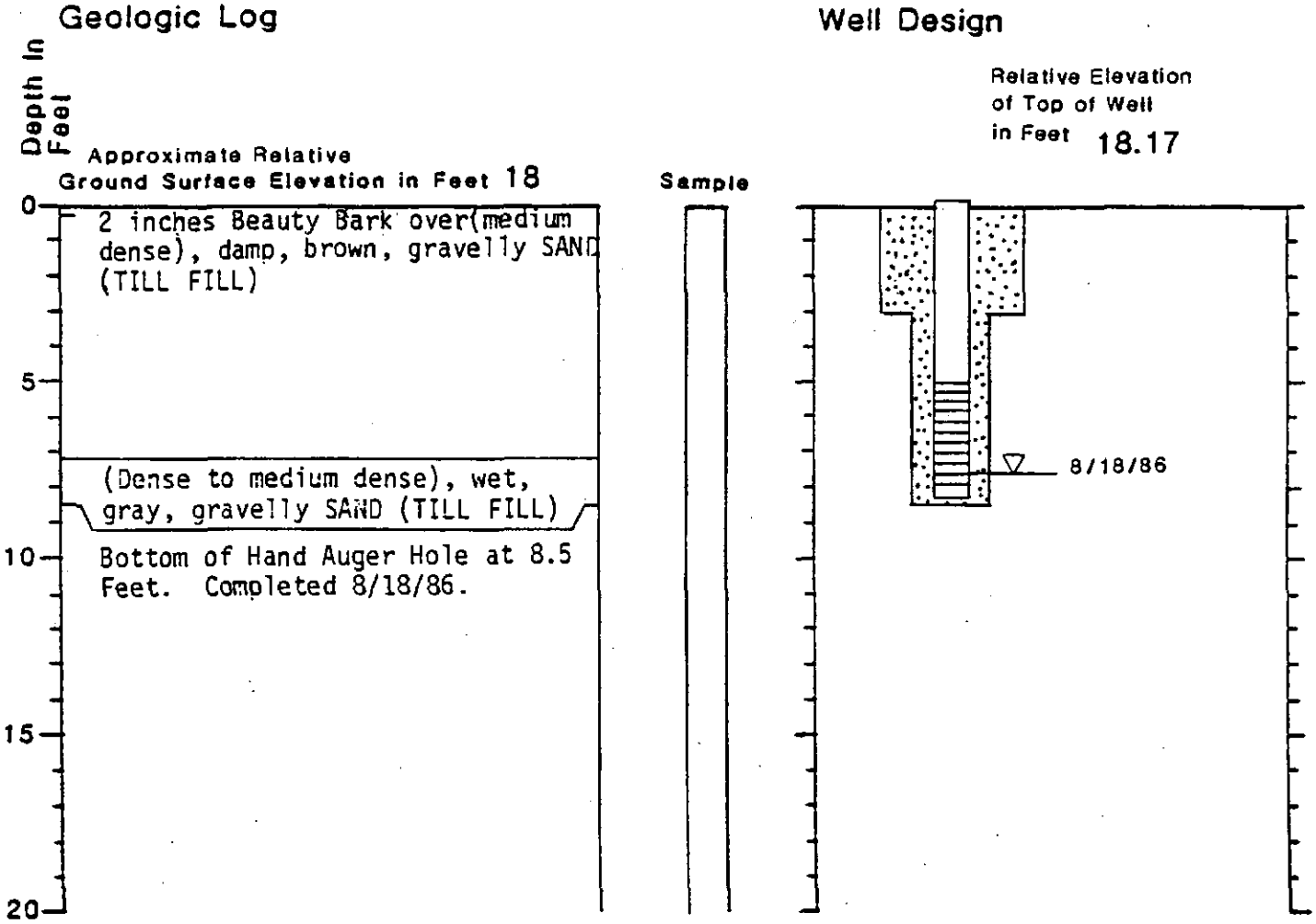
J-1784 September 1986

HART-CROWSER & associates inc.

Figure 3

COPY TO BP

Boring Log and Construction Data for Observation Well HA-2



Water Level

On-site SAND Backfill

2-inch ⌀ PVC Riser Pipe

2-inch ⌀ PVC Screen (0.020-inch Slot Size)

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

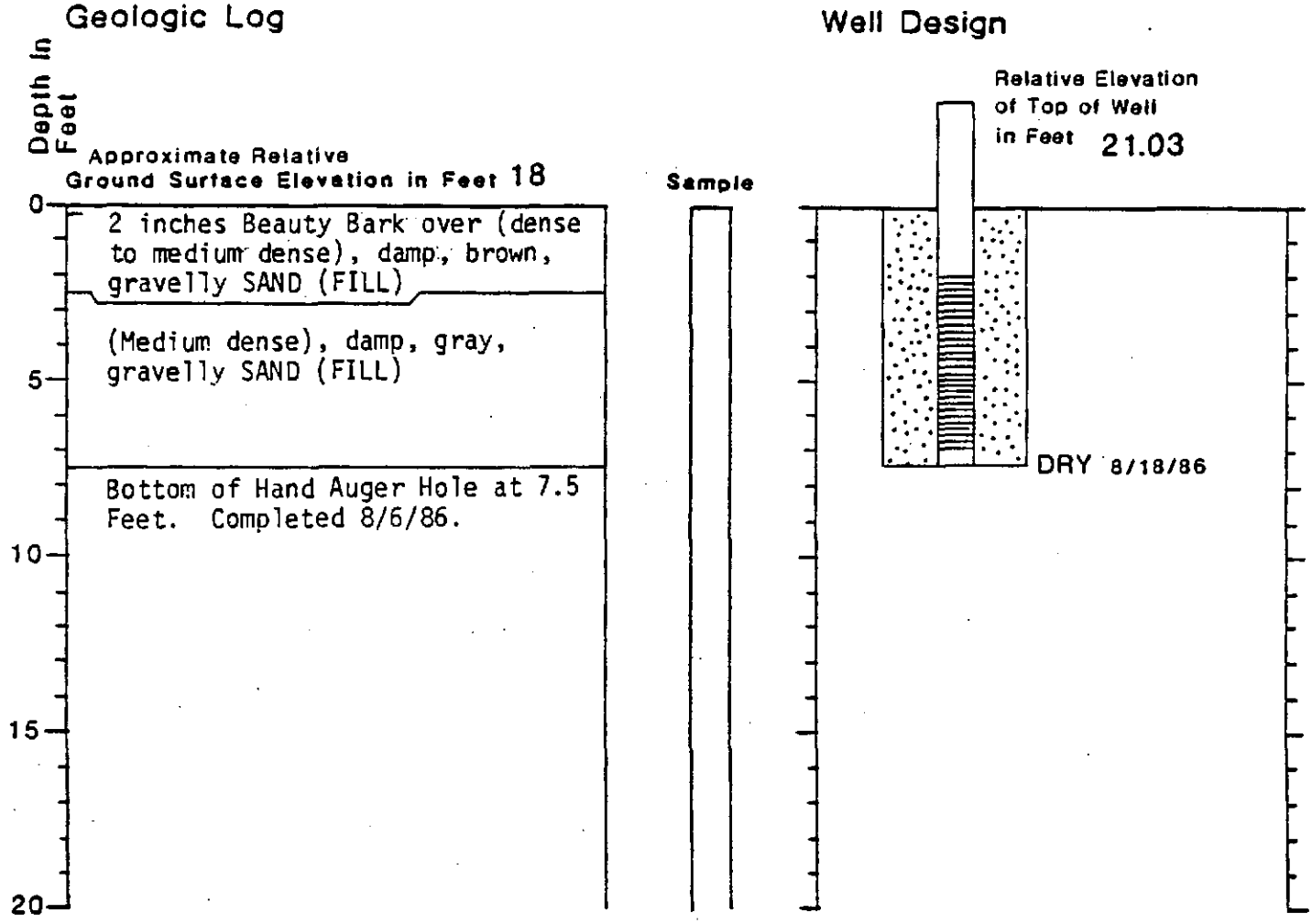
J-1784 September 1986

COPY TO BP

HART-CROWSER & associates inc.

Figure 4

Boring Log and Construction Data for Observation Well HA-3



Water Level

On-site SAND Backfill

2-inch ⌀ PVC Riser Pipe

2-inch ⌀ PVC Screen (0.020-inch Slot Size)

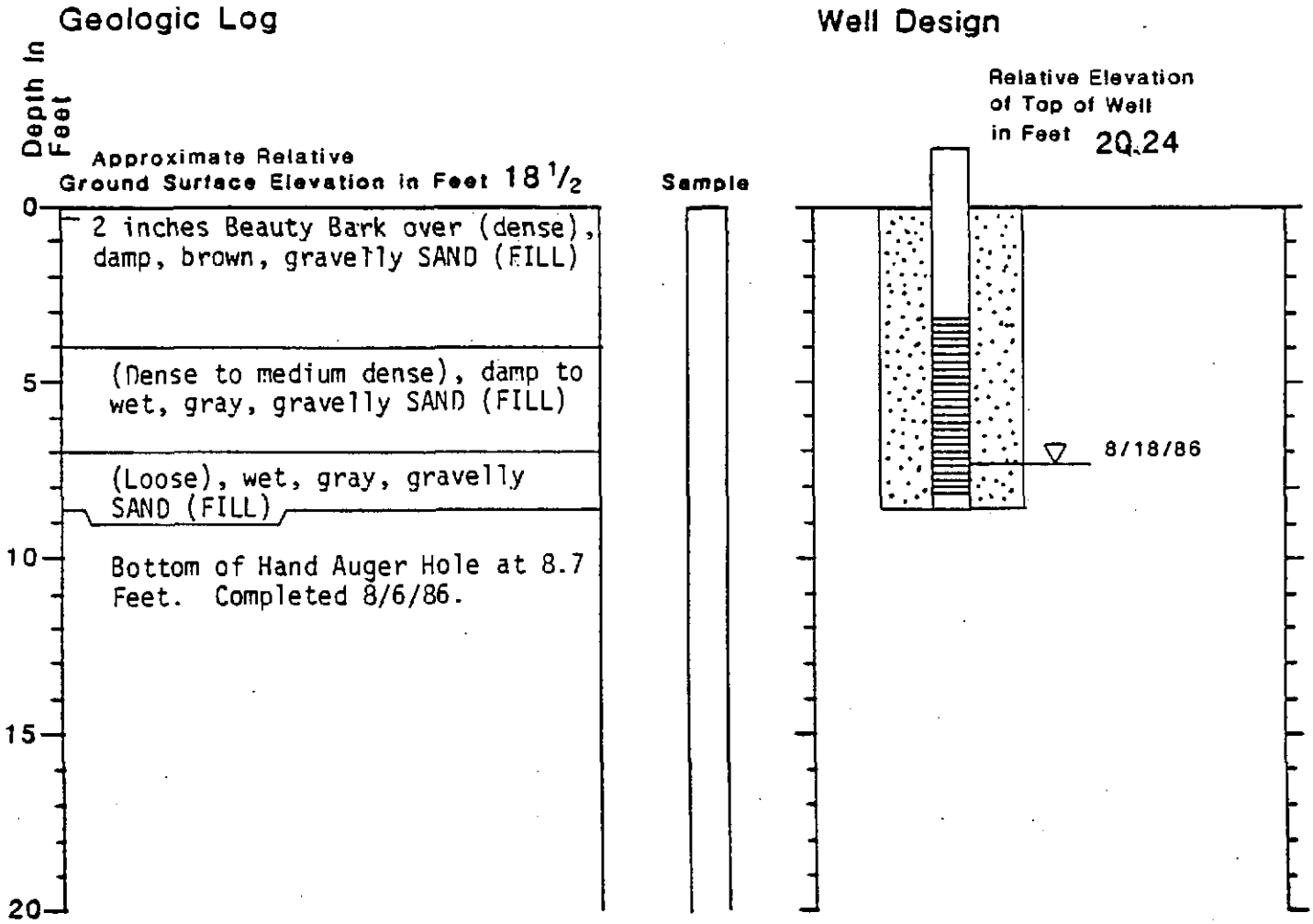
NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

COPY TO BP

J-1784 September 1986
HART-CROWSER & associates inc.
Figure 5

Boring Log and Construction Data for Observation Well HA-4



Water Level

On-site SAND Backfill

2-inch ⌀ PVC Riser Pipe

2-inch ⌀ PVC Screen (0.020-inch Slot Size)

NOTES:

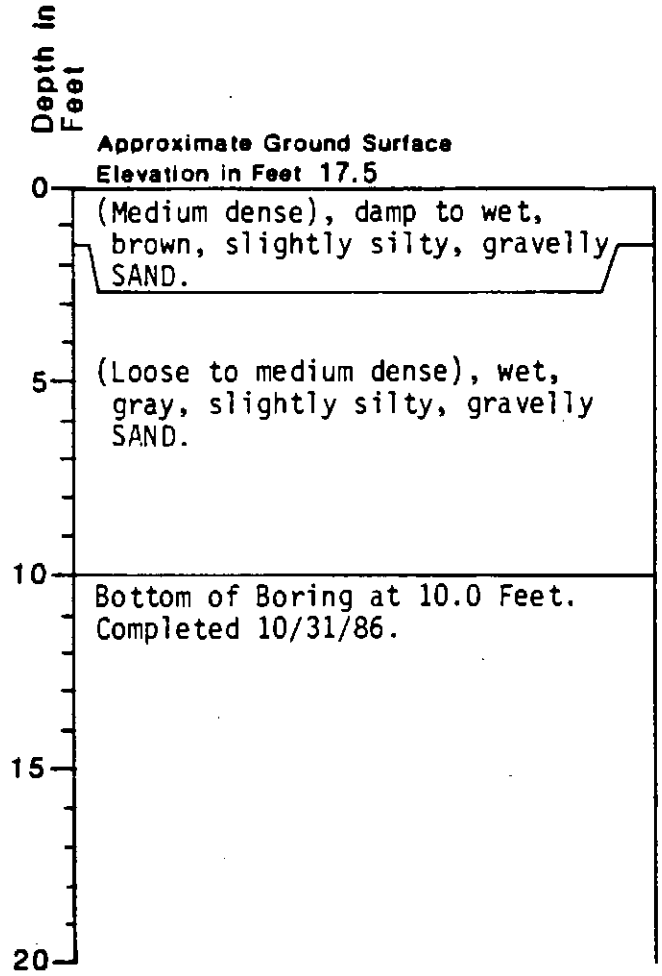
1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

COPY TO BP

J-1784 September 1986
HART-CROWSER & associates inc.
Figure 6

Boring Log and Construction Data for Observation Well HA-5

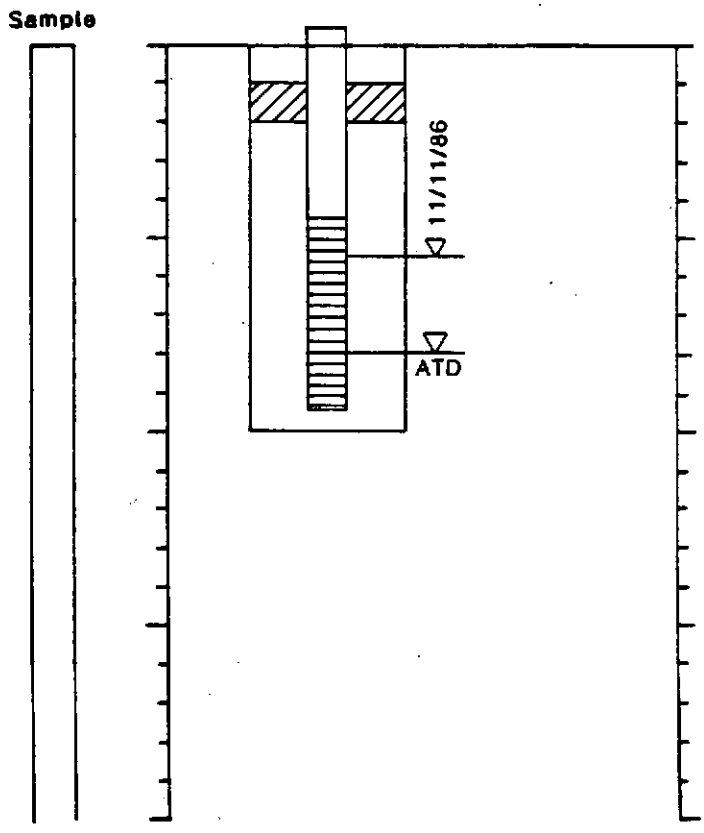
Geologic Log

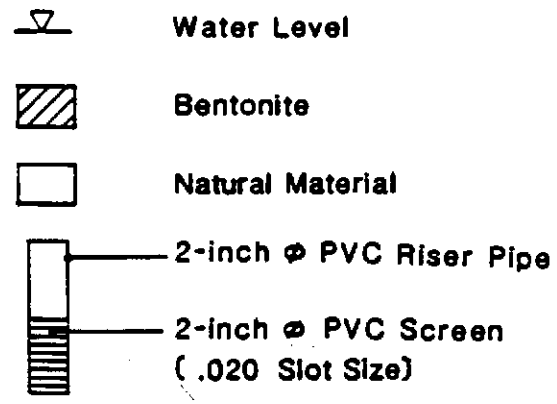


Well Design

Casing Stickup in Feet .5

Relative Elevation of Top of Well in Feet 18.07





NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

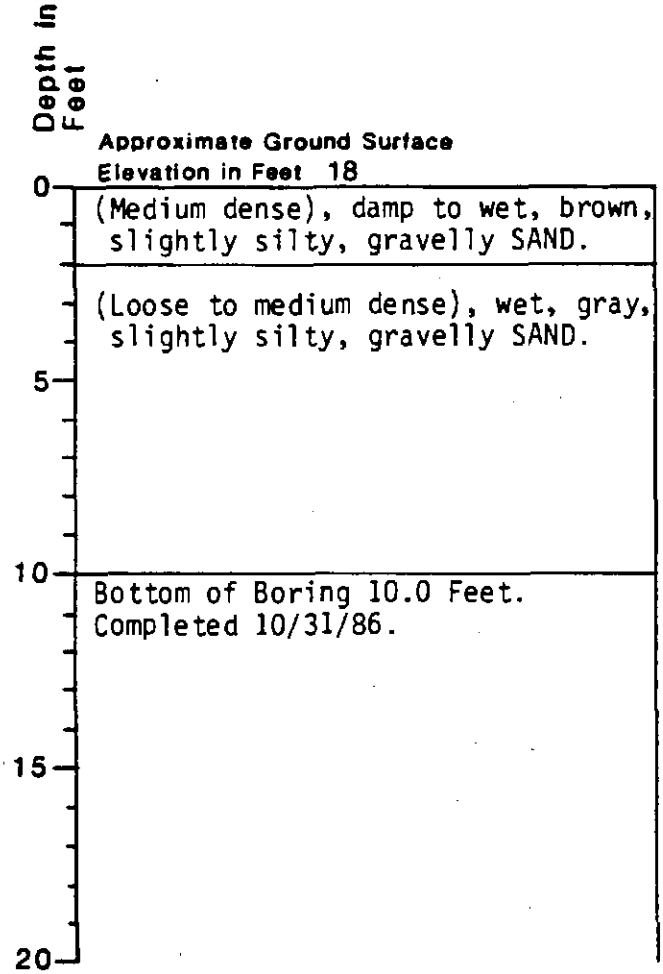
J-1784 November 1986

HART-CROWSER & associates inc.

Figure 5

Boring Log and Construction Data for Observation Well HA-6

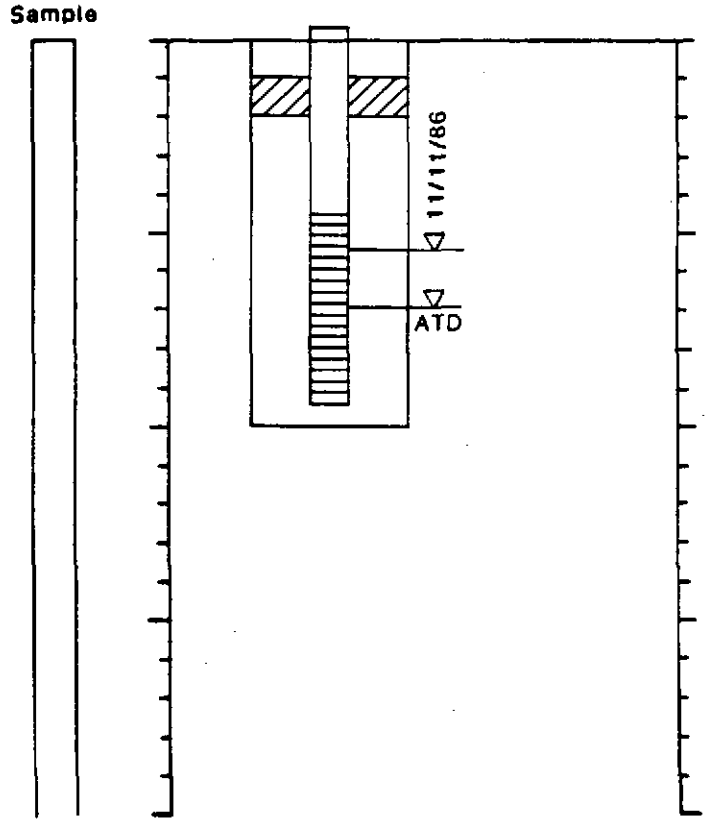
Geologic Log



Well Design

Casing Stickup in Feet < .5

Relative Elevation of Top of Well in Feet 18.16



Water Level

Bentonite

Natural Material

2-inch ø PVC Riser Pipe

2-inch ø PVC Screen (.020 Slot Size)

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

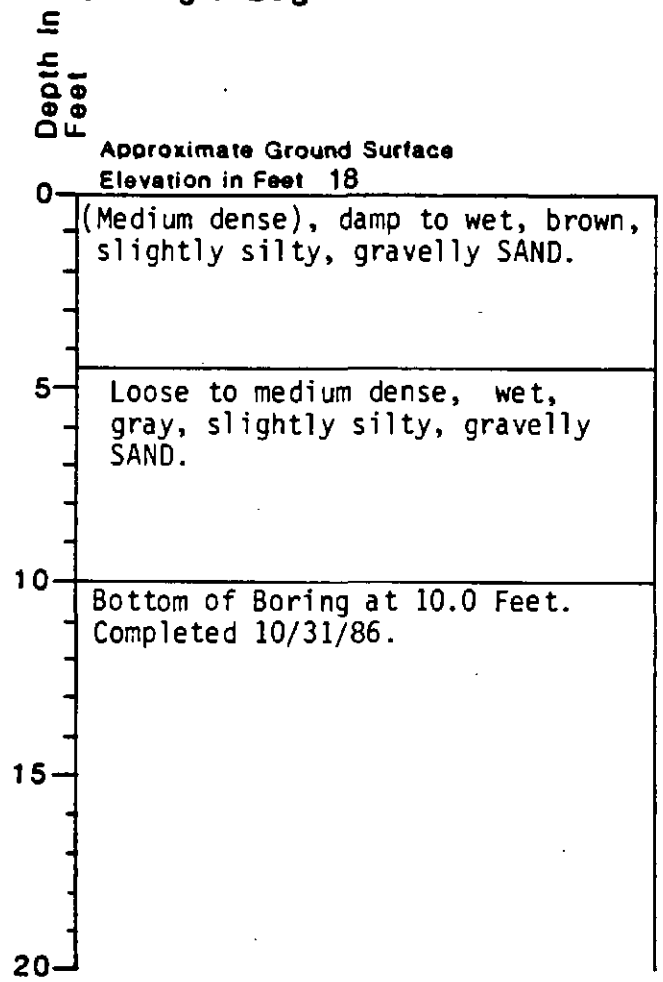
J-1784 November 1986

HART-CROWSER & associates inc.

Figure 6

Boring Log and Construction Data for Observation Well HA-7

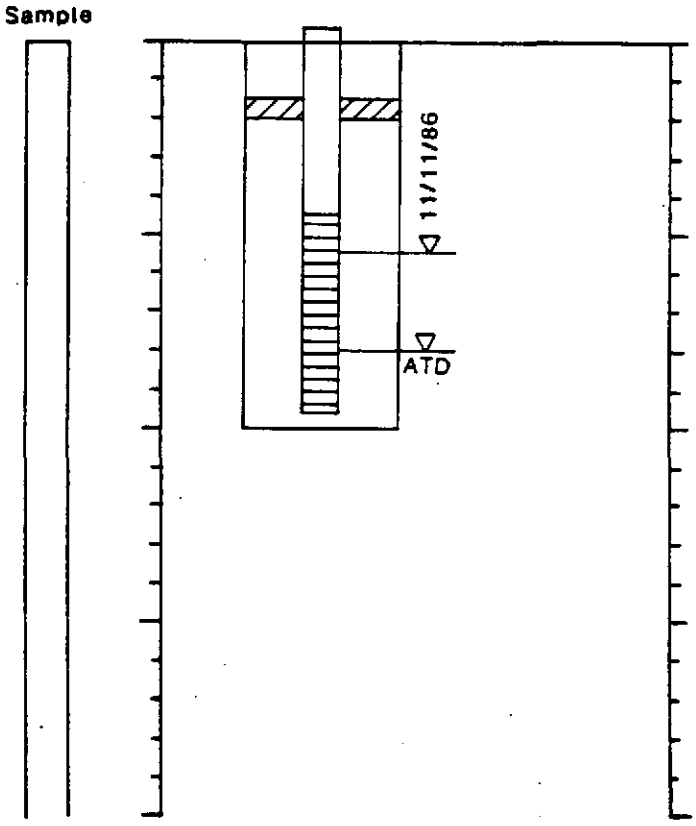
Geologic Log



Well Design

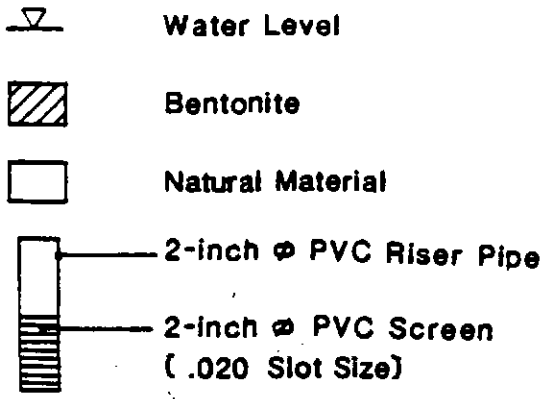
Casing Stickup in Feet .5

Relative Elevation of Top of Well in Feet 18.44



NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling



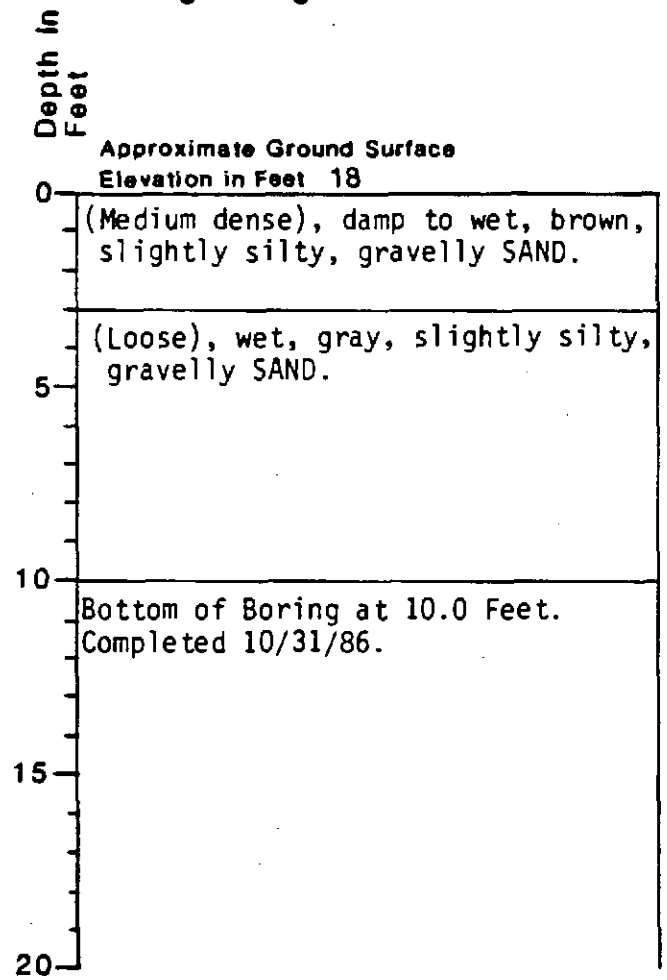
J-1784 November 1986

HART-CROWSER & associates inc.

Figure 7

Boring Log and Construction Data for Observation Well HA-8

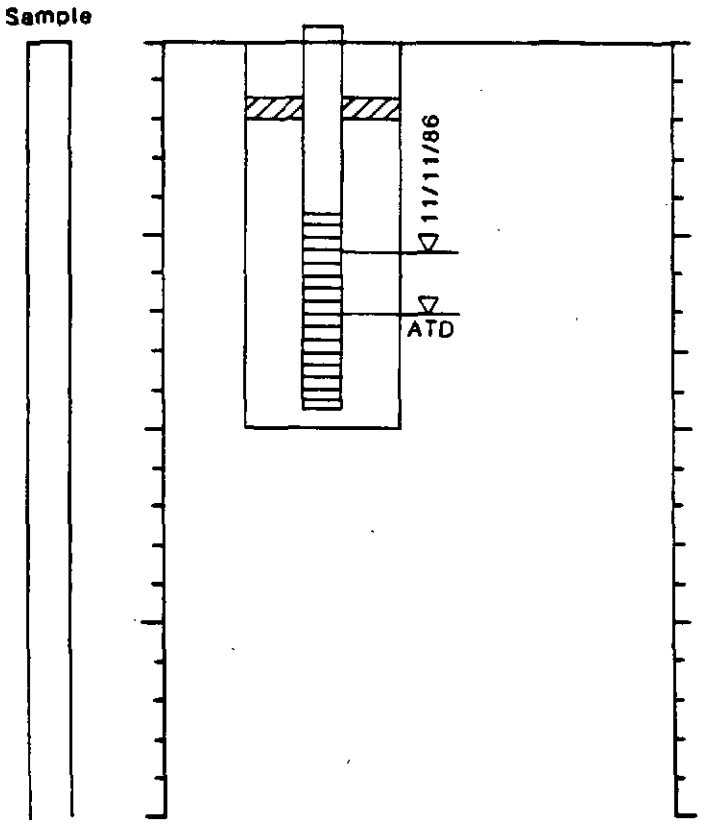
Geologic Log



Well Design

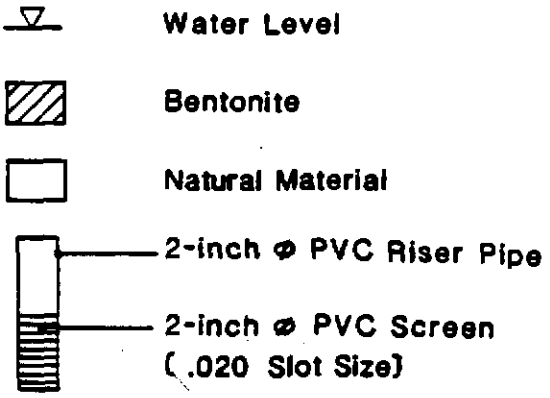
Casing Stickup in Feet .7

Relative Elevation of Top of Well in Feet 18.88



NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling



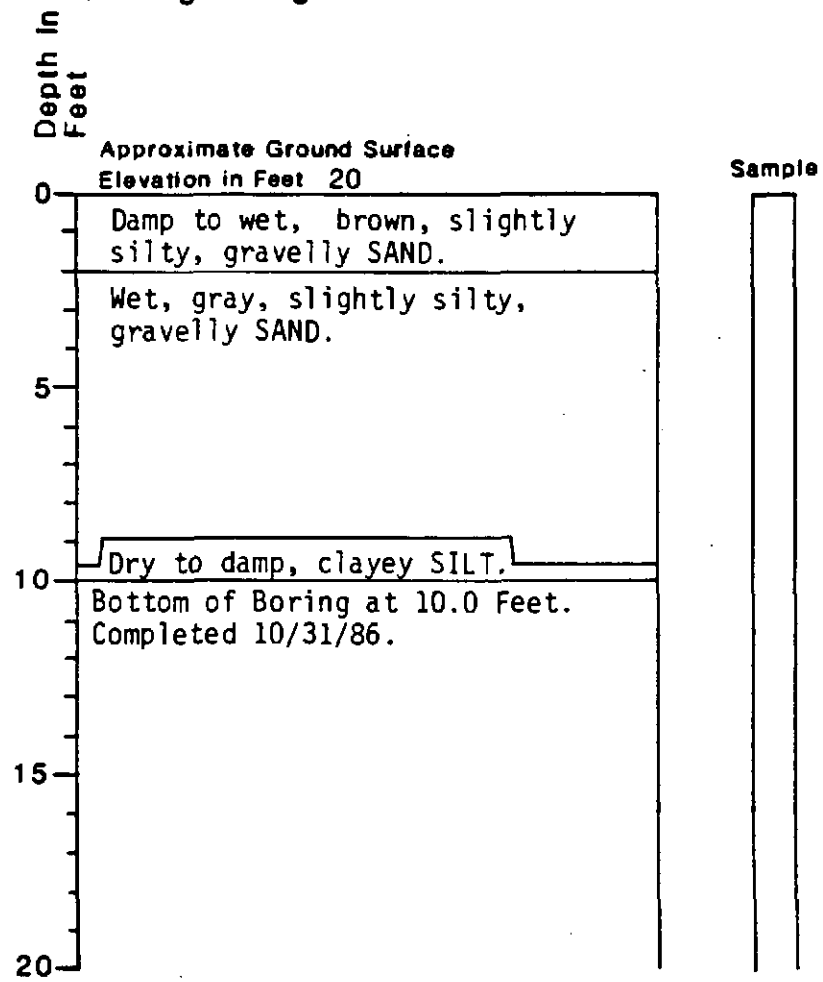
J-1784 November 1986

HART-CROWSER & associates inc.

Figure 8

Boring Log and Construction Data for Observation Well HA-9

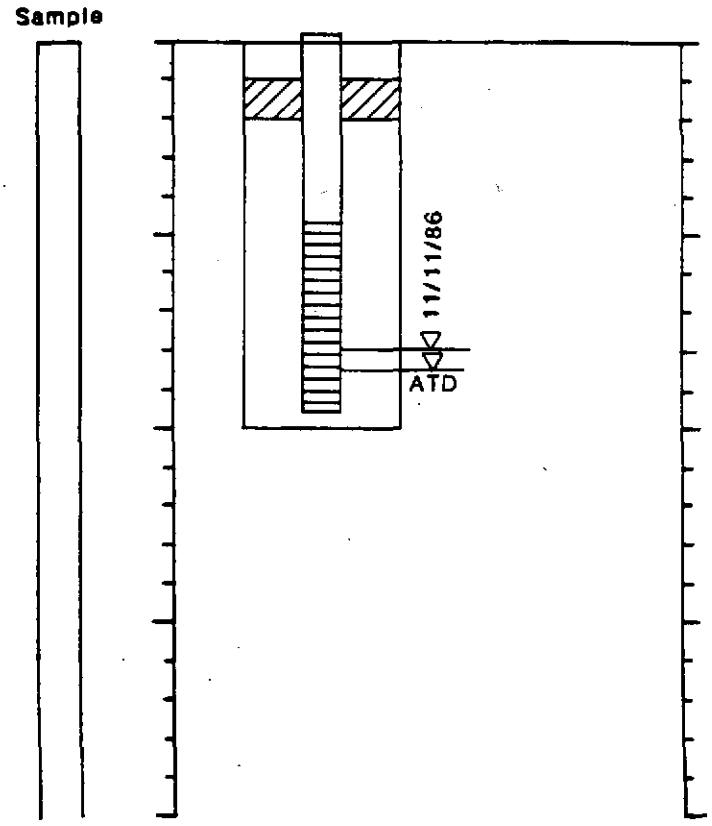
Geologic Log

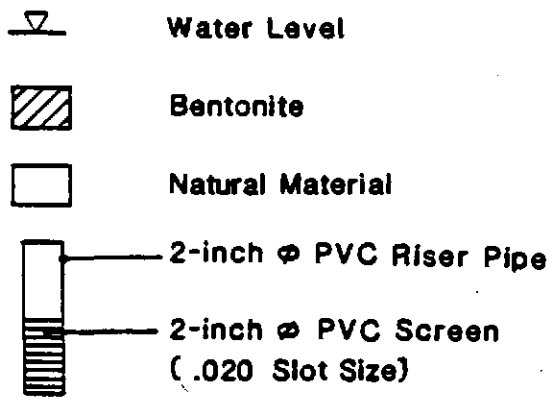


Well Design

Casing Stickup in Feet .3

Relative Elevation of Top of Well in Feet 19.40





NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

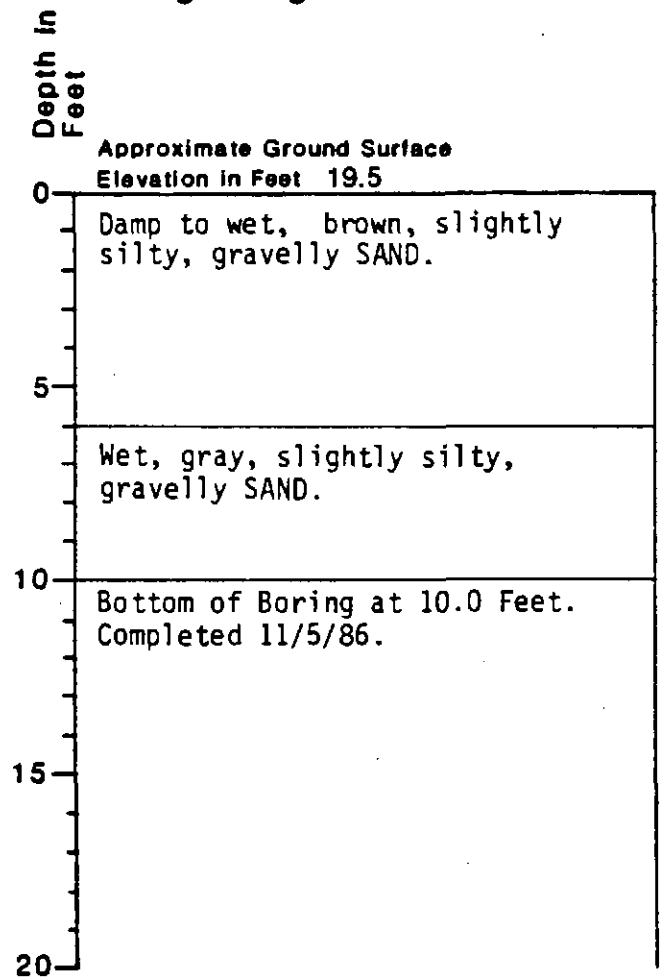
J-1784 November 1986

HART-CROWSER & associates inc.

Figure 9

Boring Log and Construction Data for Observation Well HA-10

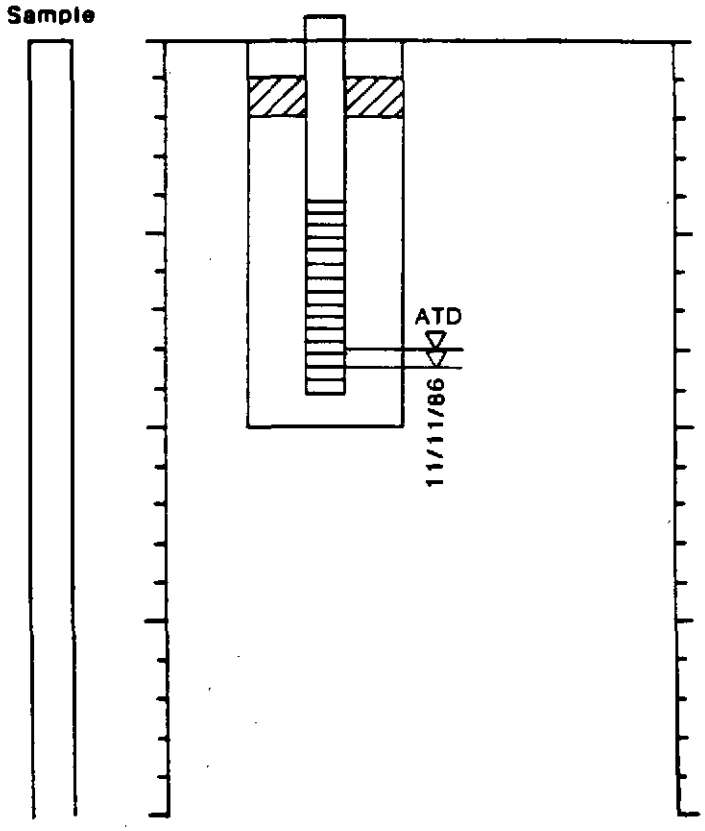
Geologic Log

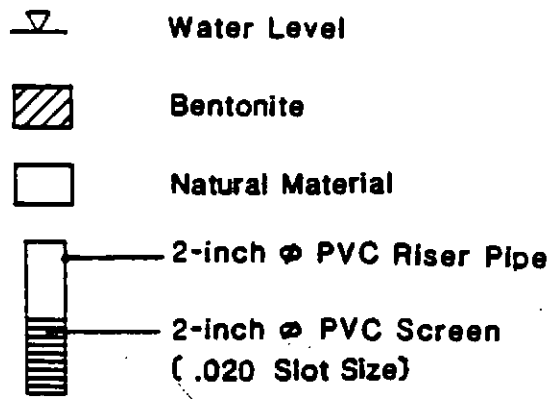


Well Design

Casing Stickup in Feet .7

Relative Elevation of Top of Well in Feet 19.33





NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

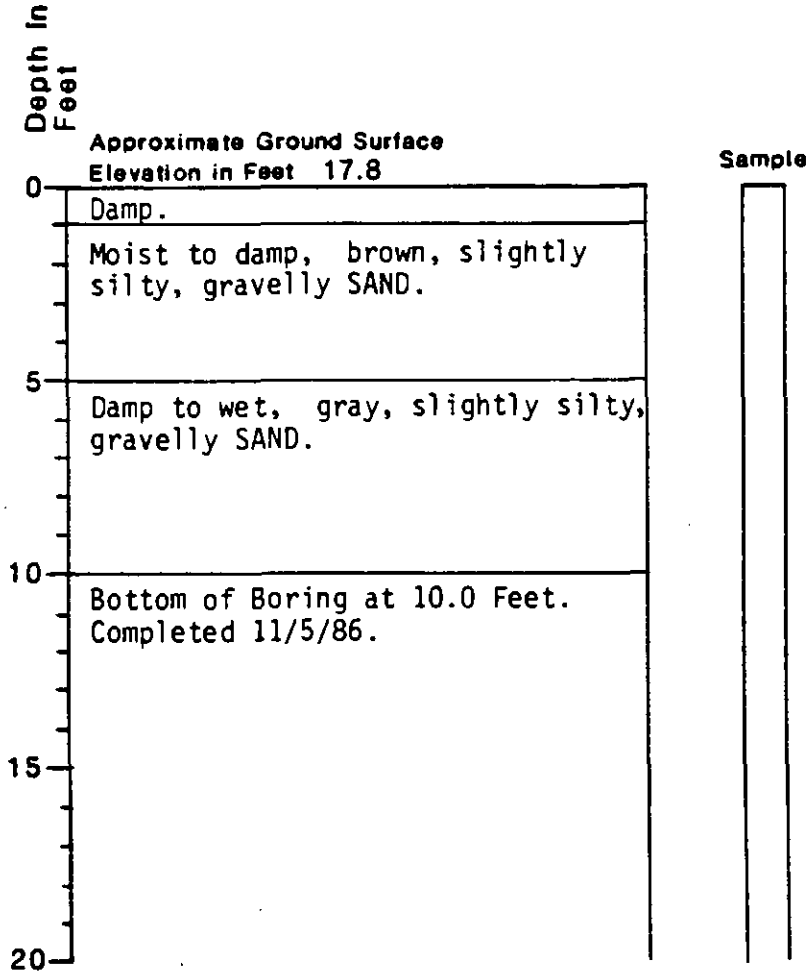
J-1784 November 1986

HART-CROWSER & associates inc.

Figure 10

Boring Log and Construction Data for Observation Well HA-11

Geologic Log

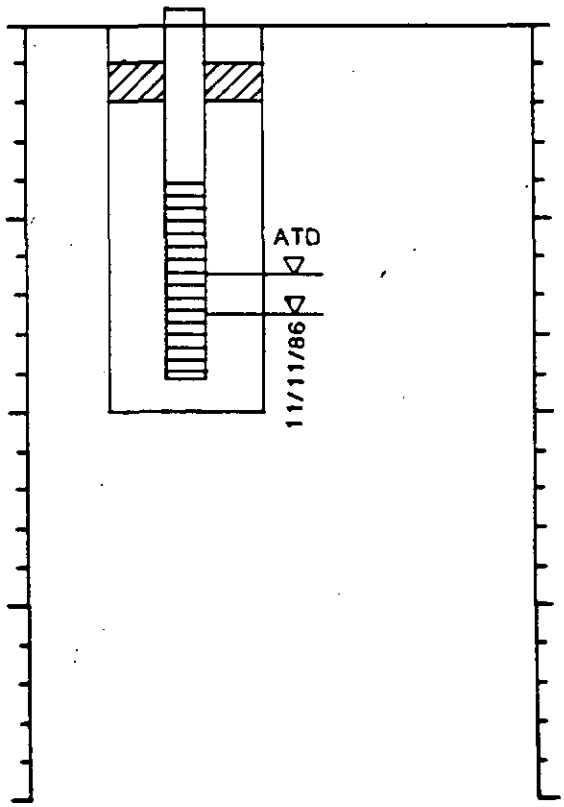


Sample

Well Design

Casing Stickup In Feet .7

Relative Elevation of Top of Well in Feet 18.51



Water Level

Bentonite

Natural Material

2-inch ⌀ PVC Riser Pipe

2-inch ⌀ PVC Screen (.020 Slot Size)

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

J-1784 November 1986

HART-CROWSER & associates inc.

Figure 11

PROJECT: ConocoPhillips Facilty No. 3485	WELL / BORING NO: **B1**
LOCATION: 2423 Lind Ave. SW, Renton, WA	
STARTED: 4/27/05 COMPLETED: 4/27/05	NORTHING: EASTING:
DRILLING COMPANY: Cascade Drilling Inc.	GROUND ELEV: M.P. ELEV:
DRILLING EQUIPMENT: Cascade Drilling Inc.	INITIAL DTW: 5 TOTAL DEPTH: 9.0
DRILLING METHOD: push probe	STATIC DTW: BOREHOLE DIAMETER: 4"
SAMPLING EQUIPMENT:	LOGGED BY: AW CHECKED BY: AW

DEPTH (ft)	GRAPHIC LOG	USCS	LITHOLOGIC DESCRIPTION	SAMPLE	TIME	RECOV. (%)	BLOW COUNT	PID (ppm)	DEPTH (ft)	WELL CONSTRUCTION
			Bark landscaping							
		SP	SAND brown, medium grained with fine gravel and trace fines, moist, no odor		8:42			22.4		
			@2.5': increased fines		8:47			24.7		
			@3': gray		8:53			22.7		
			@4': coarse gravel and cobbles, gray		9:01			21.4		
5			@5': moist, saturated, gravel is rounded to angular		9:15			25.6	5	abandoned with hydrated bentonite chips
					9:25(w)					
10			Boring terminated at 9' (w) = water sample taken						10	
15									15	
20									20	

PROJECT: ConocoPhillips Facilty No. 3485	WELL / BORING NO: **B2**
LOCATION: 2423 Lind Ave. SW, Renton, WA	
STARTED: 4/27/05 COMPLETED: 4/27/05	NORTHING: EASTING:
DRILLING COMPANY: Cascade Drilling Inc.	GROUND ELEV: M.P. ELEV:
DRILLING EQUIPMENT: Cascade Drilling Inc.	INITIAL DTW: 9 TOTAL DEPTH: 13.0
DRILLING METHOD: push probe	STATIC DTW: BOREHOLE DIAMETER: 4"
SAMPLING EQUIPMENT:	LOGGED BY: AW CHECKED BY: AW

DEPTH (ft)	GRAPHIC LOG	USCS	LITHOLOGIC DESCRIPTION	SAMPLE	TIME	RECOV. (%)	BLOW COUNT	PID (ppm)	DEPTH (ft)	WELL CONSTRUCTION
			Bark landscaping							
		SP	SAND brown, medium grained with fine to coarse gravel and fines, moist, no odor		9:32			31.3		
					9:35			31.6		
					9:38			32.0		
					9:41			32.5		
5		SM	SAND gray, fine grained with silt and fine to coarse gravel, moist						5	
					9:58			34.2		
									▽	
10		OL	SILT organic, brown black with wood fragments						10	
					10:25(w)					
		ML	SILT organic, gray, medium plastic, saturated							
			Boring terminated at 13' (w) = water sample taken							
15									15	
20									20	

ENV WELL CP 03485.GPJ SECOR_CO.GDT 5/12/05

PROJECT: ConocoPhillips Facilty No. 3485	WELL / BORING NO: **B3**
LOCATION: 2423 Lind Ave. SW, Renton, WA	
STARTED: 4/27/05 COMPLETED: 4/27/05	NORTHING: EASTING:
DRILLING COMPANY: Cascade Drilling Inc.	GROUND ELEV: M.P. ELEV:
DRILLING EQUIPMENT: Cascade Drilling Inc.	INITIAL DTW: 6 TOTAL DEPTH: 9.0
DRILLING METHOD: push probe	STATIC DTW: BOREHOLE DIAMETER: 4"
SAMPLING EQUIPMENT:	LOGGED BY: AW CHECKED BY: AW

DEPTH (ft)	GRAPHIC LOG	USCS	LITHOLOGIC DESCRIPTION	SAMPLE	TIME	RECOV. (%)	BLOW COUNT	PID (ppm)	DEPTH (ft)	WELL CONSTRUCTION
			Bark landscaping							
		SP	SAND brown, medium grained with fine to coarse gravel, cobbles, some silt, moist, no odor		10:22			27.7		
					10:25			23.4		
					10:28			25.9		
					10:35			19.1		
5			@5': medium grained with fine gravel, saturated, odor						5	abandoned with hydrated bentonite chips
					11:10(w)				▽	
		OL	SILT organic, brown, saturated							
10			Boring terminated at 9' (w) = water sample taken						10	
15									15	
20									20	

ENV_WELL_CP 03485.GPJ SECOR_CO.GDT 5/12/05

PROJECT: ConocoPhillips Facilty No. 3485	WELL / BORING NO: **B4**
LOCATION: 2423 Lind Ave. SW, Renton, WA	
STARTED: 4/28/05 COMPLETED: 4/28/05	NORTHING: EASTING:
DRILLING COMPANY: Cascade Drilling Inc.	GROUND ELEV: M.P. ELEV:
DRILLING EQUIPMENT: Cascade Drilling Inc.	INITIAL DTW: TOTAL DEPTH: 13.0
DRILLING METHOD: push probe	STATIC DTW: BOREHOLE DIAMETER: 4"
SAMPLING EQUIPMENT:	LOGGED BY: AW CHECKED BY: AW

DEPTH (ft)	GRAPHIC LOG	USCS	LITHOLOGIC DESCRIPTION	SAMPLE	TIME	RECOV. (%)	BLOW COUNT	PID (ppm)
			Grass					
		SP	**SAND** brown, medium grained with trace silt, moist		8:40			19.9
					8:45			21.1
			@2.5': some fine to coarse rounded gravel, some gray coloration					
			@3': gray		8:50			16.7
					9:00			2.4
5								
			@6': moist to saturated					
					9:30			
			@9': gray					
10								
		OL	**SILT** organic, brown					
		ML	**SILT** gray, medium plastic					
			Boring terminated at 13'					
15								
20								

DEPTH (ft)	WELL CONSTRUCTION
5	abandoned with hydrated bentonite chips
10	
15	
20	

ENV_WELL CP 03485.GPJ SECOR_CO.GDT 5/12/05

SECOR International Incorporated

PROJECT NO. 01CP.03485.03

PROJECT: ConocoPhillips Facilty No. 3485	WELL / BORING NO: **B5**
LOCATION: 2423 Lind Ave. SW, Renton, WA	
STARTED: 4/28/05 COMPLETED: 4/28/05	NORTHING: EASTING:
DRILLING COMPANY: Cascade Drilling Inc.	GROUND ELEV: M.P. ELEV:
DRILLING EQUIPMENT: Cascade Drilling Inc.	INITIAL DTW: 6.5 TOTAL DEPTH: 9.0
DRILLING METHOD: push probe	STATIC DTW: BOREHOLE DIAMETER: 4"
SAMPLING EQUIPMENT:	LOGGED BY: AW CHECKED BY: AW

DEPTH (ft)	GRAPHIC LOG	USCS	LITHOLOGIC DESCRIPTION	SAMPLE	TIME	RECOV. (%)	BLOW COUNT	PID (ppm)	DEPTH (ft)	WELL CONSTRUCTION
			Grass							
		SP	SAND brown, medium grained with trace silt, some fine to coarse gravel and cobbles moist		9:45			22.7		
					9:50			23.6		
					9:55			18.8		
					10:00			24.8		abandoned with hydrated bentonite chips
5									5	
					10:10(w)				▽	
			@9': some organic material, gray							
10			Boring terminated at 9' (w) = water sample taken						10	
15									15	
20									20	

ENV_WELL_CP 03485.GPJ SECOR_CO.GDT 5/12/05

PROJECT: ConocoPhillips Facility No. 3485	WELL / BORING NO: **B6**
LOCATION: 2423 Lind Ave. SW, Renton, WA	
STARTED: 4/27/05 COMPLETED: 4/27/05	NORTHING: EASTING:
DRILLING COMPANY: Cascade Drilling Inc.	GROUND ELEV: M.P. ELEV:
DRILLING EQUIPMENT: Cascade Drilling Inc.	INITIAL DTW: 8 TOTAL DEPTH: 22.0
DRILLING METHOD: push probe	STATIC DTW: BOREHOLE DIAMETER: 4"
SAMPLING EQUIPMENT:	LOGGED BY: AW CHECKED BY: AW

DEPTH (ft)	GRAPHIC LOG	USCS	LITHOLOGIC DESCRIPTION
			Gravel fill Soft dig to 5' using air wand and vacuum truck
5		SP	SILTY SAND gray, fine grained with gravel fill, moist to saturated
10		OL	SILT organic, brown
15		ML	SILT with some silt, gray and brown, moist, moderately plastic @18': lens of fine sand
20		SP SM	SILTY SAND dark gray, fine grained, saturated
			Boring terminated at 22'

SAMPLE | TIME | RECOV. (%) | BLOW COUNT | PID (ppm)

DEPTH (ft) | WELL CONSTRUCTION

5 | 10 | 15 | 20

abandoned with hydrated bentonite chips

PROJECT: ConocoPhillips Facilty No. 3485	WELL / BORING NO: **B7**
LOCATION: 2423 Lind Ave. SW, Renton, WA	
STARTED: 4/27/05 COMPLETED: 4/27/05	NORTHING: EASTING:
DRILLING COMPANY: Cascade Drilling Inc.	GROUND ELEV: M.P. ELEV:
DRILLING EQUIPMENT: Cascade Drilling Inc.	INITIAL DTW: 7 TOTAL DEPTH: 13.0
DRILLING METHOD: push probe	STATIC DTW: BOREHOLE DIAMETER: 4"
SAMPLING EQUIPMENT:	LOGGED BY: AW CHECKED BY: AW

DEPTH (ft)	GRAPHIC LOG	USCS	LITHOLOGIC DESCRIPTION	SAMPLE	TIME	RECOV. (%)	BLOW COUNT	PID (ppm)
			Bark landscaping					
		SP	**SAND** brown, medium grained with fine to coarse gravel and cobbles, some silt, moist, no odor		11:38			17.5
					11:42			31.6
					11:45			33.0
5			@4.5': gray		11:50			34.4
10			@10': saturated					
			@13': organic material					
			Boring terminated at 13'					
15								
20								

DEPTH (ft)	WELL CONSTRUCTION
5	abandoned with hydrated bentonite chips
10	
15	
20	

ENV_WELL_CP 03485.GPJ SECOR_CO.GDT 5/12/05

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2A

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, 3' east of R-2, within trench 2

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,121/169,870 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.82' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	13' BGS
		Weather:	Overcast, cool
Drilling Started:	10/11/07 0915	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 0933	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECV'D	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs.	
5				12	POORLY GRADED GRAVEL (GP), dark greenish gray (5G 4/1), dense, moist, 95% fine to coarse gravel, predominantly coarse gravel, rounded except where broken; 5% sand; maximum size 50 cm; no evident roots or fouling.		GP		
				18				Soft drilling at 10'.	
10					POORLY GRADED SAND (SP), dark greenish gray (5GY 4/1), loose, wet, 5% fine to coarse gravel, 90% medium to coarse sand; 5% fines.		SP		
					SILT (ML), very dark grayish brown (2.5Y 3/2), soft, wet, 100% fines; roots, organic matter.		ML		

LOG_OF_BORING 1304207NEW.GPJ ACTON.GDT 11/2/07

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2B

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, 14' east of R-2, within trench 2

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,132/169,870 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.47' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	13' BGS
		Weather:	Overcast, cool
Drilling Started:	10/11/07 0945	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1001	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECVD	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs.	
5				11	POORLY GRADED GRAVEL WITH SAND (GP), dark greenish gray (5GY 4/1), dense, moist, 90% fine to coarse gravel, predominantly large gravel, rounded; 10% fine to coarse sand; maximum size 50 cm; no evident roots or fouling.		GP		
				30	▼ wet.			Soft drilling at 10'.	
10					▼ 60% fine to coarse gravel; 40% sand; maximum size 20 cm.				
					SILT (ML), very dark grayish brown (2.5Y 3/2), very soft, wet, 100% fines; roots and organic matter.		ML		

LOG_OF_BORING 1304207NEW.GPJ ACTON.GDT 11/2/07

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2C

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, 15' east-southeast of R-2

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,132/169,863 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.61' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	16' BGS
		Weather:	Overcast, cool
Drilling Started:	10/11/07 1025	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1045	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECV'D	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs.	
5				36	POORLY GRADED SAND WITH SILT (SP-SM), dark greenish gray (10GY 4/1), dense, moist, 10% fine to coarse gravel; 80% fine to coarse sand, predominantly medium to coarse; 10 % fines; maximum size 50 cm.		SP-SM		
					▼ 10% fine to coarse gravel; 85% medium to coarse sand; 5% fines.				
				36					
10					▼ wet.				
					SILT (ML), very dark grayish brown (10YR 3/2), soft, wet, 100% fines; interbeds of clay (CL), 10YR4/1 dark gray; roots, organic matter.		ML		
				48					
					POORLY GRADED SAND (SP), dark greenish gray (10Y 3/1), medium, wet, 95% fine sand; 5% fines; micaceous.		SP		
15					LEAN CLAY (CL), dark gray (5Y 4/1), soft, wet, 100% fines; micaceous; roots, organic matter.		CL		

LOG_OF_BORING 1304207NEW.GPJ ACTON.GDT 11/2/07

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2D

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, east of trench 2 across Olympic driveway

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,231/169,870 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.55' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	12' BGS
		Weather:	Overcast, cool
Drilling Started:	10/11/07 1058	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1113	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECV'D	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs.	
					POORLY GRADED SAND WITH GRAVEL (SP), dark greenish gray (5GY 4/1), medium, moist, 15% fine to coarse rounded gravel; 80% fine to coarse sand, predominantly fine to medium; 5 % fines; maximum size 50 cm.		SP		
5				30				Logged from air knife cuttings 3-5'.	
				36	wet.				
					CLAYEY SILT (ML-CL), very dark grayish brown (2.5Y 3/2) and gray (5Y 5/1), soft, wet, 100% fines; interbedded silt and clay; roots, organic matter.		ML-CL	Slough at top of core. Contact approx.	
10					POORLY GRADED SAND (SP), dark greenish gray (5G 4/1), loose, wet, 95% fine sand; 5% fines.		SP		

LOG_OF_BORING 1304207NEW.GPJ ACTON.GDT 11/2/07

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2E

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, 9' north of W-4

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,087/169,857 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.71' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	16' BGS
		Weather:	Overcast, cool
Drilling Started:	10/11/07 1125	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1220	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECV'D	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs.	
					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dark grayish brown (2.5Y 4/2), medium, moist, 20% fine to coarse rounded gravel; 70% fine to coarse sand, predominantly fine to medium; 10 % fines; maximum size 70 cm.		SP-SM	Logged from air knife cuttings 3 -5'.	
5				24	dark greenish gray (5GY 4/1), 15% fine to coarse rounded gravel; 75% fine to coarse sand, predominantly fine to medium; 10 % fines; maximum size 40 cm.				
				36	wet.				
10					SILT (ML), very dark grayish brown (2.5Y 3/2), soft, wet, 100% fines; organic matter, roots, wood fragments to 40 cm.		ML		
				30	LEAN CLAY (CL), dark gray (2.5Y 4/1), soft, wet, 100% fines.		CL		
					POORLY GRADED SAND (SP), dark greenish gray (10GY 3/1), medium, wet, 90% fine sand; 10% fines.		SP		
					LEAN CLAY (CL), dark gray (2.5Y 4/1), soft, wet, 100% fines.		CL		
					POORLY GRADED SAND (SP), dark greenish gray (10GY 3/1), medium, wet, 95% fine to medium sand; 5% fines.		SP		
15									

LOG_OF_BORING 1304207NEW.GPJ ACTON.GDT 11/2/07

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2F

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, across driveway from trench 2, northeast of HA-2

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,187/169,824 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.80' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	12' BGS
		Weather:	Overcast, cool
Drilling Started:	10/11/07 1235	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1250	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECVD	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs.	
					POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dark greenish gray (10Y 3/1), medium, moist, 15% fine to coarse rounded gravel; 75% fine to coarse sand, predominantly fine to medium; 10 % fines; maximum size 40 cm.		SP-SM	Logged from air knife cuttings 2.5-5'.	
5				27					
					SILTY SAND WITH GRAVEL (SM), dark greenish gray (10Y 3/1), medium, wet, 15% fine to coarse gravel; 60% fine to coarse sand; 25 % fines; maximum size 30 cm.		SM		
					POORLY GRADED SAND (SP), dark greenish gray (10Y 4/1), medium, moist, 5% fine to coarse gravel; 95% fine to coarse sand, predominantly fine to medium; 5% fines; maximum size 20 cm.		SP		
				36	▼ wet.				
10					SILT (ML), very dark gray (2.5Y 3/1), soft, wet, 100% fines; roots.		ML		
					LEAN CLAY (CL), greenish gray (10Y 5/1), soft, wet, 100% fines; roots.		CL		
					POORLY GRADED SAND WITH SILT (SP-SM), dark greenish gray (10Y 4/1), medium, wet, 90% fine sand; 10% fines.		SP-SM		

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2G

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, in trench 2, 4' northeast of W-4

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,089/169,849 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.65' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	12' BGS
		Weather:	Overcast, cool, breezy
Drilling Started:	10/11/07 1310	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1345	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECV'D	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs. Hole caves 2 after air knifing.	
5				2	POORLY GRADED GRAVEL (GP), dark greenish gray (10GY 3/1), medium, moist, 95% fine to coarse rounded gravel ; 5% sand; mostly recovered large gravel.		GP	Soft at 7' (sand or clay).	
					POORLY GRADED SAND WITH GRAVEL (SP), dark greenish gray (10GY 3/1), medium, moist, 15% fine to coarse gravel, 80% fine to coarse sand; 5% fines; maximum size 40 cm; no evident fouling.		SP		
				28	▼ wet.				
10					SILT (ML), very dark gray (2.5Y 3/1), soft, wet, 100% fines; interbeds of clay (CL) 2.5Y4/1 dark gray; organic matter, roots, wood fragments to 40 cm.		ML		

LOG_OF_BORING_1304207NEW.GPJ_ACTON.GDT 11/2/07

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2H

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, 16' south-southwest of R-2

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,112/169,854 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.98' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	16' BGS
		Weather:	Overcast, cool, breezy
Drilling Started:	10/11/07 1405	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1430	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECV'D	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs.	
5				36	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), dark greenish gray (10Y 3/1), medium, moist, 15% fine to coarse rounded gravel; 75% fine to coarse sand, predominantly fine to medium; 10 % fines; maximum size 40 cm.		SP-SM		
10				12					
				18	SILT (ML), very dark gray (2.5Y 3/1), very soft, wet, 100% fines; thin (1-3 cm) clay interbeds; organic matter, roots.		ML	Sample stuck in core barrel, liner crumpled.	
15					POORLY GRADED SAND (SP), dark greenish gray (10GY 3/1), medium, wet, 95% fine sand; 5% fines.		SP		

APPENDIX C

Elevation Data and Survey Notes

RENTON SOIL BORINGS SURVEY

Instrument set up point	Survey point	Approximate Point Location [2] Angle [1]	Approximate Distance (ft)	Elevation (ft)	
HA-9	HA-2	S 0° 00'	86.70	21.09	Reference point for elevations
	SB A	S 73° 20' W	49.20	21.82	
	SB B	S 71° 00' W	35.80	21.47	
	SB C	S 61° 00' W	37.50	21.61	
	SB D	S 80° 10' E	65.00	21.55	
	SB E	S 72° 00' W	83.30	21.71	
	SB F	S 19° 00' E	60.80	21.80	
	SB G	S 66° 00' W	81.70	21.65	
	SB H	S 61° 30' W	61.70	21.98	
	W-3	S 55° 30' W	15.00	19.97	For check only. Slight difference from survey
	W-4	S 65° 30' W	86.70	20.95	For check only. Slight difference from survey
	R2	S 74° 00' W	50.00		

Notes

[1] Turned angle while setup on HA-9 and back site HA-2 (assumed that line was S 0 degrees)

[2] Point location is approximated and should be only used if GPS data does not compute

ACTON • MICKELSON • ENVIRONMENTAL, INC.

5175 Hillsdale Circle #100
El Dorado Hills, CA 95762

LOG OF BORING

SB-TR2G

Facility: Former Mobil Terminal #46-080

Address: 2423 Lind Avenue SW
Renton, Washington

AME Project No.: 13042.07

Area No./ Description: Northwest corner of site, in trench 2, 4' northeast of W-4

Drilling Company:	Cascade Drilling	Location (East/North):	1,296,089/169,849 (not surveyed)
Drilled By:	Frank Scott	Ground Surface Elevation:	21.65' (not surveyed)
Drilling Method:	Direct Push	Water Depth (Date, Time):	NA
Boring Diameter:	2"	Casing Elevation:	NA
Sampling Method:	Continuous core	Total Depth (feet):	12' BGS
		Weather:	Overcast, cool, breezy
Drilling Started:	10/11/07 1310	Logged By:	J.R. Heglie, L.G.
Drilling Finished:	10/11/07 1345	Checked By:	
Source:	Original field notes	PID/FID:	

DEPTH (feet)	SAMPLE INTERVAL	SAMPLE ID	BLOW COUNTS BLOWS/6 IN. (N)	IN. RECV'D	SOIL DESCRIPTION: SOIL NAME, COLOR, RELATIVE DENSITY OR CONSISTENCY, MOISTURE, PARTICLE SIZE RANGE, OTHER	GRAPHIC LOG	SOIL CLASS	COMMENTS: DRILLING RATE AND CONDITIONS, WATER DEPTH, BACKFILL	FIELD PID READING (ppm)
0								Not logged. Cleared by air knife/vacuum excavation to approx. 5' bgs. Hole caves 2 after air knifing.	
5				2	POORLY GRADED GRAVEL (GP), dark greenish gray (10GY 3/1), medium, moist, 95% fine to coarse rounded gravel ; 5% sand; mostly recovered large gravel.		GP	Soft at 7' (sand or clay).	
					POORLY GRADED SAND WITH GRAVEL (SP), dark greenish gray (10GY 3/1), medium, moist, 15% fine to coarse gravel, 80% fine to coarse sand; 5% fines; maximum size 40 cm; no evident fouling.		SP		
				28	▼ wet.				
10					SILT (ML), very dark gray (2.5Y 3/1), soft, wet, 100% fines; interbeds of clay (CL) 2.5Y4/1 dark gray; organic matter, roots, wood fragments to 40 cm.		ML		

LOG_OF_BORING 1304207NEW.GPJ ACTON.GDT 11/2/07

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-1** PAGE 1 OF 1

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **10.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
12:45			Asphalt							Asphalt 12 inches thick surface patch
		SW	SW; gray; moist; slight petroleum odor; some silty sand; with gravel		G-1@ 1-1'			0		Fill 12 inches thick
13:10			Boring was cleared to five feet using a hand auger		13:10 G-1@ 3-3'			0		
					G-1@ 4-4'			0		
5			No Recovery		No Recovery				5	
		SW	SW; gray; moist; slight petroleum odor; some silty sand; with gravel		G-1@ 6-6'			3.2		Hydrated Bentonite Chips
					G-1@ 7-7'			4.3		
13:15					13:15 G-1@8-9' 4/20/09			4.9		
					G-1@ 9-9'			4.2		
10			Hole terminated at 10 feet.						10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-2** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7 4/20/09**
BOREHOLE DEPTH (ft): **10.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
11:00			Asphalt							Asphalt 6 inches thick surface patch
		SW	SW; brownish gray; dry; slight petroleum odor; medium to fine grain sand; few gravel							
11:20					11:20 G-2@2' 4/20/09			24.6		
11:23			Boring was cleared to five feet using a hand auger		11:23 G-2@ 3-3'			55.3		
11:25					11:25 G-2@ 4-4'			28.8		
11:30	5				.			1540		
					G-2@ 4.5-4.5' 11:30			1809	5	Hydrated Bentonite Chips
					G-2@ 5-5'			1343		
					. G-2@ 6-6'			1837 ▽		
					. G-2@ 7-7'			1411		
					. G-2@ 8-8'					
					. No Recovery					
	10		Hole terminated at 10 feet.						10	
	15								15	

GEO FORM.304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-3** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **NE**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **T. Parise**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **10.0**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
8:15			Asphalt							Asphalt 6 inches thick surface patch
		SW	SW; gray; slight petroleum odor; medium to fine grain sand; few gravel							
			Boring was cleared to five feet using a hand auger		G-3@ 4-4'			691		
					G-3@ 4.5-4.5'			1448		
8:35	5				8:35 G-3@5' 4/20/09			1760	5	Hydrated Bentonite Chips
					G-3@ 5.5-5.5'			1673		
					G-3@ 6-6'			1272		
8:50		SM	SM; gray; moist; slight petroleum odor; silty sand; some gravel					1650		
					G-3@ 7-7'			367		
8:55					8:50 G-3@8' 4/20/09			1043		
	10		Hole terminated at 10 feet.		8:55 G-3@9' 4/20/09				10	
	15								15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-4** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **10.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
9:10			Asphalt							Asphalt 6 inches thick surface patch
		SW	SW; gray; dry; slight petroleum odor; sand; some gravel; large cobble at 3.5 feet Boring was cleared to five feet using a hand auger							
		SW	SW; brown; dry; slight petroleum odor; sand; some gravel		G-4@ 4.5-4.5'			1818		
5		SW	SW; gray; moist; slight petroleum odor; sand; some gravel		9:40 G-4@5.5' 4/20/09			1795	5	Hydrated Bentonite Chips
9:40					G-4@ 6.5-6.5'			1933		
9:45					9:45 G-4@7.5' 4/20/09			2130		
					G-4@ 8.5-8.5'			1722		
10			Hole terminated at 10 feet.						10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-5** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7 4/20/09**
BOREHOLE DEPTH (ft): **10.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
10:05			Asphalt							Asphalt 6 inches thick surface patch
		SW	SW; gray; dry; slight petroleum odor; sand; some gravel; large cobble at 3.5 feet Boring was cleared to five feet using a hand auger		10:24 G-5@ 2.5-2.5'			125		
10:24					10:25 G-5@ 3-3'			151		
		SW	SW; brown; dry; slight petroleum odor; sand; some gravel					1842		
10:30					G-5@ 3.5-3.5'			1953		
5		SM	SM; brown; dry; slight petroleum odor; silty sand; few cobbles		10:30 G-5@4-5' 4/20/09			1755	5	Hydrated Bentonite Chips
					G-5@ 5-5'			1706		
					G-5@ 6-6'			710		
					G-5@ 7-7'			780		
					G-5@ 8-8'			818		
10			Hole terminated at 10 feet.		G-5@ 9-9'				10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-6** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7** **4/20/09**
BOREHOLE DEPTH (ft): **10.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
13:40			Asphalt							Asphalt 6 inches thick surface patch
		SW	SW; brown; dry; no odor; sand; some gravel							
13:45					13:45 G-6@1' 4/20/09			1		
					13:50 G-6@ 3-3'			354		
			Boring was cleared to five feet using a hand auger		G-6@ 4-4'			78.1		
5					G-6@ 5-5'			1503	5	Hydrated Bentonite Chips
					13:55 G-6@6-7' 4/20/09			1551		
13:55		SW	SW; brown; moist; slight petroleum odor; medium grain sand; some gravel		G-6@ 7-7'			1052		
					G-6@ 8-8'			1144		
					G-6@ 9-9'			1216		
10			Hole terminated at 10 feet.						10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-7** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7 4/20/09**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **T. Parise**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **10.0**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
14:30			Asphalt							Asphalt 6 inches thick surface patch
		SW	SW; gray; moist; slight petroleum odor; medium grain sand; some gravel							
14:40					14:40 G-7@1' 4/20/09			103		
14:42					14:42 G-7@ 2-2'			106		
14:50			Boring was cleared to five feet using a hand auger		G-7@ 3-3'			115		
					G-7@ 4-4'			115		
14:52					G-7@ 5-5'			0	5	Hydrated Bentonite Chips
					G-7@ 6-6'			9		
					G-7@ 7-7'			1275 ▽		
14:55					G-7@8-9' 4/20/09			1615		
					G-7@ 9-9'			1371		
10			Hole terminated at 10 feet.						10	
15									15	

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-8** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/20/09** COMPLETED: **4/20/09**
INSTALLATION: STARTED **4/20/09** COMPLETED: **4/20/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **7** **4/20/09**
BOREHOLE DEPTH (ft): **10.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
15:30			Landscaped topsoil							Topsoil
15:40		SW	SW; gray; moist; slight petroleum odor; medium grain sand; some gravel		15:40 G-8@ 1-1'			0		
15:45					15:45 G-8@ 2-2'			0		
15:50			Boring was cleared to five feet using a hand auger		15:50 G-8@ 3-3'			0.1		
					G-8@ 4-4'			13		
5					G-8@ 5-5'			60.3	5	Hydrated Bentonite Chips
					G-8@ 6-6'			0		
15:55					G-8@ 7-7'			25.7 ▽		
					G-8@ 8-8'			215		
10			Hole terminated at 10 feet.		15:55 G-8@9-10' 4/20/09			1071	10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-9** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **5 4/21/09**
BOREHOLE DEPTH (ft): **7.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
11:25			Gravel surface							Gravel
		SW	**SILTY** ; SW; brown; medium grain sand; silty sand; some gravel							
11:30					11:30 G-9@ 2-2'			0.2		
11:32			Boring was cleared to five feet using a hand auger		11:32 G-9@ 3-3'			0.1		
11:33					11:33 G-9@ 4-4'			0.3		Hydrated Bentonite Chips
11:35					11:35 G-9@ 5-5'			0.3	▽ 5	
11:40					11:40 G-9@ 6-6'			5.2		
11:42			Hole terminated at 7 feet.		11:42 G-9@7' 4/21/09			17.4		
10									10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-10** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **6 4/21/09**
BOREHOLE DEPTH (ft): **7.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
9:00			Gravel surface							Gravel
		SW	SW; brown gray; moist; slight petroleum odor; medium grain sand; gravel							
					9:10 G-10@ 2-2'			0.6		
9:10										
					9:20 G-10@ 3-3'			5.1		
9:20			Boring was cleared to five feet using a hand auger							
					10:00 G-10@ 4-4'			0		Hydrated Bentonite Chips
10:00										
					10:01 G-10@ 5-5'			0.1		
10:01 5									5	
10:02					10:02 G-10@6' 4/21/09			0.1		
								2.1		
			Hole terminated at 7 feet.		G-10@ 7-7'					
10									10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-11** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **2 4/21/09**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **T. Parise**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **5.0**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
10:20			Gravel surface							Gravel
		SW	SW; brown; moist; strong petroleum odor; medium grain sand; with gravel							
10:25					10:25 G-11@2' 4/21/09			0.5	▽	
10:30			Boring was cleared to five feet using a hand auger		10:30 G-11@3' 4/21/09			755		Hydrated Bentonite Chips
10:35			Moist; strong petroleum odor; hydrocarbon staining; medium grain sand; gravel		10:35 G-11@ 4-4'			47.6		
5			Hole terminated at 5 feet.		G-11@ 5-5'				5	
10									10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-12** PAGE 1 OF 1

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **2 4/21/09**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **T. Parise**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **5.0**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
10:05			Gravel surface							Gravel
		SW	SW; brown gray; moist; strong petroleum odor; medium grain sand; with gravel							
10:10					10:10 G-12@ 2-3'			5.7		
10:13			Boring was cleared to five feet using a hand auger		10:13 G-12@3' 4/21/09			96.2		Hydrated Bentonite Chips
10:20		SW	SW; brown; moist; strong petroleum odor; medium grain sand; gravel		10:20 G-11@4' 4/21/09			2477		
5			Hole terminated at 5 feet.		G-12@ 5-5'				5	
10									10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-13** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **7.5** **4/21/09**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **T. Parise**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **8.0**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
8:10			Gravel surface							Gravel
		SW	SW; gray; saturated; slight petroleum odor; hydrocarbon staining; medium grain sand; with gravel							
					8:20 G-13@ 2-2'			1		
8:20										
					10:13 G-13@ 3-3'			0.8		
8:25			Boring was cleared to five feet using a hand auger							
					10:20 G-13@ 4-4'			6.7		Hydrated Bentonite Chips
8:27										
					8:30 G-13@ 5-5'			1.9	5	
8:30 5										
					8:35 G-13@ 6-6'			3.6		
8:35										
					8:40 G-13@ 7-7'			0.7	▽	
8:40										
8:45			Hole terminated at 8 feet.		8:45 G-13@8' 4/21/09			1810		
10									10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-14** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **NE**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **T. Parise**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **4.0**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
7:50			Gravel surface							Gravel
		SW	SW; brown; moist; slight petroleum odor; medium grain sand; with gravel; refusal at 4 feet							
8:05					8:05 G-14@ 2-2'			0.5		Hydrated Bentonite Chips
8:08			Boring was cleared to five feet using a hand auger		8:08 G-14@ 3-3'			0.6		
8:12			Hole terminated at 4 feet.		8:12 G-14@4' 4/21/09			50		
5									5	
10									10	
15									15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-15** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
LATITUDE:
GROUND ELEV (ft):
INITIAL DTW (ft): **6.5** **4/21/09**
STATIC DTW (ft): **NE**
WELL CASING DIAMETER (in): **---**
LOGGED BY: **T. Parise**

EASTING (ft):
LONGITUDE:
TOC ELEV (ft):
BOREHOLE DEPTH (ft): **6.5**
WELL DEPTH (ft): **---**
BOREHOLE DIAMETER (in): **6**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)
12:20			Gravel surface					
		SW	SW; brown gray; moist; slight petroleum odor; hydrocarbon staining; medium grain sand; with gravel					
12:23					12:23 G-15@ 2-2'			0.3
12:25			Boring was cleared to five feet using a hand auger		12:25 G-15@ 3-3'			0.5
12:27					12:27 G-15@ 4-4'			19.7
12:30 5					12:30 G-15@ 5-5'			1.7
12:33					12:33 G-15@6' 4/21/09			1.3
			Hole terminated at 6.5 feet.					
10								
15								

Depth (feet): 5, 10, 15

Borehole Backfill: Gravel; Hydrated Bentonite Chips

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-16** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **5.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
12:30			Gravel surface							Gravel
		SW	SW; brown; moist; slight petroleum odor; hydrocarbon staining; medium grain sand; with gravel							
					12:35 G-16@ 2-2'					
12:35								0.1		
12:40			Boring was cleared to five feet using a hand auger		12:40 G-16@3' 4/21/09					Hydrated Bentonite Chips
								0.2		
12:45					12:45 G-16@ 4-4'			0.3		
12:50	5		Hole terminated at 5 feet.		12:50 G-16@ 5-5'			0.3	5	
	10								10	
	15								15	

PROJECT: **ConocoPhillips Site 3485**
LOCATION: **Renton, Washington**
PROJECT NUMBER: **212302119**

WELL / PROBEHOLE / BOREHOLE NO: **G-17** PAGE 1 OF 1

Stantec

DRILLING: STARTED **4/21/09** COMPLETED: **4/21/09**
INSTALLATION: STARTED **4/21/09** COMPLETED: **4/21/09**
DRILLING COMPANY: **Cascade Drilling**
DRILLING EQUIPMENT: **Geoprobe**
DRILLING METHOD: **Direct Push**
SAMPLING EQUIPMENT: **Acetate Sleeves/Hand Auger**

NORTHING (ft):
EASTING (ft):
LATITUDE:
LONGITUDE:
GROUND ELEV (ft):
TOC ELEV (ft):
INITIAL DTW (ft): **NE**
BOREHOLE DEPTH (ft): **5.0**
STATIC DTW (ft): **NE**
WELL DEPTH (ft): **---**
WELL CASING DIAMETER (in): **---**
BOREHOLE DIAMETER (in): **6**
LOGGED BY: **T. Parise**
CHECKED BY: **R. Fetterly**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count	Headspace PID (units)	Depth (feet)	Borehole Backfill
10:58			Gravel surface							Gravel
		SW	SW; gray; moist; slight petroleum odor; hydrocarbon staining; medium grain sand; with gravel; cobbles <2"							
11:00					11:00 G-17@ 2-2'			0		
11:05			Boring was cleared to five feet using a hand auger		11:05 G-17@ 3-3'			0		Hydrated Bentonite Chips
11:10					11:10 G-17@4' 4/21/09			1.7		
11:15	5		Hole terminated at 5 feet.		11:15 G-17@5' 4/21/09			8	5	
	10								10	
	15								15	

GEO FORM 304 CONOCOPHILLIPS SITE 3485, RENTON, WA.GPJ SECOR INTL.GDT 6/12/09

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: AS-1
DATE COMPLETED: July 16, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS
	NOT LOGGED - SEE BORING LOG TW-1 FOR STRATIGRAPHY		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE; 2" PVC WELL SCREEN; SAND PACK				
30	END OF BOREHOLE @ 30.0ft BGS	30.00					

WELL DETAILS
Screened interval:
25.00 to 30.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 0.020
Material: PVC
Seal:

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: AS-1
DATE COMPLETED: July 16, 2012
DRILLING METHOD: 4-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE				
				NUMBER	INTERVAL	REC (%)	BLOW COUNTS	
36			1.00 to 23.00ft BGS Material: BENTONITE CHIPS Sand Pack: 23.00 to 30.00ft BGS Material: 2/12 SILICA SAND					
38								
40								
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: D-1R
DATE COMPLETED: October 10, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	SM-SILTY SAND, trace medium gravel, medium grained, poorly graded, brown, moist		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 6" BOREHOLE	1HA				0.0
5.00	SM-SILTY SAND, with gravel, medium to coarse grained, loose, poorly graded, moist, brown							0.1
8	- gray at 8.0ft BGS			2GP				
10.00	OL-SILTY CLAY, dense, stiff, medium plasticity, brownish gray, wet, organic material			D-1R-10				0.9
				3GP				
14.00	SM-SILTY SAND, trace clay, very fine to fine grained, compact, stiff, gray, wet							0.0
				4GP				
20.00	END OF BOREHOLE @ 20.0ft BGS			D-1R-20				0.3

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (D-1R-10, D-1R-20)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: D-4R/G-43
DATE COMPLETED: October 13, 2011
DRILLING METHOD: GEOPROBE/ LIF/ 8" HSA
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	ASPHALT	0.50	CONCRETE					
	SM-SILTY SAND, trace coarse gravel, trace silt, coarse grained, poorly graded, gray, moist		2" PVC WELL CASING BENTONITE CHIPS					0.0
4			8" BOREHOLE					
	SM-SILTY SAND, with gravel, medium grained, poorly graded, brown, moist	5.00			X		6 10 11	0.0
8								
10	SP-SAND, with silt, fine grained, poorly graded, loose, gray, wet	10.00		D-4R-10	X		19 11 12	0.2
12								
14								
	SP-SAND, fine grained, loose, poorly graded, gray, wet	15.00			X		4 7 8	0.1
18								
20	- fine to medium grained at 20.0ft BGS			D-4R-20	X		6 6 6	0.0
	END OF BOREHOLE @ 21.5ft BGS	21.50						
22								
24								
26								
28								
30								
32								
34								

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 21.50ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

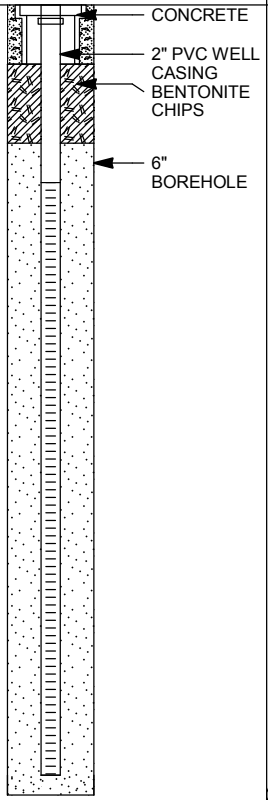
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: D-5R
DATE COMPLETED: October 16, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	ASPHALT	0.50
2	SM-SAND, trace coarse gravel, trace silt, coarse grained, poorly graded, gray, moist	
4		
		5.00
6	SM-SILTY SAND, with gravel, medium to coarse grained, gray, wet, slight hydrocarbon odor	
8		
		9.00
10	SP-SAND, fine grained, loose, gray, wet, slight hydrocarbon odor	
		11.50
12	CL-CLAY, with silt, dense, medium plasticity, brown, wet	12.50
	SM-SILTY SAND, fine grained, dense, brown, wet	
14		14.00
	SP-SAND, trace silt, medium grained, dark gray, wet	
16		
18		
20	END OF BOREHOLE @ 20.0ft BGS	20.00
22		
24		
26		
28		
30		
32		
34		

MONITORING WELL



WELL DETAILS
Screened interval:
4.50 to 19.50ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
1.50 to 3.50ft BGS
Material: BENTONITE CHIPS
Sand Pack:
3.50 to 20.00ft BGS
Material: 2/12 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
				6.8
D-5R-7				2.4
				4.7
				0.9
D-5R-20				7.4

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (D-5R-20)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-1
DATE COMPLETED: October 4, 2011
DRILLING METHOD: 8" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	SM-SILTY SAND, with coarse gravel, medium grained, poorly graded, brown to gray, moist	
	GP-PEA GRAVEL, backfill	5.00
	SP-SAND, medium grained, loose, gray, wet	9.50
		10.00
	ML-SILT (native), moderate plasticity, high organic content, brown, damp	10.50
	GP-GRAVEL, with silt, poorly graded, brown, wet	
	- gray, saturated at 13.0ft BGS	
	SP-SAND, trace silt, trace gravel, fine grained, poorly graded, gray, wet	14.00
		15.00
	SP-SAND, fine to medium grained, poorly graded, loose, dark brown to black, wet, no odor	
	- trace gravel at 25.0ft BGS	
	- medium to coarse grained at 28.0ft BGS	

MONITORING WELL: CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE; NATIVE SOIL

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
		100		0.0
		100		
DW-1-9.5				18.2
		100		6.0
		100		0.0
DW-1-19				0.8
		100		
DW-1-24				0.0
		100		
		100		

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-1
DATE COMPLETED: October 4, 2011
DRILLING METHOD: 8" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	MH-CLAYEY SANDY SILT, plastic, gray, wet	36.00 36.50				100		0.0
	SP-SAND, fine to medium grained, poorly graded, loose, black, wet, no odor	37.50						
38	MH-CLAYEY SANDY SILT, plastic, gray, wet - sand in tip of barrel at 38.0ft BGS	38.00						0.0
40	END OF BOREHOLE @ 38.0ft BGS		WELL DETAILS Screened interval: 20.00 to 30.00ft BGS Length: 10ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 2.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 30.00ft BGS Material: 2/12 SILICA SAND					
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-2
DATE COMPLETED: October 5, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	ASPHALT	0.67	CONCRETE					
2	SM-SAND, little silt, trace cobble, coarse grained, poorly graded, brown to gray, moist, slight odor							15.3
4			2" PVC WELL CASING BENTONITE CHIPS					
	SM-SILTY SAND, with gravel, fine to medium grained, poorly graded, gray brown, moist, hydrocarbon odor	5.00						24.9
6			6" BOREHOLE					
8								
	ML-SILT, trace sand, medium dense, brown, moist, slight hydrocarbon odor	9.00		DW-2-9				520
10								
	SP-SAND, medium grained, poorly graded, gray, wet, hydrocarbon odor	10.50		DW-2-11				624
12								
14	MH-CLAYEY SILT, medium dense, brown, wet, slight odor	14.00						
16	SP-SAND, with silt, fine to medium grained, poorly graded, loose, compact, dark gray, wet	16.00						
18				DW-2-19				8.7
20	SM/SC-SILTY SAND, with lenses of silty clayey sand, very fine to fine grained, poorly graded, dark gray, wet, no odor	20.00						
22								
24								0.9
26								
28								
30				DW-2-30				10.2
	MH-CLAY, with sand and silt, high plasticity, dense, gray brown, wet	31.00						
32								
	SP-SAND ,trace silt, fine grained, poorly graded, loose, dark gray, wet	33.00						
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-2
DATE COMPLETED: October 5, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	SM-SILTY SAND, medium to coarse grained, loose, dark gray, wet	35.50	NATIVE SOIL					0.4
38								
40	END OF BOREHOLE @ 40.0ft BGS	40.00	WELL DETAILS Screened interval: 20.00 to 30.00ft BGS Length: 10ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 2.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 30.00ft BGS Material: 2/12 SILICA SAND	DW-2-40				1.0
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (DW-2-40)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-3
DATE COMPLETED: October 5, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	SM-SAND, with silt, some coarse gravel, medium grained, brown, moist		CONCRETE					
2								0.0
4			2" PVC WELL CASING BENTONITE CHIPS					
		5.00						
6	SM-SILTY SAND (FILL), with gravel, loose, medium grained, brown, moist		6" BOREHOLE					
8		8.00						0.0
10	ML-SANDY SILT, trace gravel, dense, stiff, bluish gray, moist - semi-consolidated at 10.0ft BGS							0.0
12				DW-3-12				0.3
		13.00						
14	MH/CH-CLAYEY SILT/SILTY CLAY, very soft, high plasticity, lenses or organic material, dark gray, wet, no odor							
16								
18								0.0
		19.00						
20	SM-SILTY SAND, loose, medium grained, black, wet, no odor							
		20.50						
22	MH/CH-CLAYEY SILT/SILTY CLAY, very soft, high plasticity ,dark gray, wet, no odor	22.00						
24	SP-sAND, trace silt, medium grained, loose, poorly graded, black, wet, no odor							
26								
28								
30				DW-3-30				0.0
32								
		33.00						
34	CH-SILTY CLAY, very soft, high plasticity, dark gray, wet, no odor		NATIVE SOIL					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-3
DATE COMPLETED: October 5, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	SC-CLAYEY SAND, trace silt, medium grained, poorly graded, loose, black, wet, no odor	36.00						
38	END OF BOREHOLE @ 38.0ft BGS	38.00	WELL DETAILS Screened interval: 20.00 to 30.00ft BGS Length: 10ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 2.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 30.00ft BGS Material: 2/12 SILICA SAND					0.0
40								
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-4
DATE COMPLETED: July 11, 2012
DRILLING METHOD: GEOPROBE/ 4-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED (0 to 5ft BGS)		CONCRETE					
2				1AK				
4			2" PVC WELL CASING BENTONITE CHIPS					
		5.00						
6	SP-SAND, trace silt, trace fine to coarse gravel, fine grained, poorly graded, brown, moist	6.00	8" BOREHOLE					
8	ML-CLAYEY SILT, trace fine sand, lwo to medium plasticity, gray, moist			2MC		50		0.0
	- wood fragments at 9.5ft BGS							
10	- medium plasticity at 9.6ft BGS	10.00						
12	SM-SILTY SAND, trace fine gravel, fine grained, poorly graded, loose, brown, wet			3MC		80		0.0
14		14.00						
	ML-SANDY SILT, low plasticity, stiff, gray, moist	15.00						
16	SP-SAND, trace silt, fine grained, poorly graded, brown to black, moist							
18				4MC		90		0.0
20	- loose at 20.0ft BGS							
22				5MC		70		0.0
24	- black at 25.0ft BGS							
26				6MC		60		0.0
28								
30	- medium grained, wet at 30.0ft BGS							
32				7MC		100		0.0
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: DW-4
DATE COMPLETED: July 11, 2012
DRILLING METHOD: GEOPROBE/ 4-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	- loose, wet at 35.0ft BGS			8MC		90		0.0
38								
40	END OF BOREHOLE @ 40.0ft BGS	40.00	WELL DETAILS Screened interval: 20.00 to 40.00ft BGS Length: 20ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 1.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 40.00ft BGS Material: 2/12 SILICA SAND					
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-18
DATE COMPLETED: September 12, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, with silt, trace coarse gravel, coarse grained, poorly graded, brown, moist at 2.5ft BGS			1HA				0.0
4								
5		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.							
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 12ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-19
DATE COMPLETED: September 13, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, with silt, some cobble, medium to coarse grained, brown, moist at 2.5ft BGS			1HA				0.0
4								
5.00	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 5 TO 15ft BGS.			2GP				
8								
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-20
DATE COMPLETED: September 12, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, some silt, trace cobble, coarse grained, poorly graded, brown to orange, moist at 2.5ft BGS			1HA				0.0
4		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.			2GP				
8								
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-21
DATE COMPLETED: September 15, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED TO 5ft BGS							
2	- ML-SILT, trace fine sand, trace coarse gravel, with cobble, low plasticity, light brown, dry at 2.5ft BGS			1HA				0.0
4								
5		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.							
8				2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-22
DATE COMPLETED: September 12, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, with silt, some cobble, medium to coarse grained, poorly graded, brown, moist at 2.5ft BGS			1HA				0.0
4								
5		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.			2GP				
8								
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-23
DATE COMPLETED: September 12, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, with silt, some cobble, medium to coarse grained, brown, moist at 2.5ft BGS			1GP				0.0
4								
5.00	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 5 TO 10ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-24
DATE COMPLETED: September 12, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, with silt, some cobble coarse grained, poorly graded, brown, moist, strong odor at 2.5ft BGS			1HA				350.0
4		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.			2GP				
8								
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-25
DATE COMPLETED: September 13, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, some silt, trace coarse gravel, coarse grained, poorly graded, brown to gray, moist, slight odor at 2.5ft BGS			1HA				1.1
4								
5.00	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.		BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 5 TO 15ft BGS.			2GP				
10								
12				3GP				
14								
15.00	END OF BOREHOLE @ 15.0ft BGS							
16								
18								
20								
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-26
DATE COMPLETED: September 13, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	HAND AUGERED TO 5ft BGS							
2	- SM-SAND, with silt, trace cobble, coarse grained, poorly graded, gray, moist, odor present at 2.5ft BGS			1HA				30.8
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 9ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-27
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	- ASPHALT from 0.0 to 0.5ft BGS AIR KNIFED TO 5ft BGS							
2	- SM-SAND, little silt, trace cobble, coarse grained, poorly graded, brown to gray, moist, strong odor at 2.5ft BGS			1HA				72.5
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 14ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-28
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	- ASPHALT from 0.0 to 0.5ft BGS AIR KNIFED TO 5ft BGS							
2	- SM-SAND, little silt, trace coarse gravel, coarse grained, poorly graded, gray, moist, slight odor at 2.5ft BGS			1HA				11.5
4								
5		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.							
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 14ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-29
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	- ASPHALT from 0.0 to 0.5ft BGS AIR KNIFED TO 5ft BGS							
2	- SM-SAND, little silt, trace coarse gravel, coarse grained, poorly graded, gray, moist, odor at 2.5ft BGS			1HA				45.7
4								
5		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.							
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 7 TO 12ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-30
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	- CONCRETE from 0.0 to 0.9ft BGS AIR KNIFED TO 5ft BGS							
2	- SM-SAND, trace coarse gravel, trace silt, coarse grained, poorly graded, gray, moist, strong odor at 2.5ft BGS			1HA				1696.0
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 14ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-31
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	- ASPHALT from 0.0 to 0.5ft BGS AIR KNIFED TO 5ft BGS							
2	- SM-SAND, little silt, trace coarse gravel, medium to coarse grained, poorly graded, gray, moist, slight odor at 2.5ft BGS			1HA				14.5
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 5 TO 15ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-32
DATE COMPLETED: September 15, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	- ASPHALT from 0.0 to 0.5ft BGS AIR KNIFED TO 5ft BGS							
2	- SM-SAND, trace coarse gravel, trace silt, coarse grained, poorly graded, gray, moist, strong odor at 2.5ft BGS			1HA				105.0
4								
5		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.							
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 5 TO 15ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-33
DATE COMPLETED: September 13, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	- ASPHALT from 0.0 to 0.5ft BGS AIR KNIFED TO 5ft BGS							
2	- SM-SAND, trace coarse gravel, trace silt, coarse grained, poorly graded, gray, moist, slight odor at 2.5ft BGS			1HA				125.0
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS. SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 5 TO 15ft BGS.	5.00	BACKFILLED WITH BENTONITE CHIPS	2GP				
10				3GP				
15				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-34
DATE COMPLETED: September 13, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED TO 5ft BGS							
2	- SM-SAND, with silt, trace coarse gravel, medium grained, poorly graded, loose, brown, moist, strong odor at 2.5ft BGS			1HA				75.9
4								
5.00	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 3 TO 13ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-35
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED TO 5ft BGS							
2	- SM-SAND, little silt, trace coarse gravel, coarse grained, poorly graded, brown to gray, moist, slight odor at 2.5ft BGS			1HA				35.2
4								
5		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.							
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 14ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-36
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED TO 5ft BGS							
2	- SM-SAND, little silt, trace cobble, coarse grained, poorly graded, brown to gray, moist, slight odor at 2.5ft BGS			1HA				13.7
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8				2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-37
DATE COMPLETED: September 14, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED TO 5ft BGS							
2	- SM-SAND, medium grained, poorly graded, brown, moist at 2.5ft BGS			1HA				0.0
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 14ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-38
DATE COMPLETED: September 13, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED TO 5ft BGS							
2	- SM-SILTY SAND, trace fine gravel, medium grained, poorly graded, brown to gray, moist, slight odor at 2.5ft BGS			1HA				25.3
4								
5	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.	5.00	BACKFILLED WITH BENTONITE CHIPS					
6								
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 14ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: G-39
DATE COMPLETED: September 15, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	BOREHOLE	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED TO 5ft BGS							
2	- SM-SILTY SAND, trace medium gravel, medium grained, poorly graded, brown to gray, moist, strong odor at 2.5ft BGS			1HA				143.0
4	- large cobble at 4.5ft BGS							
		5.00	BACKFILLED WITH BENTONITE CHIPS					
6	BORING ADVANCED WITH GEOPROBE AND LASER INDUCED FLUORESCENCE. SEE LIF LOG FOR DETAILS.							
8	SOIL CORE COLLECTED WITH 1-1/2" MACROCORE FROM 4 TO 14ft BGS.			2GP				
10								
12				3GP				
14								
16								
18				4GP				
20	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-1
DATE COMPLETED: October 10, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	SM-SILTY SAND, trace coarse gravel, coarse grained, poorly graded, brown, moist		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 6" BOREHOLE					
2								0.0
4								
5		5.00						
6	SM-SILTY SAND, with large cobble and gravel, medium to coarse grained, poorly graded, loose, brown, wet							0.1
7	- gray at 7.0ft BGS							
8								
9	- brown at 9.0ft BGS			MW-1-9				0.0
10								
12								
14	OL-SILTY CLAY, with organic material, dense, stiff, gray, wet	14.00						0.0
16								
17	SM/ML-SILTY SAND/SANDY SILT, very fine grained sand, compact, stiff, gray, wet	17.00						
18								
19	SP-SAND, medium grained, poorly sorted, loose, dark gray, wet	19.00						
20	END OF BOREHOLE @ 20.0ft BGS	20.00		MW-1-20				0.3
22								
24								
26								
28								
30								
32								
34								

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

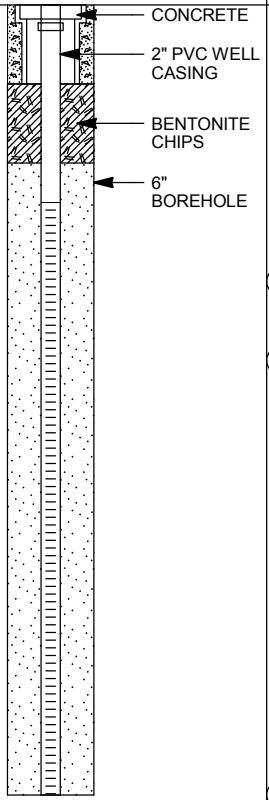
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-10
DATE COMPLETED: October 7, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	SM-SAND, with silt, some gravel, medium grained, poorly graded, brown, moist	
	SM-SILTY SAND, with gravel, medium to coarse grained, poorly graded, brown, moist, hydrocarbon odor - greenish blue at 7.0ft BGS	5.00
	SC-CLAYEY SAND, fine grained, compact, stiff, brownish gray, wet, organics	10.00
	OL-CLAY, with silt, medium plasticity, stiff, dense, brown, wet, organics	12.50 13.50
	SP-SAND, with silt, fine to medium grained, loose, poorly sorted, brown, wet	
	SP-SAND, medium to coarse grained, loose, poorly sorted, black, wet	17.00
	END OF BOREHOLE @ 20.0ft BGS	20.00

MONITORING WELL



WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
				0.0
MW-10-7				89.7
MW-10-9				49.9
				2.6
MW-10-20				2.5

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (MW-10-20)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-11
DATE COMPLETED: December 1, 2011
DRILLING METHOD: 8" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE					
	SM-SILTY SAND, trace silt, trace fine gravel, medium to coarse grained, poorly graded, brown, moist	5.00						5.0
	ML-SILT, trace fine sand, low plasticity, brown, moist	7.50		1MC		100		5.6
	SM-SAND, trace silt, fine grained, poorly graded, gray, moist	9.50						0.8
	- wet, odor at 12.5ft BGS			2MC				1.3
				3MC				0.0
	END OF BOREHOLE @ 20.0ft BGS	20.00						

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

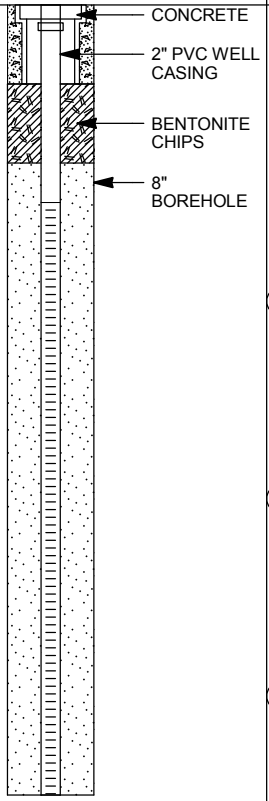
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-12
DATE COMPLETED: December 1, 2011
DRILLING METHOD: 8" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	AIR KNIFED (0 to 5ft BGS)	
5.00	SM-SAND, trace silt, trace fine gravel, medium to coarse grained, poorly graded, brown, moist to wet	
8.50	ML-SILT, low plasticity, brown, moist	
10.00	SM-SAND, trace silt, trace fine gravel, medium to coarse grained, poorly graded, brown, moist	
12.00	CL-SILTY CLAY, low to medium plasticity, gray, moist to wet	
12.50	SM-SAND, trace silt, fine grained, poorly graded, gray to brown, moist	
20.00	END OF BOREHOLE @ 20.0ft BGS	

MONITORING WELL



WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
1MC		100		0.0
2MC		100		0.0
3MC		100		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (oval)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-13
DATE COMPLETED: December 1, 2011
DRILLING METHOD: 8" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE					
	SM-SAND, trace silt, medium to coarse grained, poorly graded, brown, moist	5.00		1MC		80		0.9
	ML-SILT, low plasticity, hard, brown, moist	8.50						
	SM-SAND, trace silt, medium grained, poorly graded, gray, moist - wet at 10.0ft BGS	9.50		2MC		80		0.98
	ML-SILT, trace fine sand, low plasticity, brown to gray, moist	13.50						
	SM-SAND, trace silt, medium grained, poorly graded, gray, moist - wet at 15.0ft BGS	14.90		3MC		100		0.0
	END OF BOREHOLE @ 20.0ft BGS	20.00						

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

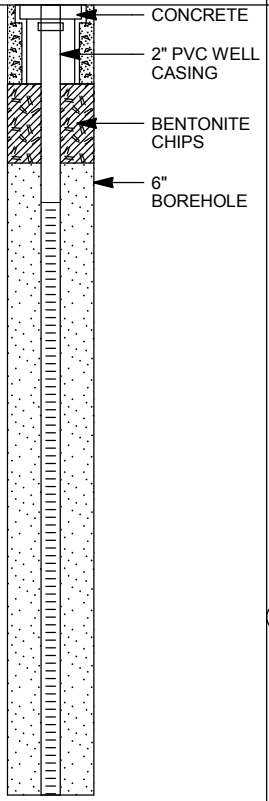
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-14/G-42
DATE COMPLETED: October 7, 2011
DRILLING METHOD: GEOPROBE/ LIF
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	ASPHALT	0.50
2	SM-SAND, trace coarse gravel, trace silt, coarse grained, poorly graded, gray, moist	
4		
	SM-SILTY SAND, with gravel, medium to coarse grained, poorly graded, gray, moist	5.00
6		
8		
10	MH-SILT, with clay, loose, medium plasticity, brown, wet	10.00
12	SP-SAND, medium to coarse grained, loose, gray, wet, hydrocarbon odor	12.00
14		
		15.50
16	SP-GRAVELLY SAND, coarse grained, loose, gray, wet, hydrocarbon odor	16.00
	CL-CLAY, dense, medium plasticity, brown, wet, hydrocarbon odor	17.50
18	NO RECOVERY	
20	END OF BOREHOLE @ 20.0ft BGS	20.00
22		
24		
26		
28		
30		
32		
34		

MONITORING WELL



WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
				0.0
				0.4
				1.1
				202
MW-14-15				392

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (MW-14-15)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

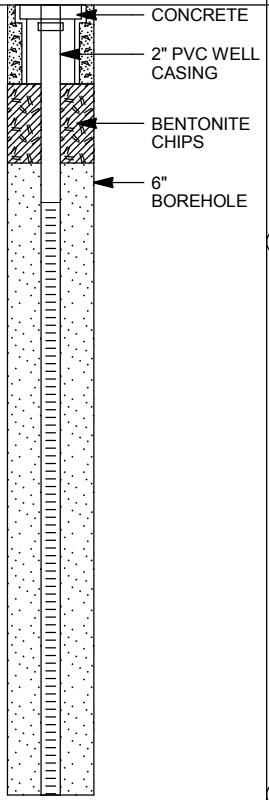
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-15
DATE COMPLETED: October 10, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	SM-SAND, with silt, trace coarse gravel, medium to coarse grained, poorly graded, brown, moist	
	SM-SILTY SAND, trace gravel, medium to coarse grained, brown, wet	5.00
	SM-SILTY SAND, trace gravel, medium to coarse grained, poorly graded, gray, wet	6.50
	PT-PEAT, stiff, brown, moist	10.00
	CL-SILTY CLAY, dense, stiff, medium plasticity, gray, wet, organic material	12.00
	SM/SC-SILTY CLAYEY SAND, very fine grained, compact, gray, wet	14.50
	SP-SAND, medium grained, loose, gray, wet	19.00
	END OF BOREHOLE @ 20.0ft BGS	20.00

MONITORING WELL



WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
				0.0
MW-15-6				0.4
				0.3
				0.6
MW-15-20				1.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (MW-15-20)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-16
DATE COMPLETED: December 1, 2011
DRILLING METHOD: 8" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE					
	SM-SAND, trace silt, medium to coarse grained, poorly graded, brown, moist	5.00						
	ML-SILT, low to medium plasticity, brown, moist	6.50		1MC		80		0.0
	SM-SAND, trace silt, medium grained, gray, moist	9.50						
				2MC		100		0.0
	CL-SILTY CLAY, trace fine sand, low plasticity, brown, moist to wet	13.00						
	SM-SAND, trace silt, trace clay, medium grained, poorly graded, brown, moist - wet at 15.0ft BGS	14.00						
				3MC		70		0.0
	END OF BOREHOLE @ 20.0ft BGS	20.00						

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (1MC, 2MC, 3MC)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-17
DATE COMPLETED: July 11, 2012
DRILLING METHOD: GEOPROBE/ 4-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE					
	SP-SAND, trace silt, fine grained, poorly graded, loose, brown to orange, moist	5.00 5.50						
	ML-CLAYEY SILT, medium plasticity, soft, gray, moist	6.00 6.50						
	WOOD FRAGMENTS	7.50		1MC		80		0.0
	ML-CLAYEY SILT, medium plasticity, brown, moist							
	SP-SAND, trace silt, fine grained, poorly graded, gray, moist to wet - with silt at 11.0ft BGS							
	- wet at 13.0ft BGS			2MC		80		0.0
	- black at 18.5ft BGS			3MC		80		0.0
	- loose at 21.0ft BGS		WELL DETAILS Screened interval: 5.00 to 20.00ft BGS Length: 15ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 2.00 to 4.00ft BGS Material: BENTONITE CHIPS Sand Pack: 4.00 to 20.00ft BGS Material: 2/12 SILICA SAND	4MC		80		0.0
	ML-CLAYEY SILT, trace fine sand, medium plasticity, gray, moist	27.00 27.50		5MC		80		0.0
	SP-SAND, trace silt, fine grained, poorly graded, firm, gray to black, moist - trace fine gravel at 30.0ft BGS							
				6MC		90		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-17
DATE COMPLETED: July 11, 2012
DRILLING METHOD: GEOPROBE/ 4-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	- medium grained, wet at 35.0ft BGS			7MC		100		0.0
38								
40	END OF BOREHOLE @ 40.0ft BGS	40.00						
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-2
DATE COMPLETED: October 13, 2011
DRILLING METHOD: 8" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	SM-SAND, with silt, trace coarse gravel, coarse grained, poorly graded, brown, moist		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE					0.0
5	SM-SILTY SAND, with gravel, medium grained, poorly graded, brown, moist, organic material	5.00			X	100	8 50/ 4"	0.0
8	OL-SILTY CLAY, stiff, low plasticity, brown, moist, high organics	8.00			X	100	10 8 4	0.0
10				MW-2-11	X	100	3 4 4	0.0
11	SP-SAND, with silt, medium grained, poorly graded, loose, gray, wet	11.00						
13	GP-GRAVEL, coarse grained, loose, gray, wet	13.00			X	100	8 9 10	0.0
15	SP-SAND, fine grained, poorly graded, loose, gray, wet - coarse grained at 17.5ft BGS	15.50			X	100	12 13 13	0.0
18				MW-2-19	X	100	10 10 12	0.0
20	- medium grained at 20.0ft BGS				X	100	3 4 5	0.0
21.5	END OF BOREHOLE @ 21.5ft BGS	21.50						

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 21.50ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (MW-2-11, MW-2-19)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-3
DATE COMPLETED: October 11, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	SM-SAND, some cobble, trace silt, coarse grained, poorly graded, brown, moist		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 6" BOREHOLE					
2								0.0
4								
		5.00						
6	SM-SILTY SAND, with gravel, medium grained, poorly graded, brown, dry							0.5
8								
10				MW-3-10				0.4
		11.00						
12	ML-CLAYEY SANDY SILT, compact, stiff, low plasticity, gray,w et	12.00						
	SP-SAND, with silt, fine to medium grained, loose, gray, wet							
14								0.1
		15.50						
16	ML-CLAYEY SANDY SILT, compact, stiff, low plasticity, gray, wet	16.50						
	SP-SAND, with silt, fine to medium grained, loose, gray, wet							
18								
20				MW-3-20				0.3
	END OF BOREHOLE @ 20.0ft BGS	20.00						
22								
24								
26								
28								
30								
32								
34								

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-4
DATE COMPLETED: October 11, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	SM-SILTY SAND, trace coarse gravel, fine to medium grained, poorly graded, light brown, moist, some rootlets		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 6" BOREHOLE					0.0
5	SM-SILTY SAND, medium to coarse grained, poorly graded, brown, wet	5.00		MW-4-7				0.5
8	OL-CLAYEY SILT, with organic material, dense, stiff, brown, moist	8.00						
10	SM-SILTY SAND, fine to medium grained, loose, gray, wet	10.00						
13.5	CL-SILTY CLAY, dense, stiff, gray, wet	13.50						
14	SP-SAND, with silt, medium grained, poorly graded, loose, gray, wet	14.00						0.1
20	END OF BOREHOLE @ 20.0ft BGS	20.00		MW-4-20				0.7

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (MW-4-20)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

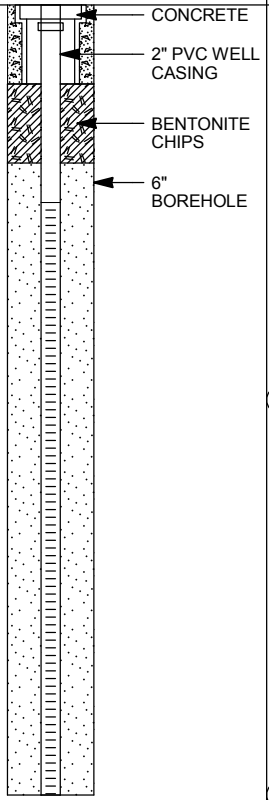
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-5
DATE COMPLETED: October 12, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	SM-SAND, with silt, trace coarse gravel, coarse grained, poorly graded, brown, moist	
	SM-SILTY SAND, with gravel, medium grained, poorly graded, brown, wet	5.00
	SM-SILTY SAND, fine to medium grained, stiff, gray, wet	10.00
	OL-SILTY CLAY, dense, stiff, moderate plasticity, gray, wet	12.00
	SP-SAND, medium grained, poorly graded, loose, gray, wet	13.00
	- silt lens at 16.0ft BGS	
	END OF BOREHOLE @ 20.0ft BGS	20.00

MONITORING WELL



WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
				0.0
				0.4
MW-5-10				0.4
				0.2
MW-5-20				0.2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS (MW-5-10, MW-5-20)

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-6
DATE COMPLETED: October 12, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	PID (ppm)
0	SM-SAND, trace coarse gravel, trace silt, coarse grained, poorly graded, brown, moist		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 6" BOREHOLE					0.0
5	SM-SILTY SAND, with gravel, coarse grained, poorly graded, brown, wet	5.00						0.1
9	- gray at 9.0ft BGS							
10	ML-SILT, with sand, compact, stiff, gray, wet	10.00		MW-6-10				0.6
11	SP-SAND, trace silt, medium to coarse grained, loose, gray, wet	11.00						0.7
20	END OF BOREHOLE @ 20.0ft BGS	20.00		MW-6-20				0.9

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

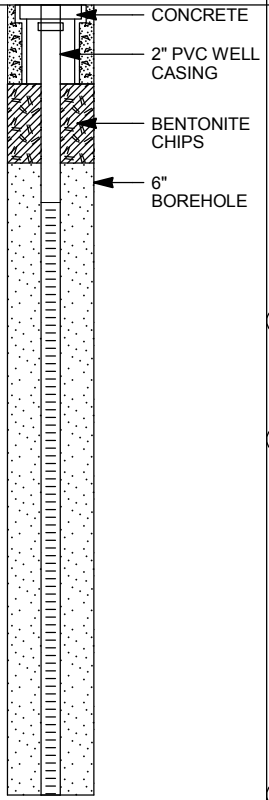
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-7/G-40
DATE COMPLETED: October 6, 2011
DRILLING METHOD: GEOPROBE/ LIF/ 6" SONIC
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	ASPHALT	0.50
2	SM-SAND, little silt, trace cobble, coarse grained, poorly graded, gray, moist, odor	
4		
		5.00
6	SM-SILTY SAND, with gravel, medium grained, compact, brownish gray, moist	
8	- more silty and consolidated at 8.5ft BGS	
10		10.00
	CL-SILTY CLAY, dense, medium plasticity, brown, moist, organic material	11.00
12	SP-SAND, medium grained, poorly graded, wet, strong hydrocarbon odor	
		13.50
14	CL-SILTY CLAY, dense, medium plasticity, brown, wet	14.50
16	SP-SAND, with silt, fine grained, compact, poorly graded, wet	
18		
20	END OF BOREHOLE @ 20.0ft BGS	20.00
22		
24		
26		
28		
30		
32		
34		

MONITORING WELL



WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	BLOW COUNTS	PID (ppm)
				24.6
MW-7-8				280
MW-7-11				196
				9.2
MW-7-20				5.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-8/G-41
DATE COMPLETED: October 10, 2011
DRILLING METHOD: GEOPROBE/ LIF/ 6" SONIC
FIELD PERSONNEL: N. HINSPERGER/ M. DAVIS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
2	SM-SAND, trace silt, coarse grained, poorly graded, gray, moist, slight odor		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 6" BOREHOLE					0.0
4								
6	SM-SILTY SAND, with gravel, medium to coarse grained, poorly graded, moist	5.00						
8	- more compact at 8.0ft BGS			MW-8-8				61.7
10	SP-SAND, fine to medium grained, loose, gray, wet, hydrocarbon odor	10.00		MW-8-11				478.1
12								
14	CL-SILTY CLAY, dense, medium plasticity, brown, wet	13.50						
16	SP-SAND, trace silt, fine to medium grained, compact, dark gray, wet, slight hydrocarbon odor	15.50						4.1
18								
20	END OF BOREHOLE @ 20.0ft BGS	20.00		MW-8-20				0.2
22								
24								
26								
28								
30								
32								
34								

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: MW-9
DATE COMPLETED: October 7, 2011
DRILLING METHOD: 6" SONIC
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	ASPHALT	0.50	CONCRETE					
2	SM-SAND, trace silt, trace coarse gravel, medium to coarse grained, brown, moist		2" PVC WELL CASING					0.0
4			BENTONITE CHIPS					
		5.00	6" BOREHOLE					
6	SM-SILTY SAND, with gravel, medium to coarse grained, brown, moist							0.1
8								
10	OL-ORGANIC SILTY CLAY, compact, stiff, brown, moist	10.00		MW-9-10				3.9
12								
		13.50						
14	SC-CLAYEY SAND, fine grained, compact, stiff, gray, wet							
		15.00		MW-9-15				0.4
16	PT-PEAT, with clay, loose, brown, wet							
		17.00						
18	SP-SAND, fine to medium grained, loose, gray, wet							
20		20.00						0.4
	END OF BOREHOLE @ 20.0ft BGS							
22								
24								
26								
28								
30								
32								
34								

WELL DETAILS
Screened interval:
5.00 to 20.00ft BGS
Length: 15ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
2.00 to 4.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
4.00 to 20.00ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-1
DATE COMPLETED: July 16, 2012
DRILLING METHOD: GEOPROBE/ 6-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED (0 to 5ft BGS)		CONCRETE					
2			4" PVC WELL CASING					
4			BENTONITE CHIPS					
		5.00						
6	NO RECOVERY (5 to 10ft BGS)		8" BOREHOLE					
8				1MC		0		
10		10.00						
	ML-CLAYEY SILT, trace cobble fragments, low plasticity, brown, moist	10.50						
12	SP-SAND, trace silt, fine grained, poorly graded, gray, wet, strong petroleum odor			2MC		100		
14								
16		16.00						
	ML-CLAYEY SILT, low to medium plasticity, brown, moist	16.50						
	SP-SAND, trace silt, fine grained, poorly graded, loose, dark brown, wet	18.00		3MC		80		1290
18	ML-CLAYEY SILT, trace fine sand, low plasticity, stiff, brown, moist	19.50						
20	SP-SAND, trace silt, fine grained, poorly graded, black, moist - wet at 20.0ft BGS		4" PVC WELL SCREEN					
22				4MC		80		478
24			SAND PACK					
26	- with silt at 26.0ft BGS			5MC		80		0.4
28								
30								
		31.00						
32	SP-SILTY SAND, fine grained, poorly graded, brown, wet			6MC		80		0.0
34								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-1
DATE COMPLETED: July 16, 2012
DRILLING METHOD: GEOPROBE/ 6-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	SP-SAND, trace silt, fine to medium grained, poorly sorted, loose, dark brown to black, moist	36.00		7MC		70		0.0
38								
40	END OF BOREHOLE @ 40.0ft BGS	40.00	WELL DETAILS Screened interval: 20.00 to 40.00ft BGS Length: 20ft Diameter: 4in Slot Size: 0.010 Material: PVC Seal: 1.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 40.00ft BGS Material: 2/12 SILICA SAND					
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-2
DATE COMPLETED: July 16, 2012
DRILLING METHOD: GEOPROBE/ 6-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS
0	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 4" PVC WELL CASING; BENTONITE CHIPS; 8" BOREHOLE				
5	SP-SAND, trace silt, trace medium gravel, fine to medium grained, poorly graded, loose, brown, moist - with silt, hard, strong petroleum odor at 7.0ft BGS	5.00	4" PVC WELL SCREEN; SAND PACK	1MC		90	
9	ML-CLAYEY SILT, low plasticity, stiff, gray, moist	9.00	SUMP				
10	END OF BOREHOLE @ 10.0ft BGS	10.00					

WELL DETAILS
Screened interval:
4.00 to 9.00ft BGS
Length: 5ft
Diameter: 4in
Slot Size: 0.010
Material: PVC
Seal:
1.00 to 3.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
3.00 to 10.50ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-3
DATE COMPLETED: July 10, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 4-1/2" BOREHOLE					
	SP-SAND, trace silt, trace fine gravel, fine grained, poorly graded, loose, light brown, wet	5.00		1MC		20		21.7
	- gray, strong petroleum odor at 10.0ft BGS			2MC		90		815
	ML-CLAYEY SILT, low to medium plasticity, soft, brown, moist	15.50 16.00						
	SP-SAND, with silt, fine grained, poorly graded, loose, brown, moist	17.00 17.60		3MC		90		17.1
	ML-SILT, trace sand, low to medium plasticity, soft, gray, moist							
	SP-SAND, trace silt, fine grained, poorly graded, loose, brown to black, moist							
	- wet at 22.0ft BGS		2" PVC WELL SCREEN	4MC		80		0.0
			SAND PACK					
	- hard at 25.0ft BGS							
				5MC		70		5.9
				6MC		80		0.0
	ML-SANDY SILT, low plasticity, soft, gray, wet	32.50 33.00						
	SP-SAND, trace silt, fine grained, poorly graded, hard, brown, moist							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-3
DATE COMPLETED: July 10, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	ML-SANDY SILT, low plasticity, dark brown, moist	36.00	NATIVE SOIL	7MC		80		0.0
38								
40	SP-SAND, trace silt, fine grained, poorly graded, loose, gray, moist	39.00						
	END OF BOREHOLE @ 40.0ft BGS	40.00	WELL DETAILS Screened interval: 20.00 to 30.00ft BGS Length: 10ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 1.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 30.00ft BGS Material: 2/12 SILICA SAND					
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-4
DATE COMPLETED: July 10, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS
0	AIR KNIFED (0 to 5ft BGS_		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 4-1/2" BOREHOLE				
5.00	SP-SAND, trace silt, trace medium to coarse gravel, fine grained, poorly graded, loose, brown to gray, moist - wet at 6.5ft BGS		2" PVC WELL SCREEN				
7.50	ML-CLAYEY SILT, trace fine sand, hard, low plasticity, brown, moist - cobble at 8.0ft BGS		SAND PACK	1MC		100	
9.50	SP-SAND, trace silt, fine grained, poorly graded, loose, gray, moist, strong petroleum odor						
10.00	END OF BOREHOLE @ 10.0ft BGS		SUMP				

WELL DETAILS
Screened interval:
4.00 to 9.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
1.00 to 3.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
3.00 to 10.50ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-5
DATE COMPLETED: July 9, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	AIR KNIFED (0 to 5ft BGS)		CONCRETE					
2			2" PVC WELL CASING					
4			BENTONITE CHIPS					
	SP-SAND, trace silt, fine grained, poorly graded, loose, brown to gray, moist	5.00						
6	ML-SILT, with sand, trace fine gravel, low plasticity, brown, moist	6.00	4-1/2" BOREHOLE					
8	ML-CLAYEY SILT, low plasticity, hard, brown to gray, moist	8.00		1MC		80		1316
10	SP-SAND, trace silt, fine grained, poorly graded, gray, wet, visible free product	10.00						
12				2MC		80		1388
14								
16	CH-SILTY CLAY, high plasticity, soft, brown and gray, wet	16.00						
	SP-SAND, with silt, fine grained, poorly graded, brown, wet	17.00		3MC		100		56.7
18								
20								
22			2" PVC WELL SCREEN	4MC		80		22.5
24			SAND PACK					
	ML-SANDY SILT, low plasticity, hard, brown, moist	24.50 25.00						
26	SP-SAND, trace silt, fine grained, poorly graded, hard, brown, moist			5MC		80		0.0
28								
30								
32				6MC		100		0.0
34	ML-SANDY SILT, trace clay, low plasticity, soft,	34.00 34.50						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-5
DATE COMPLETED: July 9, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36	gray, wet SP-SAND, trace silt, fine grained, poorly graded, loose, black, moist - wet at 36.0ft BGS		NATIVE SOIL	7MC		100		0.0
38								
40	END OF BOREHOLE @ 40.0ft BGS	40.00	WELL DETAILS Screened interval: 20.00 to 30.00ft BGS Length: 10ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 1.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 30.00ft BGS Material: 2/12 SILICA SAND					
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-6
DATE COMPLETED: July 10, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
0	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 4-1/2" BOREHOLE					
5	SP-SAND, trace silt, trace medium gravel, fine to medium grained, poorly graded, loose, brown and gray, moist	5.00	2" PVC WELL SCREEN; SAND PACK	1MC		40		1234
9	ML-CLAYEY SILT, trace fine sand, low plasticity, brown to gray, moist	9.00	SUMP					
10	END OF BOREHOLE @ 10.0ft BGS	10.00						

WELL DETAILS
Screened interval:
4.00 to 9.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
1.00 to 3.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
3.00 to 10.50ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-7
DATE COMPLETED: July 9, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 4-1/2" BOREHOLE					
	SP-SAND, trace silt, fine to medium grained, poorly graded, loose, brown, moist, strong odor	5.00						
	- cobble at 6.2ft BGS	6.50						
	ML-SANDY SILT, low plasticity, brown, moist	7.50		1MC		100		511
	SP-SILTY SAND, fine to medium grained, poorly graded, brown, moist	8.75						
	- trace cobble at 8.0ft BGS							
	ML-CLAYEY SILT, low to medium plasticity, dark brown, moist	11.00						
	SP-SAND, trace silt, fine grained, poorly graded, loose, brown to gray, wet, visible sheen	13.50		2MC		80		1310
	ML-SANDY SILT, low to medium plasticity, soft, brown, wet	14.00						
	SP-SAND, trace silt, fine grained, poorly graded, gray, moist to wet			3MC		90		14.4
			2" PVC WELL SCREEN	4MC		80		0.0
	- silt at 24.0ft BGS		SAND PACK					
	ML-SANDY SILT, low to medium plasticity, brown, moist	27.00		5MC		90		0.0
	SP-SAND, trace silt, fine grained, poorly graded, loose, dark brown, moist	28.00						
	- wet at 30.0ft BGS			6MC		80		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 10/11/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: TW-7
DATE COMPLETED: July 9, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS	SAMPLE PID (ppm)
36			NATIVE SOIL					
38	- with silt at 38.5ft BGS			7MC		100		0.0
40	END OF BOREHOLE @ 40.0ft BGS	40.00	WELL DETAILS Screened interval: 20.00 to 30.00ft BGS Length: 10ft Diameter: 2in Slot Size: 0.010 Material: PVC Seal: 1.00 to 18.00ft BGS Material: BENTONITE CHIPS Sand Pack: 18.00 to 30.00ft BGS Material: 2/12 SILICA SAND					
42								
44								
46								
48								
50								
52								
54								
56								
58								
60								
62								
64								
66								
68								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

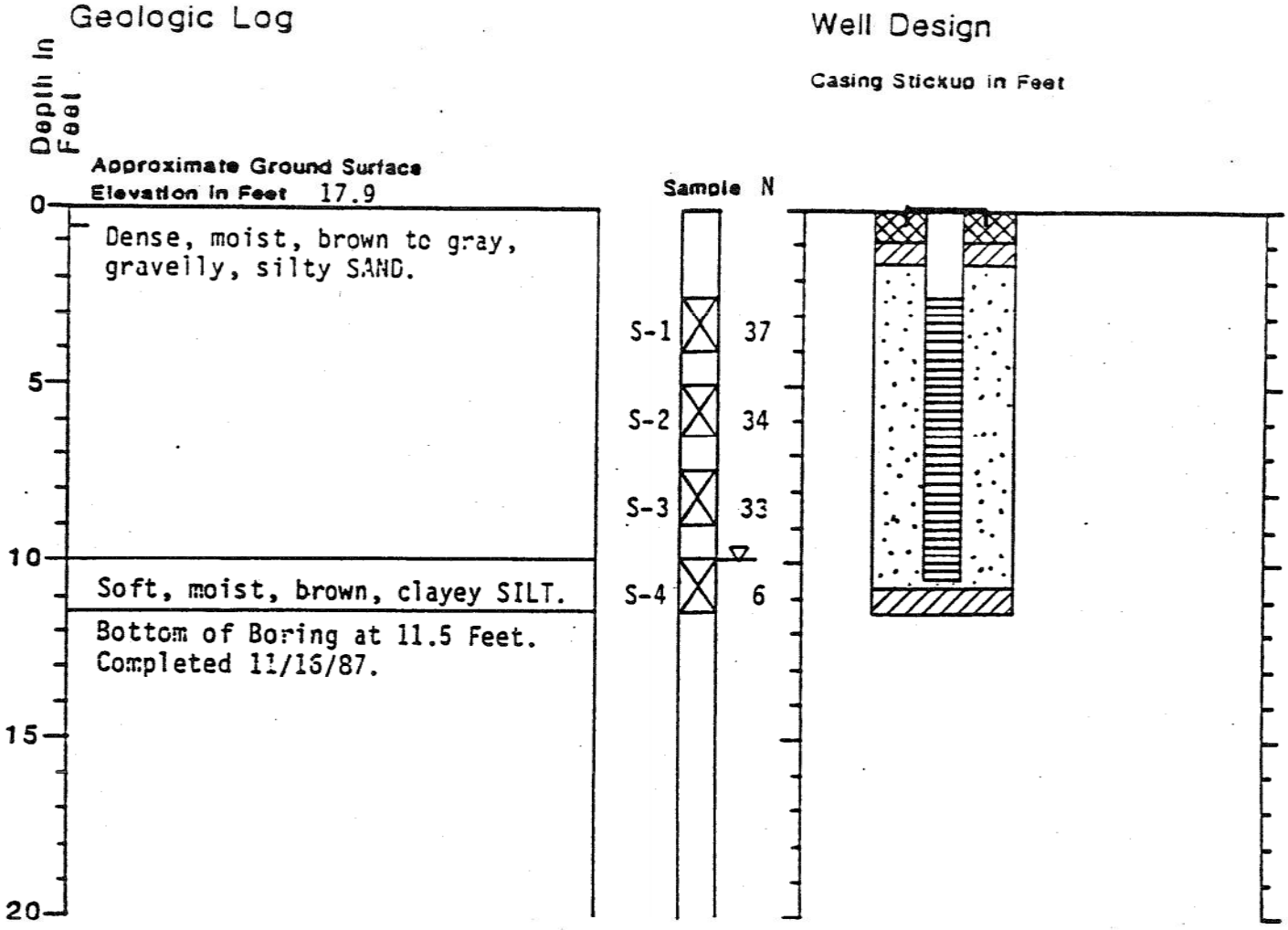
HOLE DESIGNATION: TW-8
DATE COMPLETED: July 9, 2012
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	TEMP MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE BLOW COUNTS
0	AIR KNIFED (0 to 5ft BGS)		CONCRETE; 2" PVC WELL CASING; BENTONITE CHIPS; 4-1/2" BOREHOLE				
5.00	SP-SAND, trace silt, trace coarse gravel, medium to coarse grained, poorly graded, loose, brown, moist	5.00					
6.00	ML-SANDY SILT, trace coarse gravel, low plasticity, soft, gray, moist	6.00	2" PVC WELL SCREEN; SAND PACK	1MC		70	
8.50	ML-CLAYEY SILT, low plasticity, hard, brown, moist	8.50					
10.00	END OF BOREHOLE @ 10.0ft BGS	10.00	SUMP				

WELL DETAILS
Screened interval:
4.00 to 9.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
1.00 to 3.00ft BGS
Material: BENTONITE CHIPS
Sand Pack:
3.00 to 10.50ft BGS
Material: 2/12 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

Boring Log and Construction Data for Observation Well D-6



Water Level

Concrete Surface Seal

Bentonite

Aqua 8 Sand

2-inch ø PVC Riser Pipe

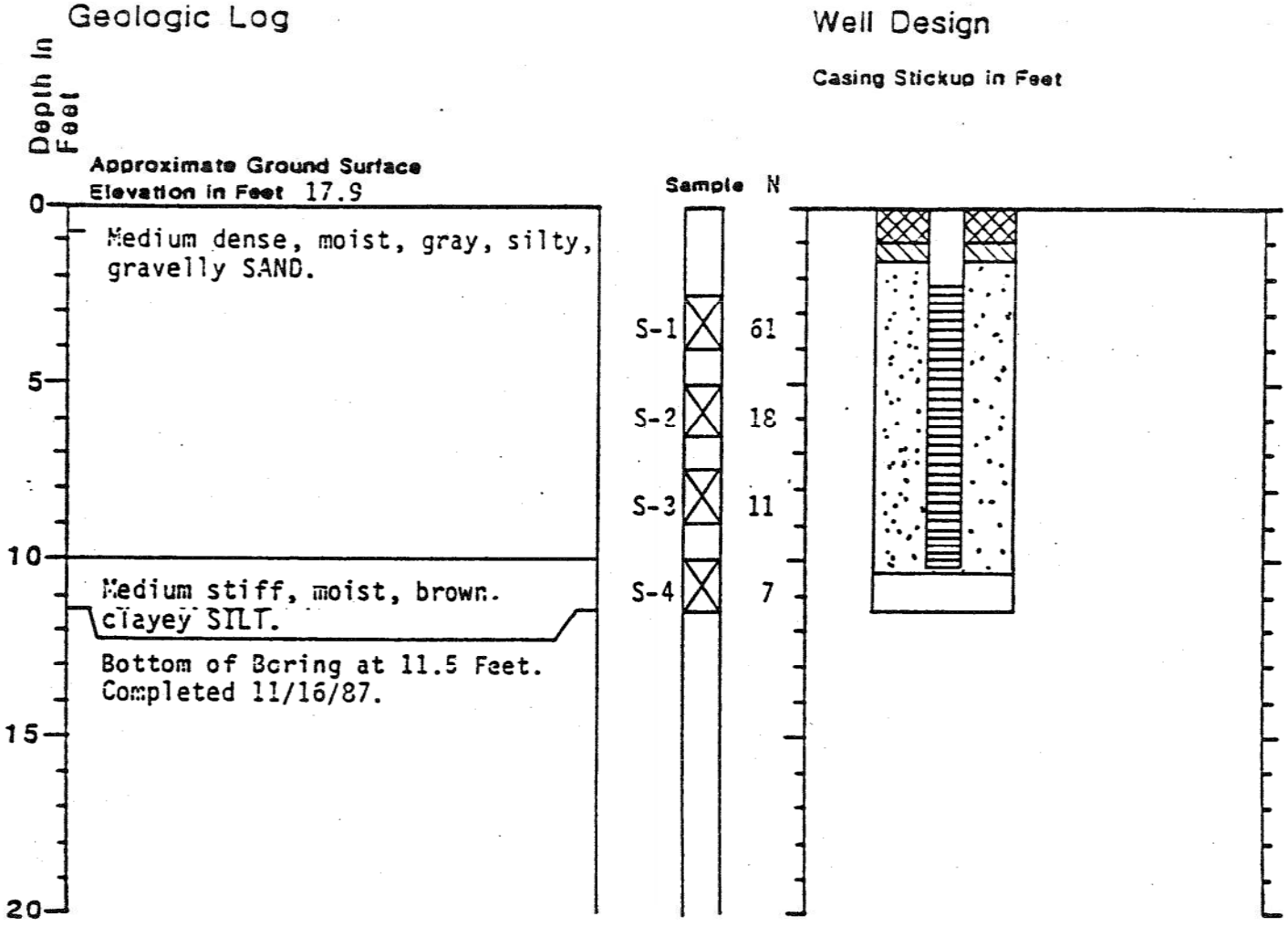
2-inch ø PVC Screen
(.020 Slot Size)

NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

J-1784-01 November 1987
HART-CROWSER & associates inc.
Figure 2

Boring Log and Construction Data for Observation Well D-7



Concrete Surface Seal

Volclay

Aqua 8 Sand

Natural Material

2-inch ø PVC Riser Pipe

2-inch ø PVC Screen (.020 Slot Size)

NOTES:

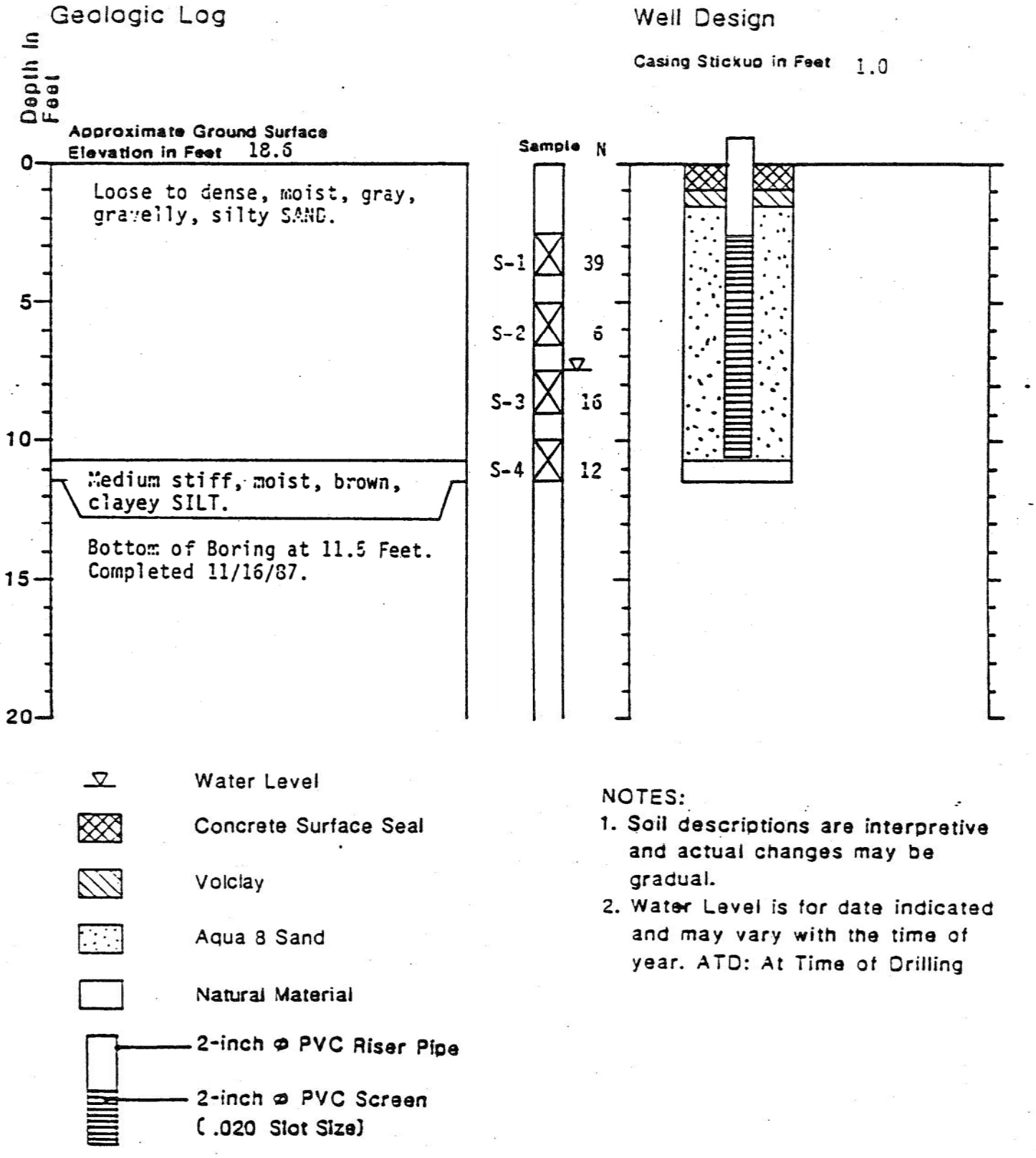
1. Soil descriptions are interpretive and actual changes may be gradual.
2. No ground water was observed.

J-1784-01 November 1987

HART-CROWSER & associates inc.

Figure 3

Boring Log and Construction Data for Observation Well D-8



NOTES:

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level is for date indicated and may vary with the time of year. ATD: At Time of Drilling

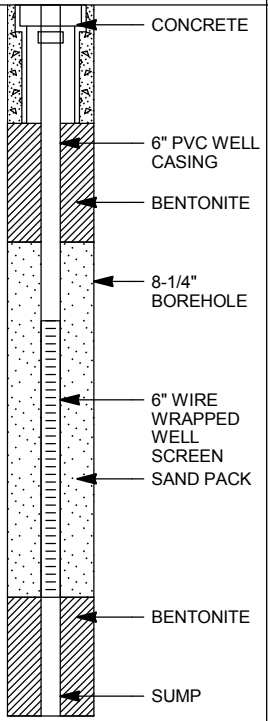
J-1784-01 November 1987
HART-CROWSER & associates inc.
Figure 4

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: EX-1
DATE COMPLETED: March 22, 2013
DRILLING METHOD: AIRKNIFE/ 8-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	AIRKNIFED (0 to 5ft BGS)	
	SM-SAND, trace silt, trace medium gravel, medium grained, poorly graded, brown, moist	5.00 5.42
	ML-SILT, trace silt, trace fine gravel, low plasticity, brown, moist	6.25 6.58
	SM-SAND, trace silt, trace medium gravel, medium grained, poorly graded, brown, moist	
	ML-SILT, trace clay, trace fine sand, low plasticity, brown, moist	8.92
	SM-SAND, trace silt, trace fine gravel, medium grained, poorly graded, brown, moist - gray, strong odor at 9.5ft BGS - strong odor at 11.0ft BGS - wet at 13.0ft BGS	
	- loose, strong odor at 15.0ft BGS	15.33
	ML-SILT, trace fines, trace clay, low plasticity, brown, moist	15.50
	SM-SAND, trace silt, medium grained, poorly graded, gray, wet	18.00
	ML-SILT, trace clay, low plasticity, brown, moist	18.83
	SM-SAND, trace silt, trace clay, medium grained, poorly graded, gray, moist	20.00
	END OF BOREHOLE @ 20.0ft BGS	



WELL DETAILS
Screened interval:
8.00 to 15.00ft BGS
Length: 7ft
Diameter: 6in
Slot Size: 0.020
Material: PVC-WIRE WRAPPED
Seal:
3.00 to 6.00ft BGS
Material: BENTONITE
Sand Pack:
6.00 to 15.00ft BGS
Material: 10/20 SAND

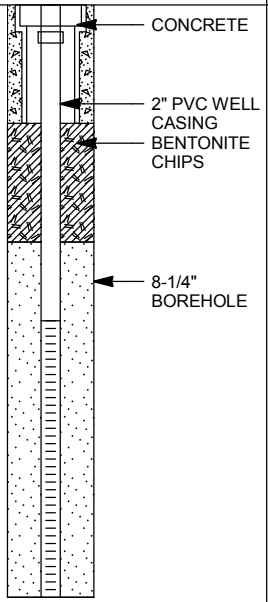
SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1HA				
2SS		100	26	1612
3SS		100	7	1651
4SS		100	16	712.0
5SS		100	23	1041
6SS		100	23	1284
7SS		100	17	1110
8SS		100	17	1439
9SS		100	6	1108
10SS		100	6	1100.6
11SS		100	20	12.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: P-1
DATE COMPLETED: March 22, 2013
DRILLING METHOD: AIRKNIFE/ 8-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NOT LOGGED - SEE BORING LOG EX-1 FOR STRATIGRAPHY						
	END OF BOREHOLE @ 15.0ft BGS	15.00					

WELL DETAILS
Screened interval:
8.00 to 15.00ft BGS
Length: 7ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
3.00 to 6.00ft BGS
Material: BENTONITE
Sand Pack:
6.00 to 15.00ft BGS
Material: 10/20 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: P66 RENTON TERMINAL
PROJECT NUMBER: 070496
CLIENT: PHILLIPS 66 COMPANY
LOCATION: RENTON, WASHINGTON

HOLE DESIGNATION: P-2
DATE COMPLETED: March 22, 2013
DRILLING METHOD: AIRKNIFE/ 8-1/4" HSA
FIELD PERSONNEL: N. HINSPERGER

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	NOT LOGGED - SEE BORING LOG EX-1 FOR STRATIGRAPHY		CONCRETE 2" PVC WELL CASING BENTONITE CHIPS 8-1/4" BOREHOLE				
	END OF BOREHOLE @ 15.0ft BGS	15.00					

WELL DETAILS
Screened interval:
8.00 to 15.00ft BGS
Length: 7ft
Diameter: 2in
Slot Size: 0.010
Material: PVC
Seal:
3.00 to 6.00ft BGS
Material: BENTONITE
Sand Pack:
6.00 to 15.00ft BGS
Material: 10/20 SILICA SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 070496WIN.GPJ CRA_CORP.GDT 5/23/13

APPENDIX E

ENGINEERING ASSESSMENT OF SECONDARY CONTAINMENT DIKES

Stantec

SLOPE STABILITY ANALYSES RENTON TERMINAL RENTON, WA

Geotechnical Investigation

Prepared for:

H. Scott Edwards
West Coast Terminals Division Engineer
ConocoPhillips Pipe Line Company
3900 Kilroy Airport Way, Suite 210
Long Beach, California 90806

Prepared by:

Stantec Consulting Corporation
12034 – 134th Court Northeast, Suite 102
Redmond, Washington 98052
Tel: (425) 298-1000 Fax: (425) 298-1019

Project No.:

212302747

December 13, 2011

Table of Contents

1 **Introduction** 1
2 **Site Description** 1
2.1 Containment 2
3 **Geotechnical Subsurface Investigation** 2
3.1 Site Investigation Program 2
4 **Soil and Groundwater Conditions** 3
4.1 Area Geology 3
4.2 Soil Conditions 3
5 **Geological Hazards** 4
5.1 Steep Slope Hazard 4
5.2 Erosion Hazard 4
5.3 Seismic Hazard 5
6 **SLOPE STABILITY ANALYSES** 6
7 **Discussion** 7
7.1 General 7
8 **Closure** 7

List of Appendices

Appendix A ..... Statement of General Conditions
Appendix B ..... Site Plans and Sections
Appendix C ..... Borehole Log Records

1 INTRODUCTION

In accordance with your authorization, Stantec has completed a geotechnical investigation with slope stability analyses for the existing soil berm surrounding fuel storage tanks at the Renton Terminal (3485) Facility located at 2423 Lind Avenue, in Renton, Washington.

The purpose of the geotechnical analyses was to identify the existing soil conditions of the soil berm, conduct slope stability analyses of the berm, and to provide geotechnical recommendations if necessary. Specific recommendations for our scope of work were provided in the Remedial Investigation and Feasibility Study (RIFS) report dated October 6, 2010 by Stantec Consulting Corporation.

The scope of work for the geotechnical investigation consisted of a site investigation followed by engineering analyses to prepare this report. The results of our slope stability analyses presented herein pertain to geotechnical aspects of the existing soil berm with regard to slope stability under static and seismic conditions.

2 SITE DESCRIPTION

The site consists of one parcel (No. 3023059086) with a total area of approximately 10.7 acres. The north half of the site is developed with a single story office building, fueling area with canopy, multiple accessory structures, and asphalt paved parking and drive areas. The subject area of this report, the south half of the property, is developed with seven above ground fuel storage tanks surrounded by a soil containment berm.

The north half of the site is generally level with local slopes on the order of 5 percent or less, which extend toward catchbasins with the paved areas. The south half of the site within the fuel tank area is generally level. The soil berm that surrounds the fuel tanks is approximately 6 feet in height and has side slopes ranging from approximately 1.2H:1V (Horizontal to Vertical) to 1.7H:1V, with an average slope of 1.5H:1V (75 percent). The top of the soil berm is approximately 2 feet in width and a concrete retaining wall connects the berm along the north-central portion of the tank area. Many above-ground utilities cross through the berm and into the fuel tank area. The areas west and south of the soil berm are generally level and consist of vegetated landscaping areas and access roadways. The off-site area east-southeast of the berm area consists of a stormwater detention basin with low magnitude slopes. An approximately 3 feet tall concrete retaining wall is located along the west end of the pond area. We understand that this wall is in place to help prevent potentially impacted water originating from the site from entering the pond.

The site is vegetated sparsely with deciduous trees, blackberries, grasses, and other underbrush. The property is bordered to the east by Lind Avenue Southwest, to the south by Southwest 27th Street, to the west by undeveloped land and commercial development, and to the north by commercial property (Olympic Pipeline).

2.1 Containment

Per the Washington Administrative Code (WAC) 173-303-640(4)(e), secondary containment systems such as the soil berm at the site must be of sufficient capacity to contain the contents of the largest tank in the containment area plus the stormwater generated in 24-hours by a 25-year storm event.

Based on dimensions estimated from site maps and available drawings, the approximate capacity of the containment dike is 612,710 cubic feet. The maximum overfill capacity of Tank No. 1, the largest above ground storage tank (AST) in the tank storage area, is 328,664 cubic feet. According to data obtained from the Western Regional Climate Center (WRCC), the 24-hour rainfall from a 25-year storm event in the Renton, WA area is approximately 3.4 inches.

The volume of stormwater that would accumulate in the containment area in 24 hours from a 25-year storm event is approximately 32,492 cubic feet. Therefore, under WAC 173-303-640(4)(e), the minimum volume of required secondary containment for the ASTs at the Renton Terminal is approximately 361,137 cubic feet. The capacity provided by the soil berm containment system is approximately 170% of the minimum required capacity, indicating that the containment system is sufficient for the current AST schedule at the site.

3 GEOTECHNICAL SUBSURFACE INVESTIGATION

3.1 Site Investigation Program

The geotechnical field investigation program was completed on July 21, 2011 and included drilling and sampling three hollow stem auger borings drilled by CN Drilling, a Stantec subcontractor, using a limited access drill rig. The borings were located along the top of the soil berm at strategic locations and away from underground utilities.

The soils encountered were logged in the field during the exploration and are described in accordance with the Unified Soil Classification System (USCS). Disturbed soil samples were obtained by using the Standard Penetration Test (SPT) as described in ASTM:D-1586. The Standard Penetration Test and sampling method consists of driving a standard 2-inch outside-diameter, split barrel sampler into the subsoil with a 140-pound hammer free falling a vertical distance of 30 inches. The summation of hammer-blows required to drive the sampler the final 12-inches of an 18-inch sample interval is defined as the Standard Penetration Resistance, or N-value. The blow count is presented graphically on the boring logs in this appendix. The resistance, or "N" value, provides a measure of the relative density of granular soils or of the relative consistency of cohesive soils.

A Stantec field representative directed the drilling program, collected disturbed soil samples from split spoon sampler tubes, classified the encountered soils, kept a detailed log of each borehole, and observed and recorded pertinent site features.

The results of the drilling and sampling program, as well as the results of the laboratory analysis are presented in Appendix C.

4 SOIL AND GROUNDWATER CONDITIONS

4.1 Area Geology

The site lies within the Puget Lowland. The lowland is part of a regional north-south trending trough that extends from south western British Columbia to near Eugene, Oregon. North of Olympia, Washington, this lowland is glacially carved, with a depositional and erosional history including at least four separate glacial advances/retreats. The Puget Lowland is bounded to the west by the Olympic Mountains and to the east by the Cascade Range. The lowland is filled with glacial and nonglacial sediments consisting of interbedded gravel, sand, silt, till, and peat lenses.

The Geologic Map of King County (2007), indicates that the site is located near the contacts of Wetland Deposits and Alluvium. Wetland deposits generally include varying thicknesses of peat mixed with vegetation and variable amounts of silt and sand. These materials are generally soft and unconsolidated. Alluvium in this area generally consists of poorly sorted sand, silt, and clay deposited by the Green River within the last several thousand years. Areas of peat and volcanic-derived sands are common, and the alluvial deposits are generally loose/soft.

4.2 Soil Conditions

Details of the encountered soil conditions are presented on the boring logs in Appendix C, which also include the results of the laboratory testing. The detailed soil description on these logs should be referred to in preference to the generalized description provided below.

Borings B-1 through B-3

All of the borings encountered approximately 3 to 4 feet of loose, silty-fine to medium grained sand with variable amounts of gravel (Fill), underlain by medium dense, silty-fine to medium grained sand with variable amounts of gravel (Fill). This layer was underlain by medium dense to dense, fine to medium grained sand (Fill), which extended to the termination depth of the borings. All of the underlying soil conditions in the borings (density and composition) were consistent and did not vary significantly.

The underlying fill materials have a different overall composition and we suspect that they were placed as a pre-load prior to development. This conclusion is based on the observations of wetland areas adjacent to the site and the elevation of the site relative to the adjacent areas.

Foundation distress and settlement can occur due to differential settlement of underlying peat and/or compressible silt deposits following construction (loading). Pre-load fill is commonly utilized in order to help densify underlying compressible materials, such as peat, allowing for site development. Pre-loads are typically 6 to 12 feet in thickness and are monitored with survey equipment to quantify the amount of settlement with regard to expected settlement.

Previous Borings

Previous borings drilled at the site generally encountered fine to coarse grained sand (poorly graded to well graded) to a depth of 7 to 12 feet. Areas of silty-sand with gravel (Fill) were encountered in several borings. Native alluvial soils, generally consisting of soft/loose to medium dense/stiff mixtures of silt, sand, clay, gravel, and organic material were encountered below the fill.

Groundwater

At the time of our investigation, groundwater was not encountered in any of the borings. Based on the groundwater conditions from previous investigations (multiple consultants), a groundwater table (phreatic surface) is located near the contact between the pre-load fill materials and the underlying native alluvium. However, groundwater was not consistently encountered throughout the site and we anticipate that local aquitards and areas of impermeable silt/clay locally prevent or limit groundwater movement.

Fluctuation to the perched groundwater conditions and elevation of the phreatic groundwater table should be anticipated due to variable seasonal precipitation and we would expect that the depth to groundwater to range from approximately 5 to 12 feet below the site grades.

5 GEOLOGICAL HAZARDS

5.1 Steep Slope Hazard

The soil berm has side slope angles on the order of 75 percent with an overall topographic relief of approximately 6 feet. In our opinion, there is not a significant hazard associated with these slopes at this time. We did not observe tension cracks or evidence of severe erosion or sloughing. The upper 4 to 6 inches of soil along the berm is generally very loose and tends to slough under foot; however, we did not observe ongoing rill activity or material deposition at the base of the slopes.

As part of this investigation, we conducted slope stability analyses of the soil berm in order to determine the existing slope stability factor of safety against failure for static and seismic conditions. The results of these analyses can be found in Section 6 of this report.

5.2 Erosion Hazard

The Natural Resources Conservation Services (NRCS) maps for King County indicate that the site is underlain by silt loam soils which have a "Slight" erosion potential in a disturbed state. The fill materials which comprise the soil berm appear similar to Alderwood gravelly sandy loam soils. These soil materials, in conjunction with the existing sloping conditions, typically have a "Severe" to "Very Severe" erosion potential in a disturbed state. However, our site observations indicate that only slight to moderate erosion from seasonal precipitation has occurred along portions of the soil berm.

Based on the composition and relative density of the soil berm and fuel tank storage area subgrade soils, we estimate that severe erosion could occur in the event of fuel tank failure. The level and extent of the erosion and its effects on the soil berm would depend on the proximity of the failure to the berm, the volume of fuel, and the velocity of the spilled fluids.

5.3 Seismic Hazard

The soil berm and underlying suspected pre-load consist of previously placed fill. Based on boring data from previous investigations, the underlying fill (pre-load?) appears to be on the order of 7 to 10 feet in thickness and is generally medium dense to dense. The soil berm soils are generally medium dense.

While these materials are relatively dense, our review of geologic information and our previous experience with the geology of this area indicate that the fill materials are underlain by loose/soft wetland and alluvial deposits to a depth of at least 50 feet. Therefore, the overall subsurface profile likely corresponds to a Site Class *E* as defined by Table 1613.5.2 of the 2009 International Building Code (2009 IBC). One or more drilled borings to a depth of at least 50 feet below the existing site grades would be necessary to verify the Site Class of the property.

A Site Class *E* applies to a profile consisting of generally loose/soft soils (average of N<15 in the top 100 feet) and having at least 10 feet of soil with a moisture content of at least 40 percent, a plasticity index greater than 20, and/or an undrained shear strength less than 500 pounds per square feet (psf). In this geologic area, the native alluvial soils are generally loose or soft, typically containing at least 10 feet of soils that have a moisture content of at least 40 percent.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S and S_1. The USGS website includes the most updated published data on seismic conditions. The site specific seismic design parameters and adjusted maximum spectral response acceleration parameters are as follows:

PGA	(Peak Ground Acceleration, in percent of g)
32.41	(10% Probability of Exceedence in 50 years)
62.33	(2% Probability of Exceedence in 50 years)
S_S	140.90% of g
S_1	48.20% of g

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table.

Soil liquefaction is a state where soil particles lose contact with each other and become suspended in a viscous fluid. This suspension of the soil grains results in a complete loss of strength as the effective stress drops to zero as a result of increased pore pressures. Liquefaction normally occurs under saturated conditions in soils such as sand in which the strength is purely frictional. However, liquefaction has occurred in soils other than clean sand, such as low plasticity silt. Liquefaction usually occurs under vibratory conditions such as those induced by seismic events.

According to the City of Renton Sensitive Areas, Liquefaction Hazards map, the site is located in an area with Moderate to High liquefaction susceptibility. In order to analyze the liquefaction potential at the site, and the resulting effect on the fuel tanks and site structures, we would need to drill several borings to at least 50 feet below the existing site grades. Differential settlements caused by soil liquefaction could cause fuel tanks to tip and/or fail, and foundation systems of site structures to

potentially experience varying degrees of distress and failure. It is possible that the thickness of fill at the site would help reduce the effect of liquefaction related distress at the ground surface. However, we are unaware whether the fill that underlies the site was engineered in its design in order to reduce the effect of liquefaction. We can analyze the liquefaction potential at the site upon request.

6 SLOPE STABILITY ANALYSES

The commercially available slope stability computer program SLOPE/W was used to evaluate the global stability of the existing soil berm using generalized cross sections and the data collected from our borings. The slope stability was analyzed under static and seismic conditions. The computer program calculates factors of safety for potential slope failures and generates the potential failure planes. This software calculates the slope stability under seismic conditions using pseudo-static methods. The stability of the described configuration was analyzed by comparing observed factors of safety to minimum values as set by standard geotechnical practice. A factor of safety of 1.0 is considered equilibrium and less than 1.0 is considered failure. Typical recommended minimum factors of safety for global stability are 1.5 for static conditions and 1.1 to 1.2 for seismic conditions.

In accordance with the 2009 *International Building Code (*2009 *IBC)* Chapter 16, Section 1615.2.1 the Probabilistic maximum considered earthquake is a 2,500 year event which has a 2 percent probability of being exceeded in 50 years. For this area, the one in 2,500 year event has a magnitude of 7.0 and a peak horizontal ground acceleration of 0.6233g (per U.S. Geological Survey).

The IBC states that the peak ground acceleration equal to SDS/2.5 shall be used for sites located in geologic hazard areas and in Design Site Classes D, E, or F. For our analyses, a seismic coefficient of 0.2g was used because the IBC states that the requirements for Design Site Class C must be met in addition (1802.2.6 and 1802.2.7) to those for Site Classes D, E, and F.

The following estimated soil parameters were used in our analysis:

Soil Description	Density (pcf)	Cohesion (psf)	Friction (degrees)
Loose to Medium Dense Silty-Sand (Berm Fill)	110 (dry) 120 (wet)	25	30
Medium Dense Silty-Sand (Berm Fill)	115 (dry) 125 (wet)	50	32
Medium Dense to Dense Poorly Graded Sand (Pre-load Fill)	115 (dry) 120 (wet)	0	36

Stability Results for Soil Berm Interior Direction

Cross Section	Static Factor of Safety	0.2g Seismic Factor of Safety
A – A'	1.647 (1.6)	1.150 (1.2)
B – B'	1.521 (1.5)	1.074 (1.1)

Stability Results for Soil Berm Exterior Direction

Cross Section	Static Factor of Safety	0.2g Seismic Factor of Safety
A – A'	1.519 (1.5)	1.095 (1.1)
B – B'	1.550 (1.6)	1.095 (1.1)

The analyses indicate that the Factor of Safety (FS) for global slope stability is at or slightly higher than the recommended minimums of 1.5 for static conditions and 1.1 for seismic conditions. Landslide hazard mitigation of the soil berm is not warranted at this time.

7 DISCUSSION

7.1 General

The results of the site investigation and slope stability analyses completed for the existing soil berm indicate that the berm is stable in its current configuration under static and seismic conditions. The existing berm fill generally consists of medium dense, silty-sand with variable amounts of gravel overlying medium dense to dense, poorly graded sand with variable amounts of gravel (fill).

We did not observe evidence of significant erosion due to runoff from precipitation; however, there is a slight to moderate potential for erosion of the near surface berm soils, which are locally loose/soft. We recommend periodic observation of the surface conditions of the berm by facility staff, and we should be notified of any changes to the berm system.

In addition, the liquefaction potential at the site is currently unknown. Liquefaction induced differential settlements could cause tanks to tip, and potentially rupture. Further site analysis utilizing several drilled borings to at a depth of at least 50 feet would provide the data required to determine the liquefaction potential at the site. We can provide these services upon request.

8 CLOSURE

This report was prepared for the exclusive use of ConocoPhillips and their appointed consultants. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Stantec.

The recommendations contained in this report are based on assumed continuity of soils with those of our test holes.

Use of this report is subject to the Statement of General Conditions provided in Appendix A. It is the responsibility of ConocoPhillips who is identified as "the Client" within the Statement of General Conditions, and its agents to review the conditions and to notify Stantec should any of these not be satisfied.

Respectfully submitted,

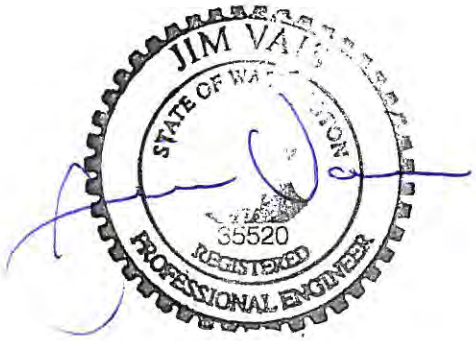
Stantec Consulting Corporation

Original signed by:



Phil Haberman, P.G., P.E.G.
Senior Engineering Geologist

Original signed by:



Jim Vais, P.E.
Principal Geotechnical Engineer

PH/jv/ms

[File Ref: P: ConocoPhillips Renton Terminal

Stantec

APPENDIX A

Statement of General Conditions

STATEMENT OF GENERAL CONDITIONS

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Stantec and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Stantec Consulting Corporation's present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec Consulting Corporation is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state of execution for the specific professional service provided to the Client. No other warranty is made.

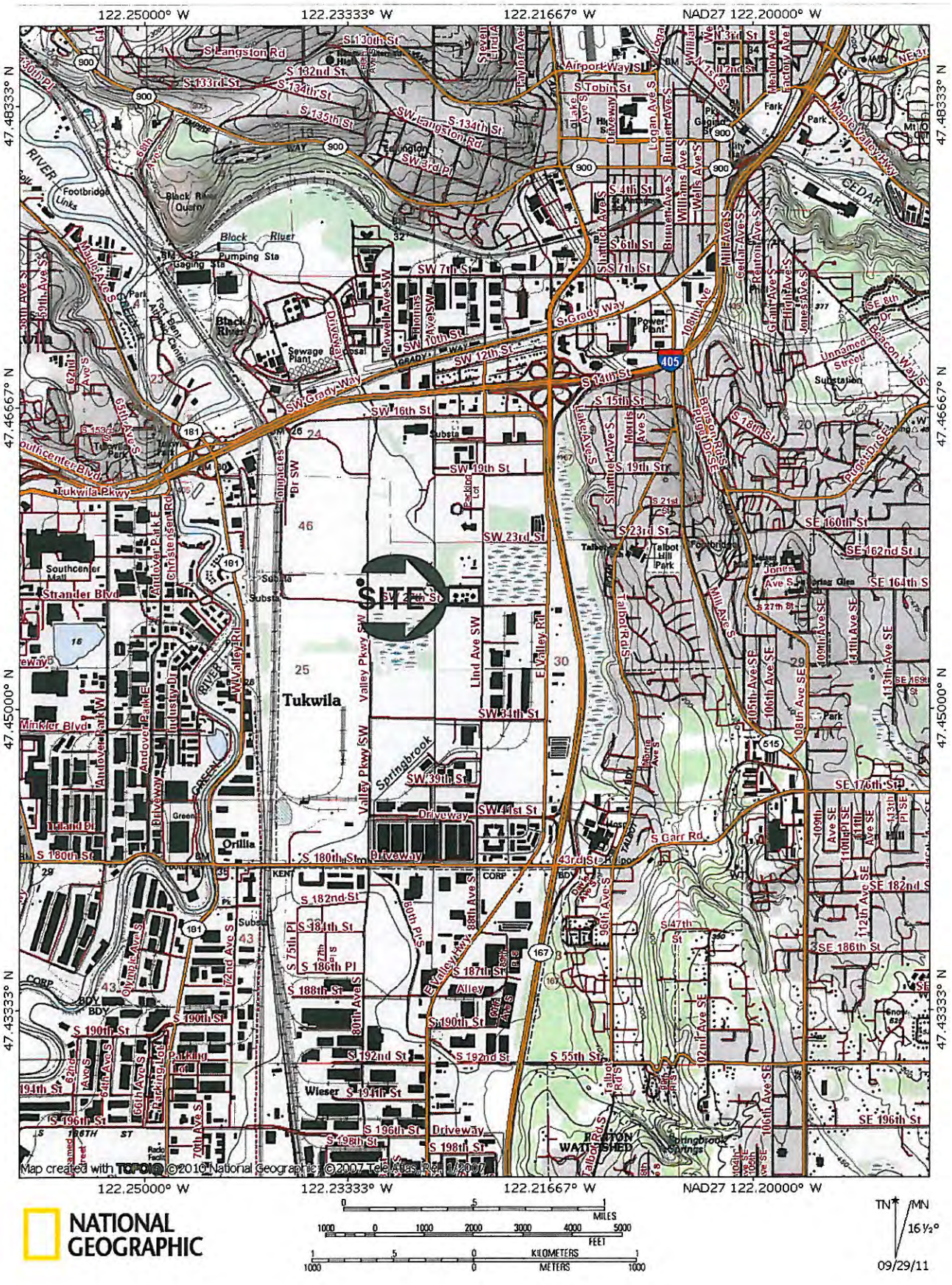
INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec Consulting Corporation at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Stantec Consulting Corporation must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec Consulting Corporation will not be responsible to any party for damages incurred as a result of failing to notify Stantec Consulting Corporation that differing site or sub-surface conditions are present upon becoming aware of such conditions.

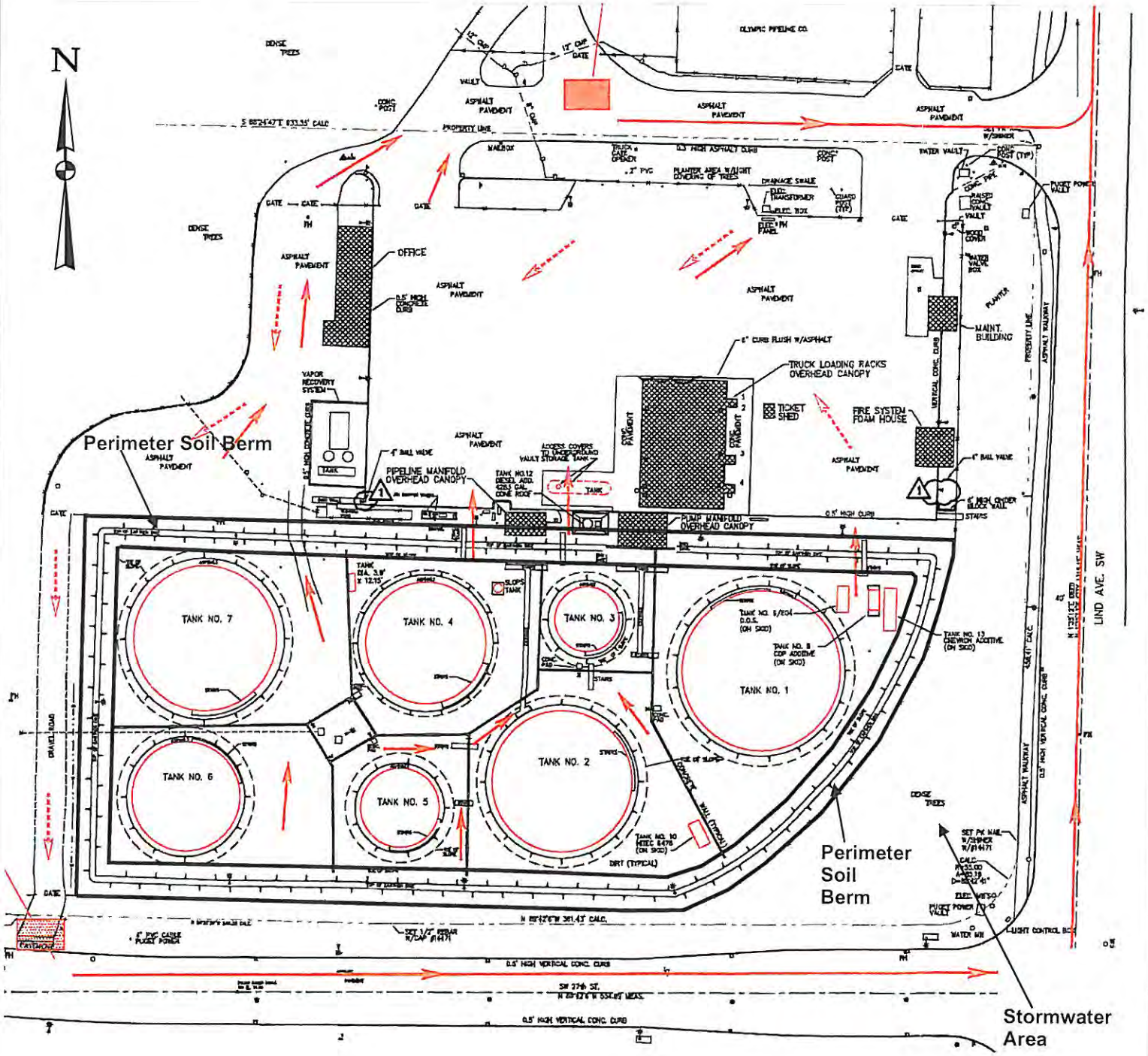
PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec Consulting Corporation, sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Stantec Consulting Corporation cannot be responsible for site work carried out without being present.

APPENDIX B

Figures: Site Plans & Sections

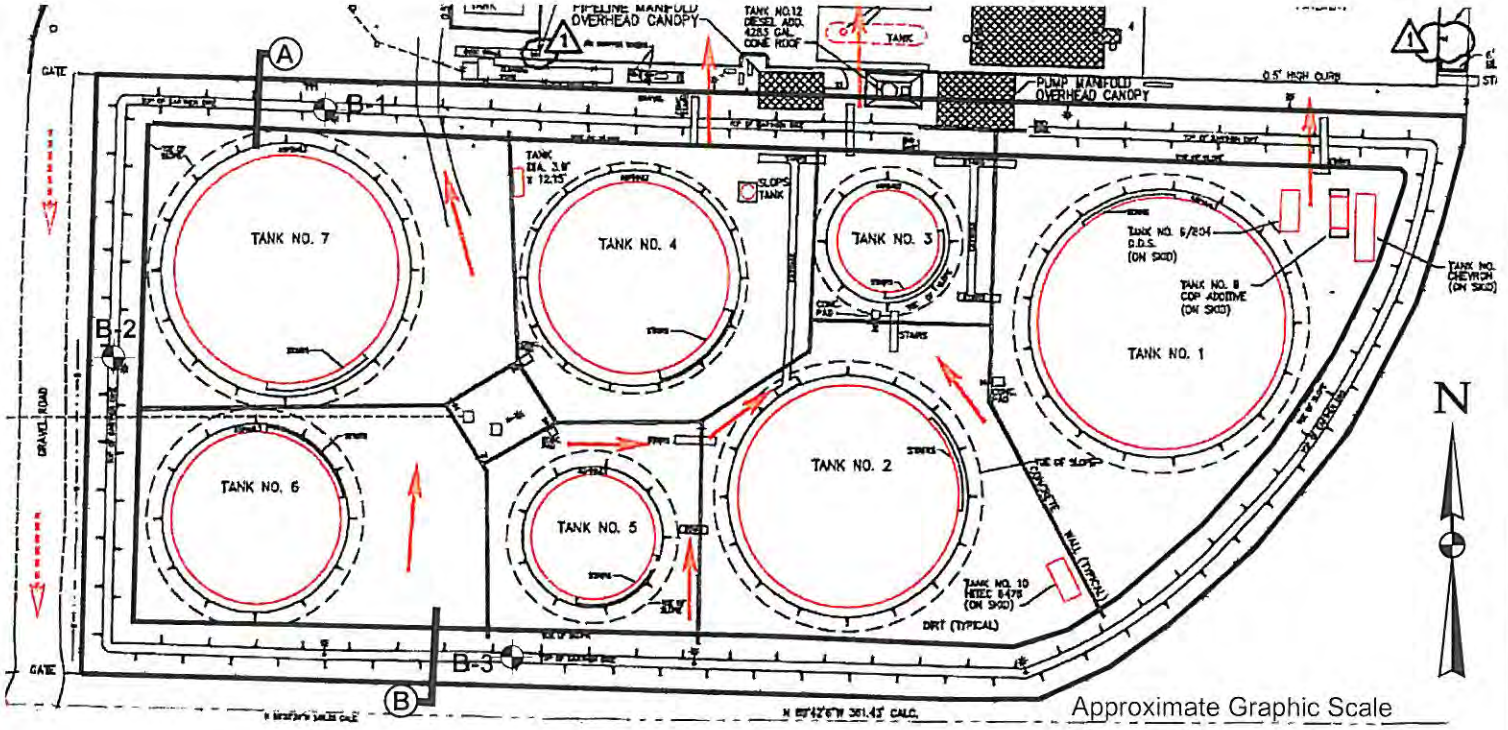


Stantec	Soil Berm Stability Analysis, Renton Terminal, 2423 Lind Avenue SW, Renton, WA				Figure 1 Vicinity Map
	July 26, 2011	Drawn By: PAH	Checked By: JV	Client: Conoco Phillips	



Not to Scale

Stantec	Soil Berm Stability Analysis, Renton Terminal, 2423 Lind Avenue SW, Renton, WA				Figure 2 General Site Map
	July 26, 2011	Drawn By: PAH	Checked By: JV	Client: Conoco Phillips	

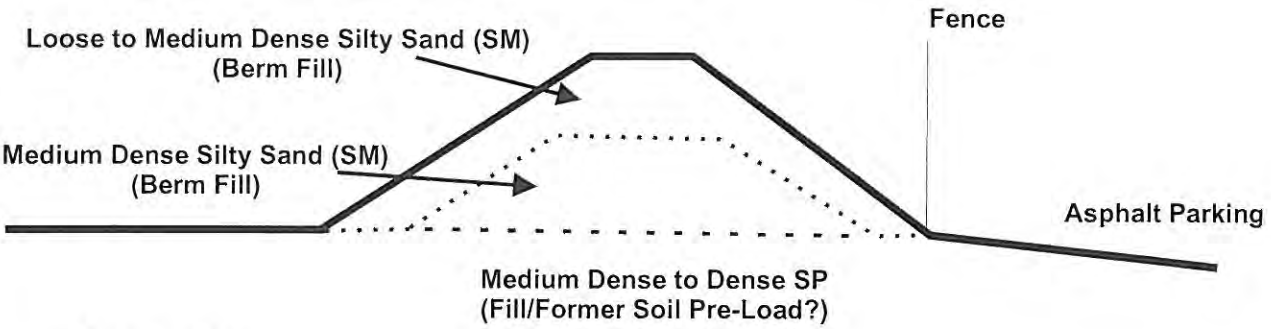


LEGEND

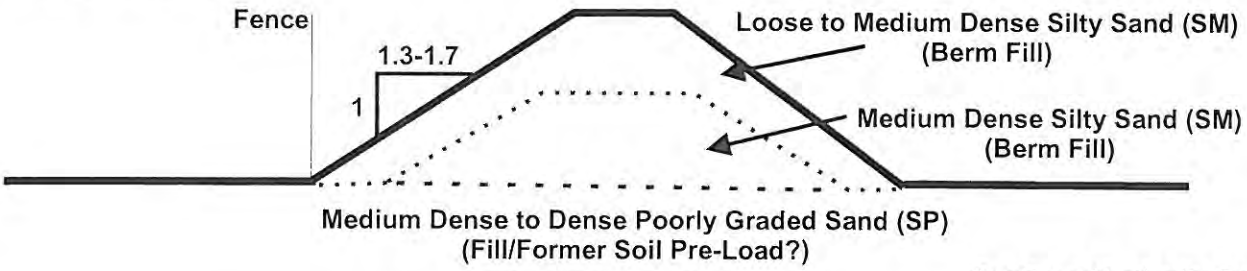
B-1 Approximate Boring Location

A Cross Section

Generalized Section A

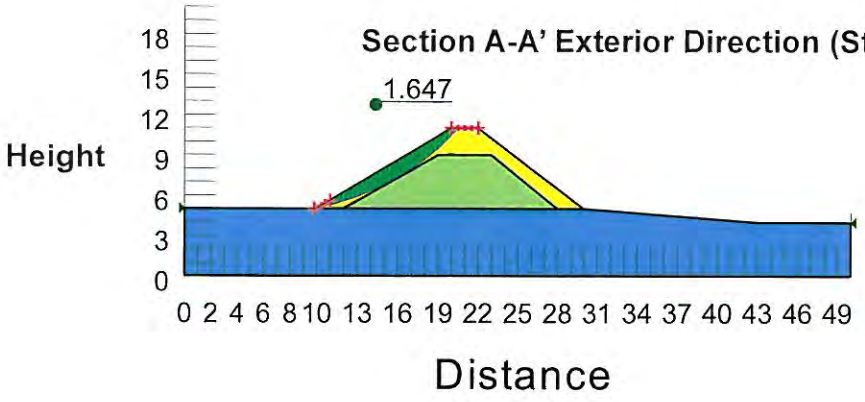


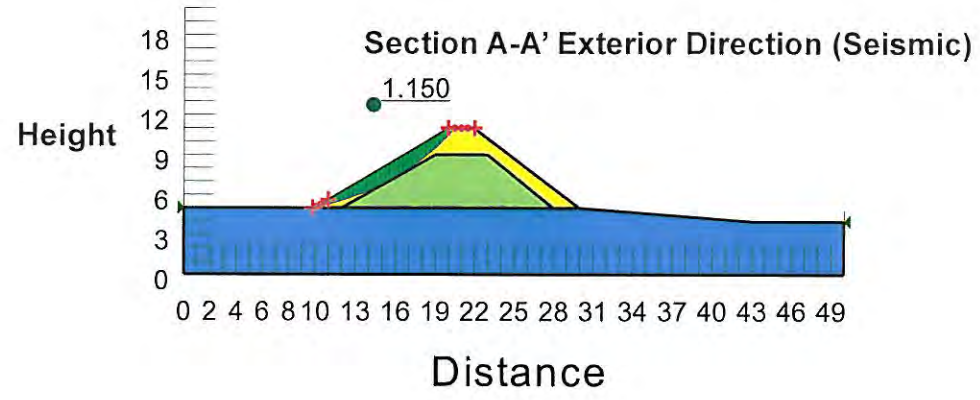
Generalized Section B

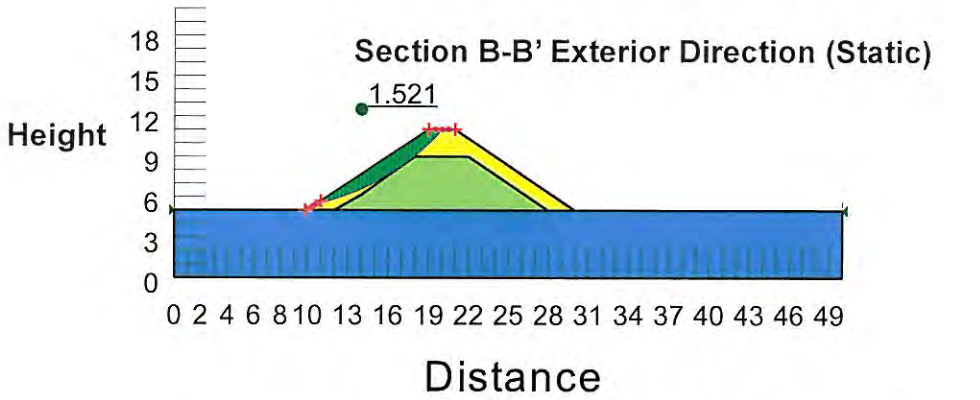


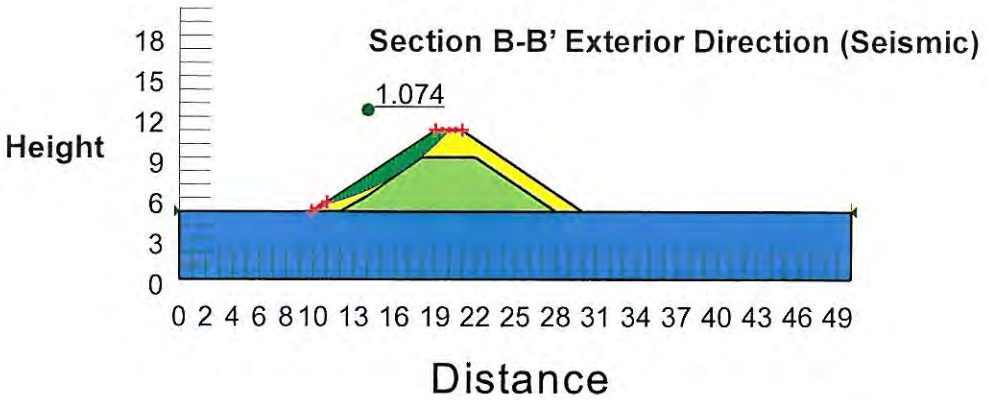
Sections Vertically Exaggerated

Stantec	Soil Berm Stability Analysis, Renton Terminal, 2423 Lind Avenue SW, Renton, WA				Figure 3 Site Map & Cross Sections
	July 26, 2011	Drawn By: PAH	Checked By: JV	Client: Conoco Phillips	



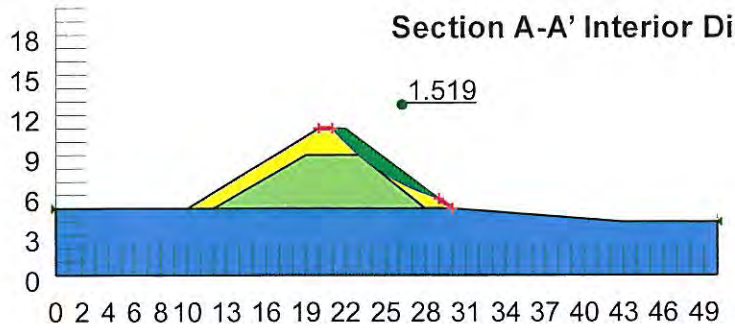


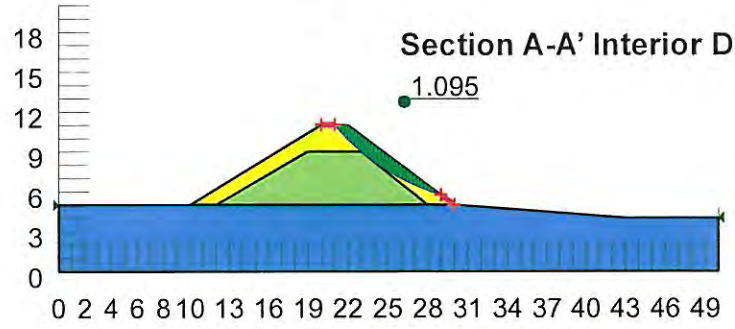


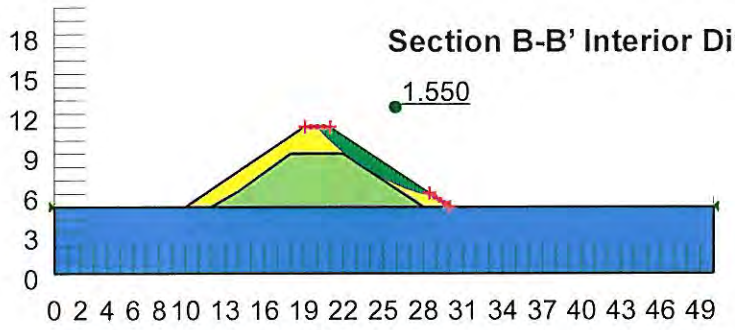


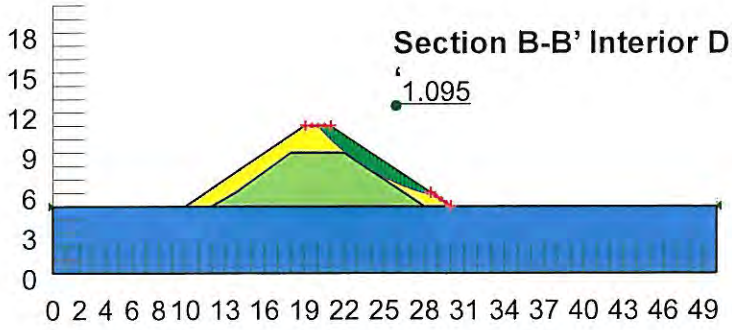
Not to Scale

Stantec	Soil Berm Stability Analysis, Renton Terminal, 2423 Lind Avenue SW, Renton, WA				Figure 4 Slope/W Results
	July 26, 2011	Drawn By: PAH	Checked By: JV	Client: Conoco Phillips	









Not to Scale

Stantec	Soil Berm Stability Analysis, Renton Terminal, 2423 Lind Avenue SW, Renton, WA				Figure 5 Slope/W Results
	July 26, 2011	Drawn By: PAH	Checked By: JV	Client: Conoco Phillips	

APPENDIX C

Borehole Log Records

PROJECT: **Conoco Phillips Renton Termial**
LOCATION: **2423 Lind Avenue SW**
PROJECT NUMBER: **212302747**

Boring **B-1** PAGE 1 OF 1

Stantec

DATE: STARTED: **7/21/2011** COMPLETED: **7/21/2011**
EXCAVATION COMPANY: **CN Drilling**
EQUIPMENT: **Limited Access**
OPERATOR: **HSA**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **NA** TEST PIT DEPTH (ft): **9.00**
STATIC DTW (ft): **NA** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in):
LOGGED BY: **PH** CHECKED BY: **SC**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count/ft	Headspace PID (ppm)	Depth (feet)
		SM	SM; Loose, fine to medium grained sand with gravel, yellowish brown, dry to moist. (Fill)			1	2 2 3		
		SM	SM; Medium dense, fine to medium grained sand with gravel, yellowish brown, moist. (Fill)			1	2 5 5		
5									5
						1	3 5 7		
		SP	SP; Dense, fine to medium grained sand, grayish brown, moist. (Fill)			1.5	6 12 18		
			Borehole terminated at 9 feet bgs.						
10									10

GEO FORM 304_SECOR037_CONOCO PHILLIPS.GPJ SECOR037.GDT 12/14/11

PROJECT: **Conoco Phillips Renton Termial**
LOCATION: **2423 Lind Avenue SW**
PROJECT NUMBER: **212302747**

Boring
B-2 PAGE 1 OF 1

Stantec

DATE: STARTED: **7/21/2011** COMPLETED: **7/21/2011**
EXCAVATION COMPANY: **CN Drilling**
EQUIPMENT: **Limited Access**
OPERATOR: **HSA**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **NA** TEST PIT DEPTH (ft): **9.00**
STATIC DTW (ft): **NA** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in):
LOGGED BY: **PH** CHECKED BY: **SC**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count/ft	Headspace PID (ppm)	Depth (feet)
		SM	SM; Loose, fine to medium grained sand with gravel, yellowish brown, dry to moist. (Fill)			1	3 3 4		
		SM	SM; Medium dense, fine to medium grained sand with gravel, yellowish brown, moist. (Fill)			1	3 5 5		
5									5
						1	3 4 6		
		SP	SP; Medium dense, fine to medium grained sand, grayish brown, moist. (Fill)			1.5	12 12 15		
			Borehole terminated at 9 feet bgs.						
10									10

GEO FORM 304_SECOR037_CONOCO PHILLIPS.GPJ SECOR037.GDT 12/14/11

PROJECT: **Conoco Phillips Renton Termial**
LOCATION: **2423 Lind Avenue SW**
PROJECT NUMBER: **212302747**

Boring **B-3** PAGE 1 OF 1

Stantec

DATE: STARTED: **7/21/2011** COMPLETED: **7/21/2011**
EXCAVATION COMPANY: **CN Drilling**
EQUIPMENT: **Limited Access**
OPERATOR: **HSA**
SAMPLING EQUIPMENT: **Split Spoon**

NORTHING (ft): EASTING (ft):
LATITUDE: LONGITUDE:
GROUND ELEV (ft): TOC ELEV (ft):
INITIAL DTW (ft): **NA** TEST PIT DEPTH (ft): **9.00**
STATIC DTW (ft): **NA** WELL DEPTH (ft): **NA**
WELL CASING DIAMETER (in): **NA** BOREHOLE DIAMETER (in):
LOGGED BY: **PH** CHECKED BY: **SC**

Time & Depth (feet)	Graphic Log	USCS	Description	Sample	Time Sample ID	Measured Recov. (feet)	Blow Count/ft	Headspace PID (ppm)	Depth (feet)
		SM	SM; Loose, fine to medium grained sand with gravel, yellowish brown, dry to moist. (Fill)			1	2 3 3		
		SM	SM; Medium dense, fine to medium grained sand with gravel, yellowish brown, moist. (Fill)			1	3 4 6		
5									5
						1	4 5 5		
		SP	SP; Medium dense, fine to medium grained sand, grayish brown, moist. (Fill)			1.5	13 14 10		
			Borehole terminated at 9 feet bgs.						
10									10

GEO FORM 304_SECOR037_CONOCO PHILLIPS.GPJ SECOR037.GDT 12/14/11

APPENDIX F

LIF 4-DIM FILES

APPENDIX G

LIF RESULTS

MATRIX ENVIRONMENTAL LLC

September 21, 2011

PO Box 364
Galena, OH 43021
740-965-8271
FAX: 740-965-8037

-Direct Sensing Report-

Client:	**CRA**
Project Name:	**Conoco Phillips Renton Terminal**
Location:	**Renton, WA**
Project Number:	**120-OHDS-11UV**

The analysis and opinions expressed in this report are based upon data obtained from UVOST logs generated (and samples collected for emulations if applicable) at the location specified, and from other information discussed in the report. Exceptions, if any, are discussed in the accompanying discussion if applicable. This report is prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted practices. Reported results shall not be reproduced, except in full, without written approval of the lab. The sample results relate only to the analytes of interest tested. No warranties, expressed or implied are intended or made.

I certify that the data contained in this final report has been generated and reviewed in accordance with approved methods and our Standard Operating Procedure. Release of this final report is authorized by Laboratory management, which is verified by the following signature.

_____ _____

Approval Signature Date

LIF SYSTEM DESCRIPTION & ANALYSIS

UVOST

Fluorescence is a property of some compounds where absorbed UV light stimulates the release of photons (light) of a longer wavelength. The release of the photons can be used to detect small amounts of substance (i.e. polycyclic aromatic hydrocarbons or PAHs) in a larger matrix (soil). This method of detection has been used in laboratories for decades. Now, with the availability of lasers and optical fibers, this technology can be applied down hole in the field.

The UVOST system sends light (via 308nm laser) through fiber optic cable strung within probe rods. The light, reflected by a parabolic mirror, then exits through a sapphire window in the side of the probe. As the probe is advanced, the soil is exposed to the UV laser light. If PAHs are present (compounds in POLs that fluoresce, i.e. LNAPL) longer wavelength light is emitted by the contaminants. This "signal" light is transmitted through a return fiber, back up hole to be analyzed. Responses are indicated in real-time on a graph of signal vs. depth. The UVOST log displays "color mixed" signal logs (contributions from 4 channels) and waveforms ("fingerprint" of multi-wavelength) to aid in identification and relative quantity of the contaminant present.

Prior to every log the UVOST system is checked for optical quality by observing the background signal for sources of signal in the fiber, filter, mirror and sapphire window. Also, the reference emitter (a standard proprietary NAPL mixture called "RE") is placed on the window to determine the qualitative and semi-quantitative properties of the laser system. This is to assure that the RE response has the correct shape and intensity and that the UVOST system is ready to log. Typically, the RE will fall between 10,000 and 12,000 pVs (picovolt-seconds, a measure of waveform area) and the background can vary from 0.1%-1% (area of about 0-100 pVs). It is important to remember that the relationship between the NAPL in the ground and the RE depends on that particular NAPL. The calibration of the system is not to concentration, but to a known fluorescence signature.

EC (Electrical Conductivity)

Electrical Conductivity (EC) is a measure of the soil's ability to conduct an electrical current between two dipoles on the LIF/EC probe. Conductivity is the reciprocal of electrical resistivity and has the units (in our application) of millisiemens per meter (mS/m). Since soil is in the pathway of the charge flow, the grain size can be determined by comparing the EC log to a soil boring. Conductivity readings in the 100s indicate smaller grain (such as clay). Larger grain size (sand and gravels) are typically in the 10s of mS/m range. Prior to every log, the EC point of the UVOST probe is checked for proper operation by performing a voltage test with a voltage meter and a conductivity test with a test block.

Discussion

In log G-21, there is fluorescence signal at 0.05 feet. This is likely a result of the window being in the rod wiper instead of the subsurface when the log was started. The signal is only 4.5% of the RE and quickly resolves to background levels. In log G-30, there is signal from the surface. Each hole was vacuum excavated to @ 5', so fluorescence in the upper 5' should be ignored as we don't know where the soil came from that was put back in the hole.

The logs are printed out at 100% RE, and those that shot over the 100% scale are also provided at 300% RE and 500% RE. There is nothing to report out of the ordinary in the logs or instances when something wasn't performing optimally. In a couple of the logs (G-36 and G-21), we expected to see signal and did not. As a check of the system, the RE was placed on the window and an additional RE was taken to verify that the system was working correctly. In both cases, the RE was measured to be within acceptable limits.

UVOST Log Reference Guide

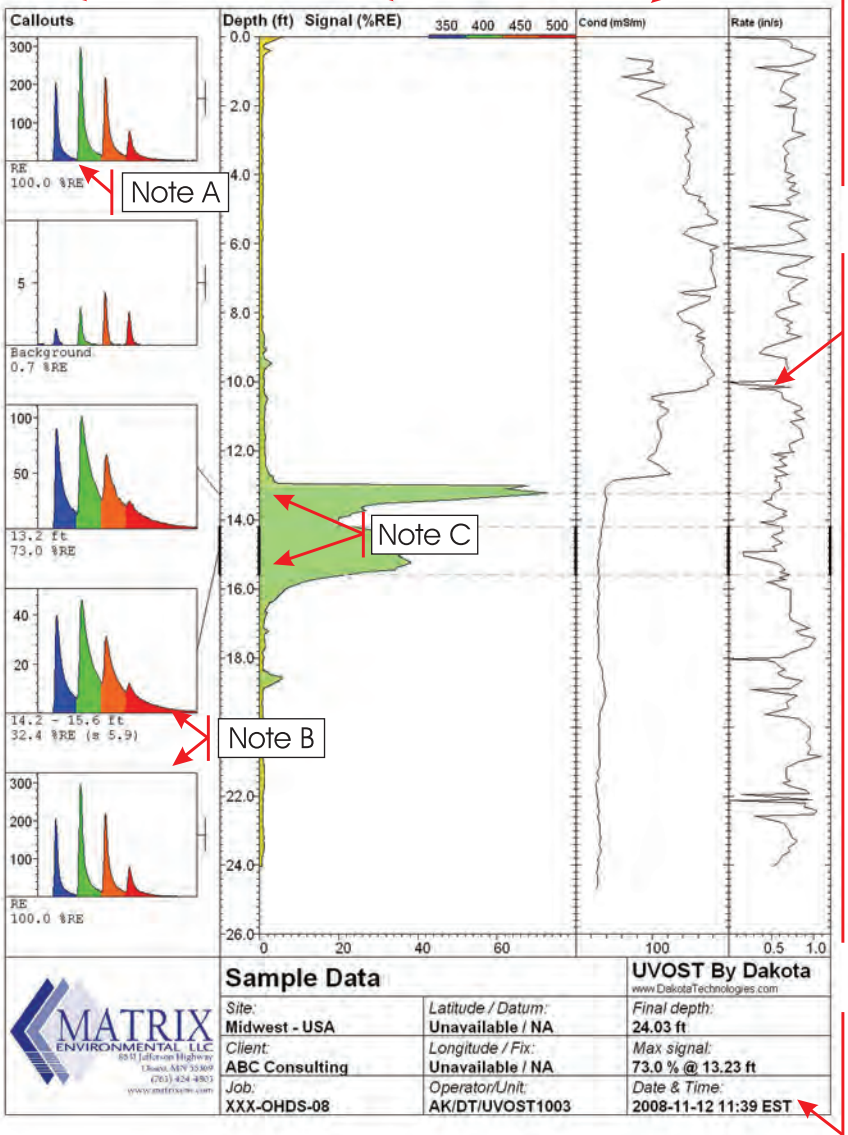
Main Plot :
Signal (total fluorescence) versus depth where signal is relative to the Reference Emitter (RE).The total area of the waveform is divided by the total area of the Reference Emitter yielding the %RE.This %RE scales with the NAPL fluorescence. The fill color is based on relative contribution of each channel's area to the total waveform area (see callout waveform).The channel-to-color relationship and corresponding wavelengths are given in the upper right corner of the main plot.

Callouts :
Waveforms from selected depths or depth ranges showing the multi-wavelength waveform for that depth.

The four peaks are due to fluorescence at four wavelengths and referred to as “channels”. Each channel is assigned a color.

Various NAPLs will have a unique waveform “fingerprint” due to the relative amplitude of the four channels and/or broadening of one or more channels.

Basic waveform statistics and any operator notes are given below the callout.



Conductivity Plot :
The Electrical Conductivity (EC) of the soil can be logged simultaneously with the UVOSTdata. EC often provides insight into the stratigraphy.
Note the drop in EC from 10 - 13 ft, indicating a shift from consolidated to unconsolidated stratigraphy.This correlates with the observed NAPL distribution.

Rate Plot :
The rate of probe advancement. ~ 0.8 in (2cm) per second is preferred.

A noticeable decrease in the rate of advancement may be indicative of difficult probing conditions (gravel, angular sands, etc.).

Notice that this log was terminated arbitrarily, not due to "refusal", which would have been indicated by a sudden rate drop at final depth.

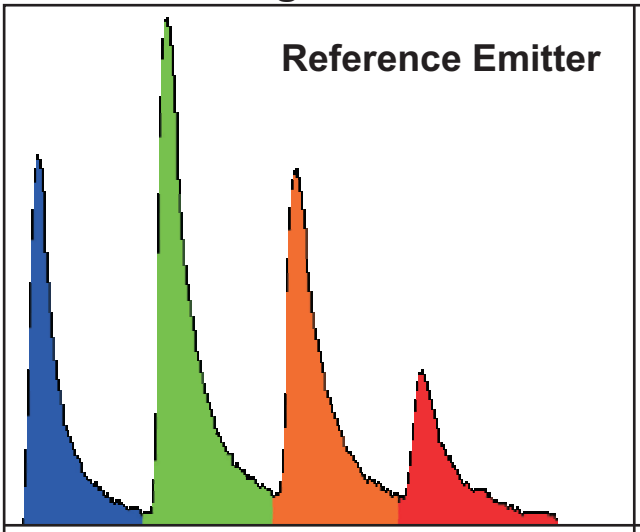
Info Box :
Contains pertinent log info including name and location.

NoteA:
Time is along the x axis. No scale is given, but it is a consistent 320ns wide.
The y axis is in mV and directly corresponds to the amount of light striking the photodetector.

Note B :
These two waveforms are clearly different.The first is weathered diesel from the log itself while the second is the Reference Emitter (a blend of NAPLs) always taken before each log for calibration.

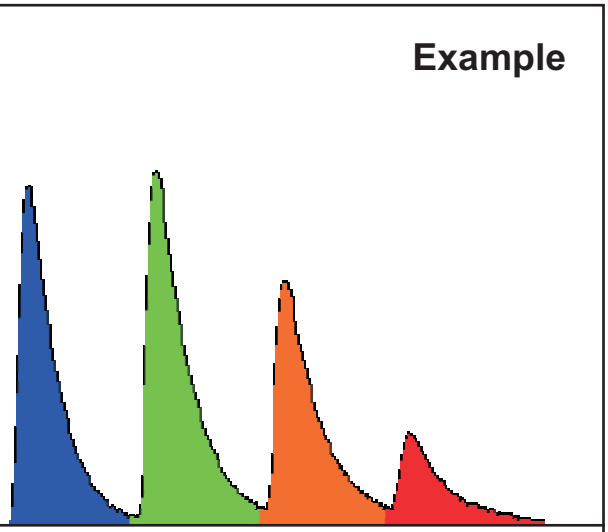
Note C :
Callouts can be a single depth (see 3rd callout) or a range (see 4th callout).The range is noted on the depth axis by a bold line. When the callout is a range, the average and standard deviation in %RE is given below the callout.

Waveform Signal Calculation



CH1		CH2		CH3		CH4		Total
4820	+	8108	+	6249	+	2984	=	**22161**
21.7		36.6		28.2		13.5		**100%**

Channel Area (pVs) Percent RE

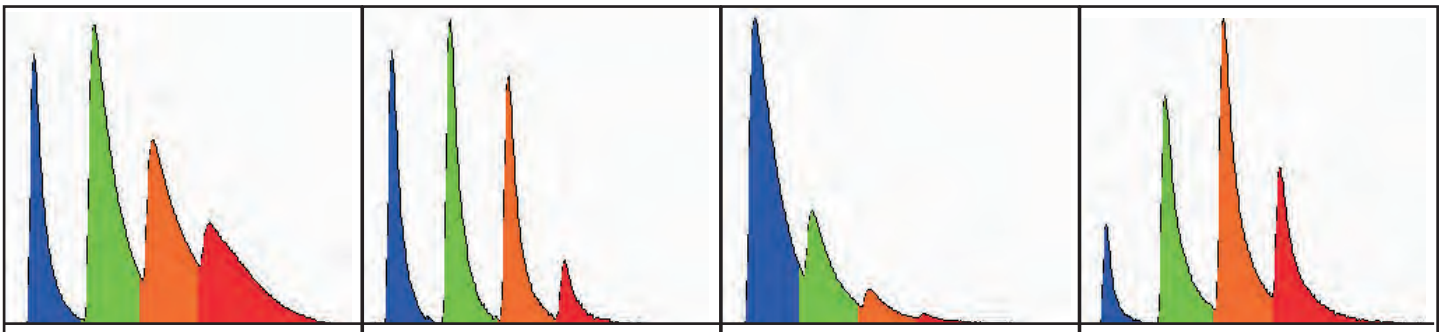


CH1		CH2		CH3		CH4		Total
4923	+	5743	+	4166	+	1735	=	**16587**
22.3		25.9		18.8		7.8		**75%**

Data Files

***.lif.raw.bin**	Raw data file. Header is ASCII format and contains information stored when the file was initially written (e.g. date, total depth, max signal, gps, etc., and any information entered by the operator). All raw waveforms are appended to the bottom of the file in a binary format.
***.lif.plt**	Stores the plot scheme history (e.g. callout depths) for associated Raw file. Transfer along with the Raw file in order to recall previous plots.
***.lif.jpg**	A jpg image of the OST log including the main signal vs. depth plot, callouts, information, etc.
***.lif.dat.txt**	Data export of a single Raw file. ASCII tab delimited format. No string header is provided for the columns (to make importing into other programs easier). Each row is a unique depth reading. The columns are: Depth, Total Signal (%RE), Ch1%, Ch2%, Ch3%, Ch4%, Rate, Conductivity Depth, Conductivity Signal. Summing channels 1 to 4 yields the Total Signal.
***.lif.sum.txt**	A summary file for a number of Raw files. ASCII tab delimited format. The file contains a string header. The summary includes one row for each Raw file and contains information for each file including: the file name, gps coordinates, max depth, max signal, and depth at which the max signal occured.
***.lif.log.txt**	An activity log generated automatically located in the OST application directory in the 'log' subfolder. Each OST unit the computer operates will generate a separate log file per month. A log file contains much of the header information contained within each separate Raw file, including: date, total depth, max signal, etc.

Common Waveforms (highly dependent on soil, weathering, etc.)



Diesel	Gas	Kerosene	Motor Oil

MATRIX ENVIRONMENTAL LLC

PO Box 364
Galena, OH 43021
(740) 965-8271
fax (740) 965-8037

Client: CRA
Contact: Matthew Davis
Services: UVOST Logging

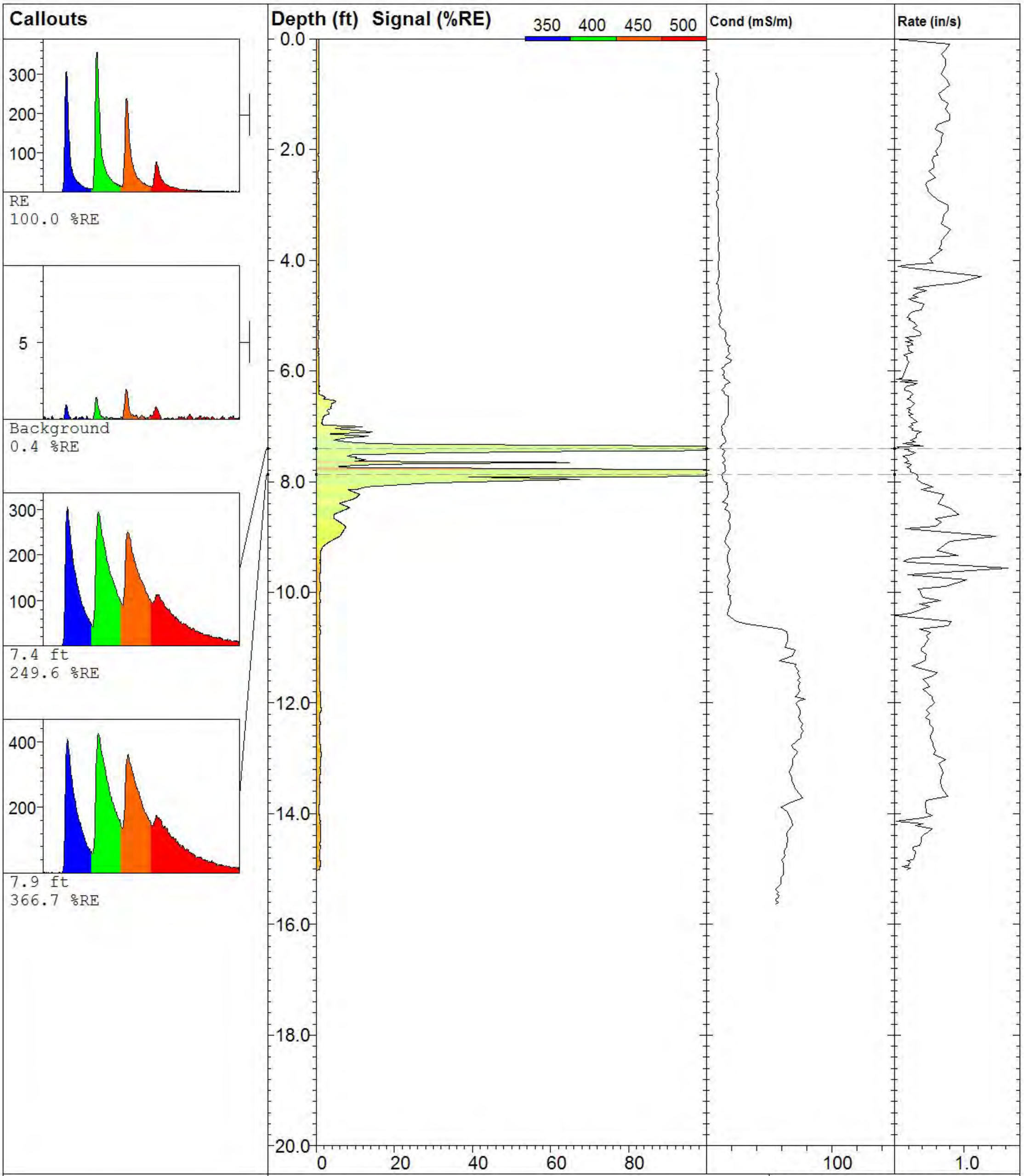
Date: 9/12-9/15/2011
Project: Conoco Phillips Renton Terminal
Project #: 120-OHDS-11
Address: Renton, WA

UVOST Log Summary

File	Date/Time	Final Depth *(ft)*	Max Signal *(%RE)*	Max. Signal Depth *(ft)*	Initial RE Area *(pVs)*	Background Area *(pVs)*	Fluorescence Top-Bottom *(ft)*
G-18	9/12/2011 17:09	15.02	401.5	7.8	11565.7	50.7	6.6-9.0
G-19	9/13/2011 12:14	15.00	129.0	7.6	11778.8	66.9	7.2-8.0
G-20	9/12/2011 16:42	20.01	277.5	6.4	11196.8	44.7	6.0-8.3
G-21	9/15/2011 18:35	20.00	4.8	0.0	11076.4	52.6	NA
G-22	9/12/2011 14:38	20.01	113.9	7.4	11805.4	92.7	6.2-7.9
G-23	9/12/2011 15:15	20.01	270.3	7.6	11165.0	36.4	4.9-5.1, 5.9-8.2, 8.6
G-24	9/12/2011 18:30	19.98	19.0	6.8	11468.0	62.6	6.7-8.4
G-25	9/13/2011 13:28	15.00	429.5	7.8	11256.2	53.5	6.2-8.6
G-26	9/13/2011 19:26	20.01	126.4	5.3	11258.8	40.3	5.0-7.3, 7.5
G-27	9/14/2011 16:46	20.00	195.5	7.3	11540.8	48.3	4.3-10.0
G-28	9/14/2011 17:40	19.99	237.5	7.1	11410.0	66.4	5.2-7.9, 8.3-9.1
G-29	9/14/2011 15:49	20.01	22.0	10.1	11261.6	62.7	8.6-10.1
G-30	9/14/2011 13:57	20.03	91.1	5.8	11796.3	51.0	0.7-6.8, 7.8-8.2, 8.8-9.6
G-31	9/14/2011 12:55	19.99	339.5	8.9	11460.8	54.8	6.0-8.4, 8.8-9.6
G-32	9/15/2011 11:21	20.00	142.2	5.8	11023.3	68.2	5.8-8.8, 9.1-9.2, 11.9-13.0
G-33	9/13/2011 18:12	20.00	76.9	12.1	11250.7	52.9	5.5-5.7, 8.1-8.7, 11.0-13.2
G-34	9/13/2011 17:16	20.00	121.9	8.9	11353.7	67.0	4.1-9.5
G-35	9/14/2011 11:27	20.00	198.5	5.1	11600.8	78.2	4.1, 4.4-7.2, 9.0-13.3

G-36	9/14/2011 12:19	21.44	1.9	12.6	11298.1	48.4	NA
G-37	9/14/2011 19:24	20.06	192.1	6.9	11229.2	53.8	5.5-9.0, 9.2, 9.4-9.6
G-38	9/15/2011 14:17	20.01	86.2	11.4	11727.3	52.0	6.2, 6.6-6.8, 6.9-7.4, 10.4-12.5
G-39	9/15/2011 16:22	20.03	192.4	8.1	11196.1	61.2	4.8-5.7, 6.5-9.1
G-40_MW-7	9/15/2011 12:24	20.00	47.8	8.4	11329.1	52.3	5.4-7.2, 7.4-8.7, 10.8-12.1
G-41_MW-8	9/15/2011 13:21	20.02	40.2	11.1	11278.3	54.6	10.9-11.7
G-42_MW-14	9/15/2011 17:24	20.02	234.9	9.9	11372.8	75.4	9.3-13.7

Logs at 100% RE

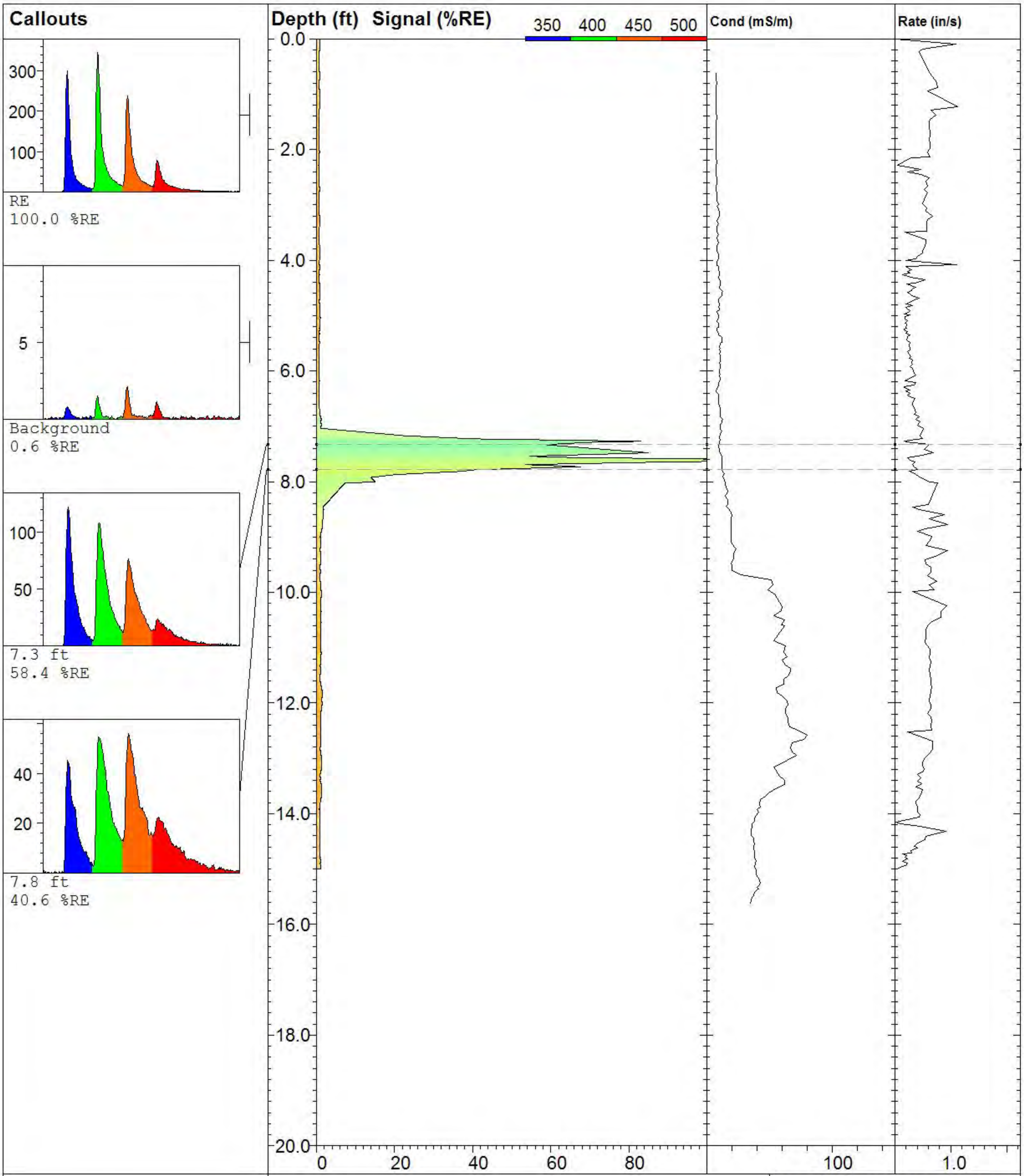


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-18

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **401.5 % @ 7.83 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 17:09 EDT**

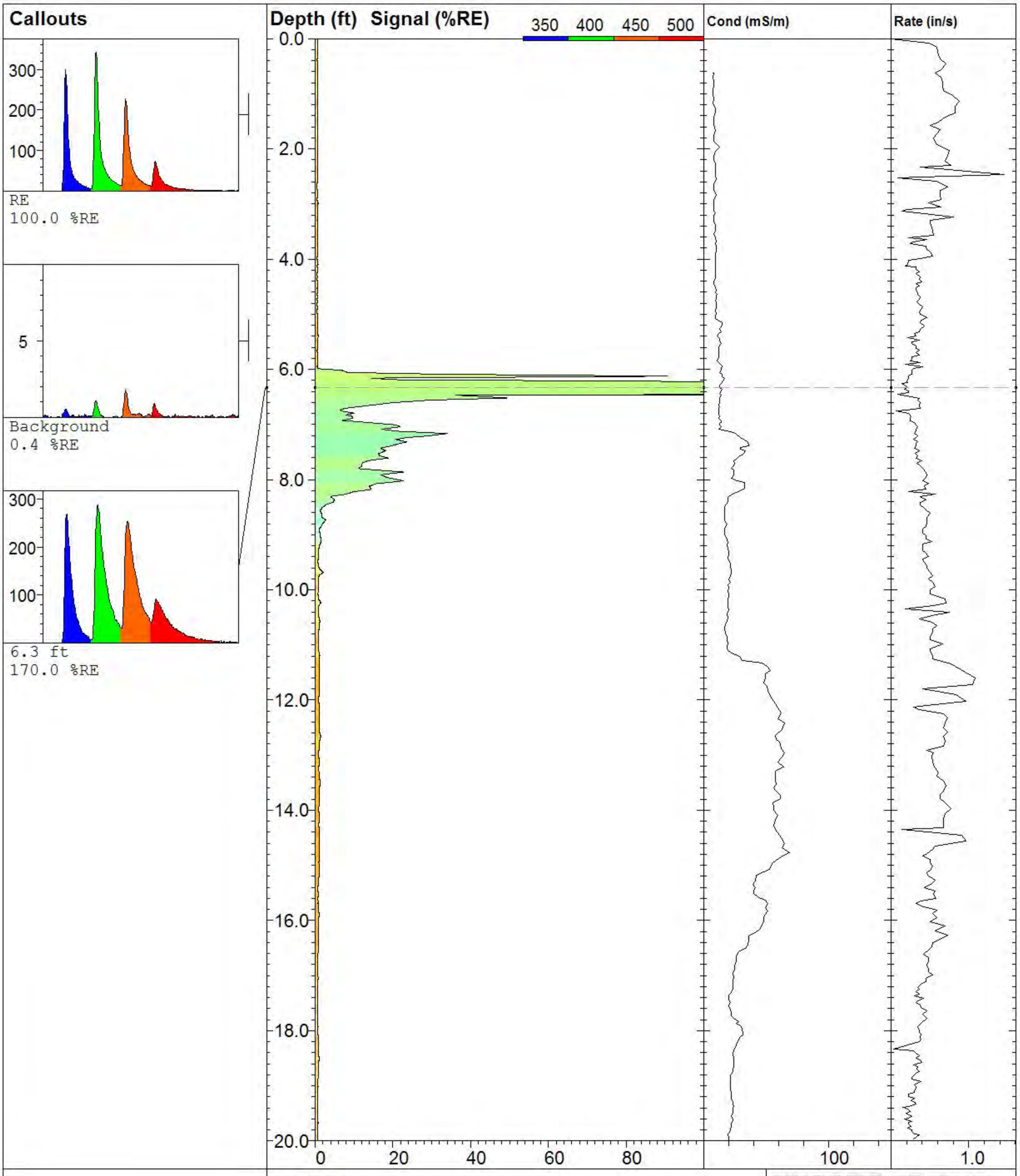


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-19

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **129.0 % @ 7.61 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 12:14 EDT**

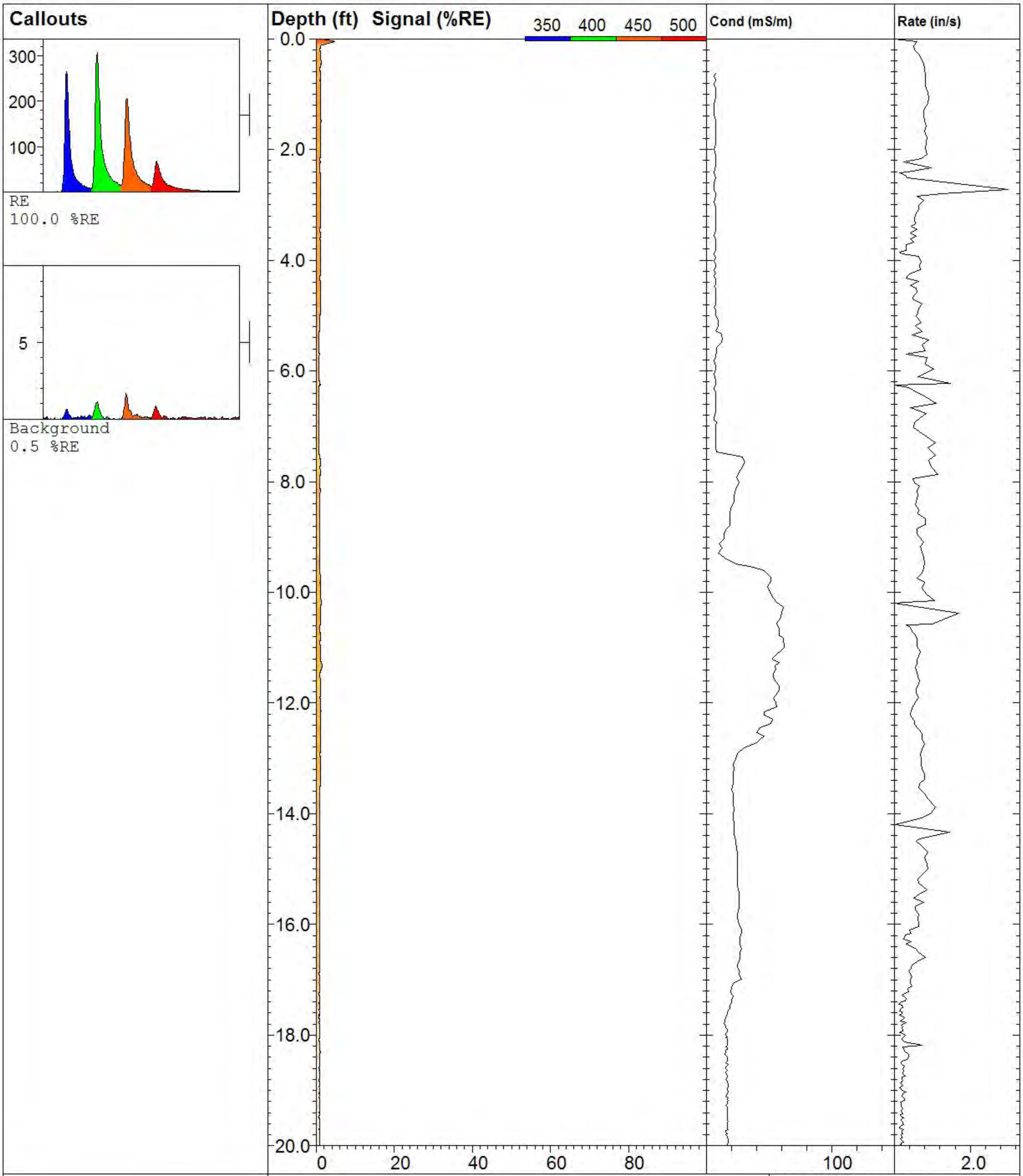


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-20

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **277.5 % @ 6.36 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 16:42 EDT**

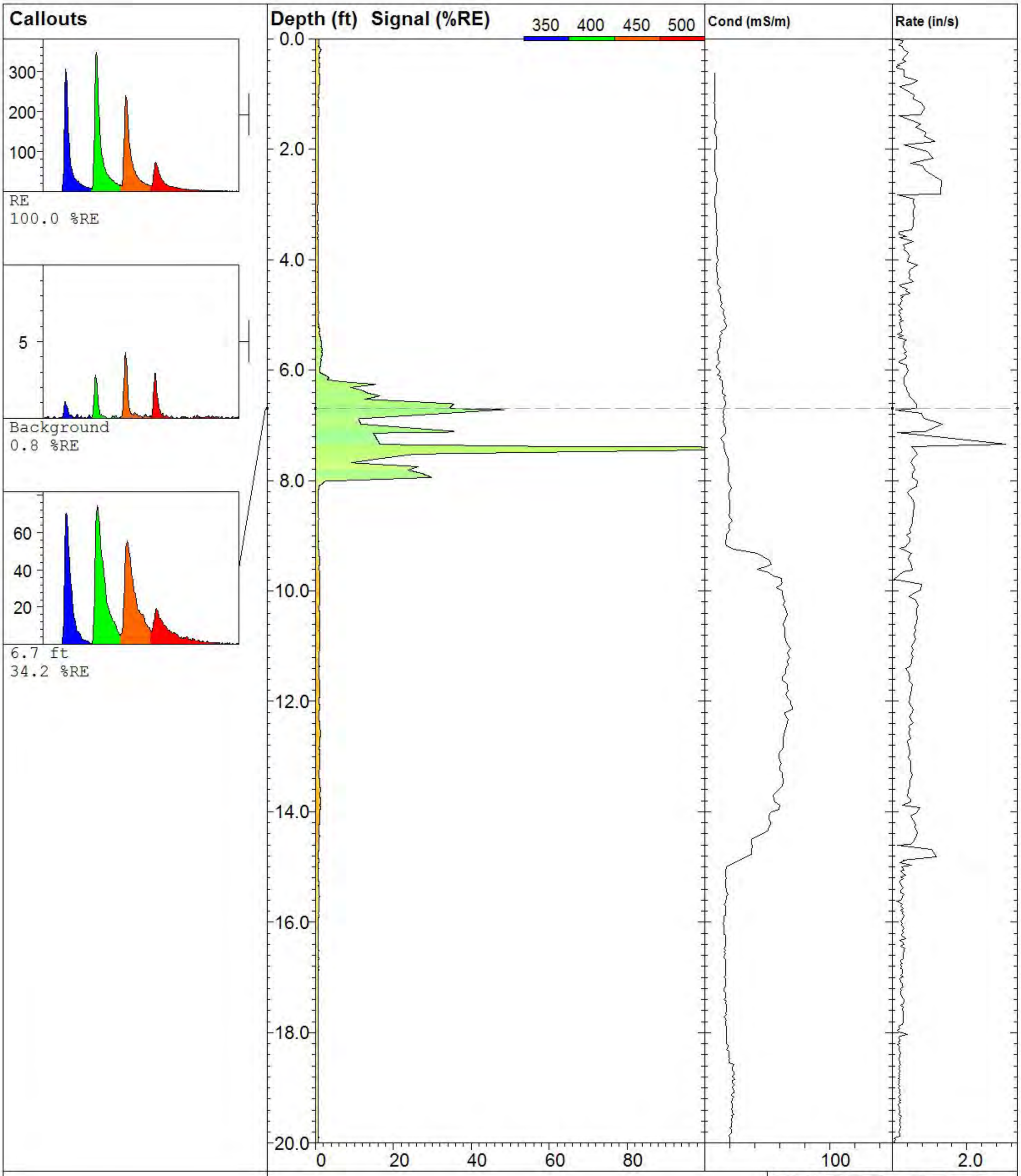


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-21

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **4.8 % @ 0.05 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 18:35 EDT**

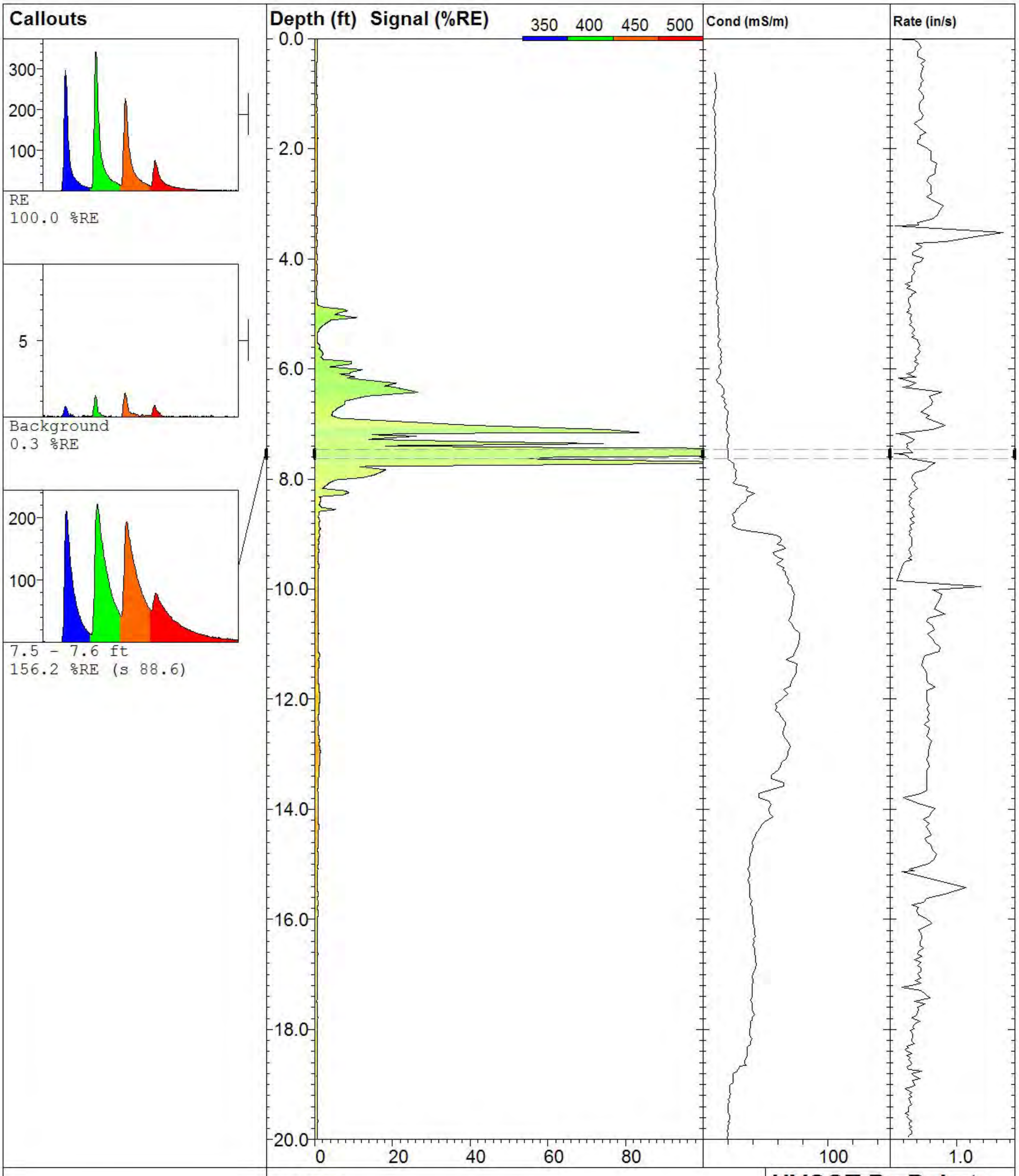


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-22

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **113.9 % @ 7.44 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 14:38 EDT**

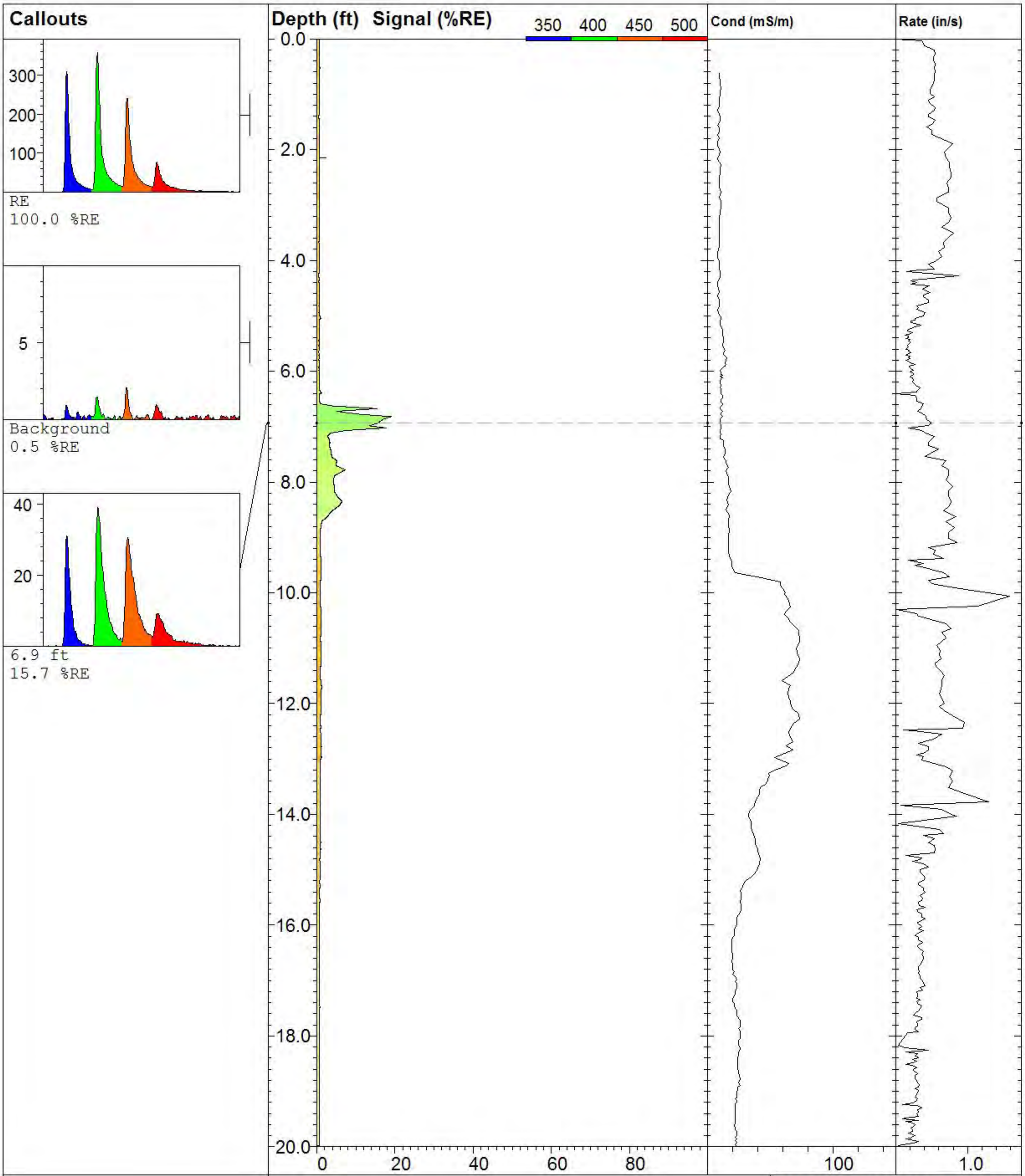


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-23

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **270.3 % @ 7.56 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 15:15 EDT**



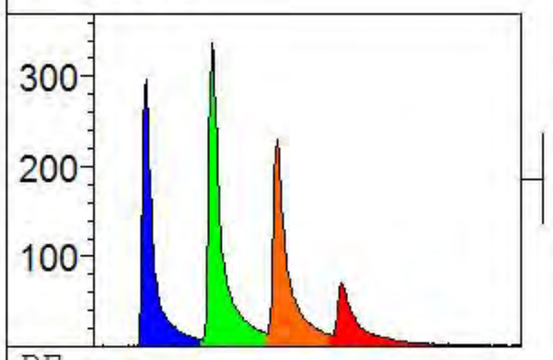
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-24

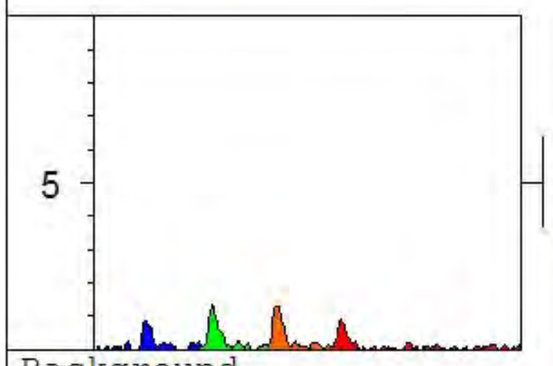
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.98 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **19.0 % @ 6.82 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 18:30 EDT**

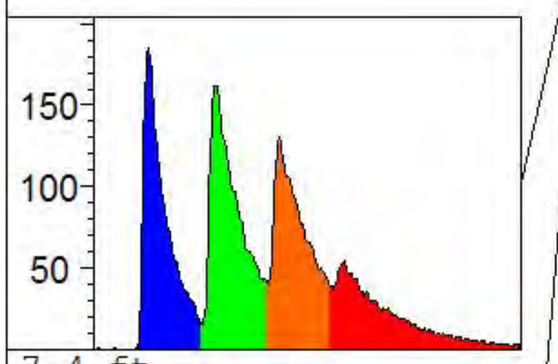
Callouts



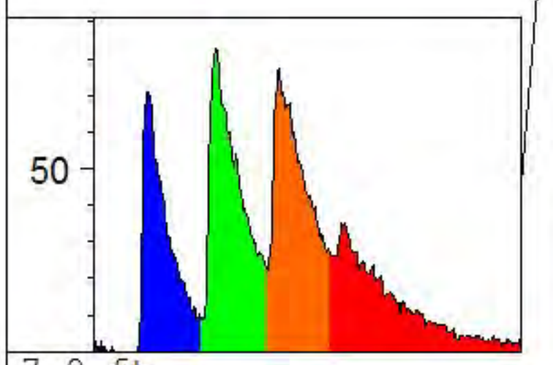
RE
100.0 %RE



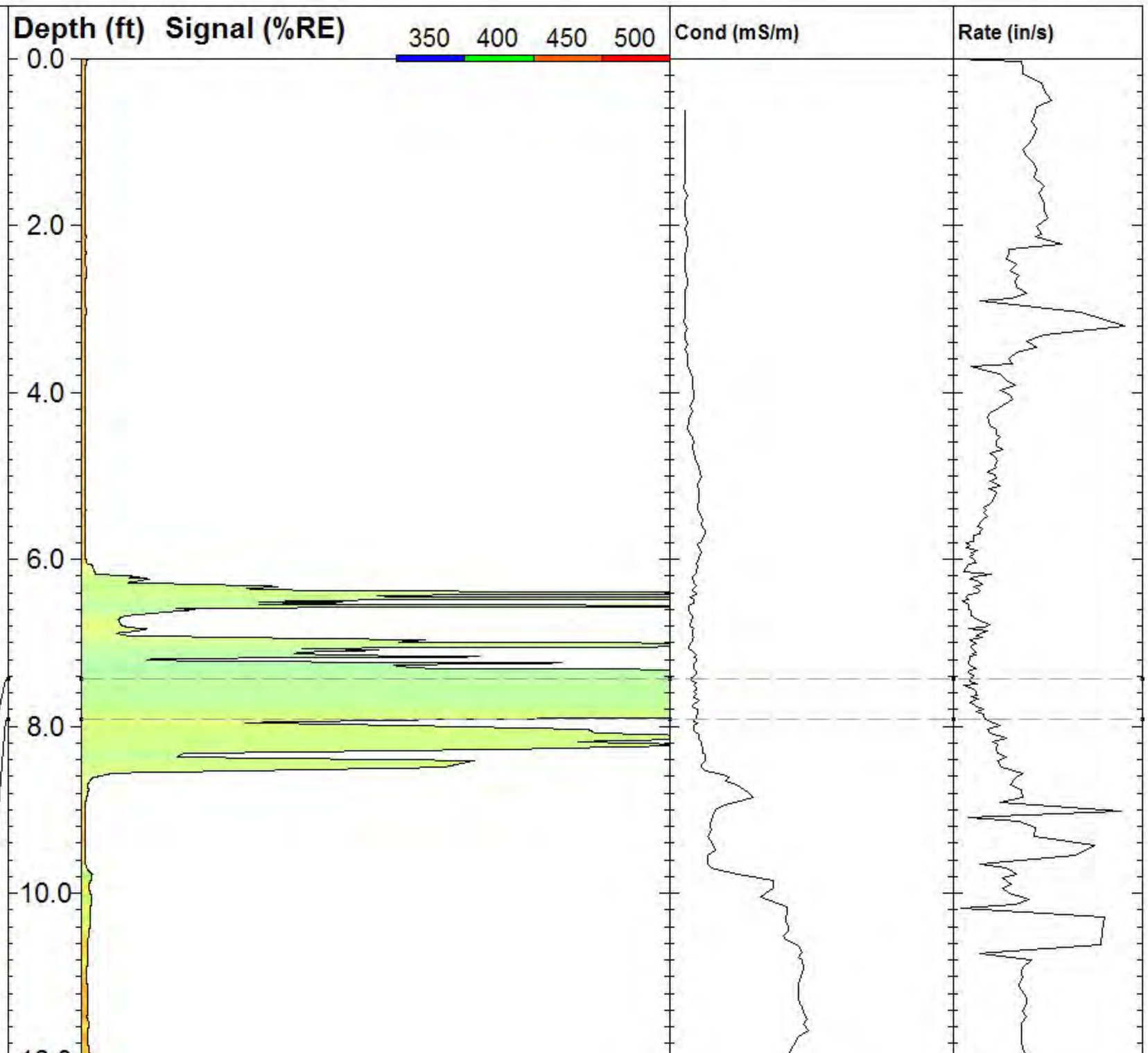
Background
0.5 %RE



7.4 ft
124.9 %RE



7.9 ft
69.1 %RE



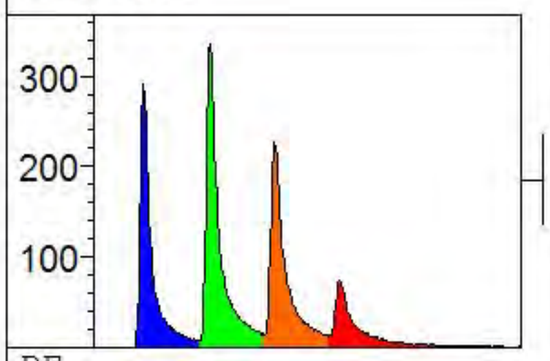
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-25

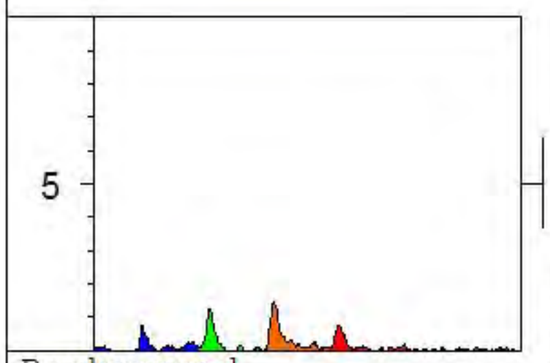
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **429.5 % @ 7.80 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 13:28 EDT**

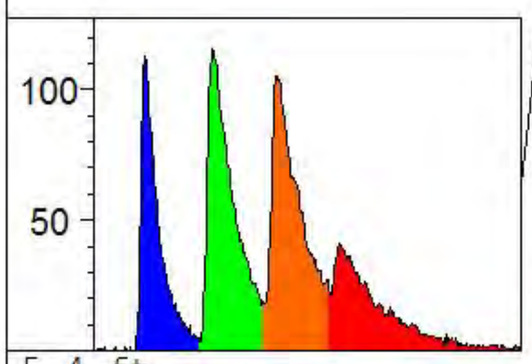
Callouts



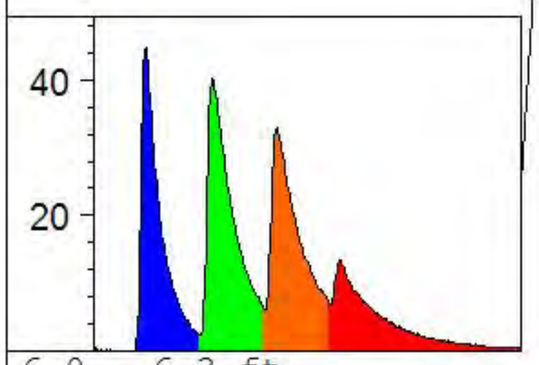
RE
100.0 %RE



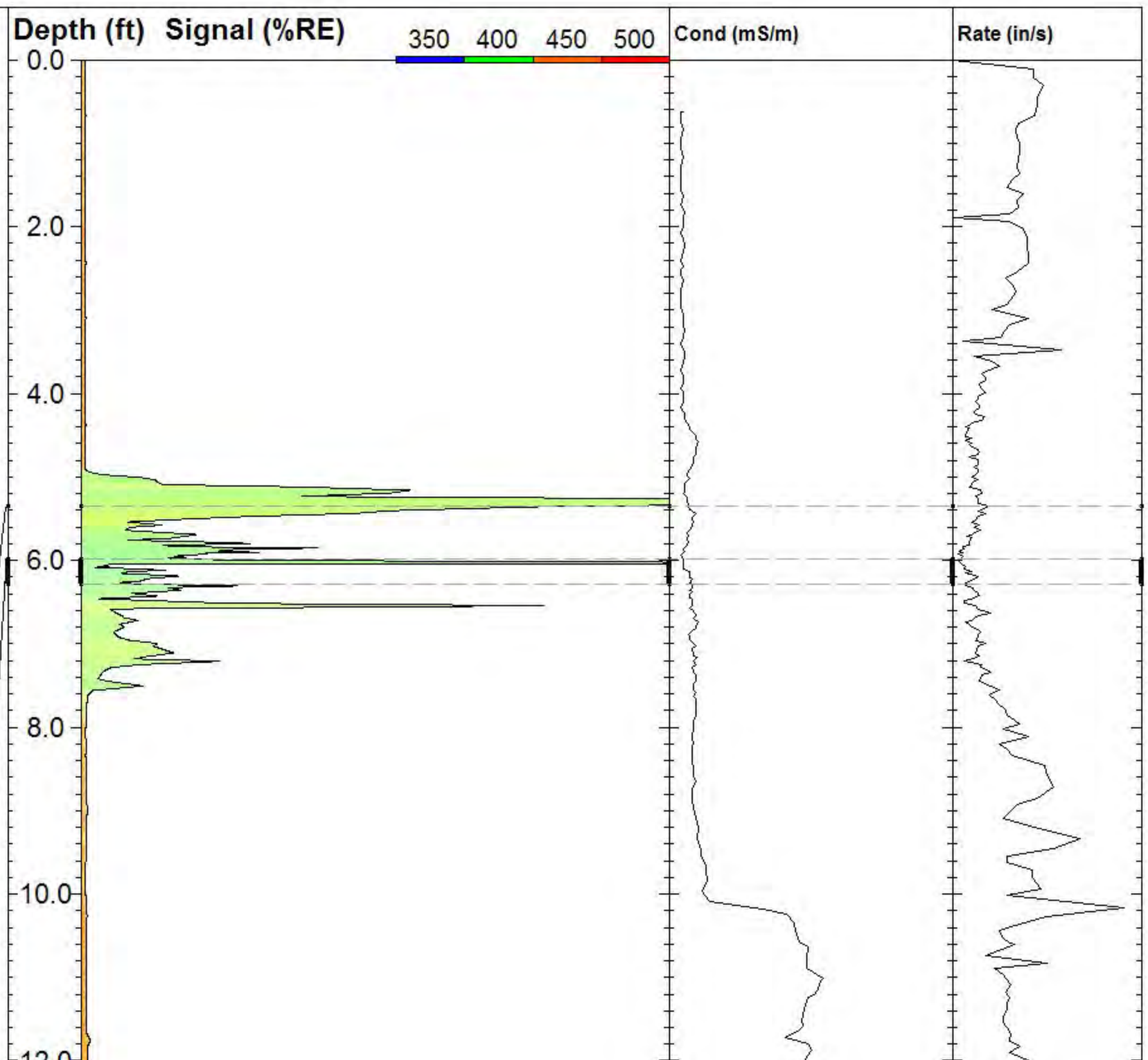
Background
0.4 %RE



5.4 ft
77.4 %RE



6.0 - 6.3 ft
26.7 %RE (s 35.9)

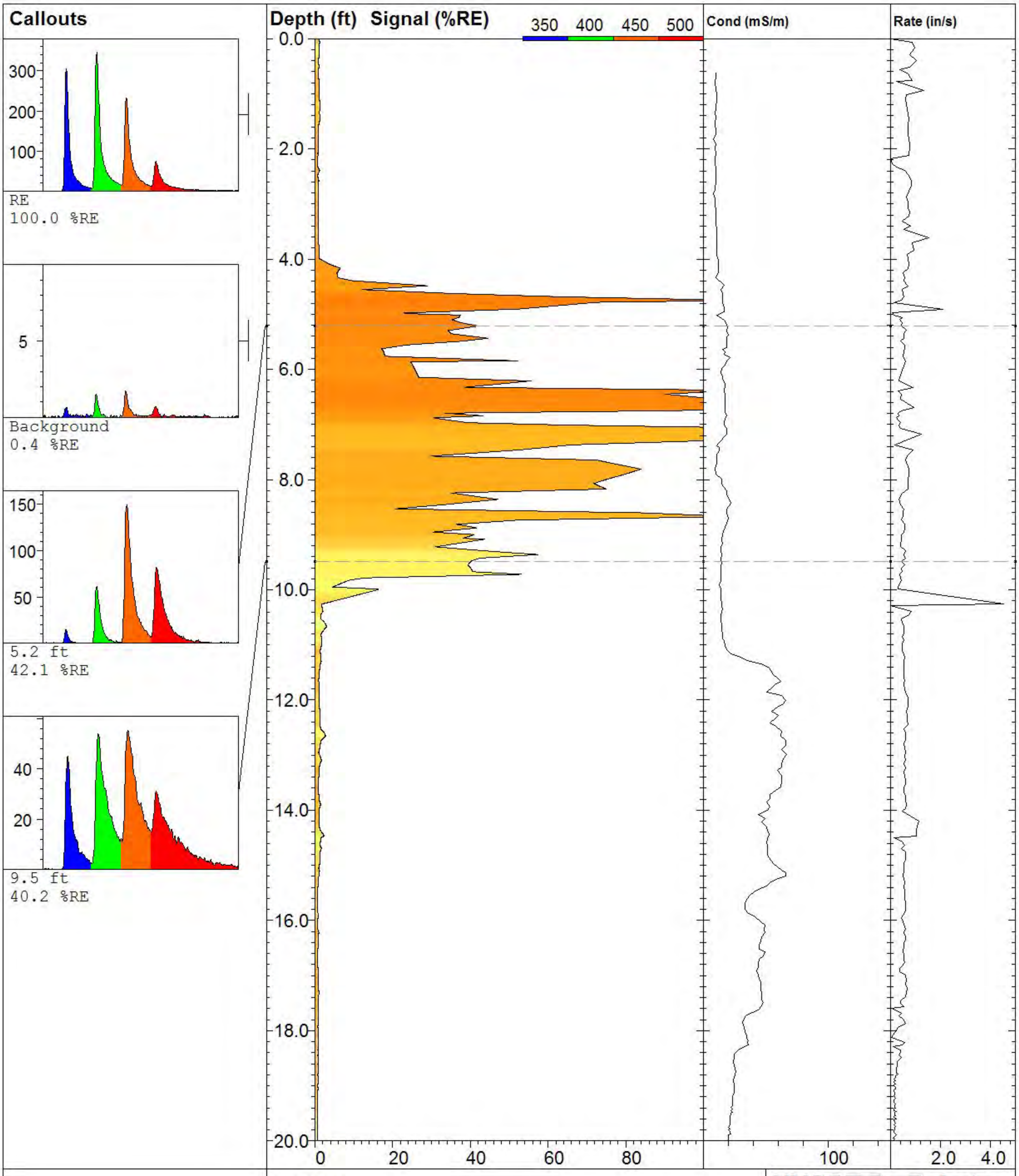


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-26

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **126.4 % @ 5.32 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 19:26 EDT**



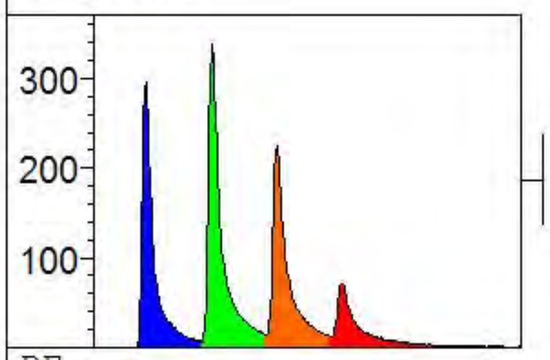
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-27

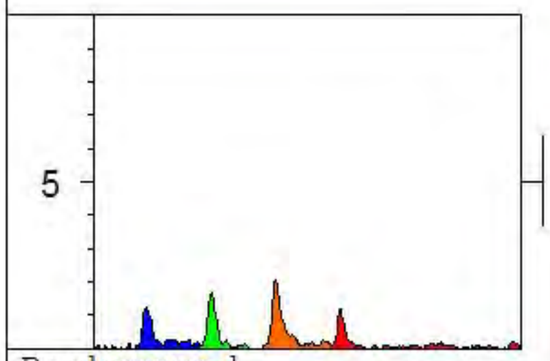
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **195.5 % @ 7.27 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 16:46 EDT**

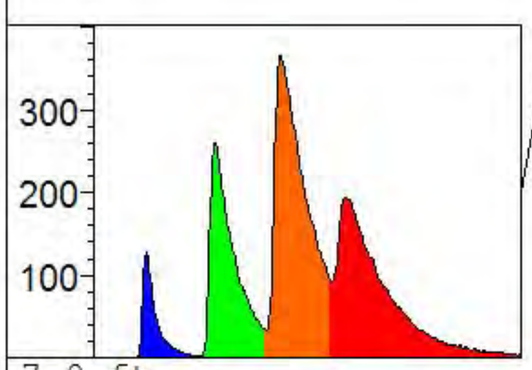
Callouts



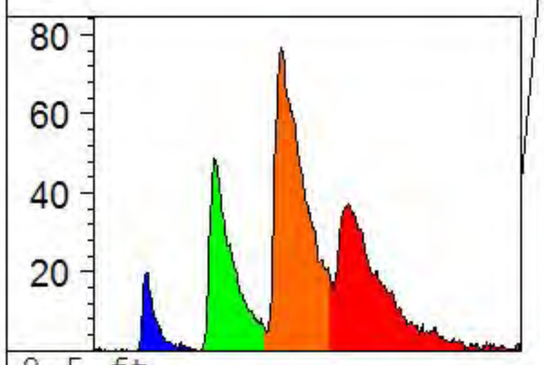
RE
100.0 %RE



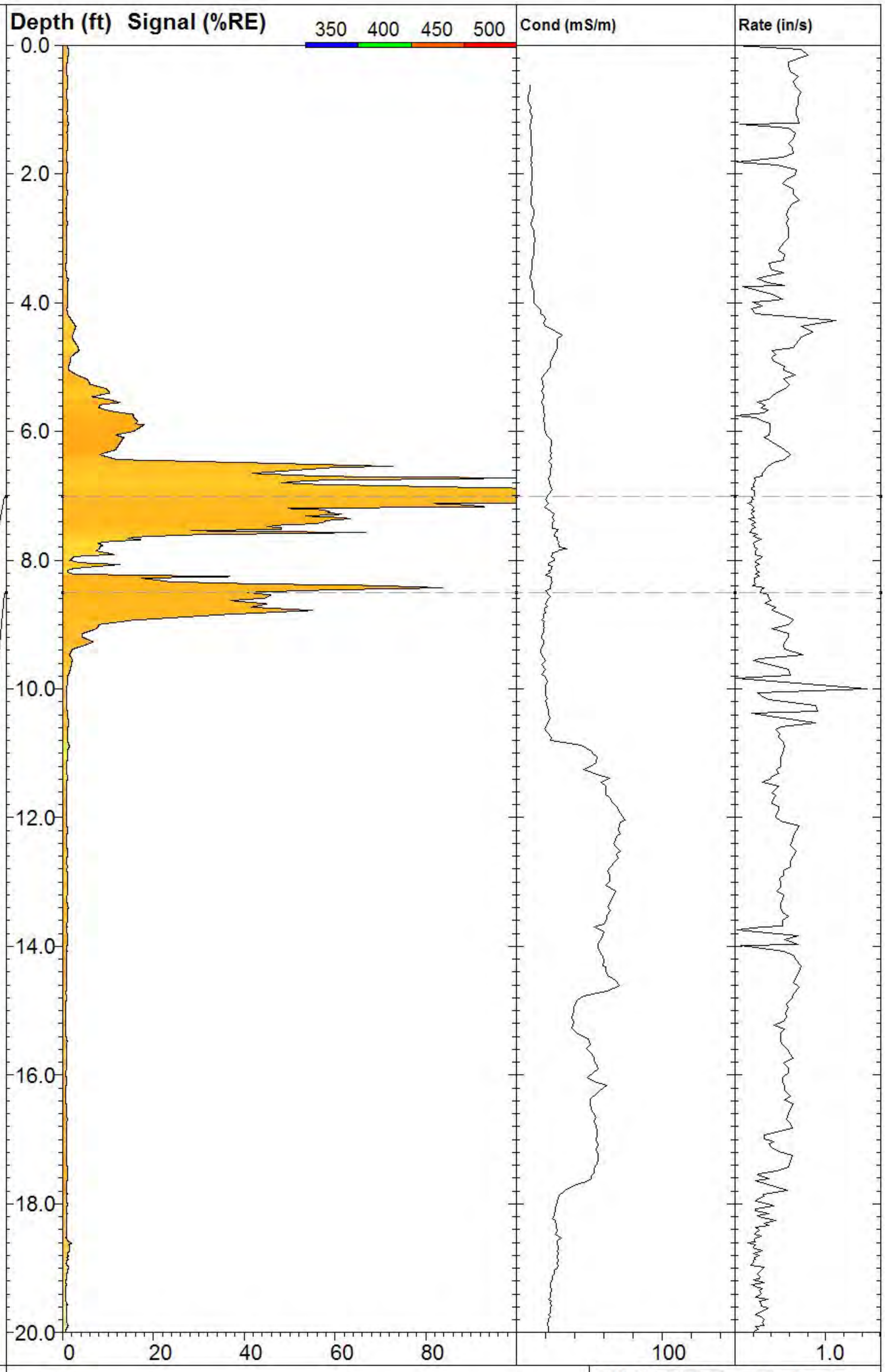
Background
0.6 %RE



7.0 ft
220.1 %RE



8.5 ft
40.6 %RE

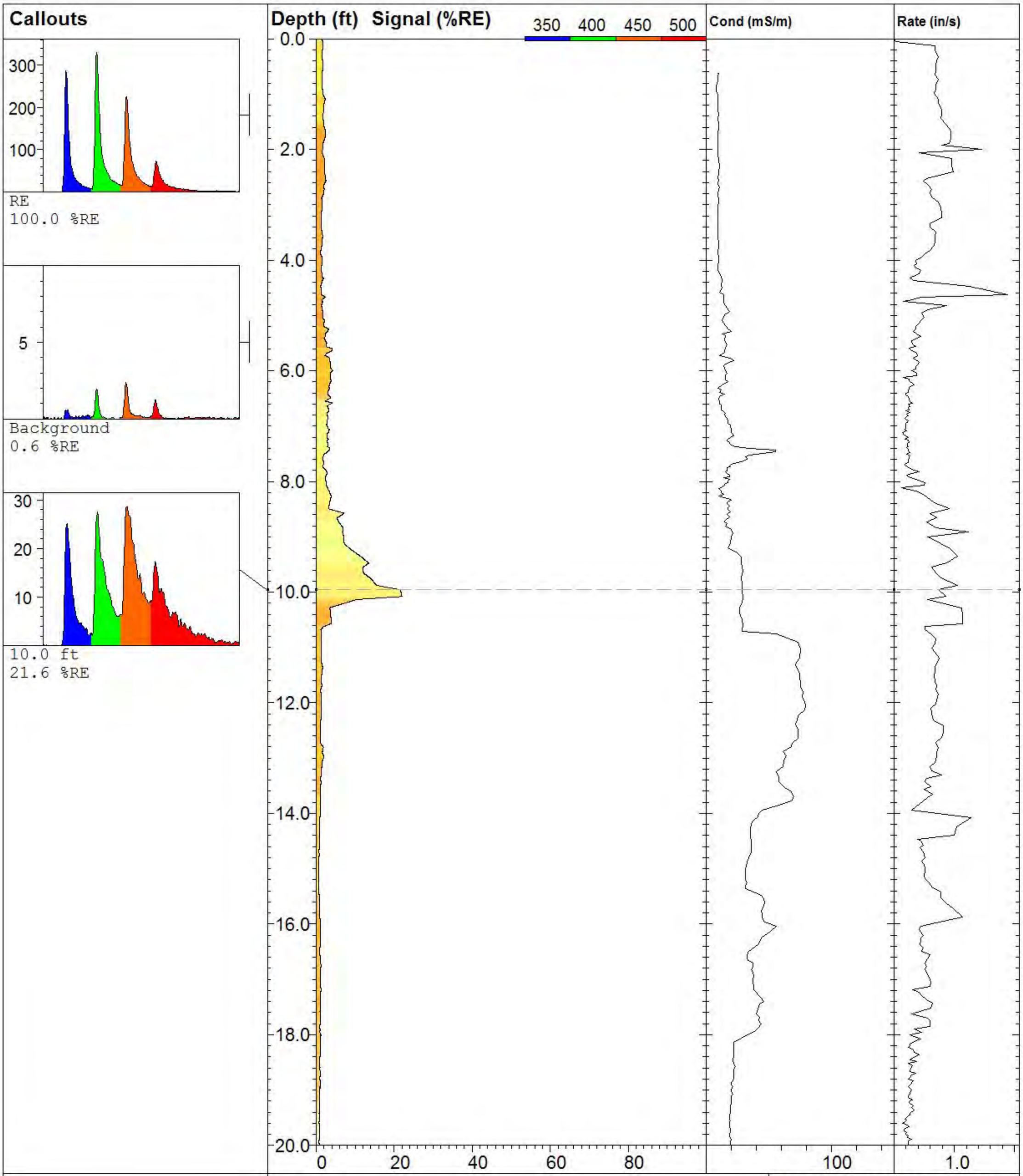


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-28

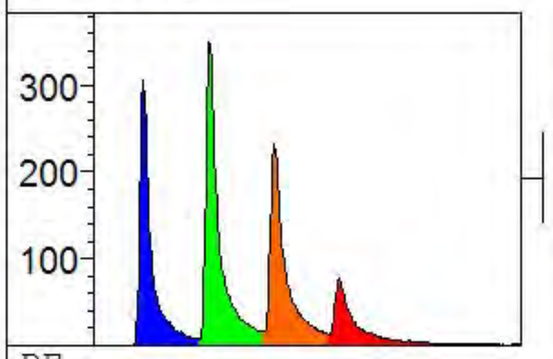
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.99 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **237.5 % @ 7.05 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 17:40 EDT**

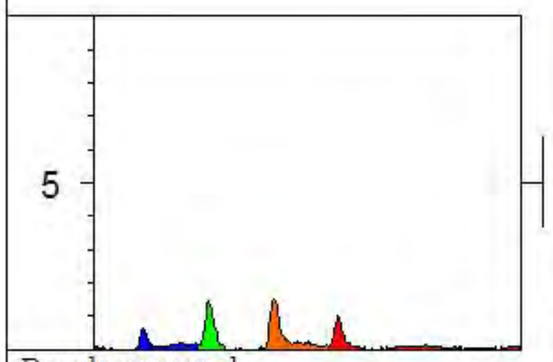


MATRIX ENVIRONMENTAL LLC www.matrixenv.com	**G-29**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
	Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **22.0 % @ 10.08 ft**
	Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 15:49 EDT**

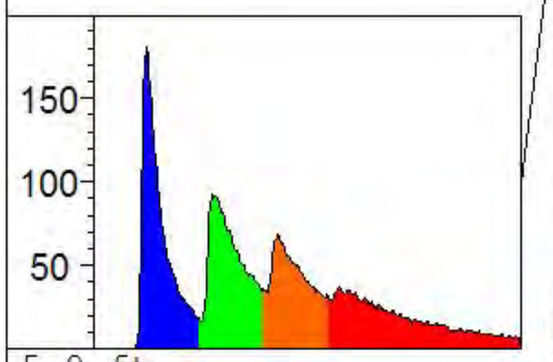
Callouts



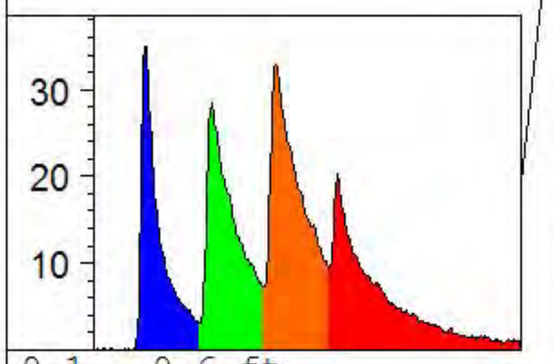
RE
100.0 %RE



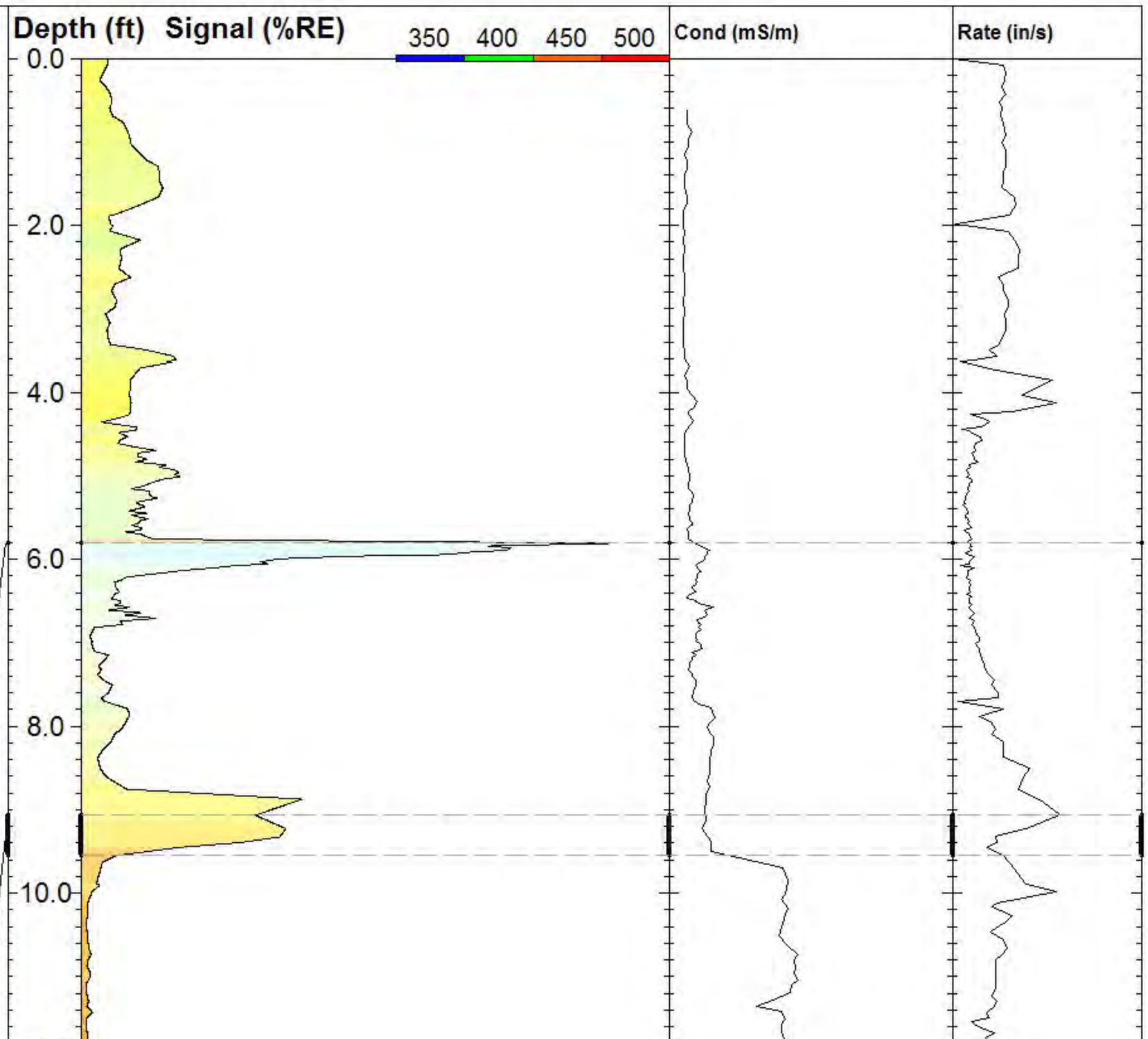
Background
0.4 %RE



5.8 ft
91.1 %RE



9.1 - 9.6 ft
24.6 %RE (s 11.3)

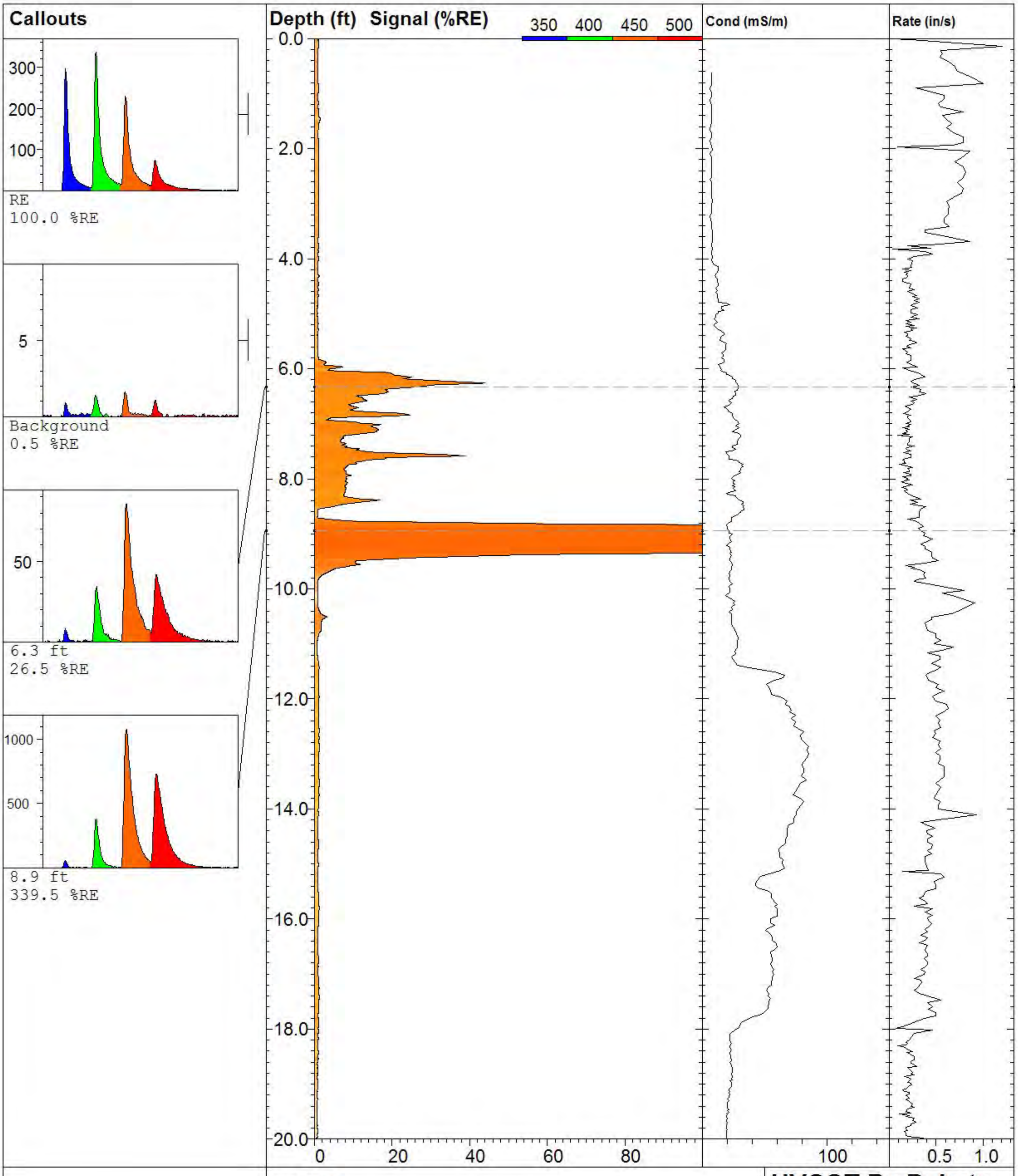


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-30

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.03 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **91.1 % @ 5.81 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 13:57 EDT**



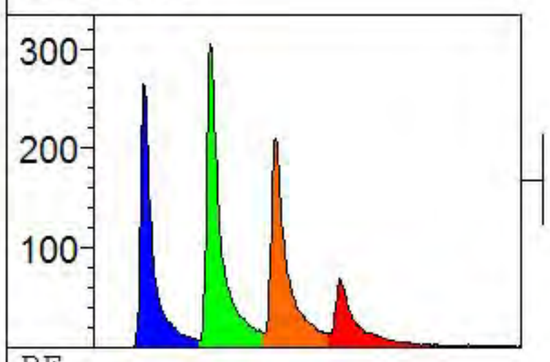
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-31

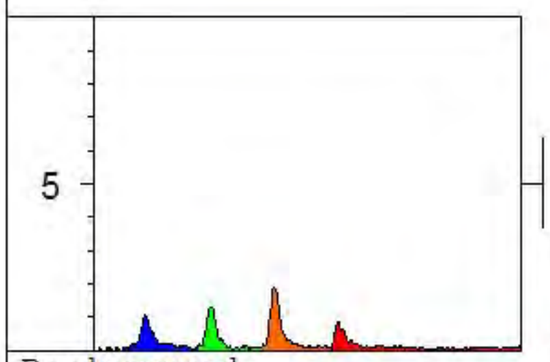
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.99 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **339.5 % @ 8.94 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 12:55 EDT**

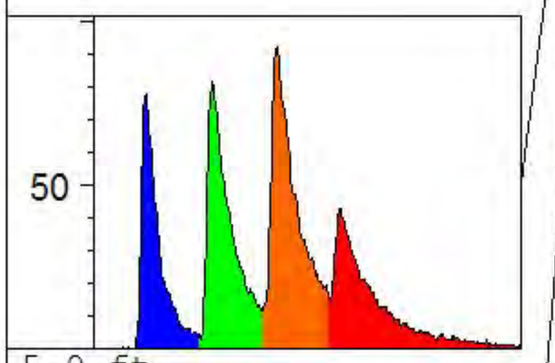
Callouts



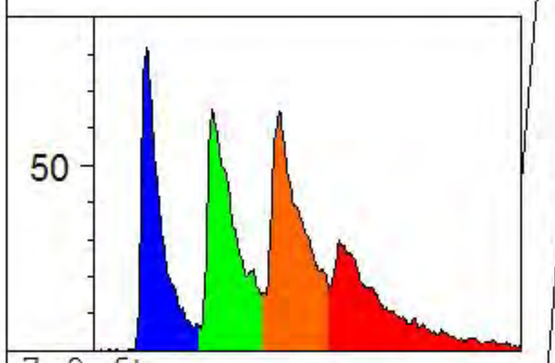
RE
100.0 %RE



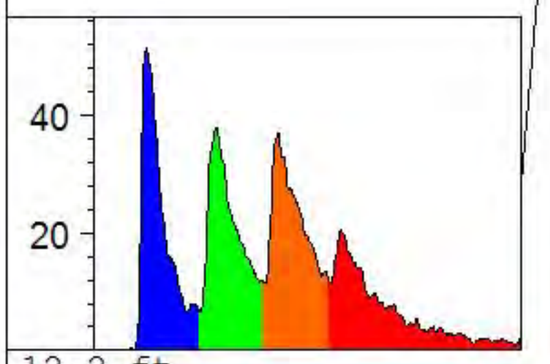
Background
0.6 %RE



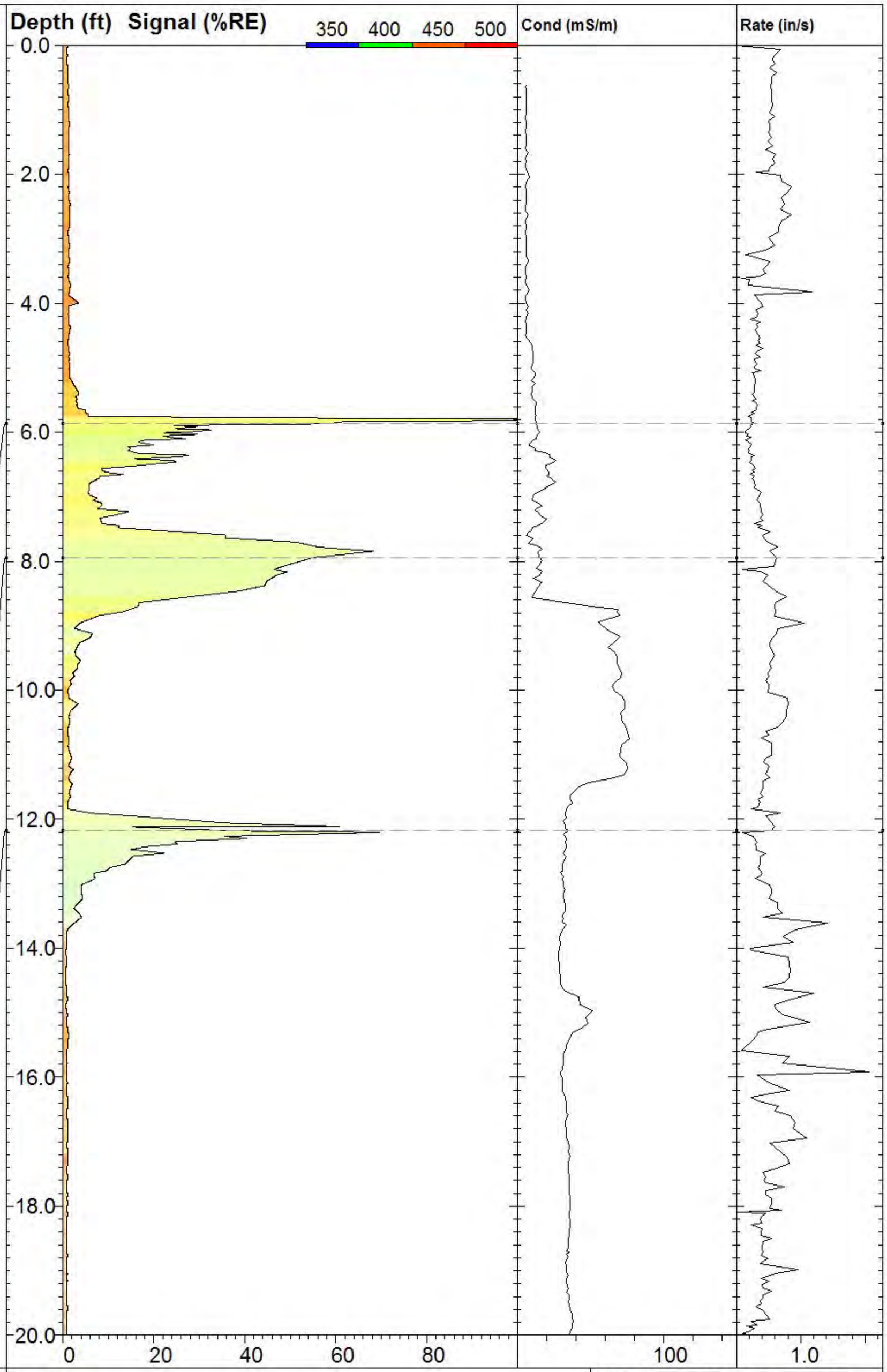
5.9 ft
58.1 %RE



7.9 ft
55.0 %RE



12.2 ft
36.4 %RE

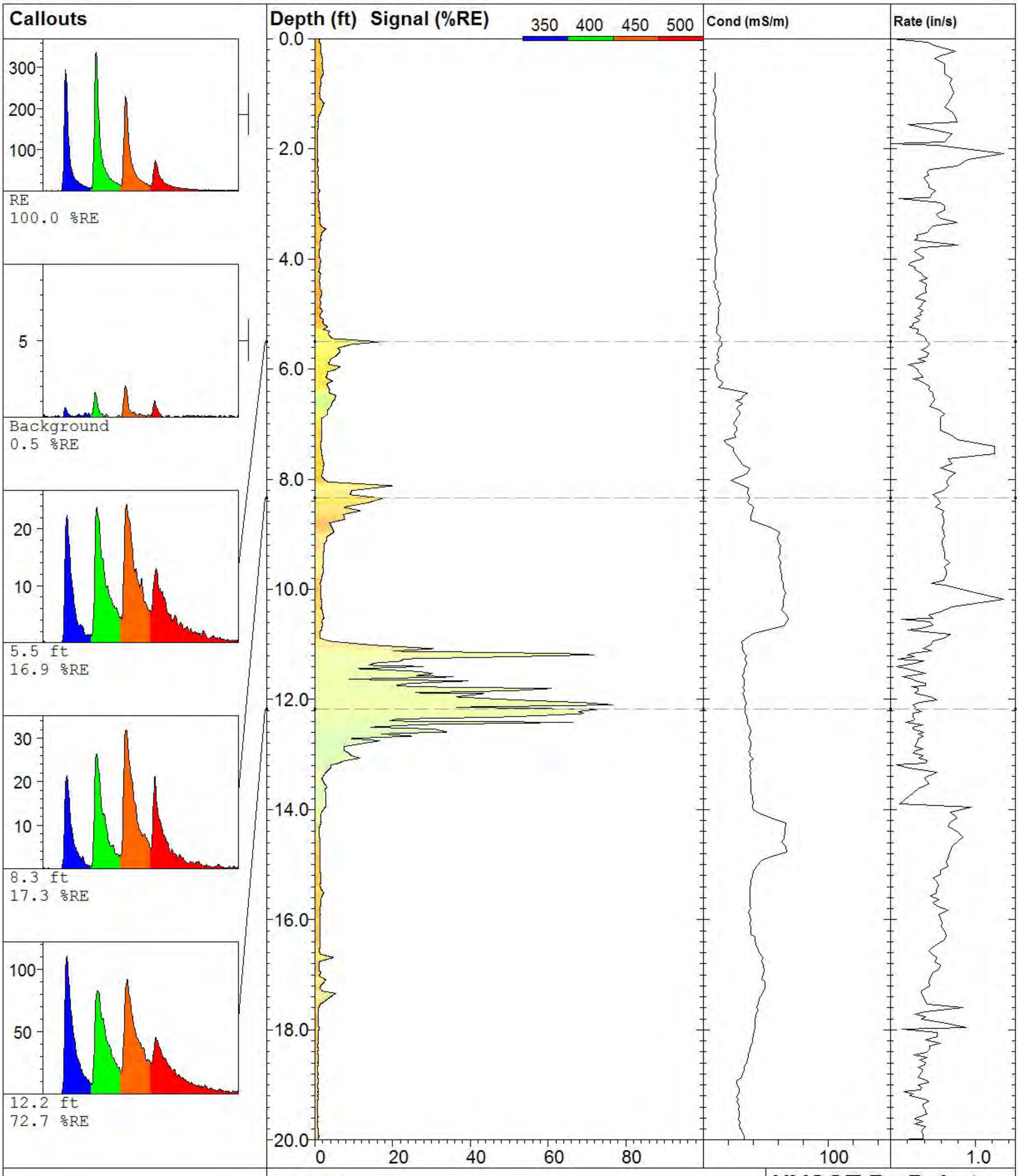


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-32

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **142.2 % @ 5.81 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 11:21 EDT**



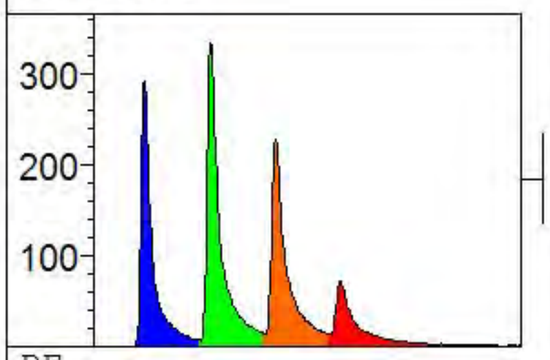
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-33

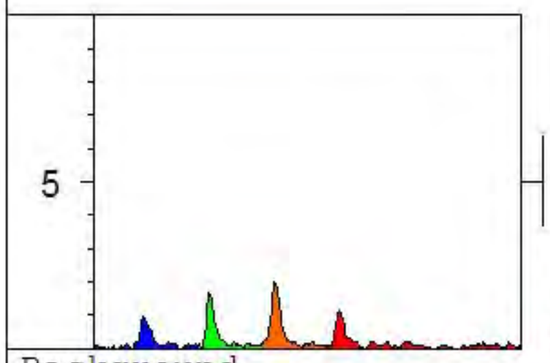
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **76.9 % @ 12.10 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 18:12 EDT**

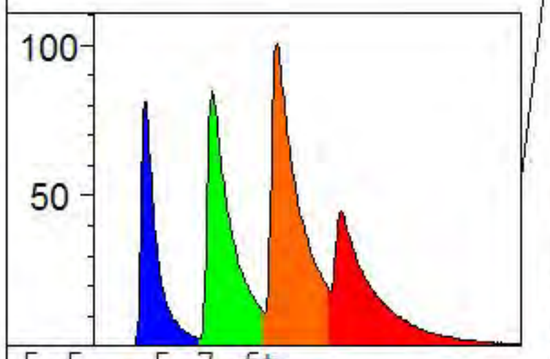
Callouts



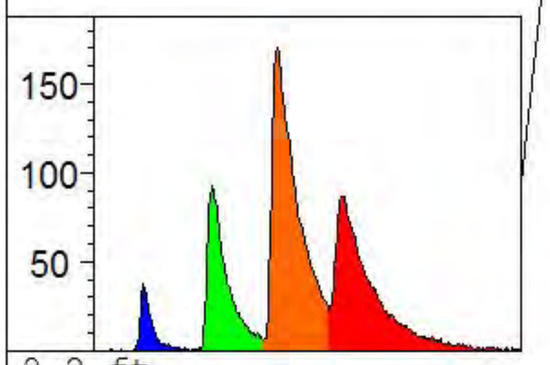
RE
100.0 %RE



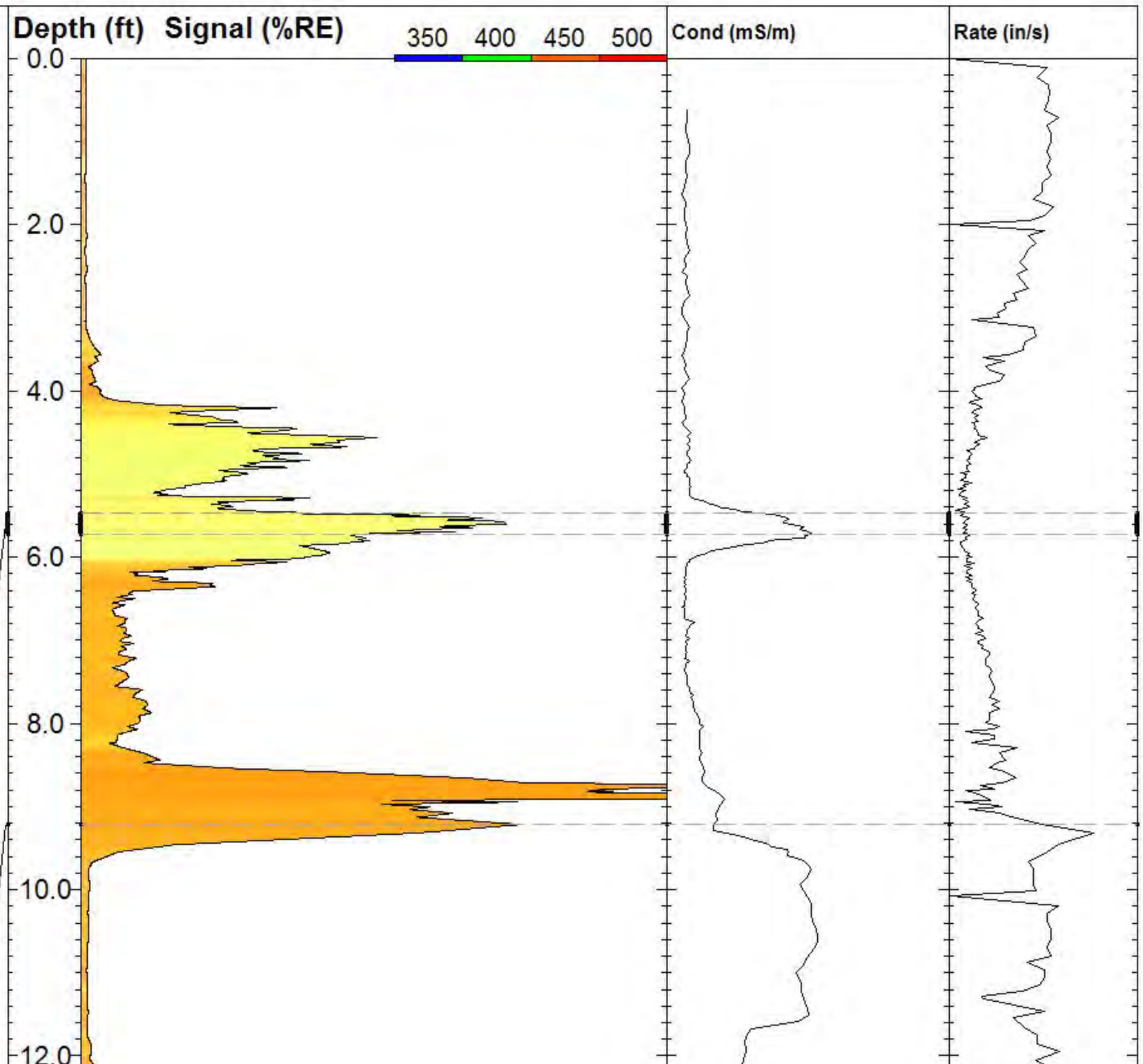
Background
0.6 %RE



5.5 - 5.7 ft
59.4 %RE (s 10.6)



9.2 ft
75.2 %RE

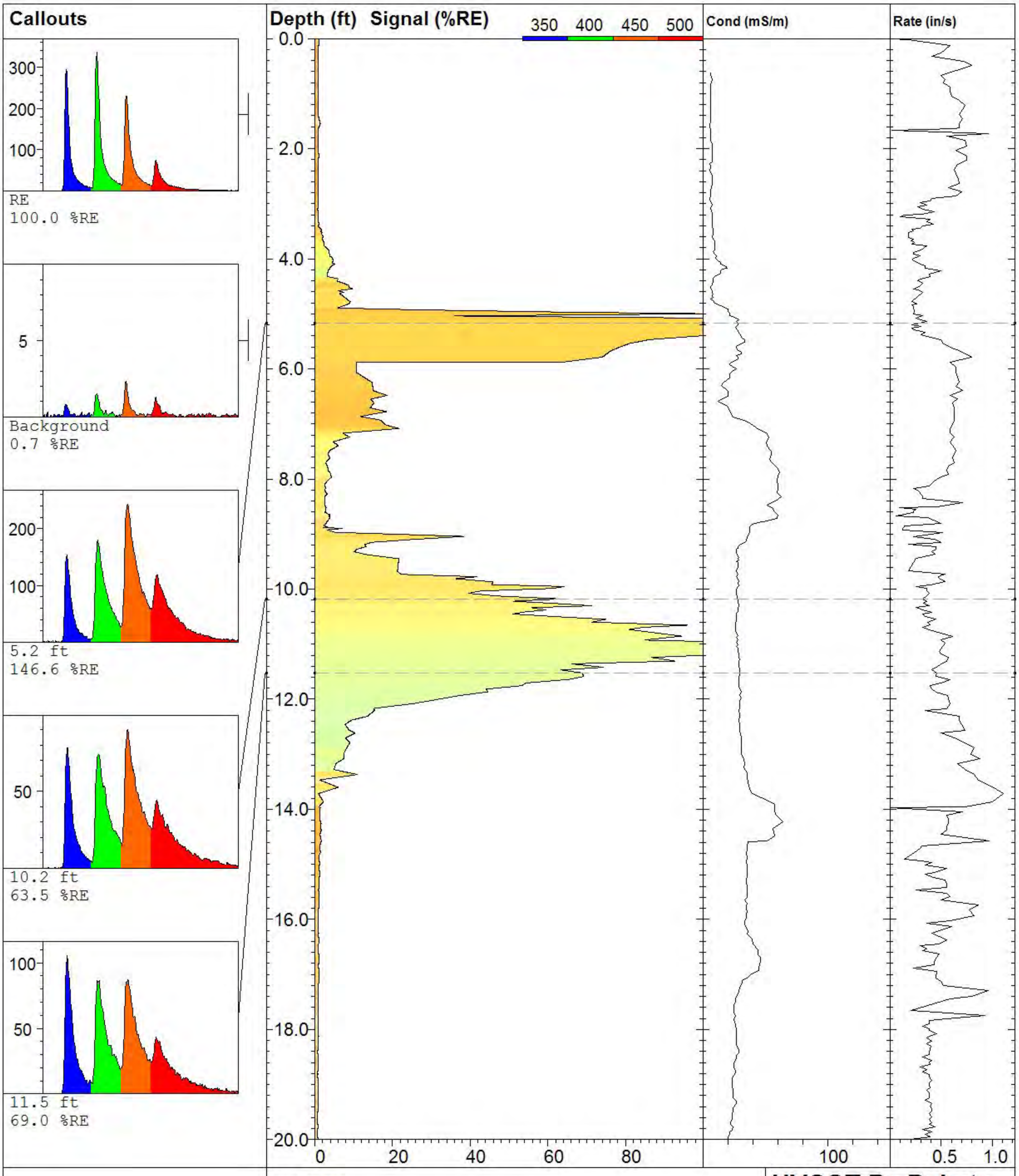


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-34

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **121.9 % @ 8.90 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 17:16 EDT**

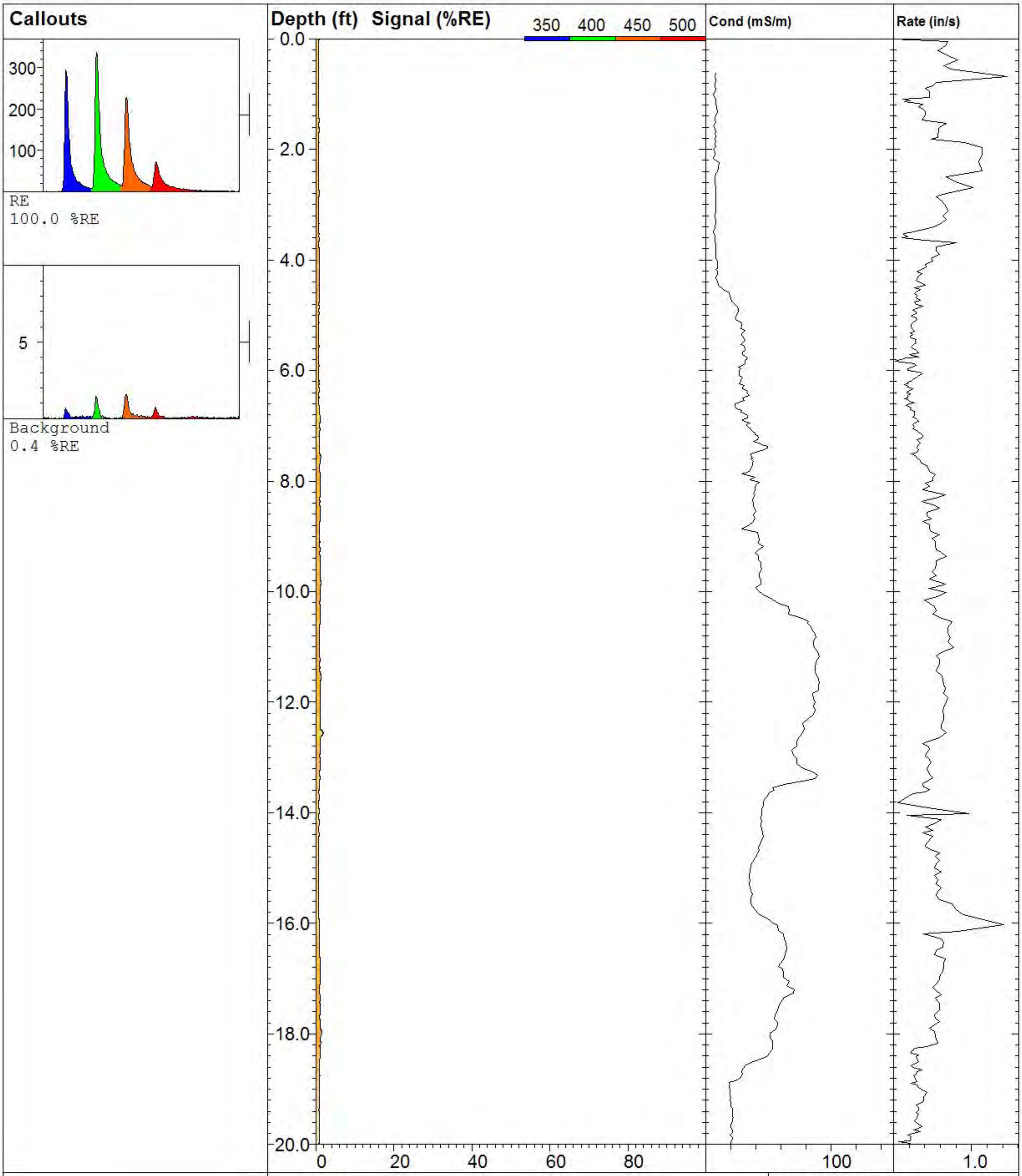


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-35

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **198.5 % @ 5.10 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 11:27 EDT**



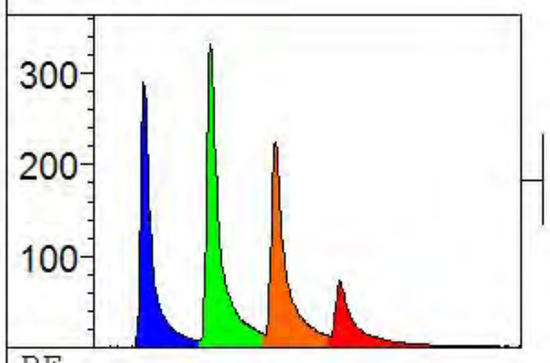
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-36

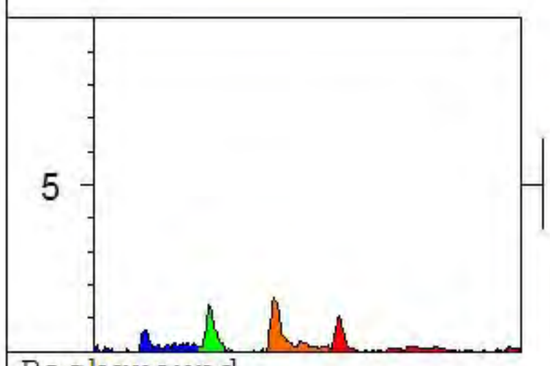
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **21.44 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **1.9 % @ 12.56 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 12:19 EDT**

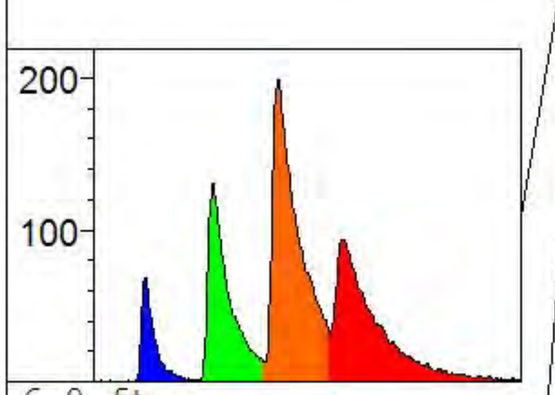
Callouts



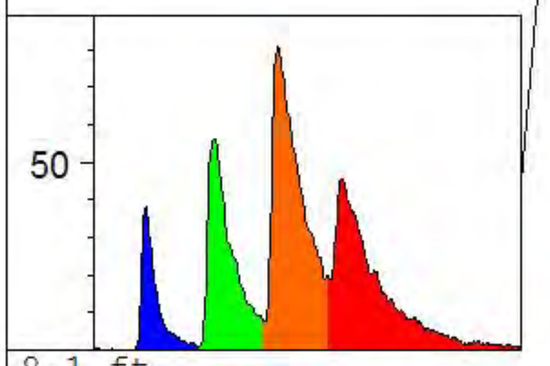
RE
100.0 %RE



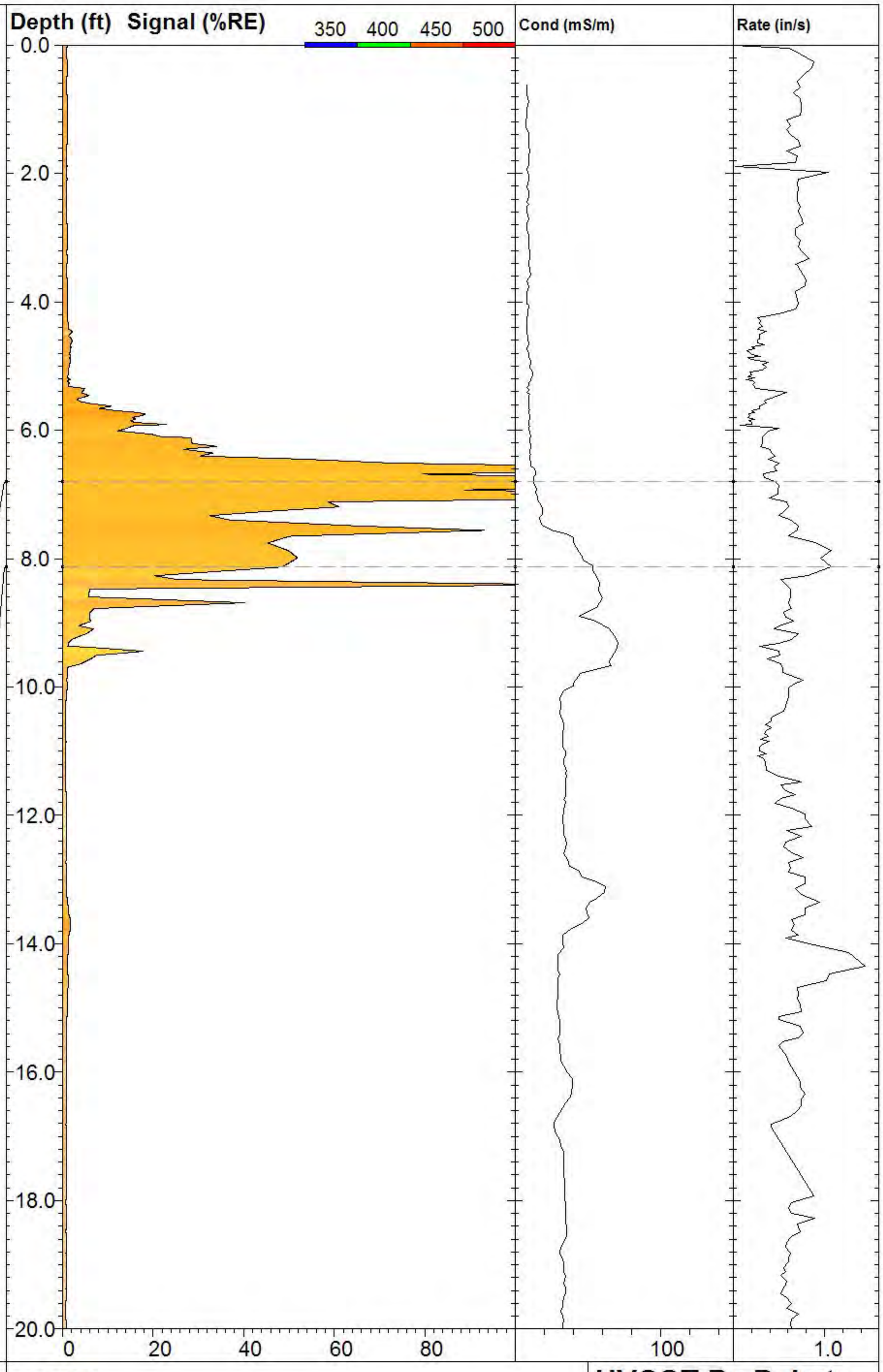
Background
0.5 %RE



6.8 ft
99.7 %RE



8.1 ft
48.5 %RE

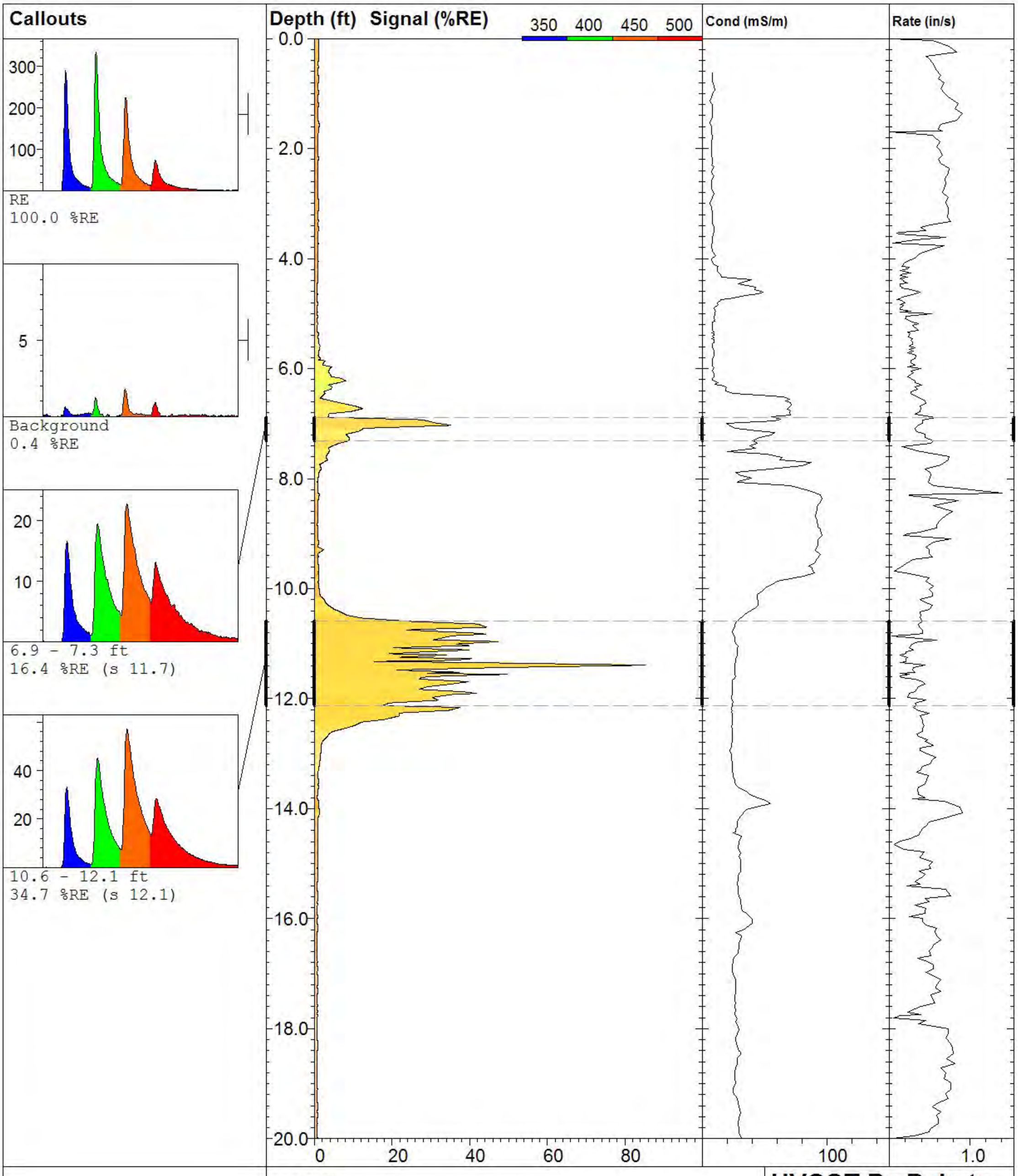


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-37

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.06 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **192.1 % @ 6.86 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 19:24 EDT**

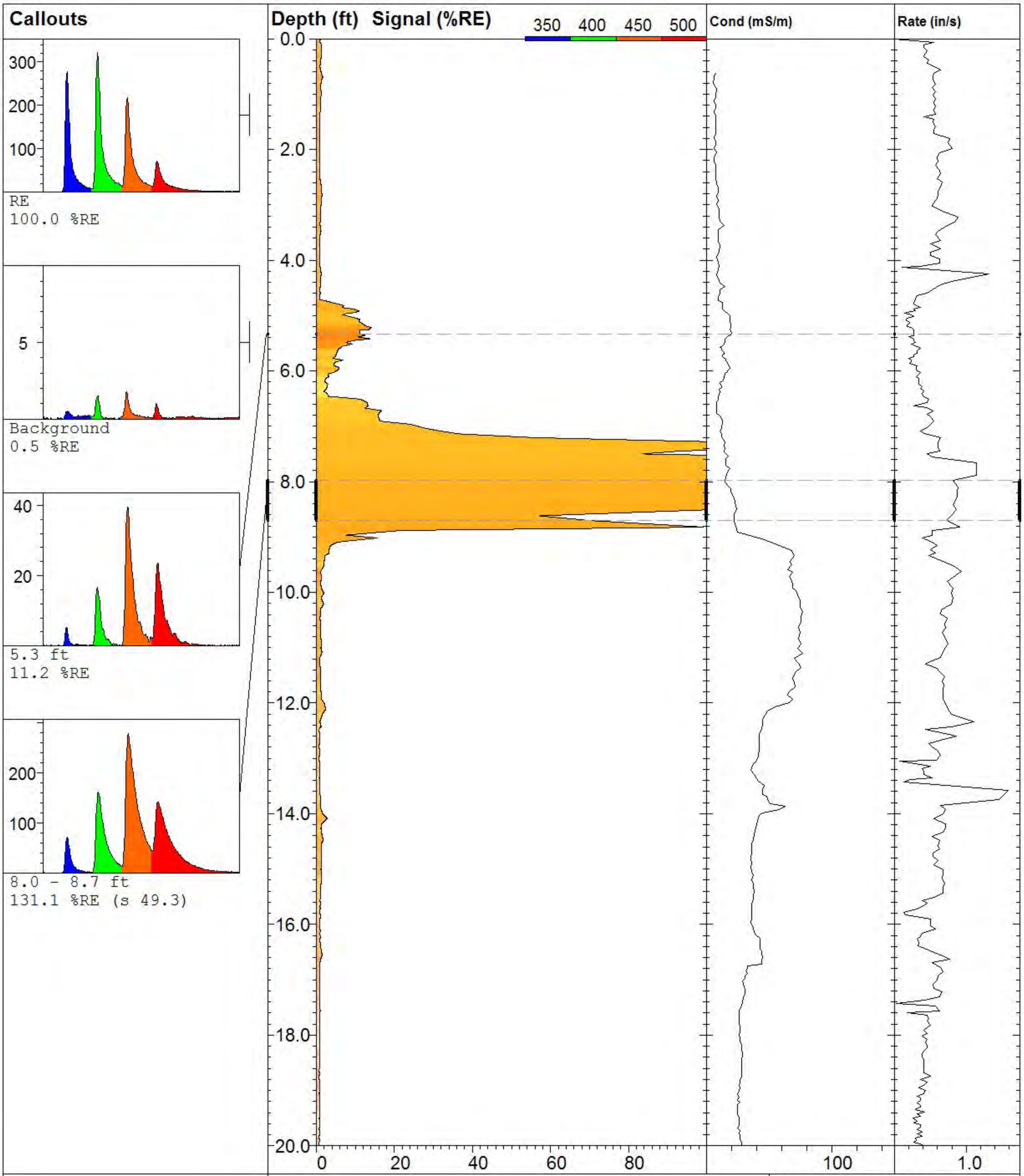


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-38

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **86.2 % @ 11.39 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 14:17 EDT**



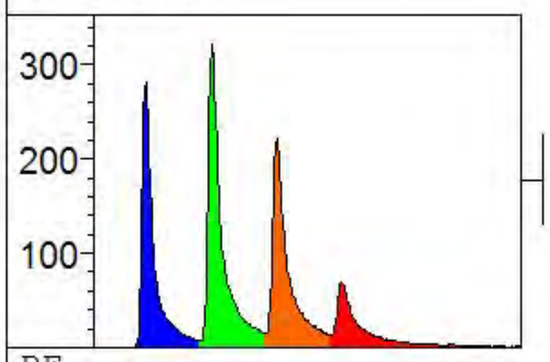
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-39

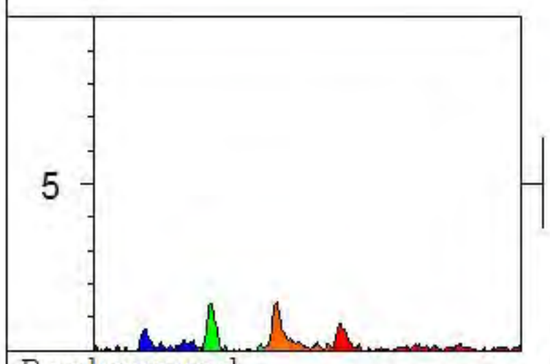
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.03 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **192.4 % @ 8.09 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 16:22 EDT**

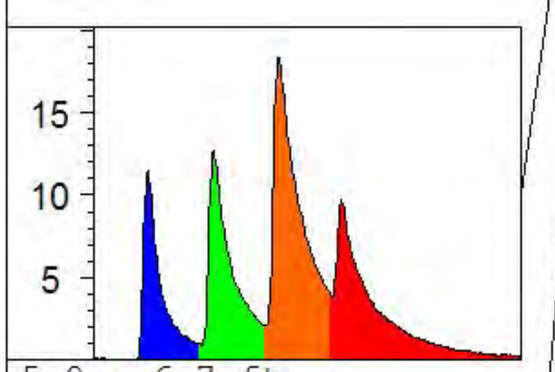
Callouts



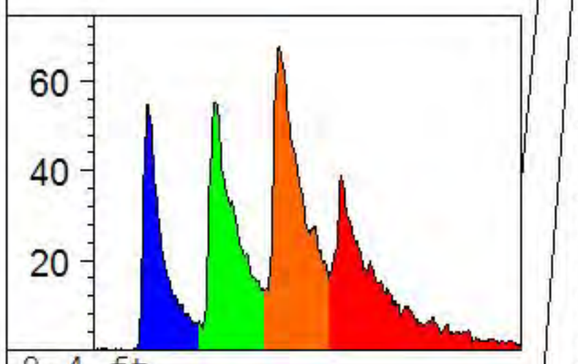
RE
100.0 %RE



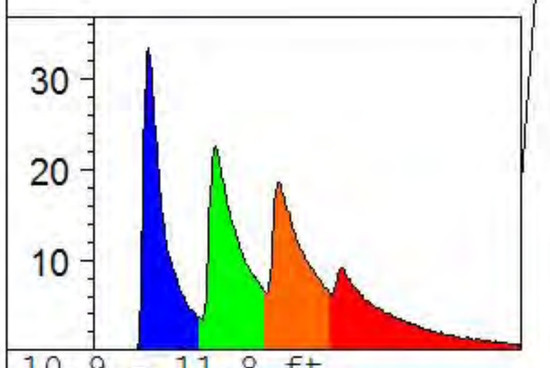
Background
0.5 %RE



5.8 - 6.7 ft
10.4 %RE (s 4.7)

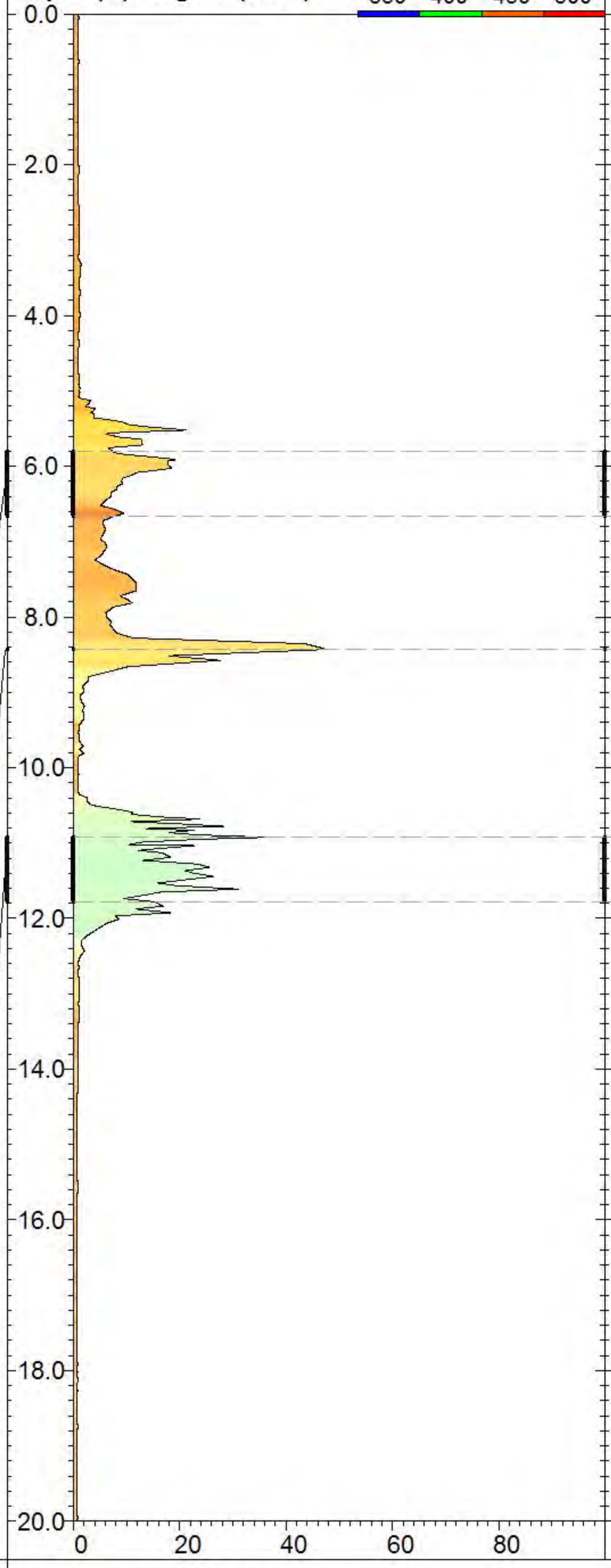


8.4 ft
47.8 %RE

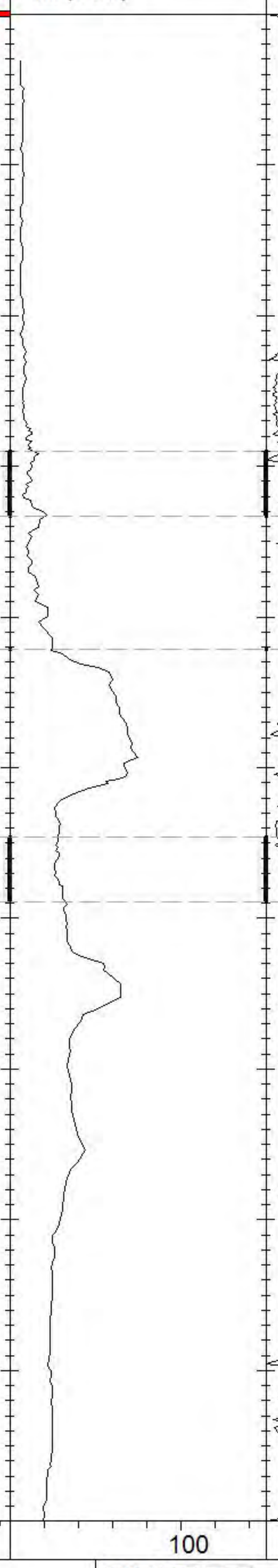


10.9 - 11.8 ft
19.5 %RE (s 6.7)

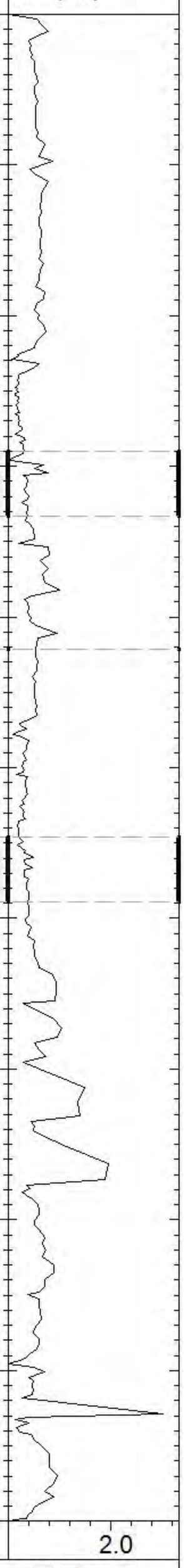
Depth (ft) Signal (%RE)



Cond (mS/m)



Rate (in/s)

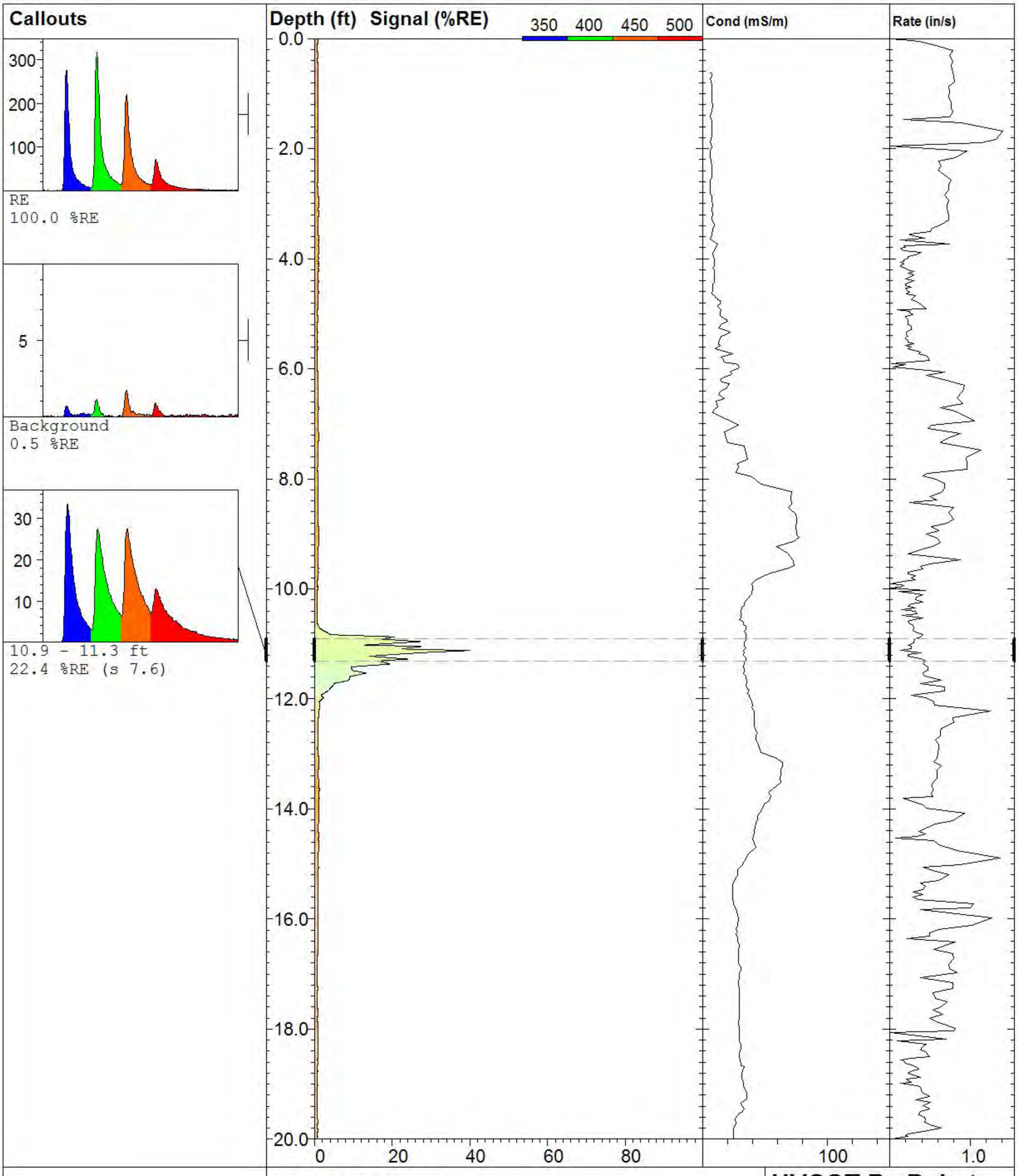


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

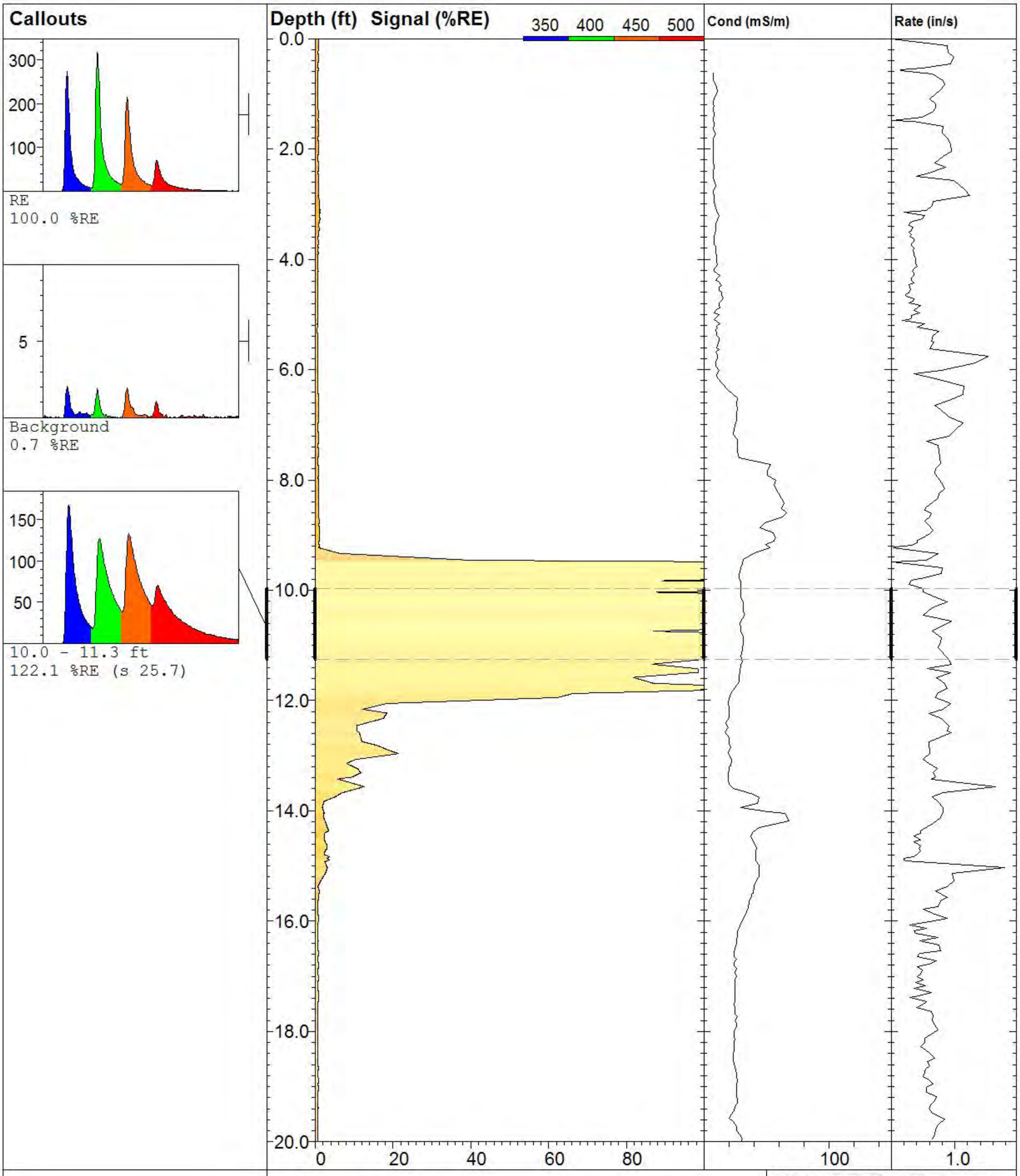
G-40_MW-7

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **47.8 % @ 8.43 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 12:24 EDT**



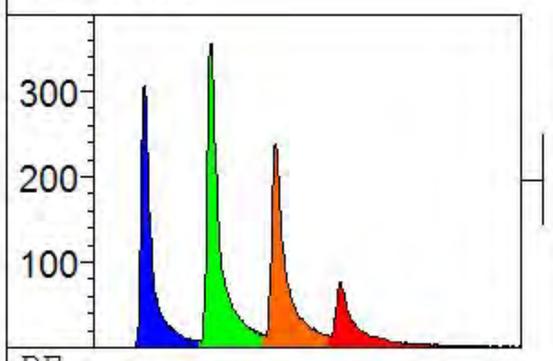
MATRIX ENVIRONMENTAL LLC www.matrixenv.com	**G-41_MW-8**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.02 ft**
	Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **40.2 % @ 11.12 ft**
	Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 13:21 EDT**



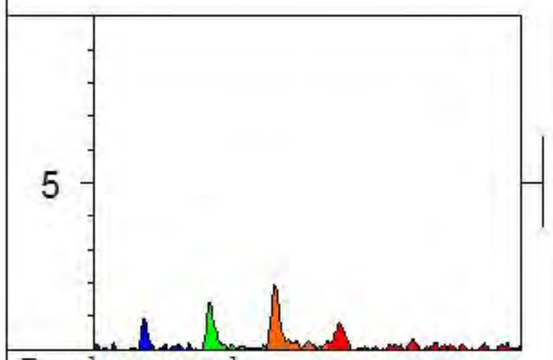
MATRIX ENVIRONMENTAL LLC www.matrixenv.com	**G-42_MW-14**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.02 ft**
	Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **234.9 % @ 9.89 ft**
	Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 17:24 EDT**

Logs at 300% RE

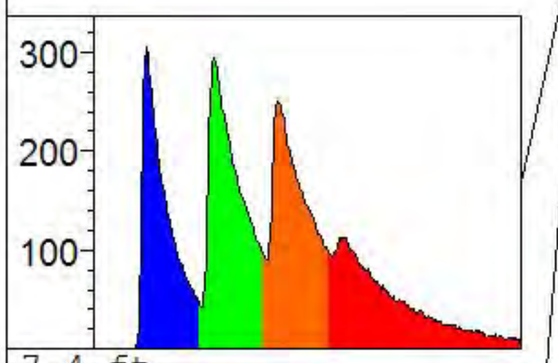
Callouts



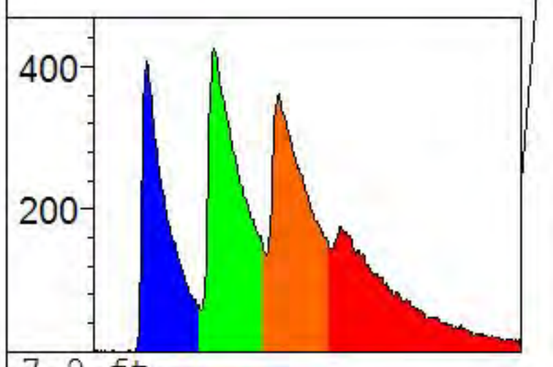
RE
100.0 %RE



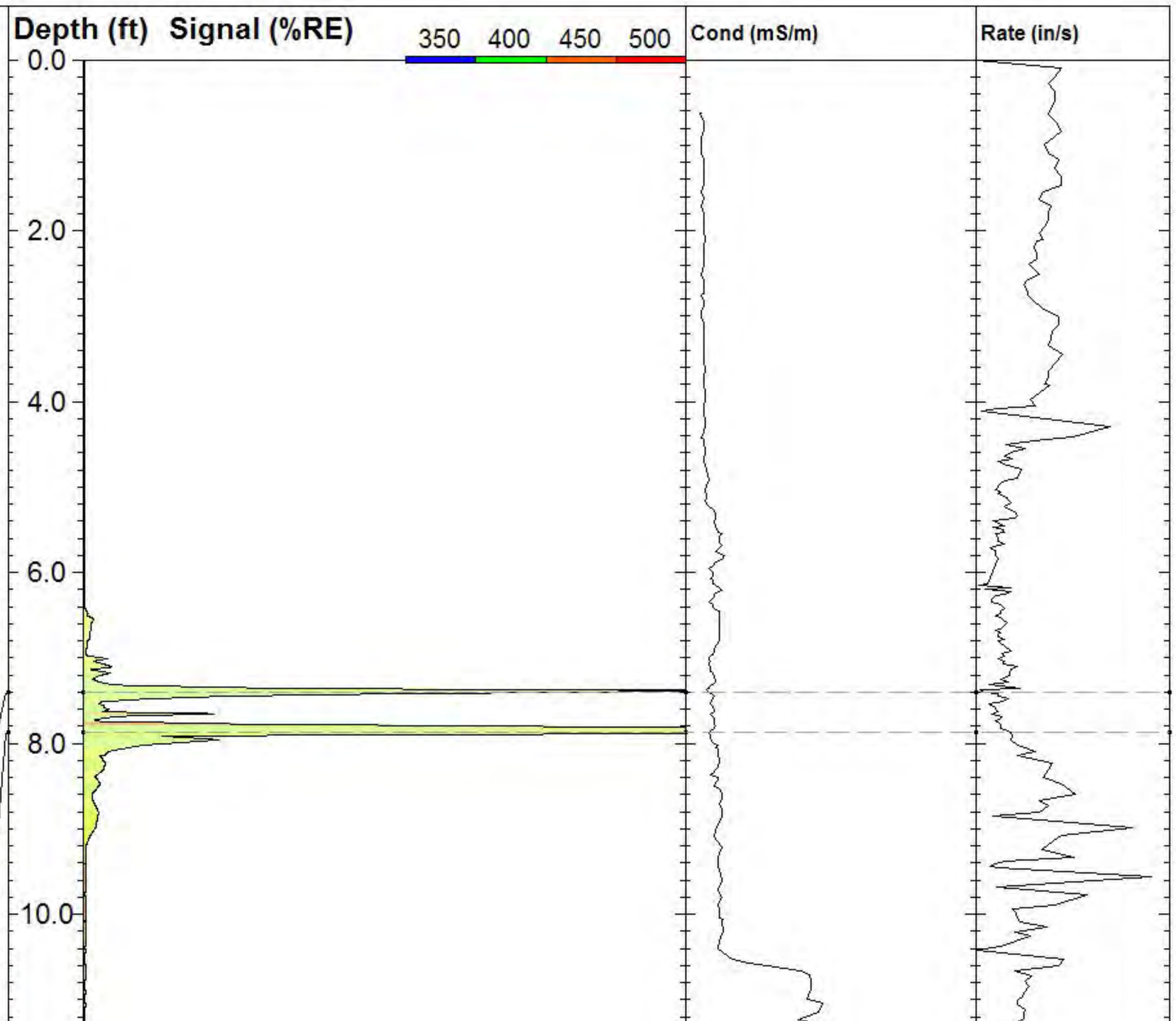
Background
0.4 %RE



7.4 ft
249.6 %RE

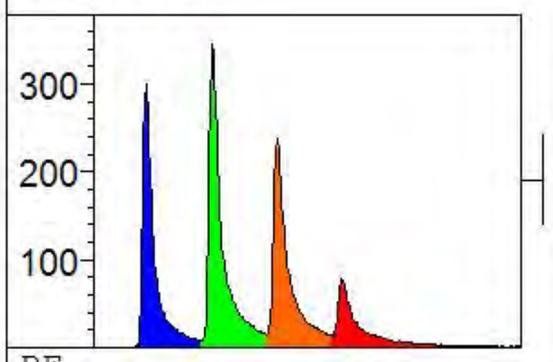


7.9 ft
366.7 %RE

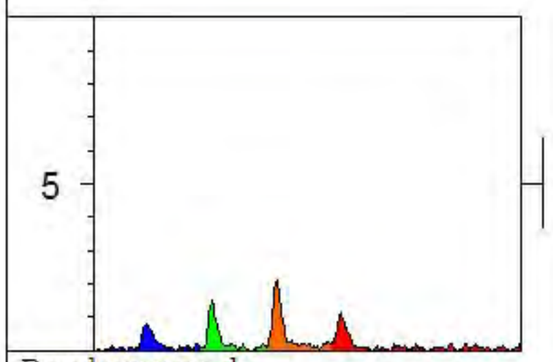


MATRIX ENVIRONMENTAL LLC www.matrixenv.com	**G-18**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.02 ft**
	Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **401.5 % @ 7.83 ft**
	Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 17:09 EDT**

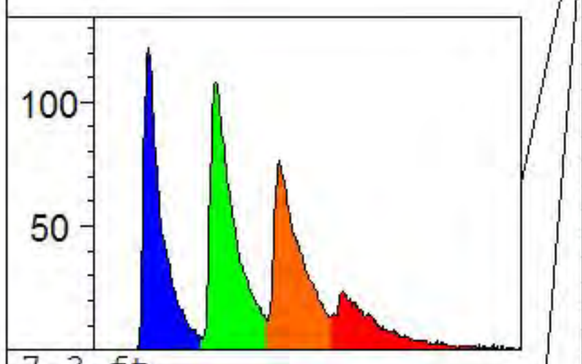
Callouts



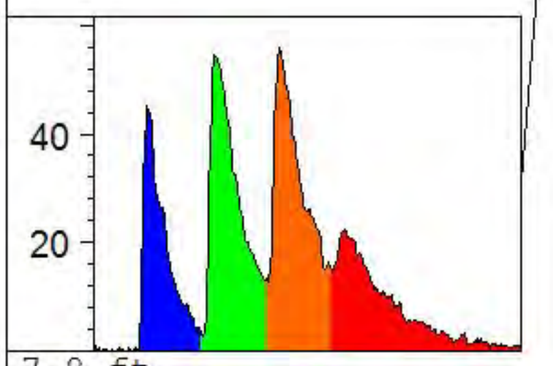
RE
100.0 %RE



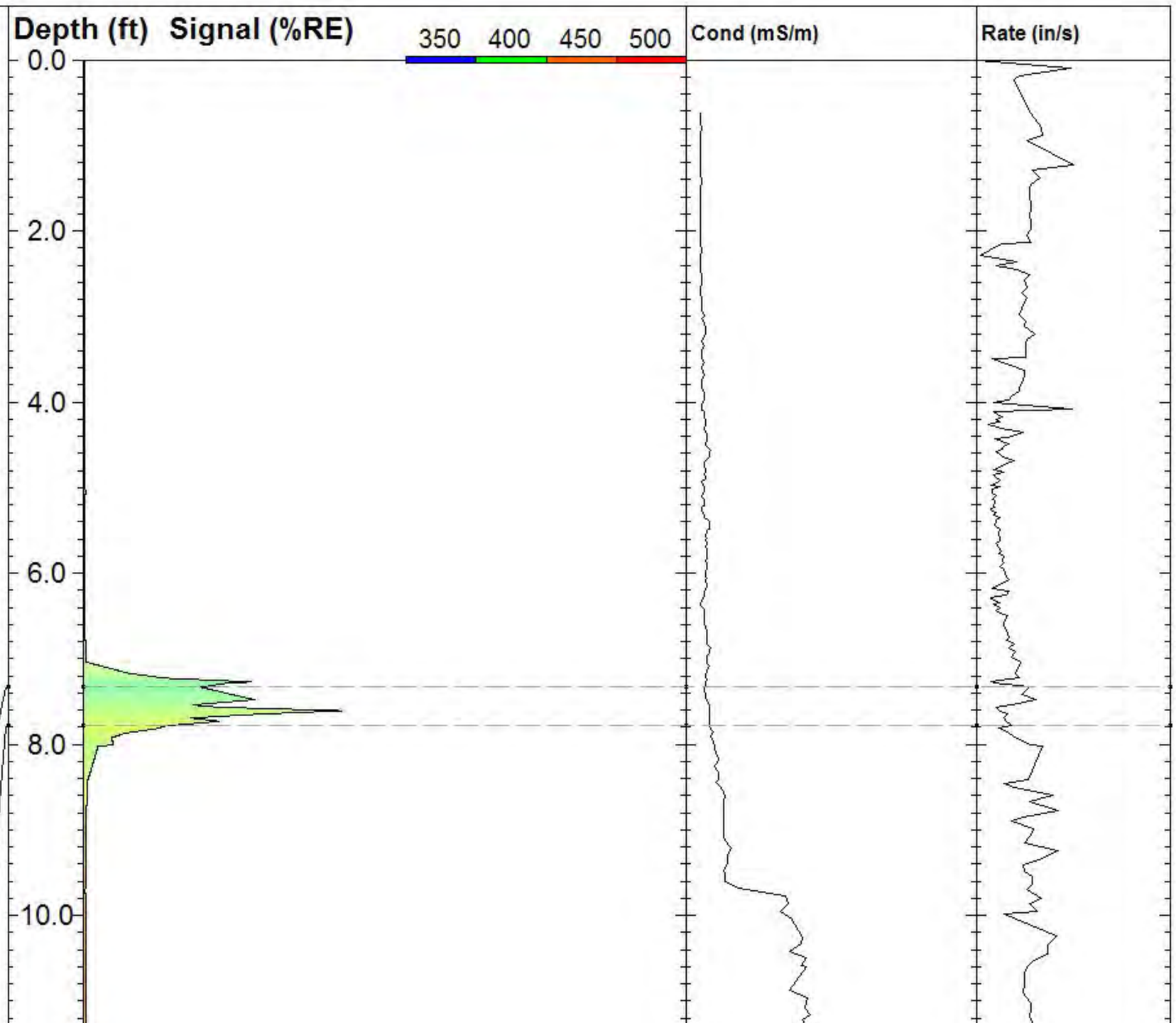
Background
0.6 %RE



7.3 ft
58.4 %RE



7.8 ft
40.6 %RE

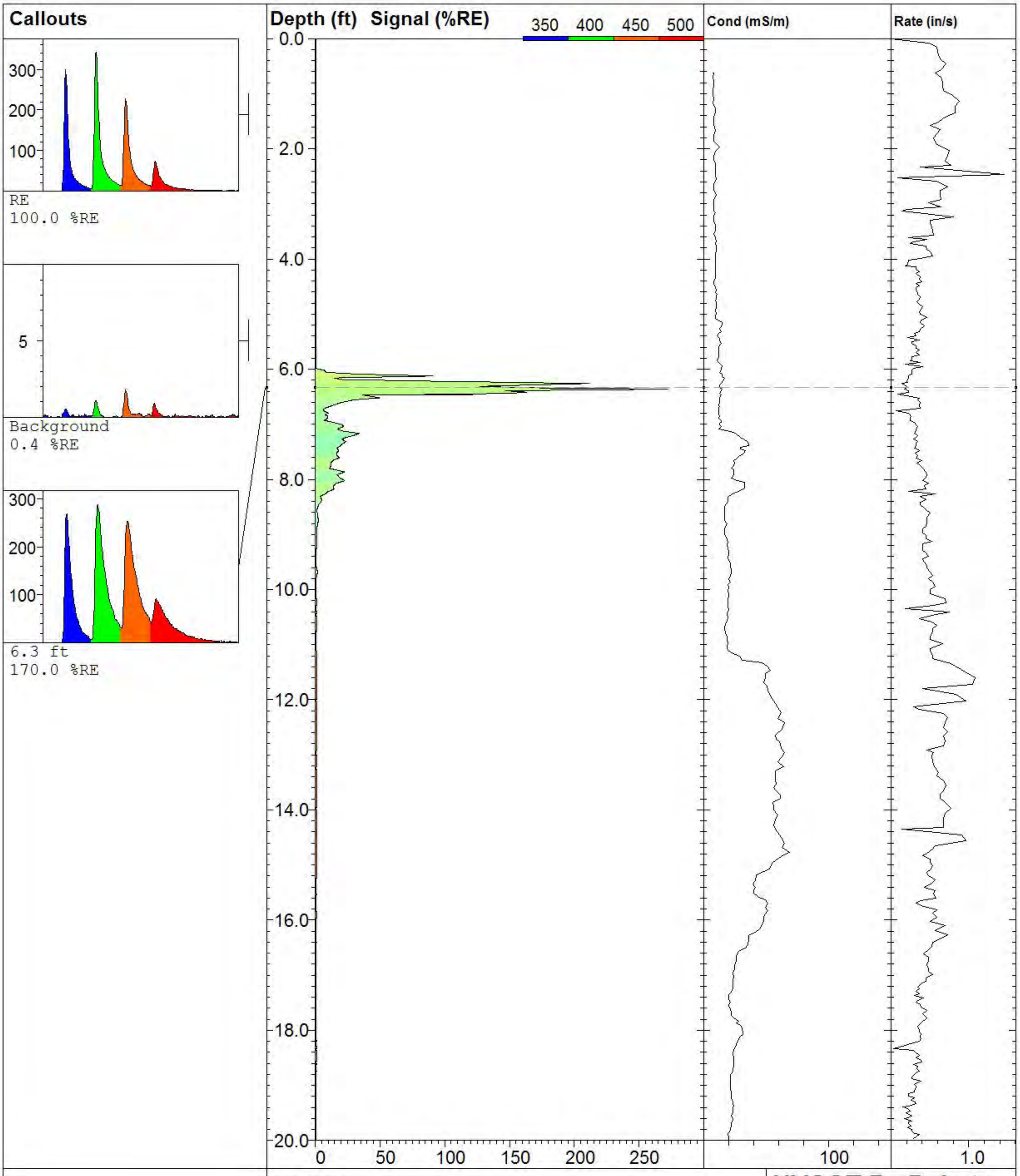


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-19

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **129.0 % @ 7.61 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 12:14 EDT**

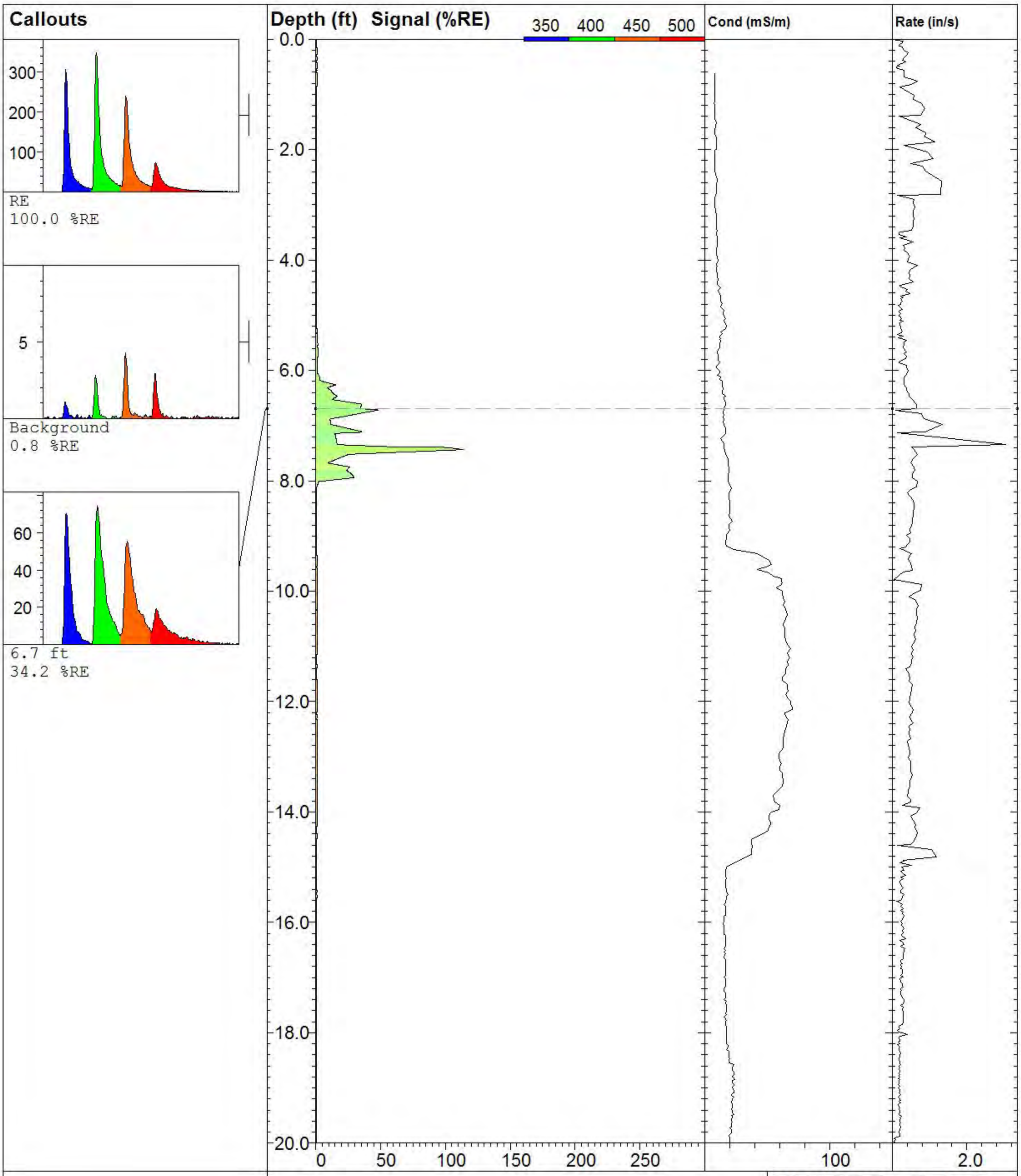


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-20

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **277.5 % @ 6.36 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 16:42 EDT**



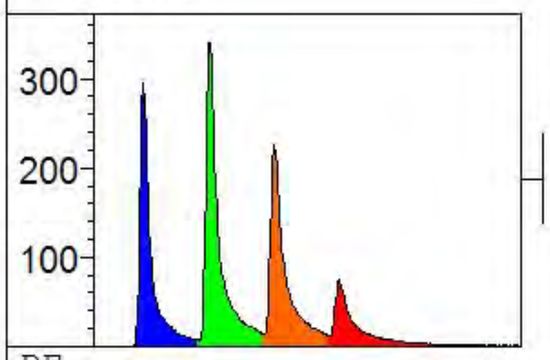
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-22

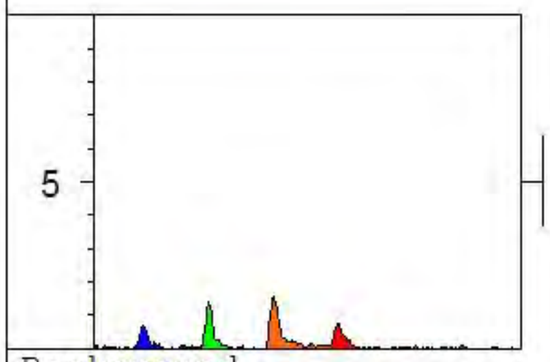
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **113.9 % @ 7.44 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 14:38 EDT**

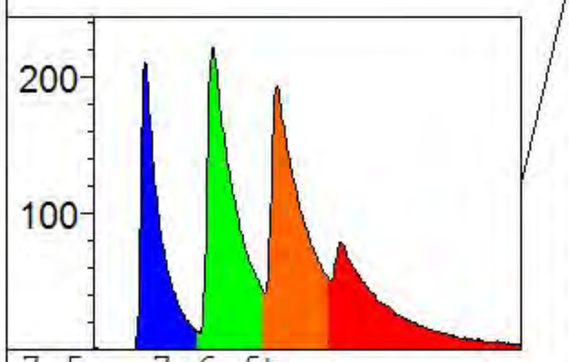
Callouts



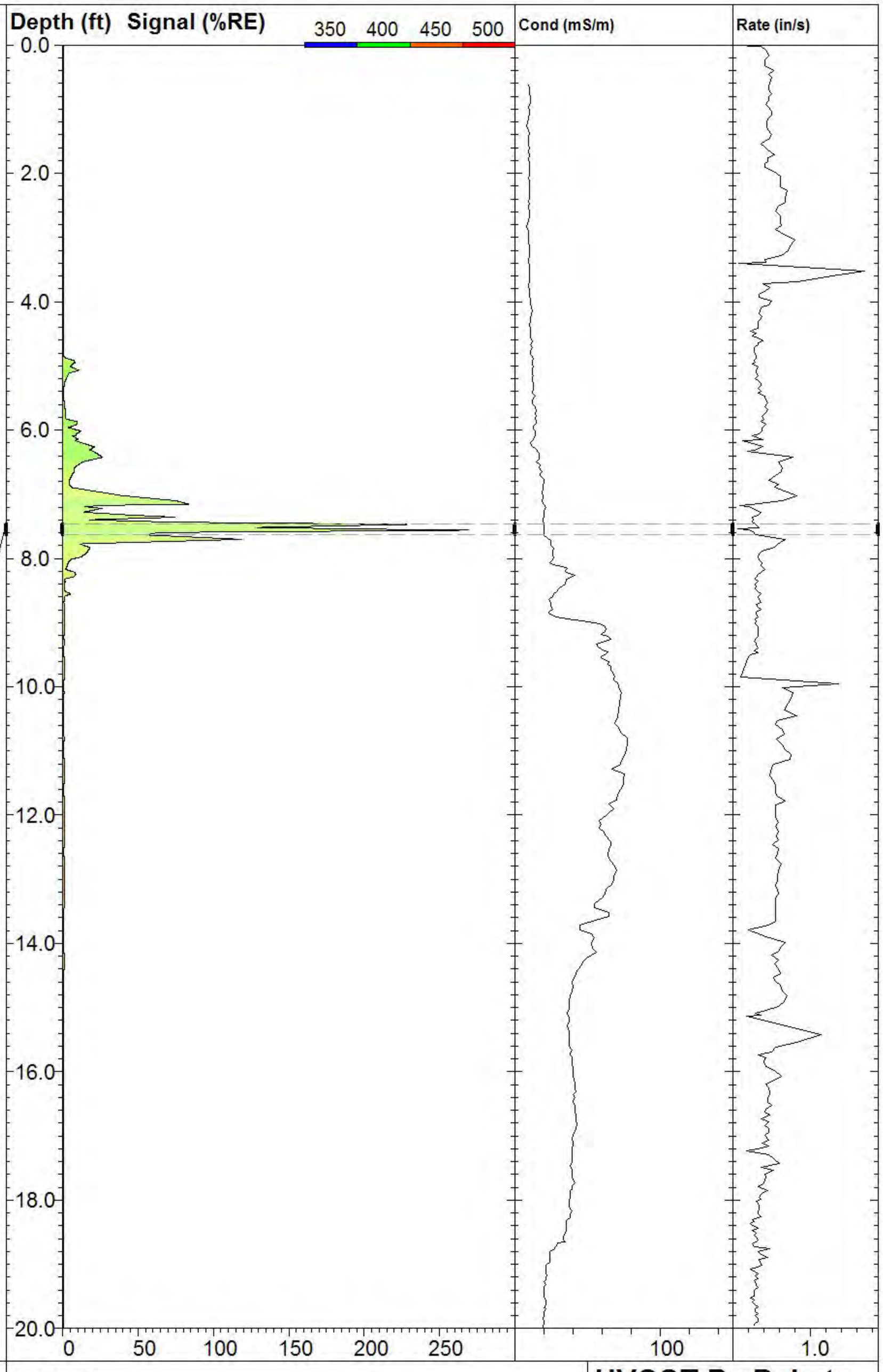
RE
100.0 %RE



Background
0.3 %RE



7.5 - 7.6 ft
156.2 %RE (s 88.6)



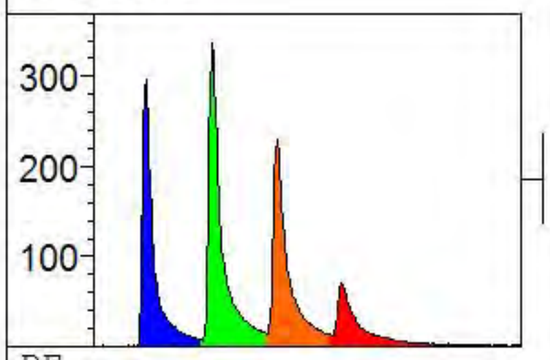
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-23

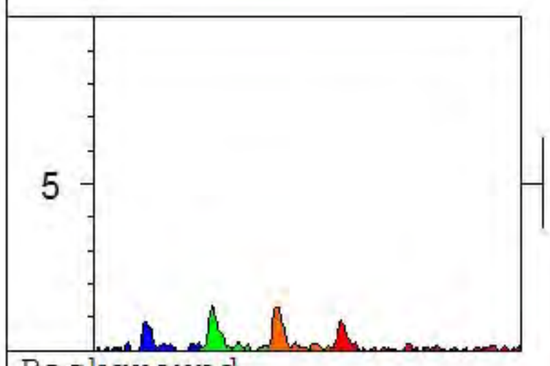
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **270.3 % @ 7.56 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 15:15 EDT**

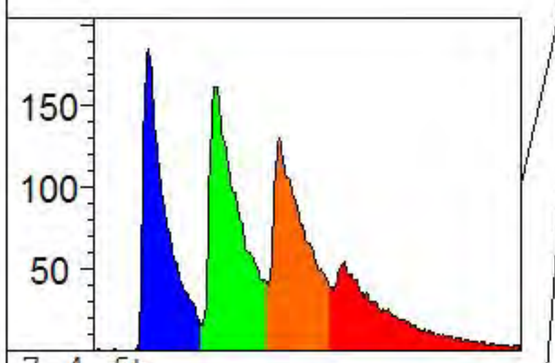
Callouts



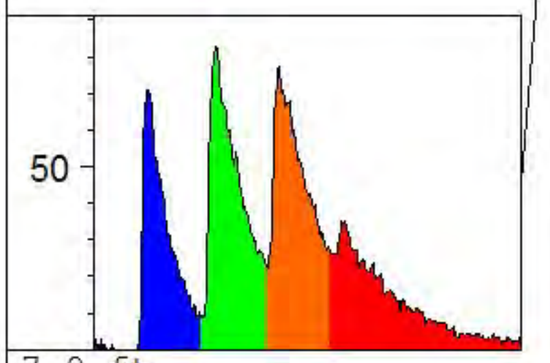
RE
100.0 %RE



Background
0.5 %RE

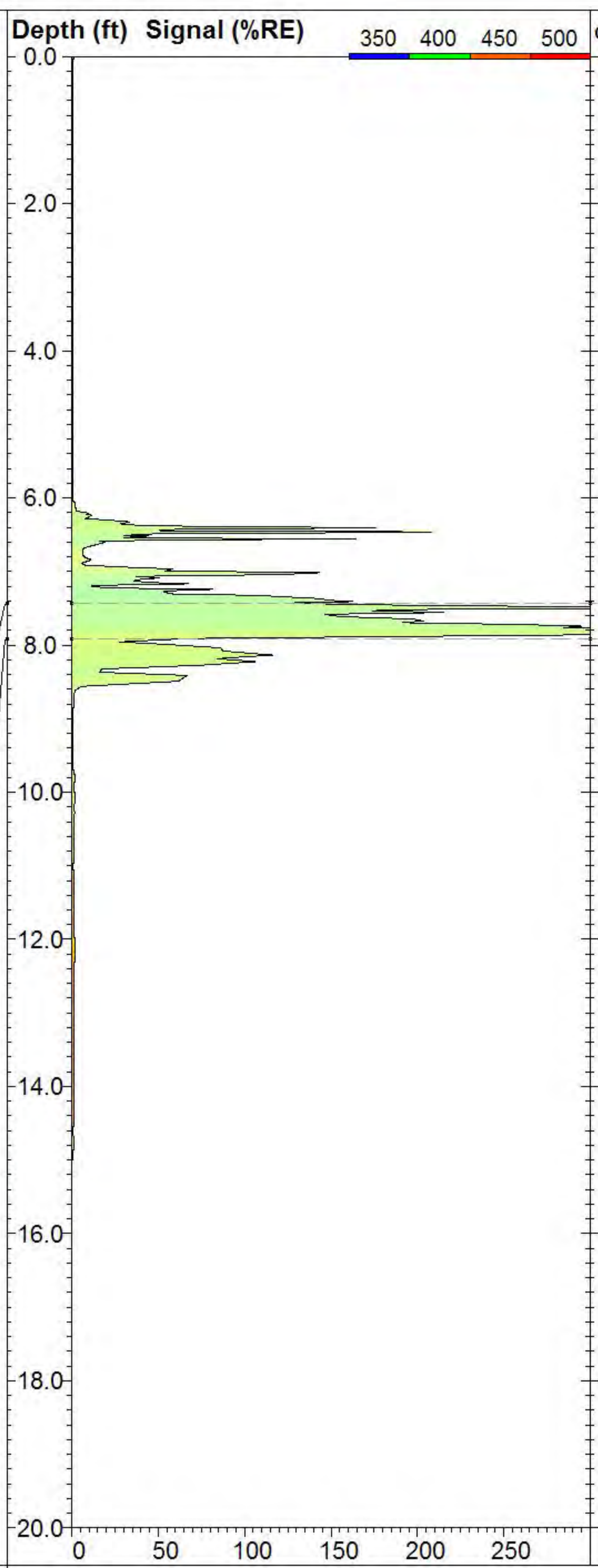


7.4 ft
124.9 %RE

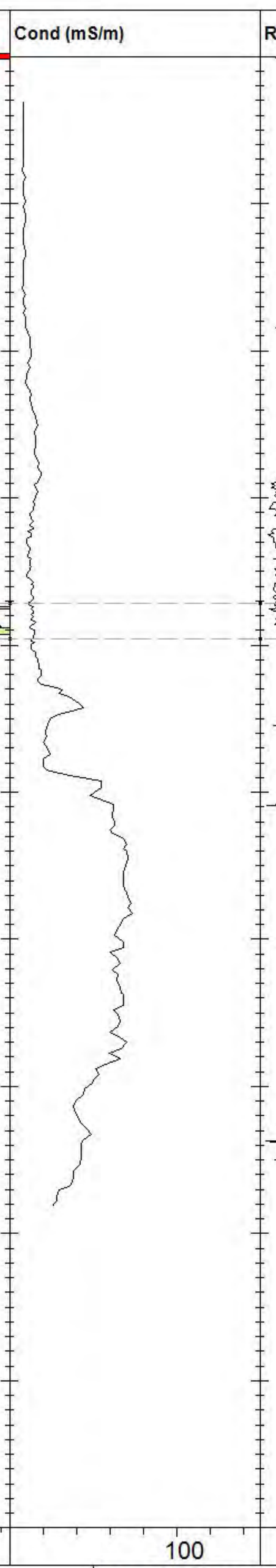


7.9 ft
69.1 %RE

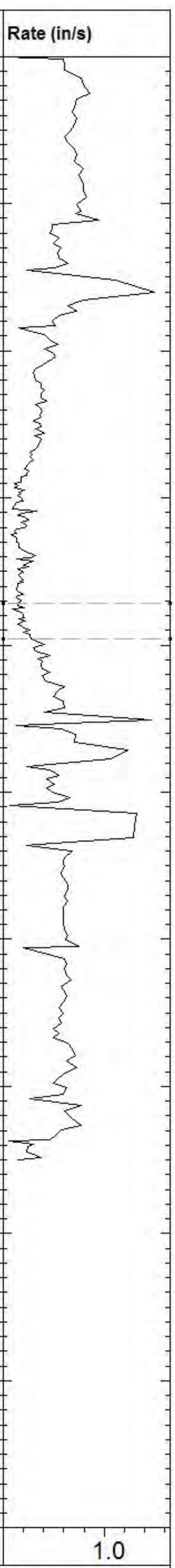
Depth (ft) Signal (%RE)



Cond (mS/m)



Rate (in/s)



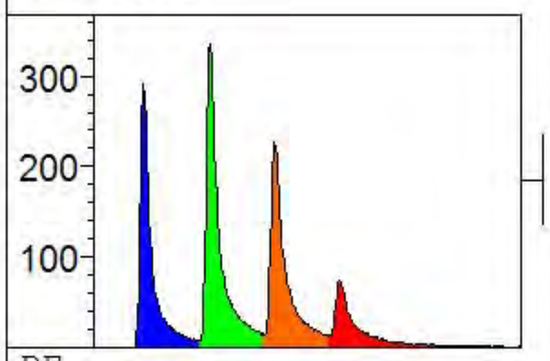
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-25

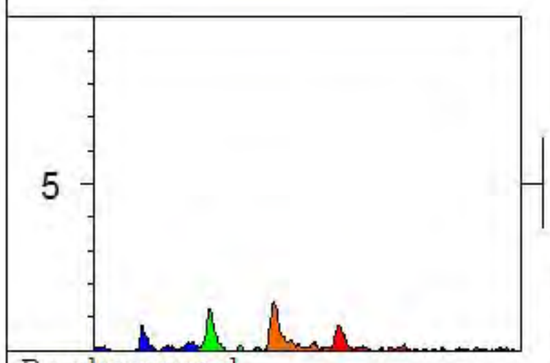
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **429.5 % @ 7.80 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 13:28 EDT**

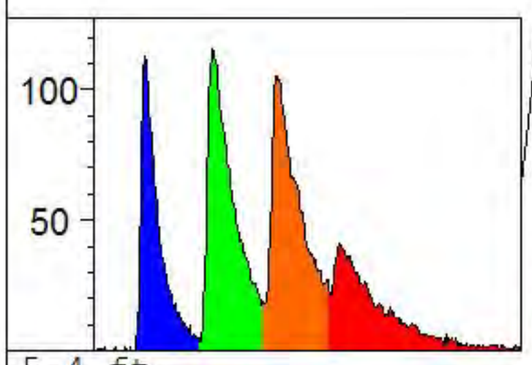
Callouts



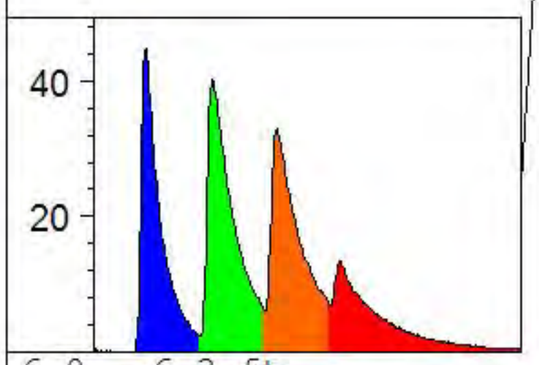
RE
100.0 %RE



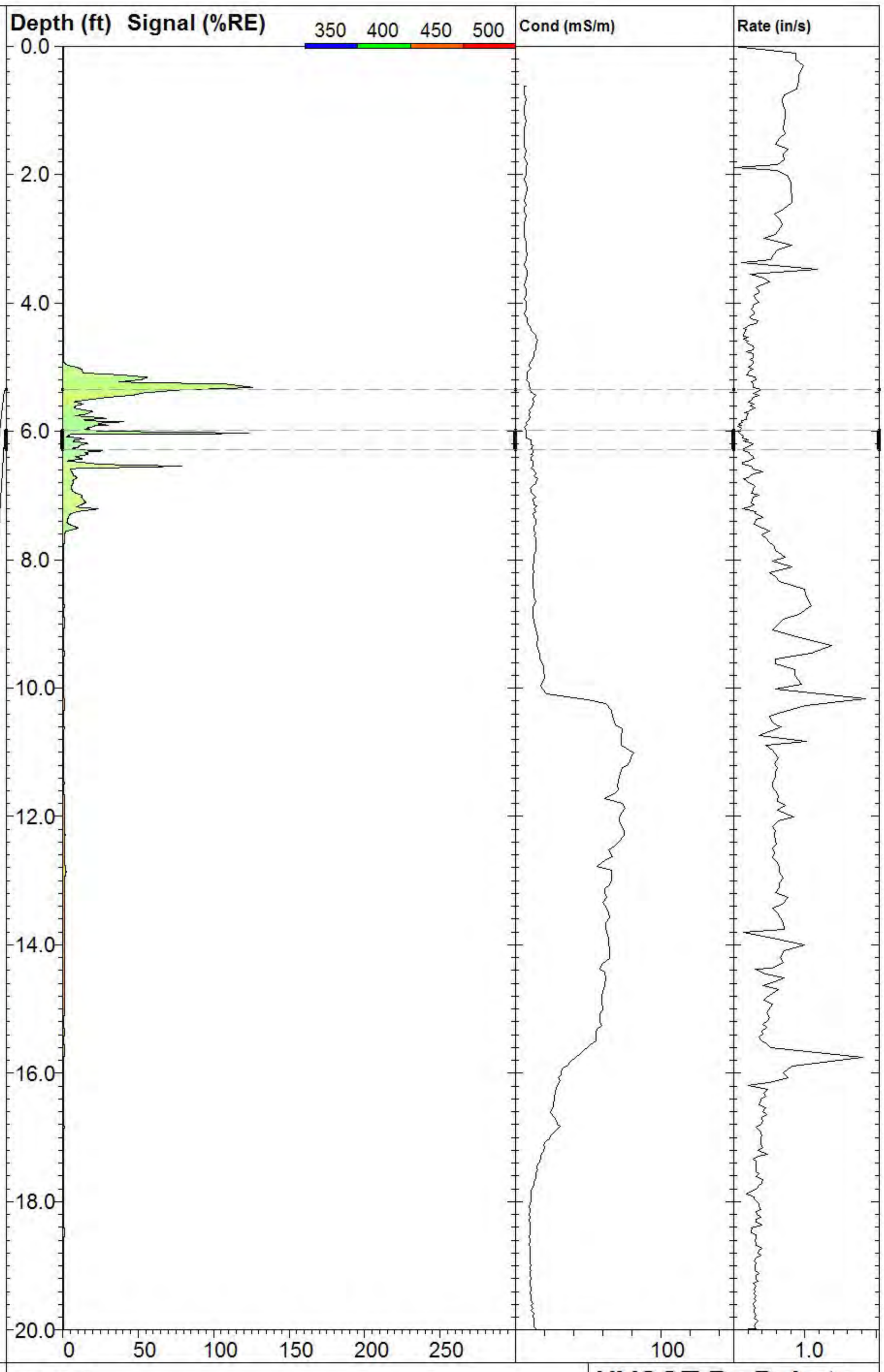
Background
0.4 %RE



5.4 ft
77.4 %RE



6.0 - 6.3 ft
26.7 %RE (s 35.9)

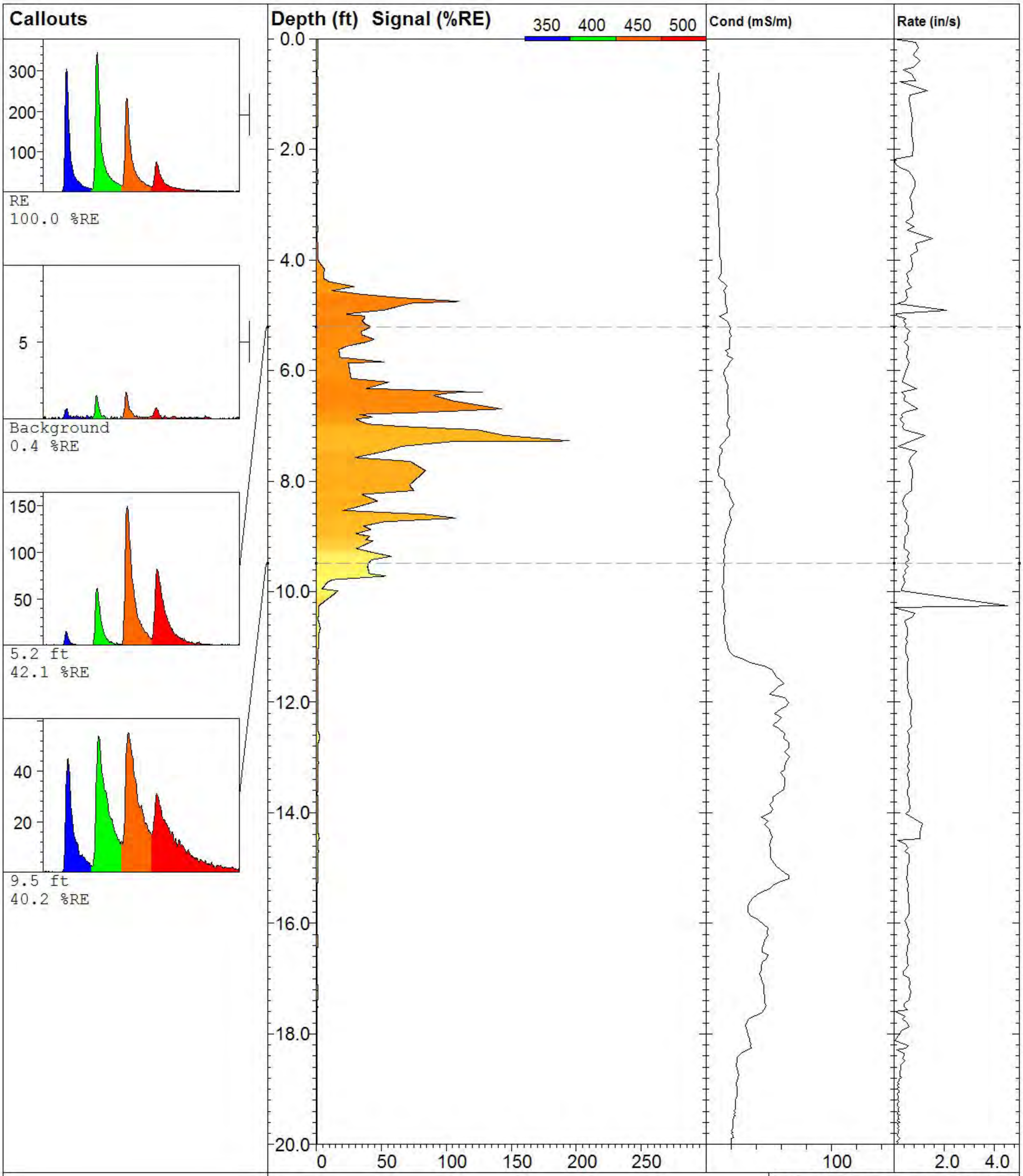


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-26

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.01 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **126.4 % @ 5.32 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 19:26 EDT**



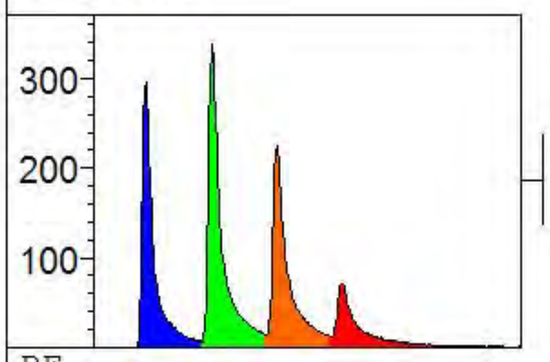
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-27

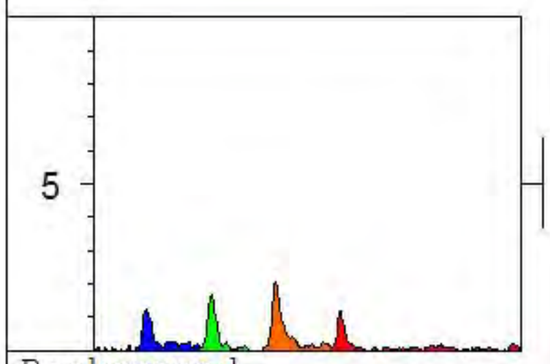
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **195.5 % @ 7.27 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 16:46 EDT**

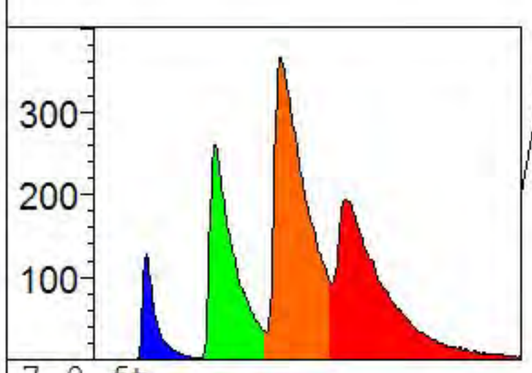
Callouts



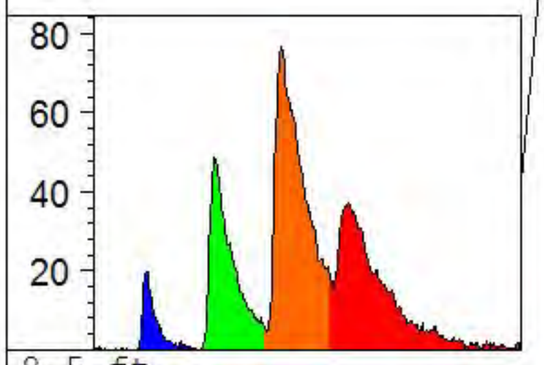
RE
100.0 %RE



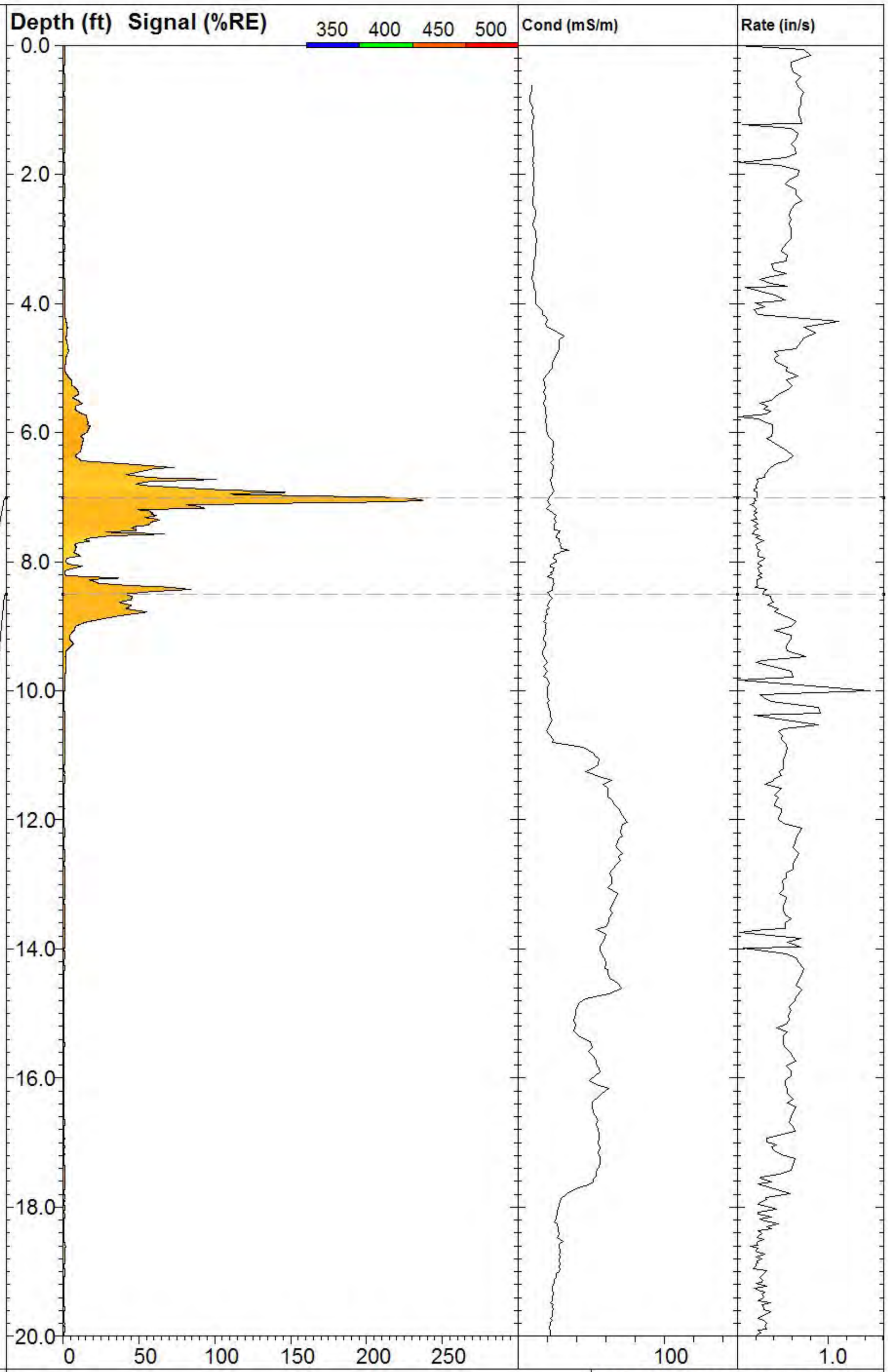
Background
0.6 %RE



7.0 ft
220.1 %RE



8.5 ft
40.6 %RE

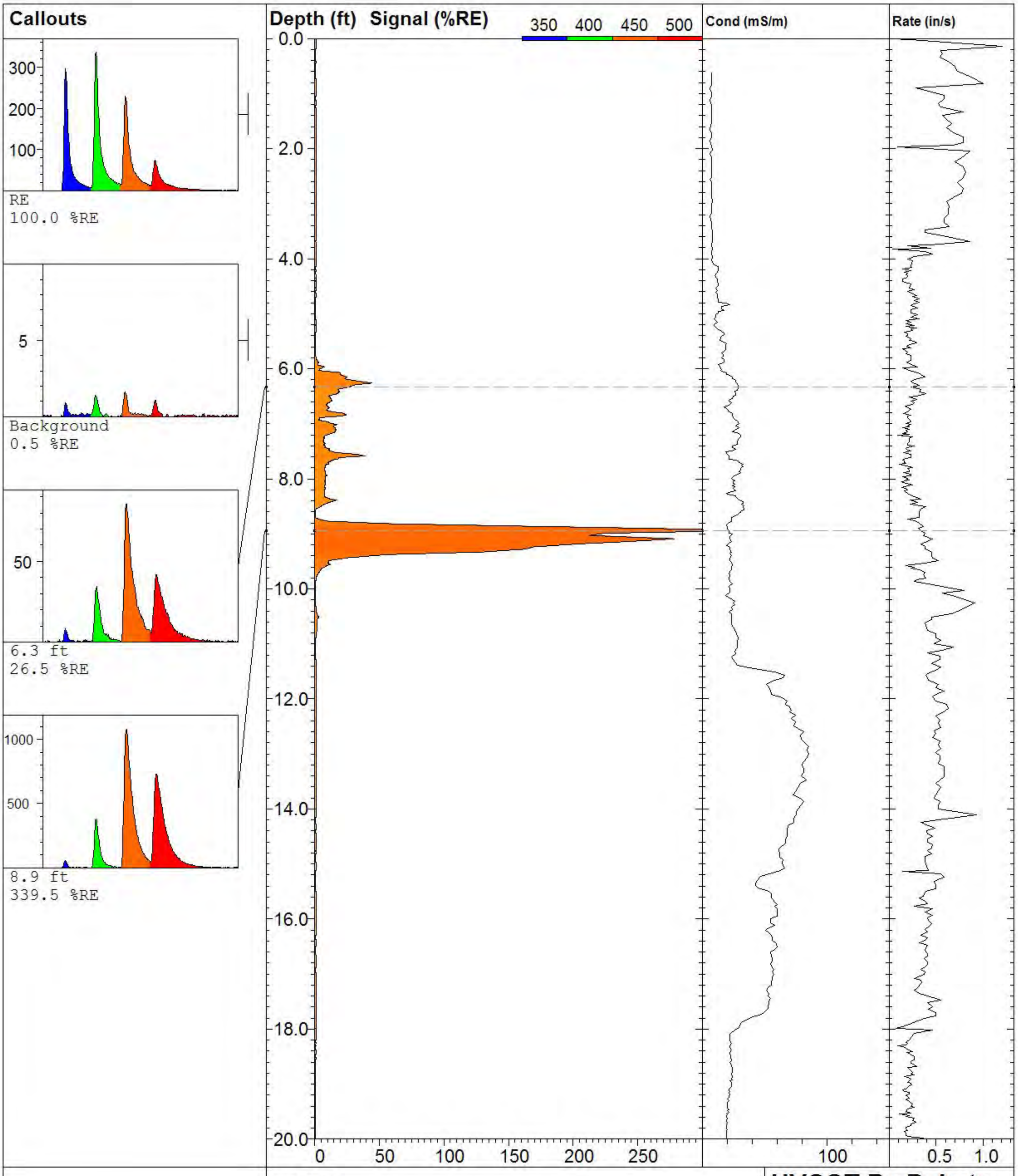


G-28

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.99 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **237.5 % @ 7.05 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 17:40 EDT**

MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

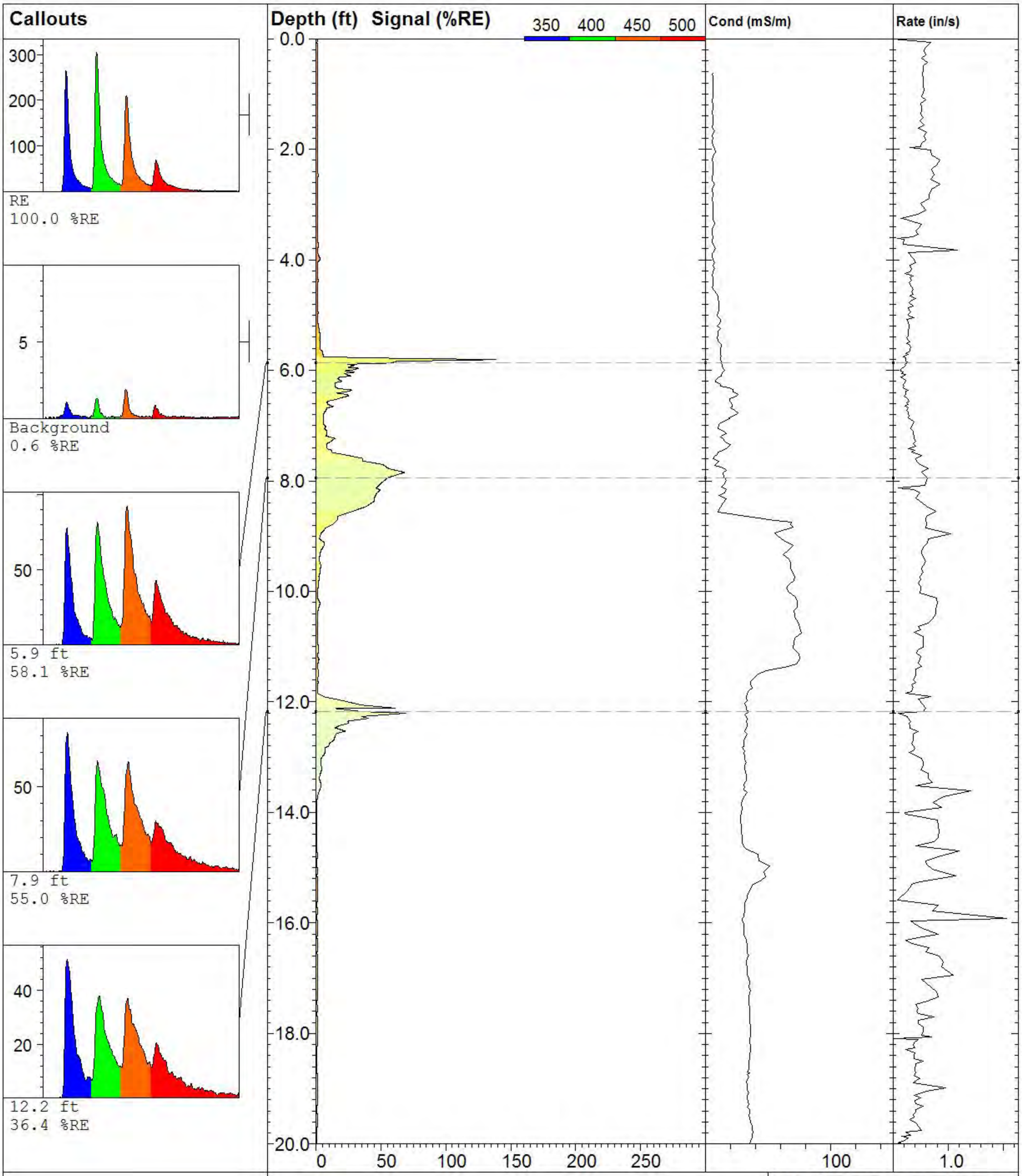


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-31

UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **19.99 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **339.5 % @ 8.94 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 12:55 EDT**



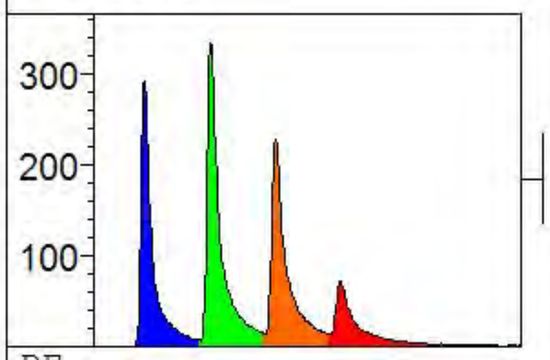
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-32

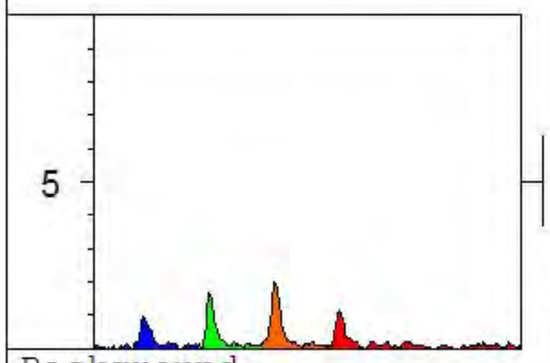
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **142.2 % @ 5.81 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 11:21 EDT**

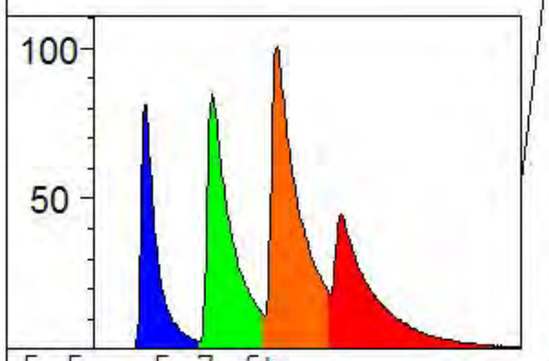
Callouts



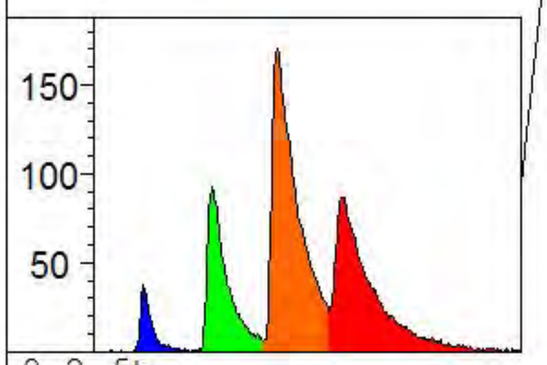
RE
100.0 %RE



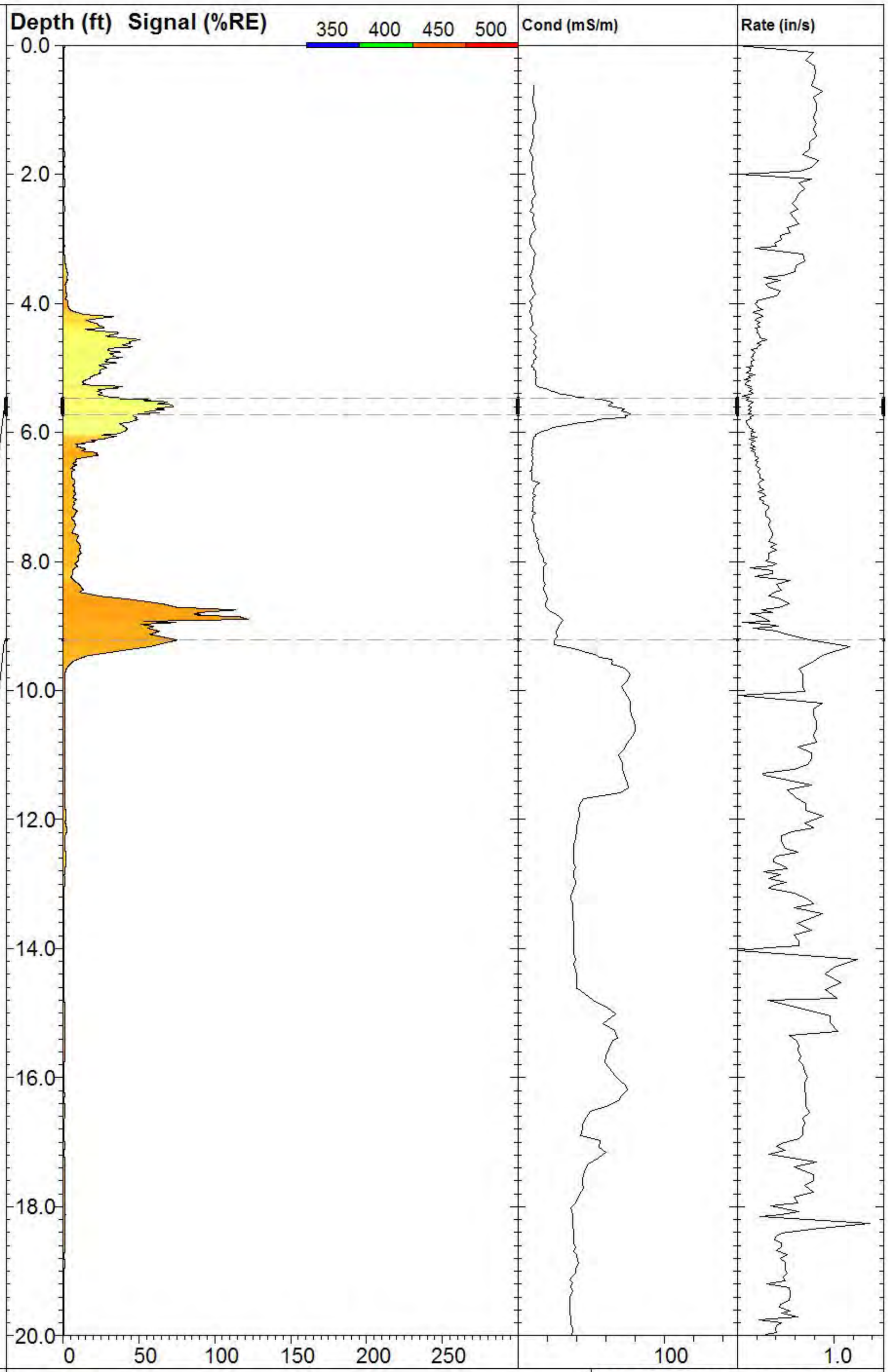
Background
0.6 %RE



5.5 - 5.7 ft
59.4 %RE (s 10.6)

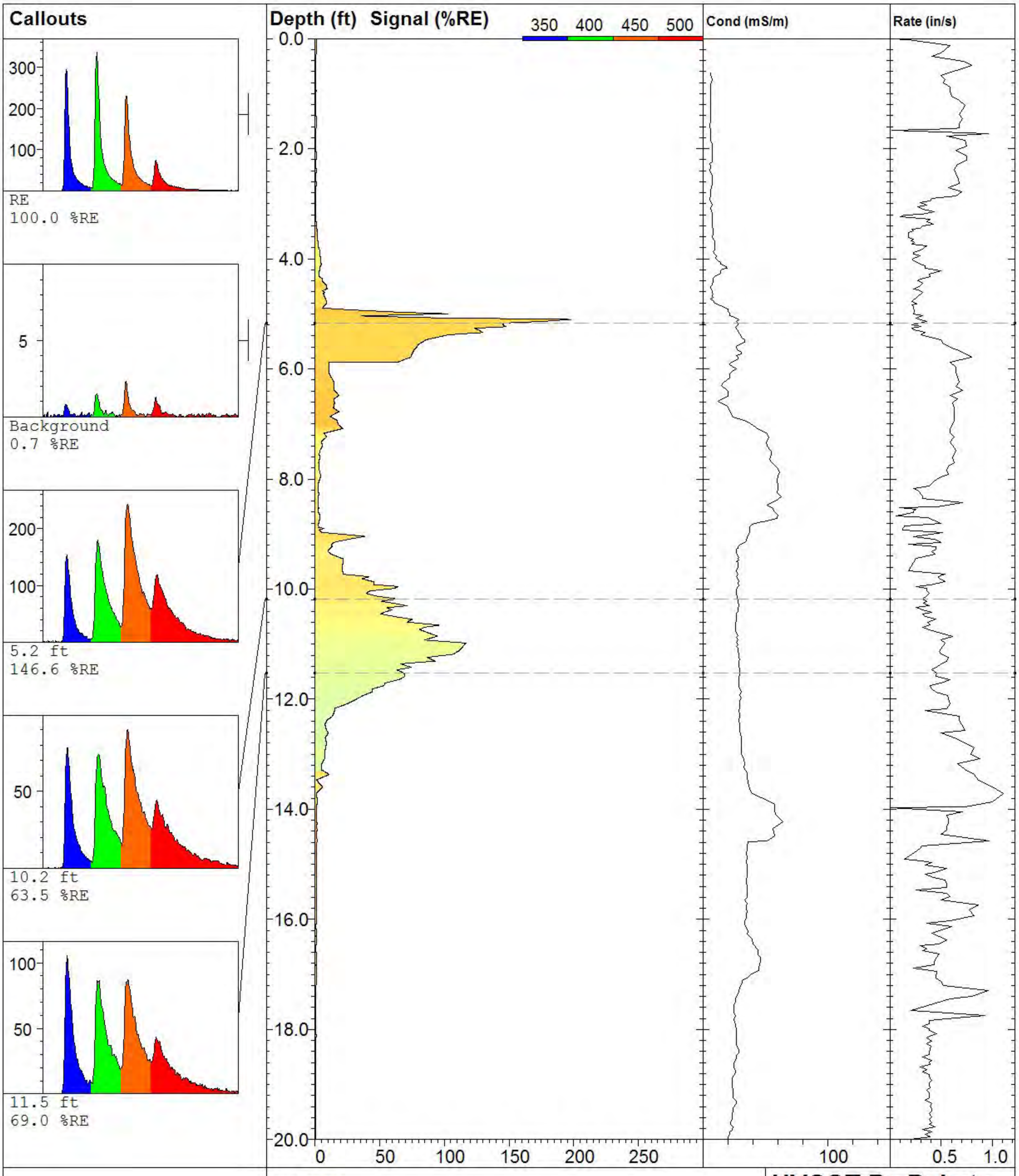


9.2 ft
75.2 %RE



G-34		**UVOST By Dakota** www.DakotaTechnologies.com
Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **121.9 % @ 8.90 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 17:16 EDT**

MATRIX ENVIRONMENTAL LLC
www.matrixenv.com



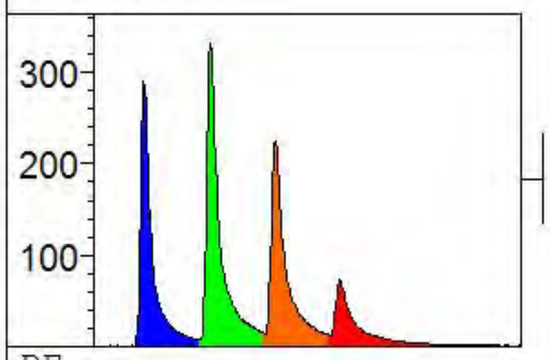
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-35

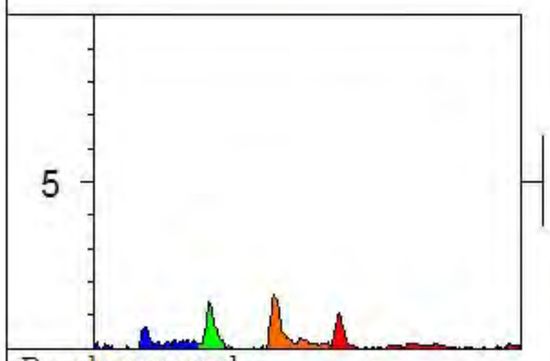
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **198.5 % @ 5.10 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 11:27 EDT**

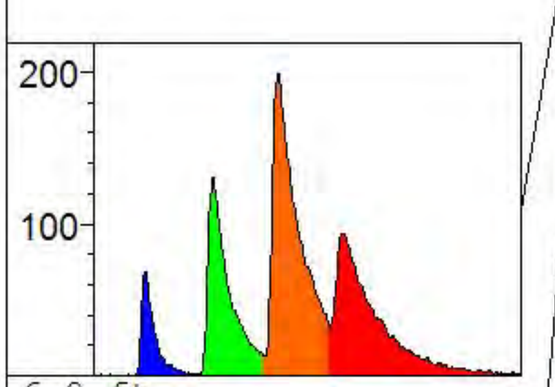
Callouts



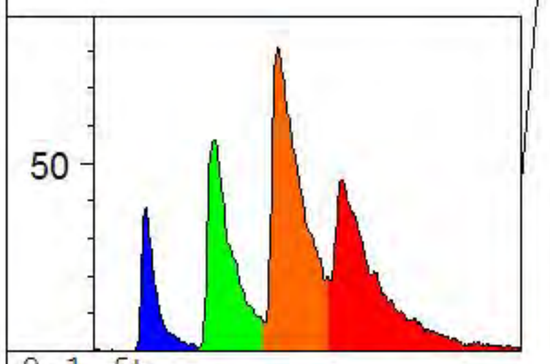
RE
100.0 %RE



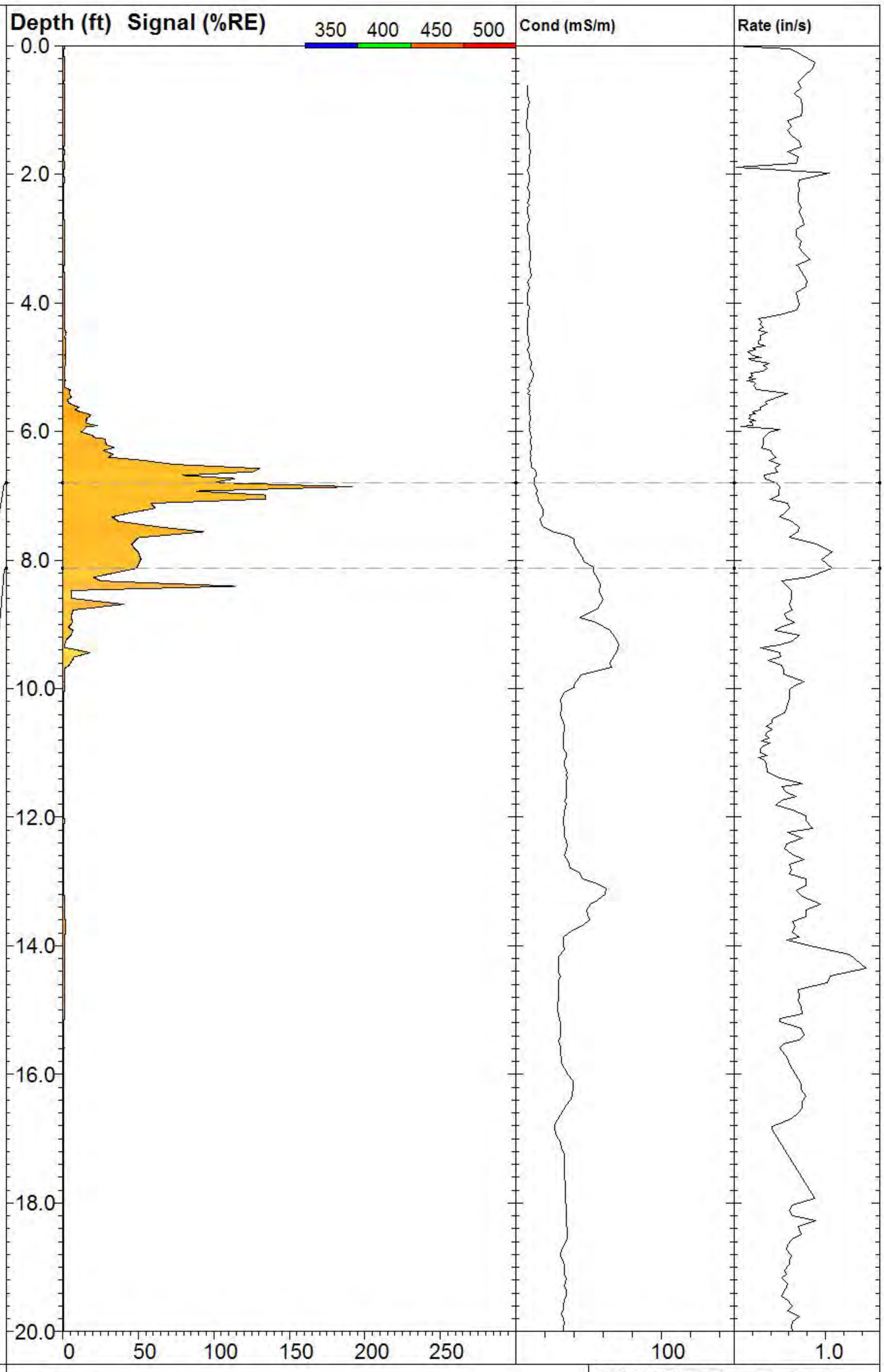
Background
0.5 %RE



6.8 ft
99.7 %RE



8.1 ft
48.5 %RE

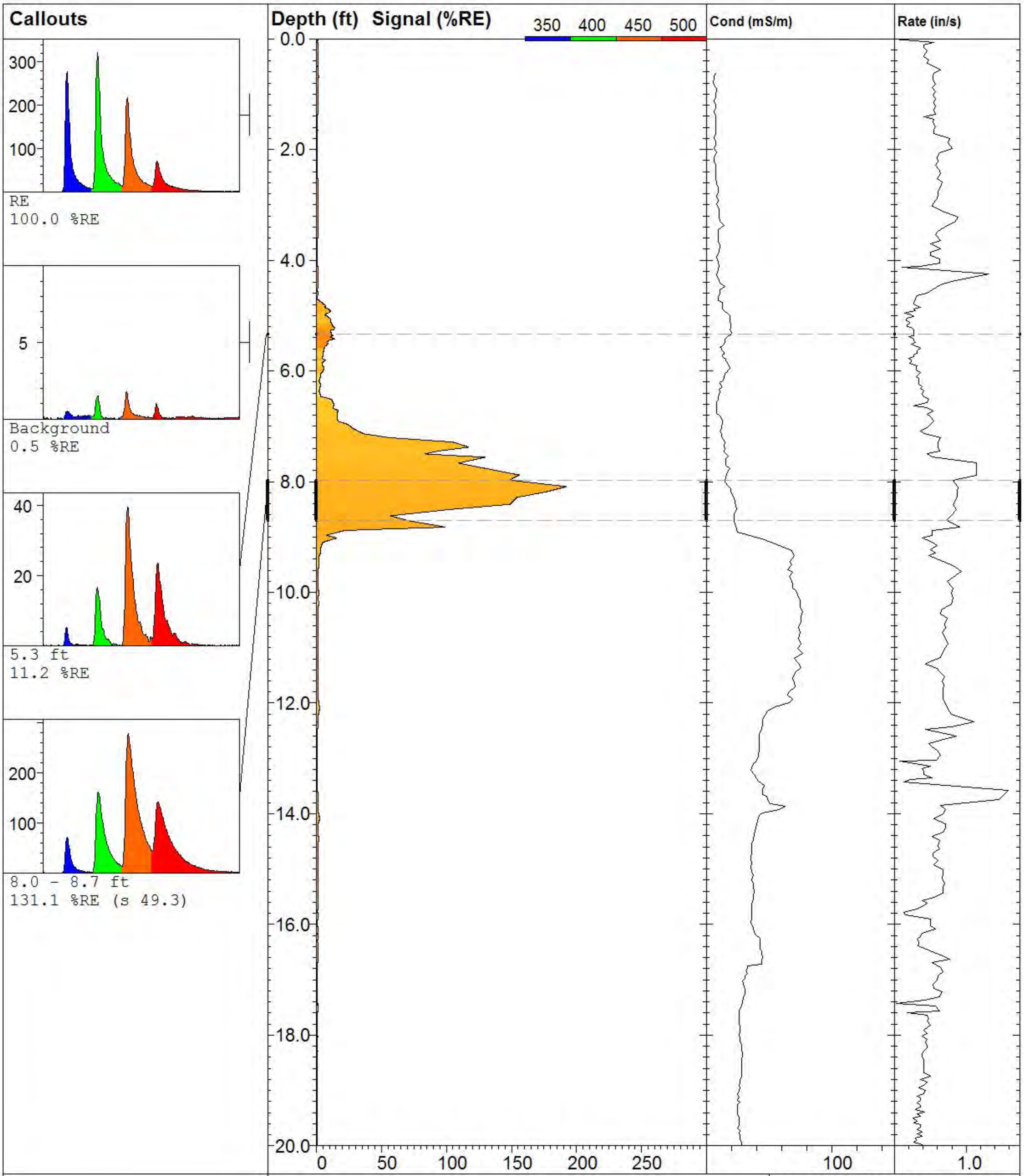


MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-37

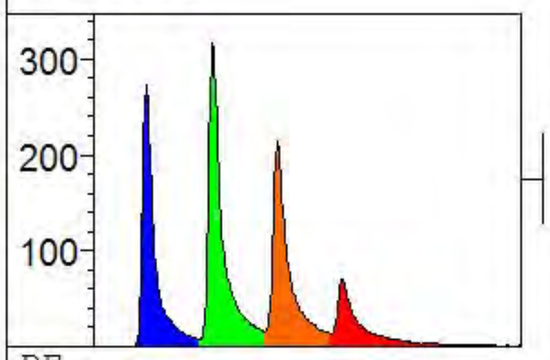
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.06 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **192.1 % @ 6.86 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-14 19:24 EDT**

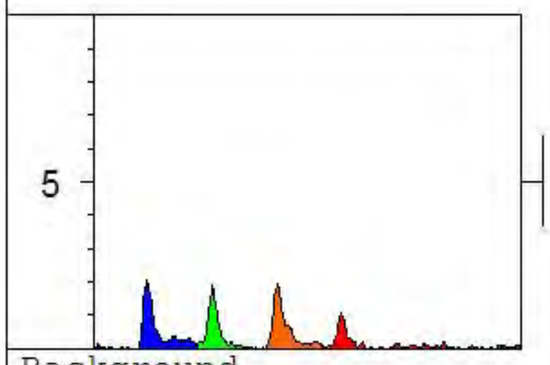


MATRIX ENVIRONMENTAL LLC www.matrixenv.com	**G-39**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.03 ft**
	Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **192.4 % @ 8.09 ft**
	Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 16:22 EDT**

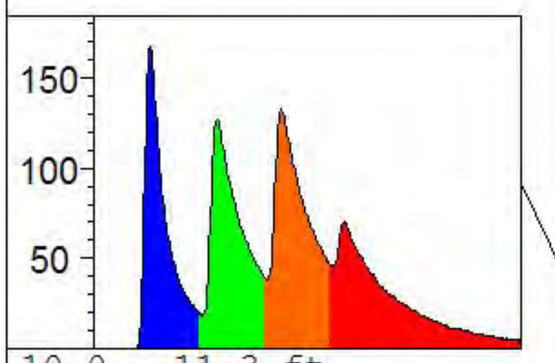
Callouts



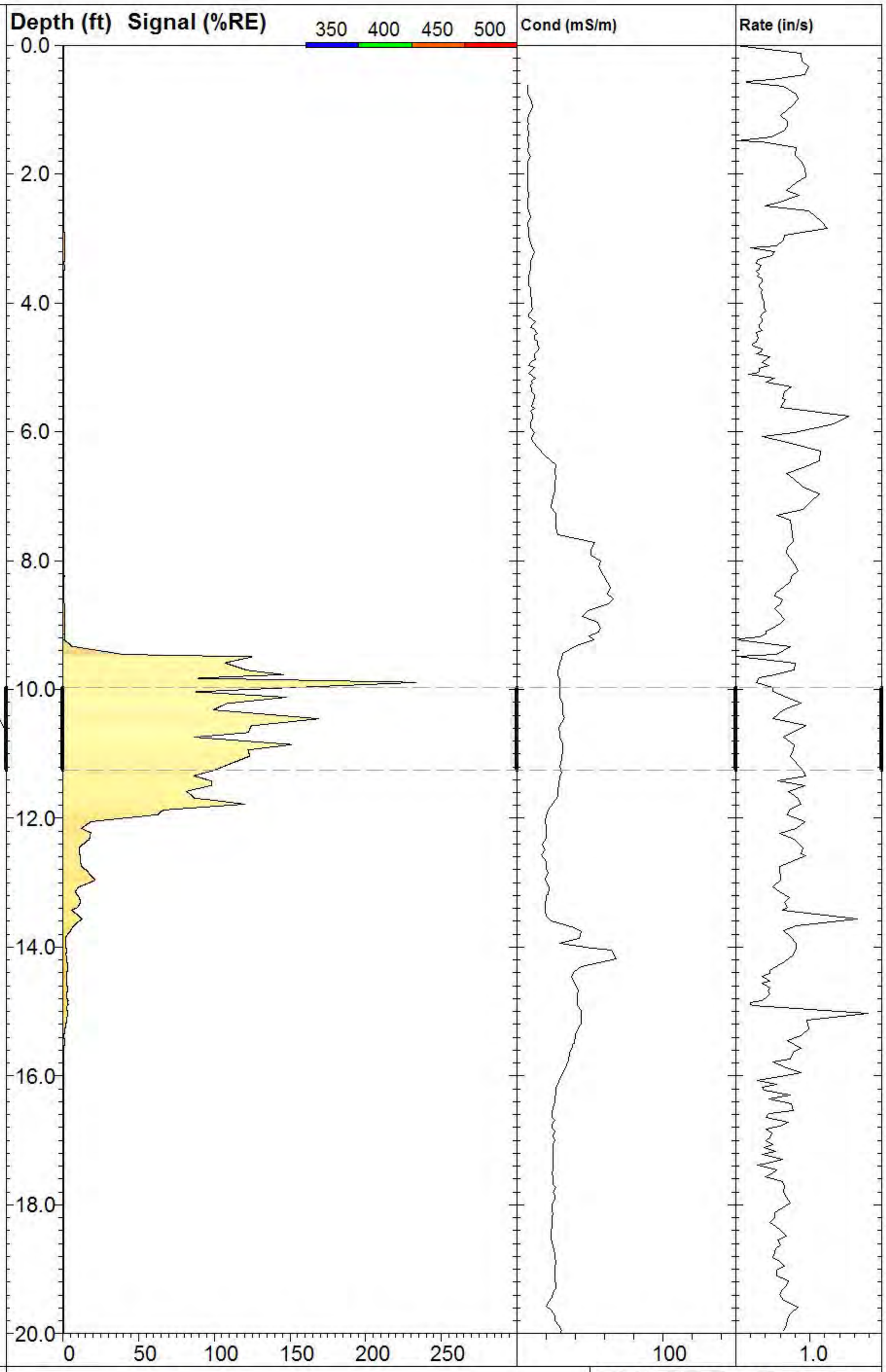
RE
100.0 %RE



Background
0.7 %RE

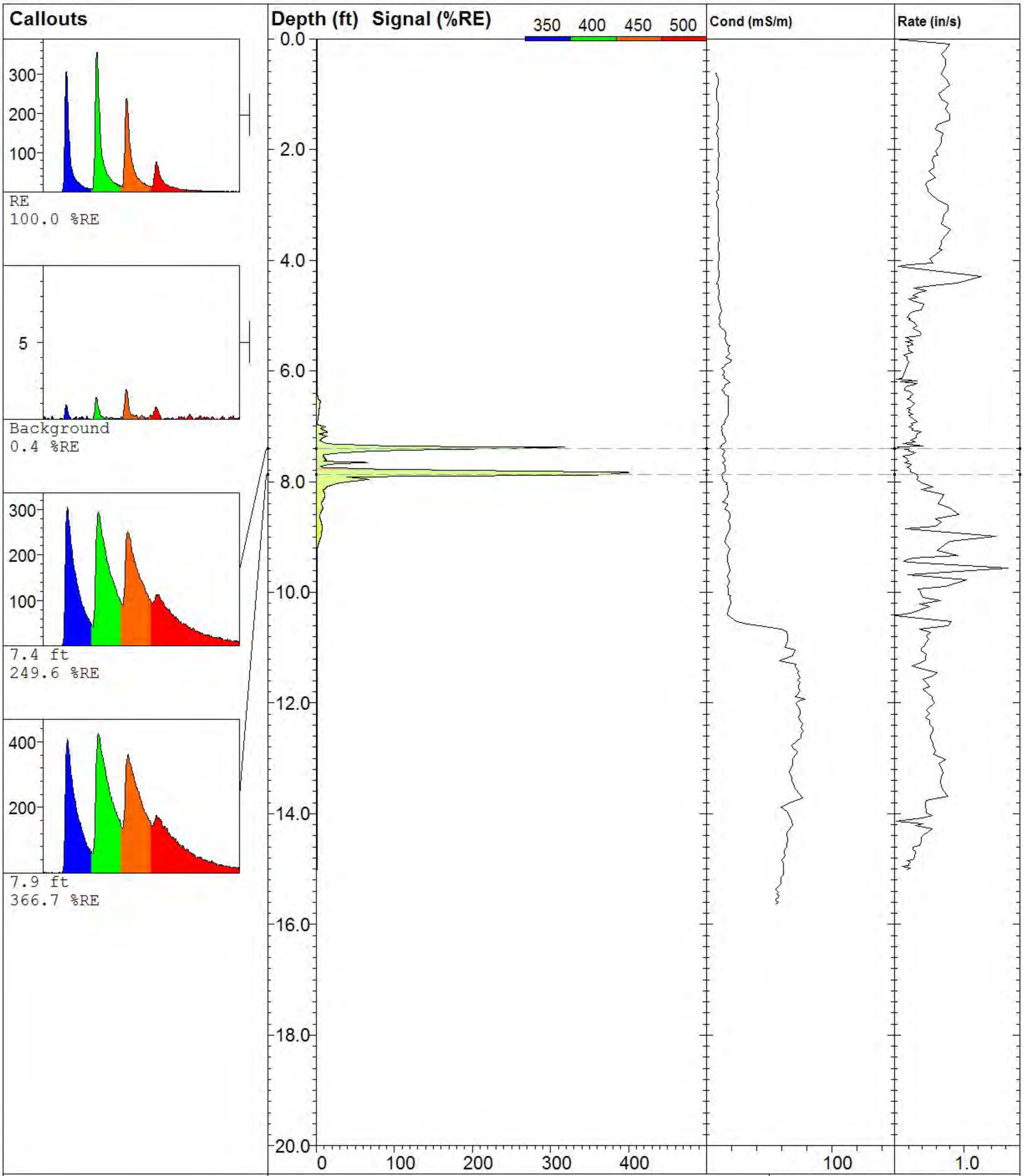


10.0 - 11.3 ft
122.1 %RE (s 25.7)



MATRIX ENVIRONMENTAL LLC www.matrixenv.com	**G-42_MW-14**		**UVOST By Dakota** www.DakotaTechnologies.com
	Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **20.02 ft**
	Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **234.9 % @ 9.89 ft**
	Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-15 17:24 EDT**

Logs at 500% RE



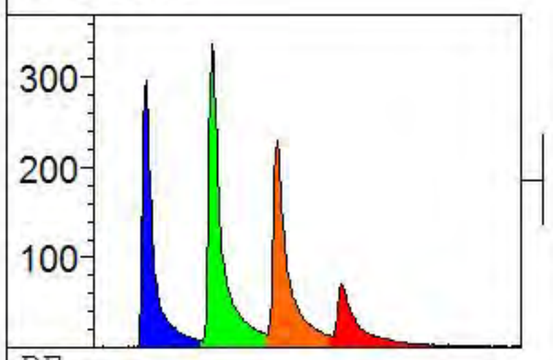
MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

G-18

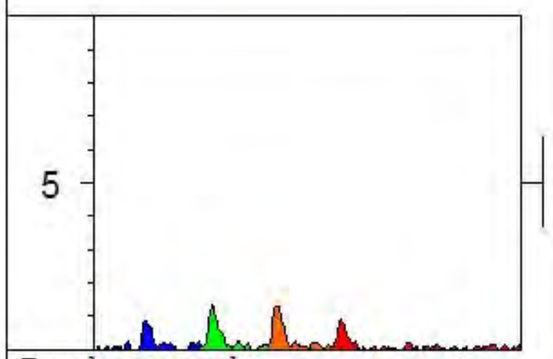
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.02 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **401.5 % @ 7.83 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-12 17:09 EDT**

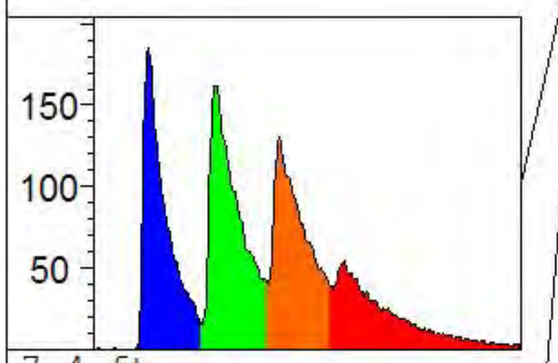
Callouts



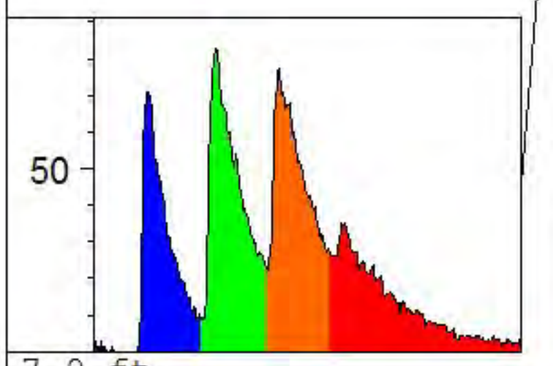
RE
100.0 %RE



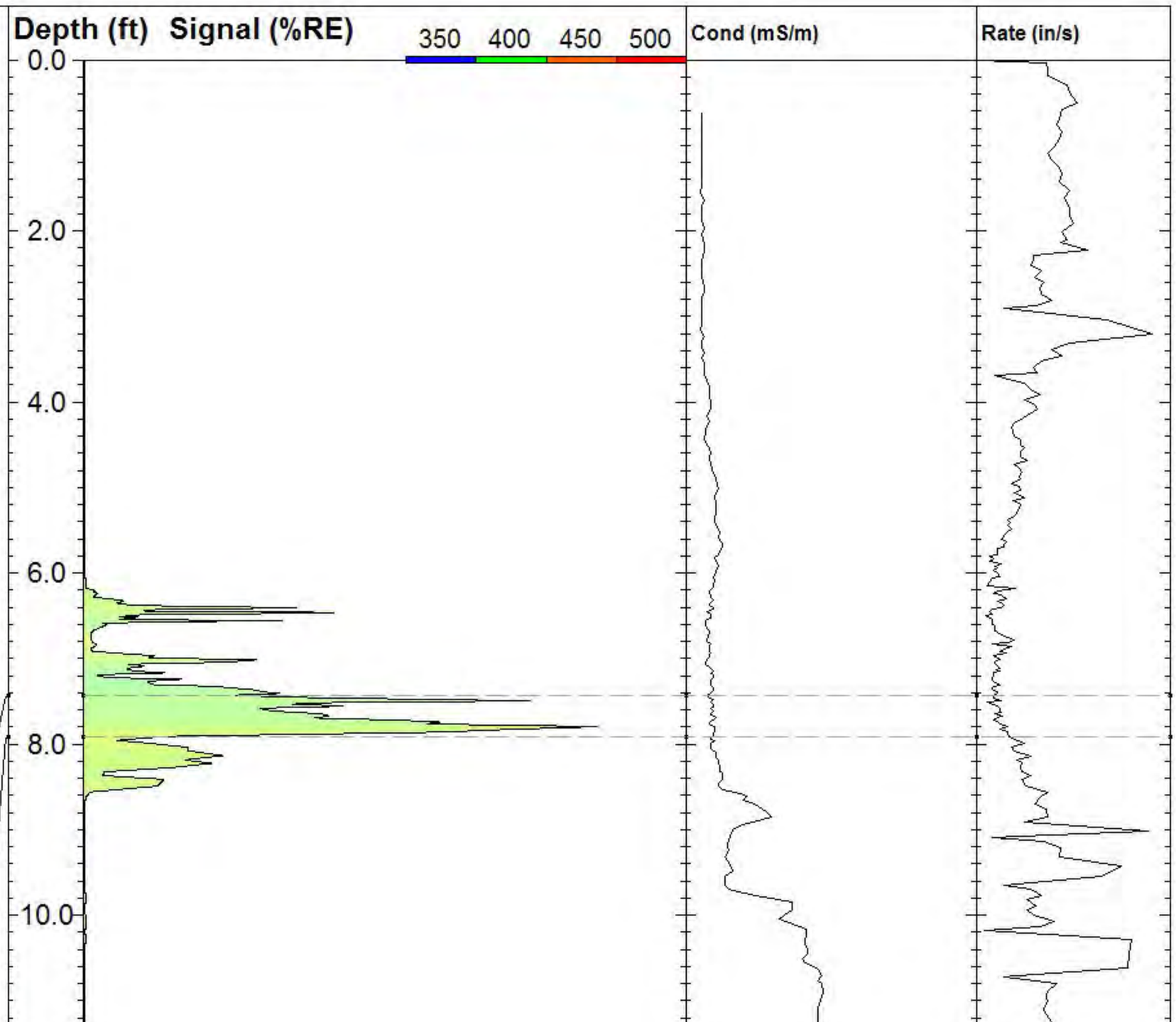
Background
0.5 %RE



7.4 ft
124.9 %RE



7.9 ft
69.1 %RE



MATRIX ENVIRONMENTAL LLC
www.matrixenv.com

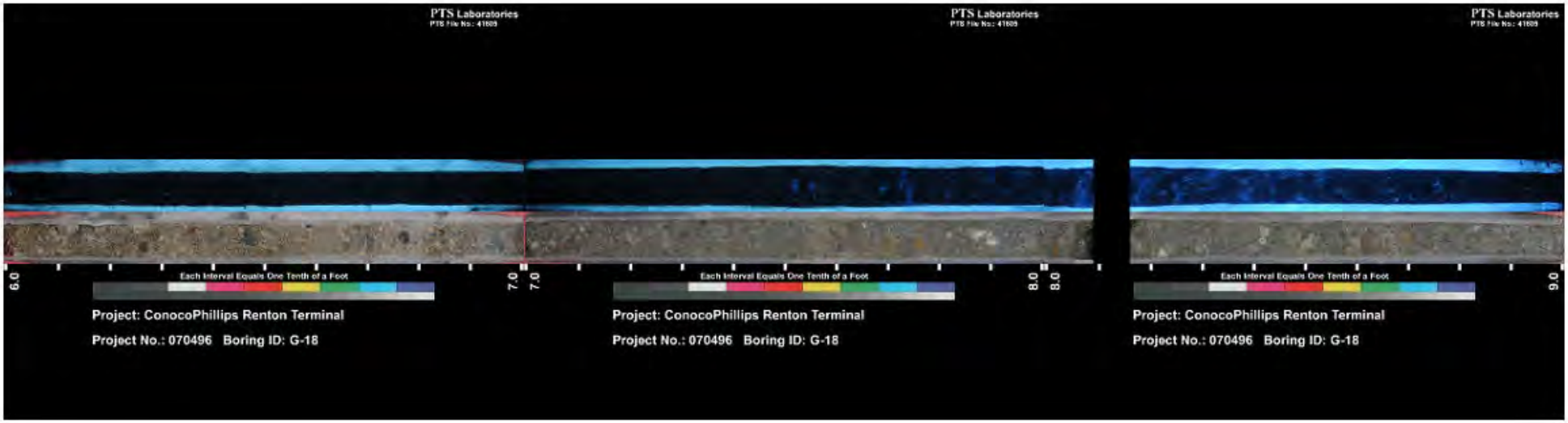
G-25

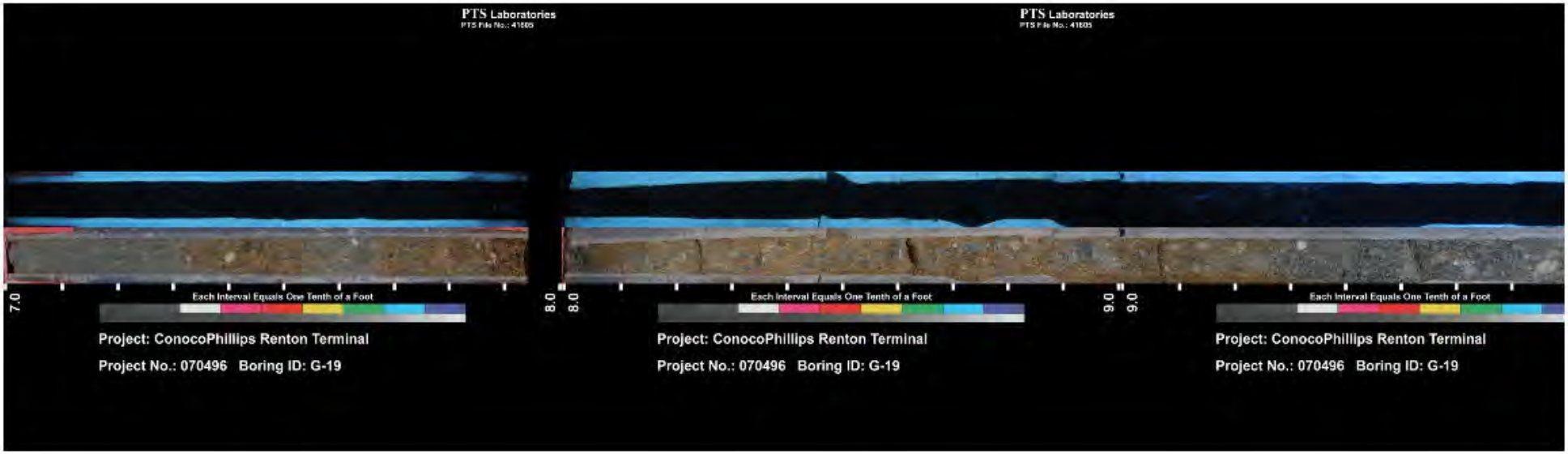
UVOST By Dakota
www.DakotaTechnologies.com

Site: **Conoco Phillips Renton T**	*Latitude / Datum:* **Unavailable / NA**	*Final depth:* **15.00 ft**
Client: **CRA**	*Longitude / Fix:* **Unavailable / NA**	*Max signal:* **429.5 % @ 7.80 ft**
Job: **120-OHDS-11**	*Operator/Unit:* **AK/UVOST1013**	*Date & Time:* **2011-09-13 13:28 EDT**

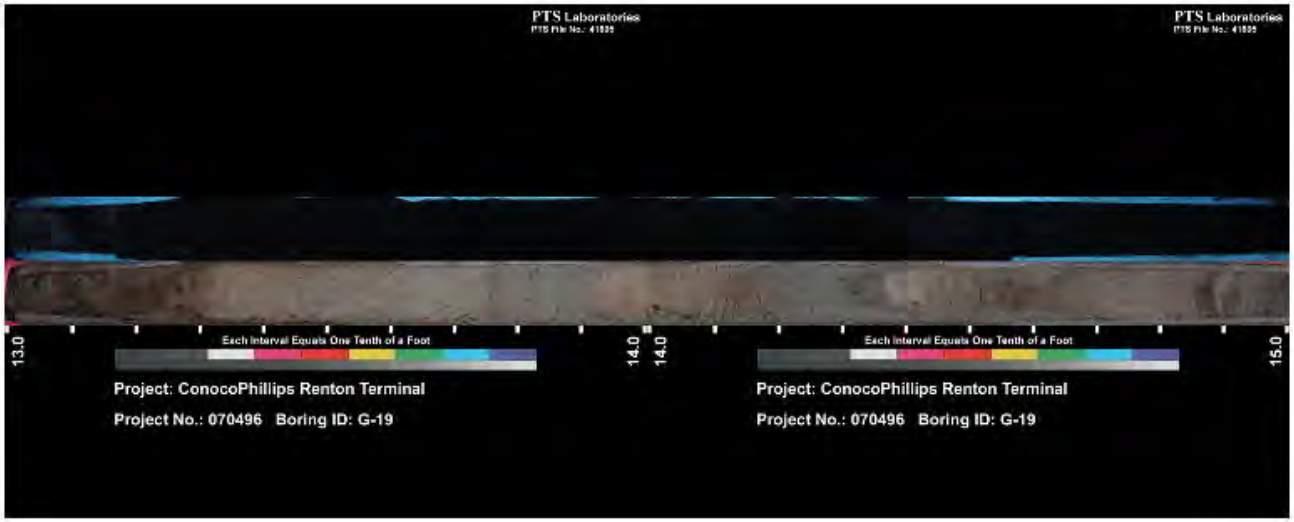
APPENDIX H

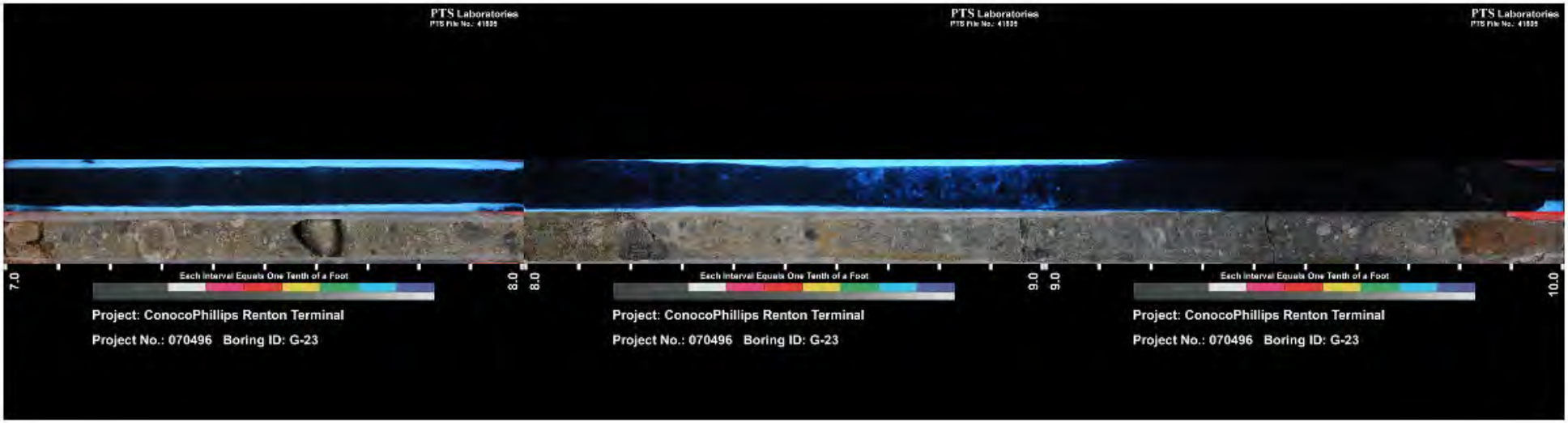
SOIL CORE PHOTOGRAPHY

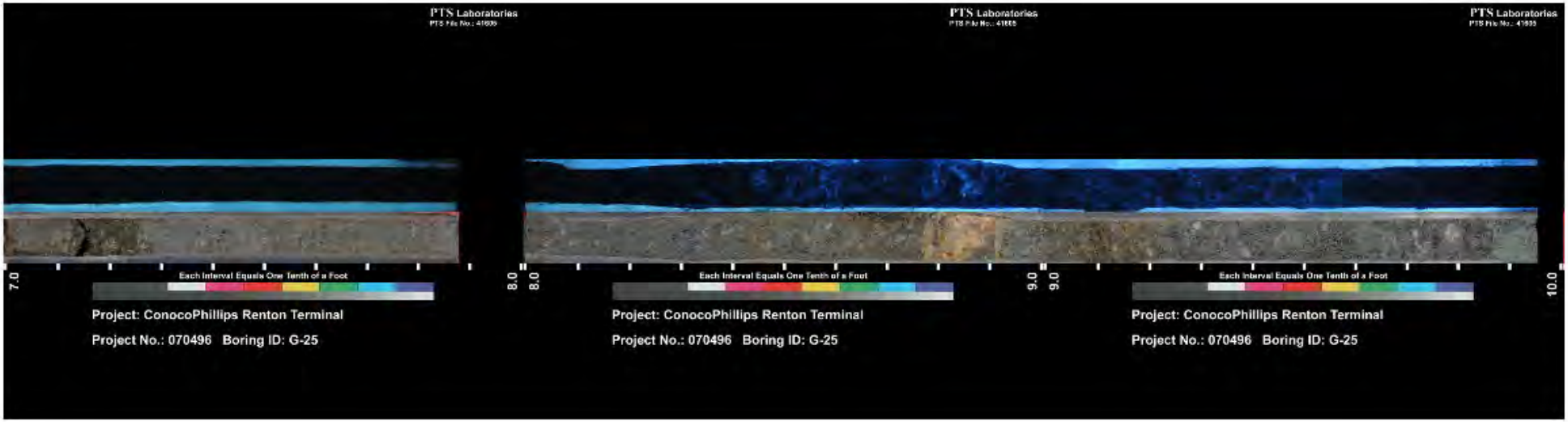

PTS Laboratories
PTS File No.: 41605
6.0
Each Interval Equals One Tenth of a Foot
7.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-18
PTS Laboratories
PTS File No.: 41605
7.0
Each Interval Equals One Tenth of a Foot
8.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-18
PTS Laboratories
PTS File No.: 41605
Each Interval Equals One Tenth of a Foot
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-18

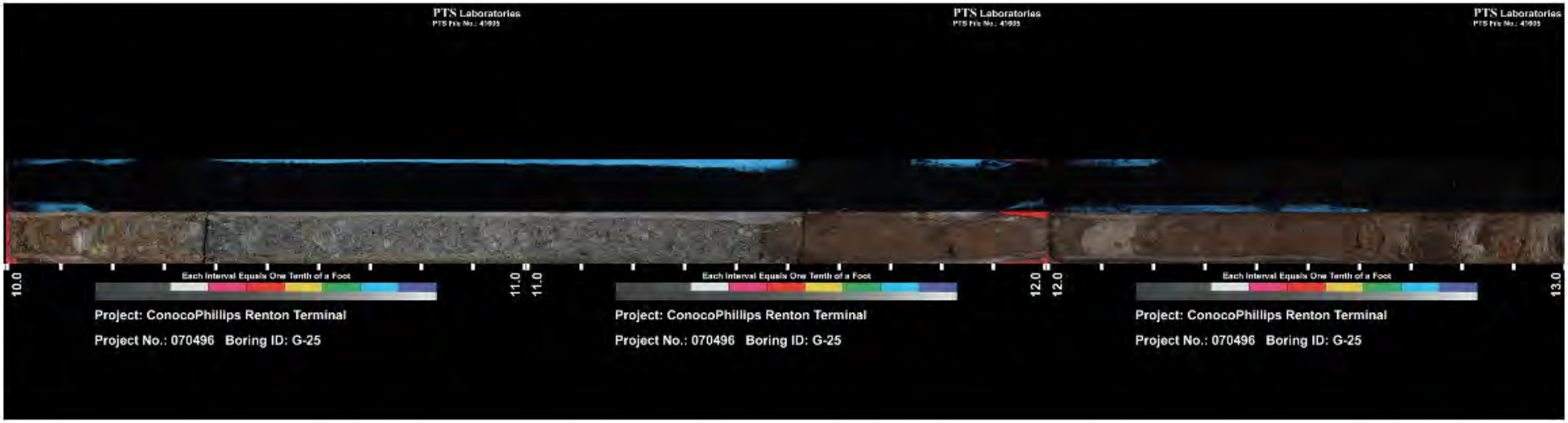

PTS Laboratories
PTS File No.: 41605
7.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19
PTS Laboratories
PTS File No.: 41605
8.0
8.0
Each Interval Equals One Tenth of a Foot
9.0
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19
PTS Laboratories
PTS File No.: 41605
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19

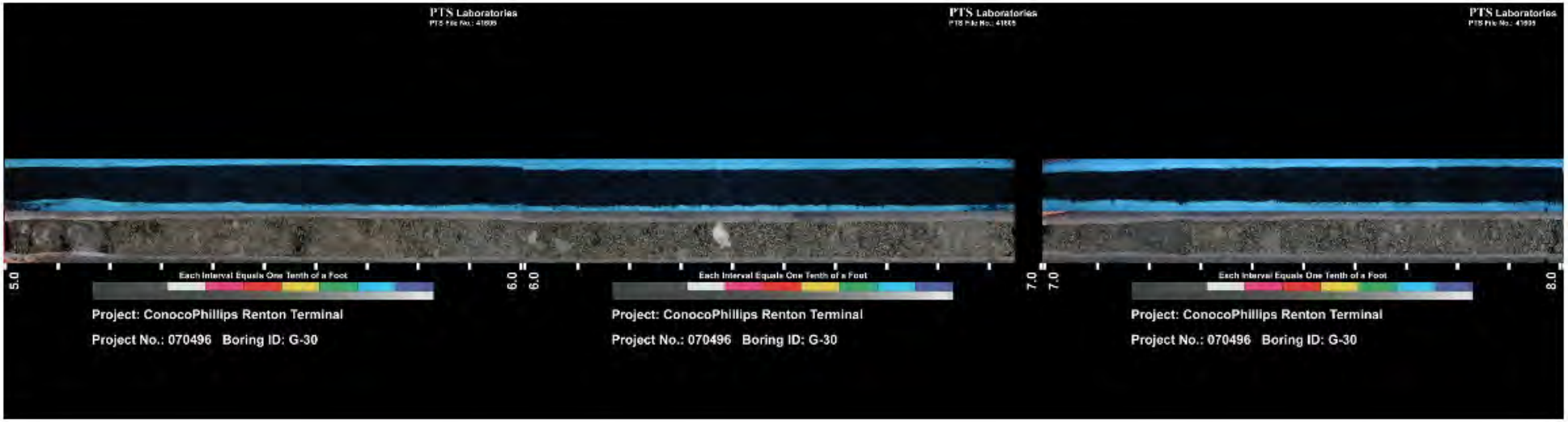

PTS Laboratories
PTS File No.: 41605
Each Interval Equals One Tenth of a Foot
11.0
11.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19
PTS Laboratories
PTS File No.: 41605
Each Interval Equals One Tenth of a Foot
12.0
12.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19
PTS Laboratories
PTS File No.: 41605
Each Interval Equals One Tenth of a Foot
13.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19

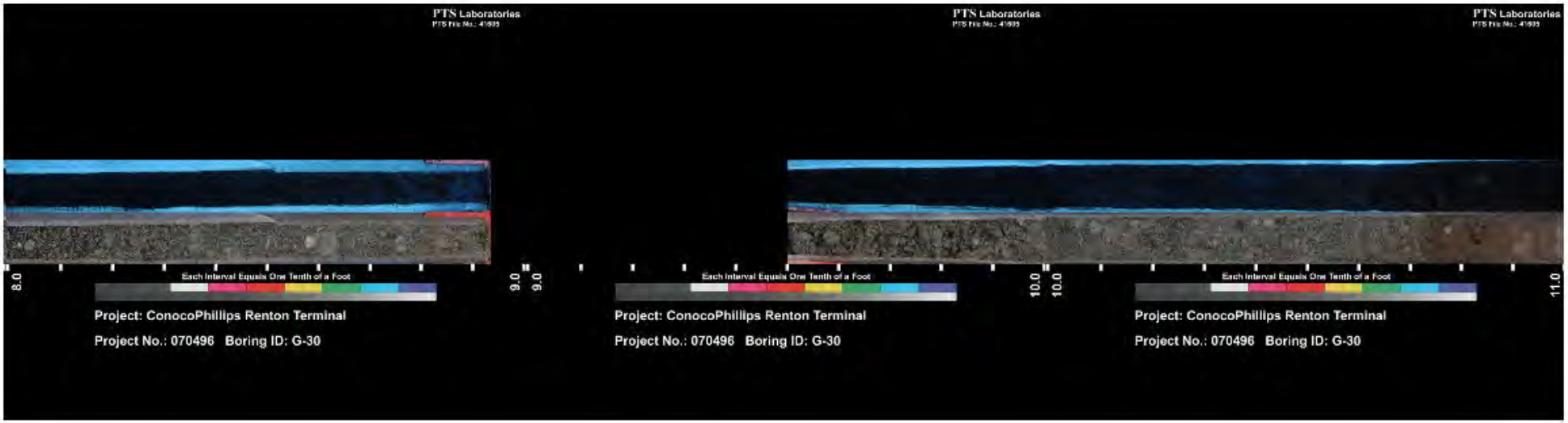

PTS Laboratories
PTS File No.: 41805
PTS Laboratories
PTS File No.: 41805
13.0
Each Interval Equals One Tenth of a Foot
14.0
14.0
Each Interval Equals One Tenth of a Foot
15.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-19

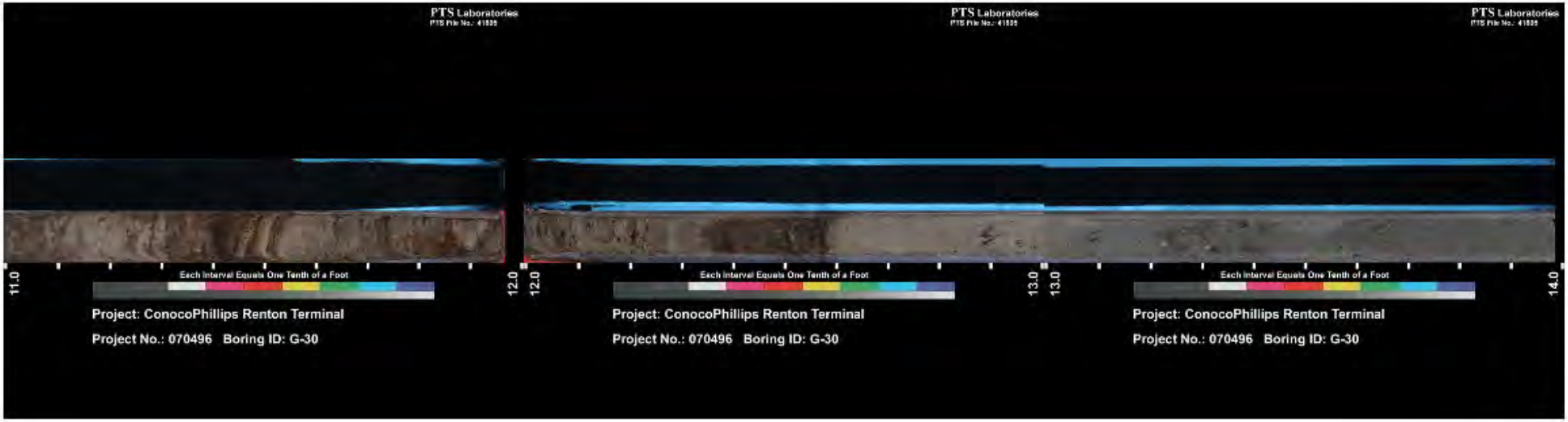

PTS Laboratories
PTS File No.: 41805
7.0
Each Interval Equals One Tenth of a Foot
8.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-23
PTS Laboratories
PTS File No.: 41805
8.0
Each Interval Equals One Tenth of a Foot
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-23
PTS Laboratories
PTS File No.: 41805
Each Interval Equals One Tenth of a Foot
10.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-23

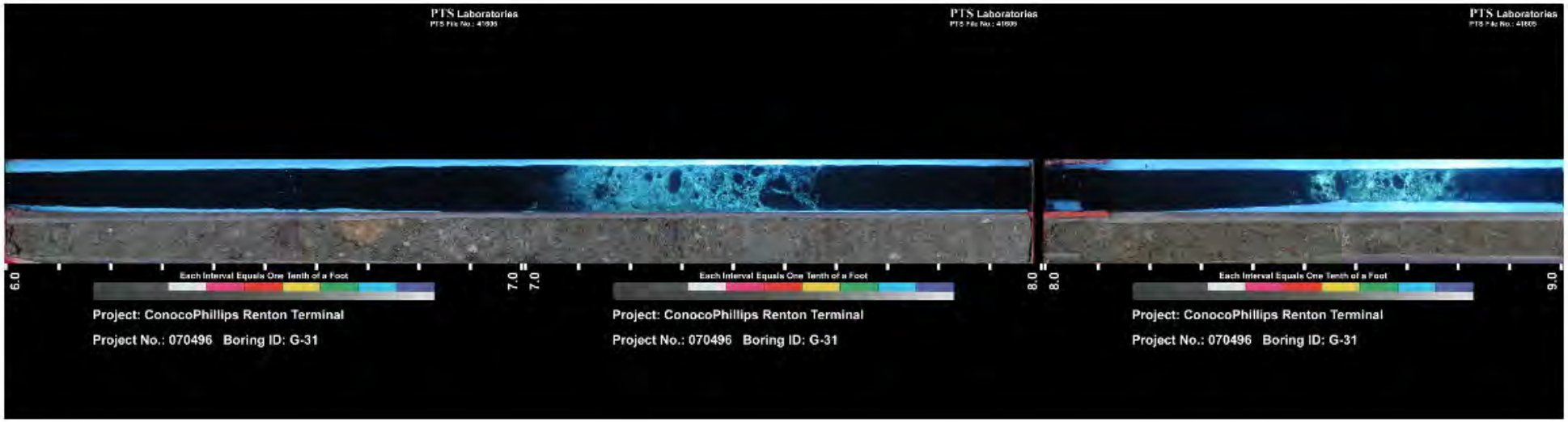

PTS Laboratories
PTS File No.: 41609
7.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-25
PTS Laboratories
PTS File No.: 41609
8.0
8.0
Each Interval Equals One Tenth of a Foot
9.0
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-25
PTS Laboratories
PTS File No.: 41609
Each Interval Equals One Tenth of a Foot
10.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-25

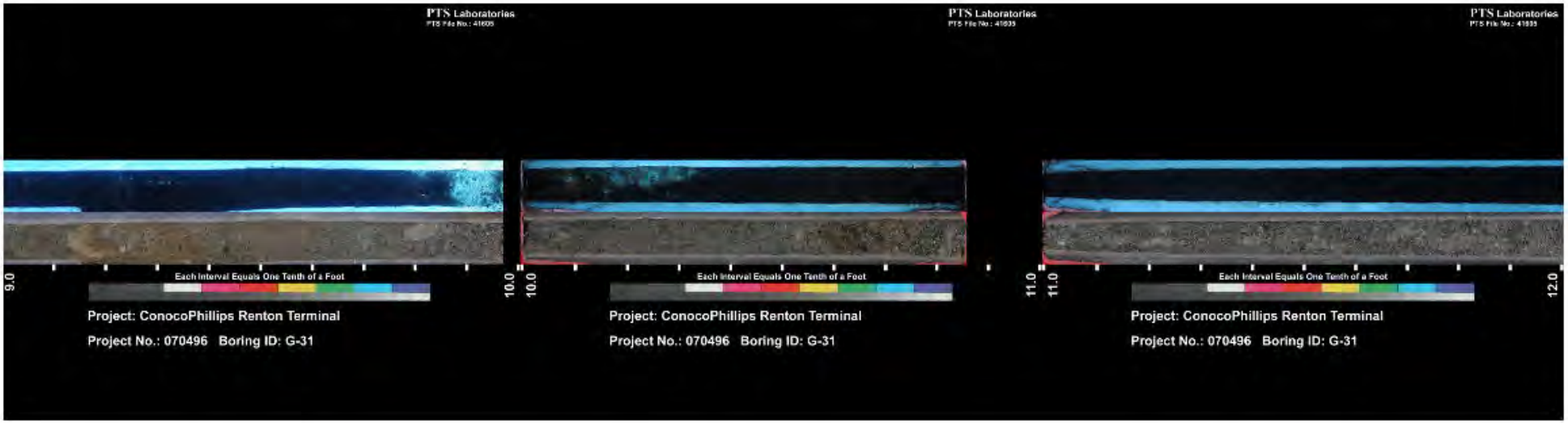

PTS Laboratories
PTS File No.: 41609
10.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-25
PTS Laboratories
PTS File No.: 41609
11.0
11.0
Each Interval Equals One Tenth of a Foot
12.0
12.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-25
PTS Laboratories
PTS File No.: 41609
Each Interval Equals One Tenth of a Foot
13.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-25

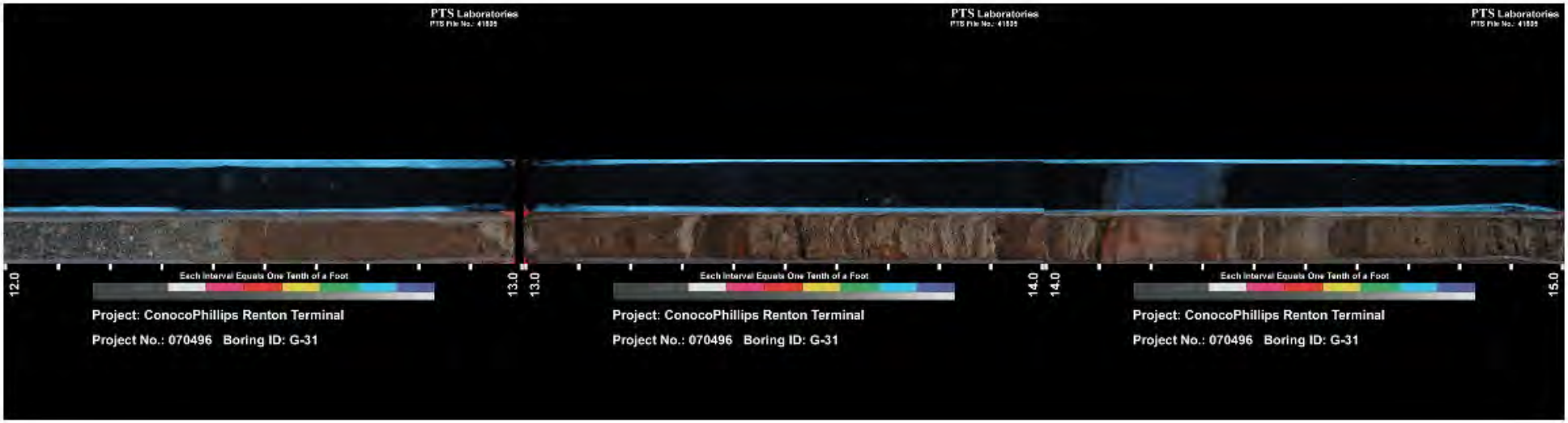

PTS Laboratories
5.0
Each Interval Equals One Tenth of a Foot
6.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30
PTS Laboratories
6.0
Each Interval Equals One Tenth of a Foot
7.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30
PTS Laboratories
7.0
Each Interval Equals One Tenth of a Foot
8.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30

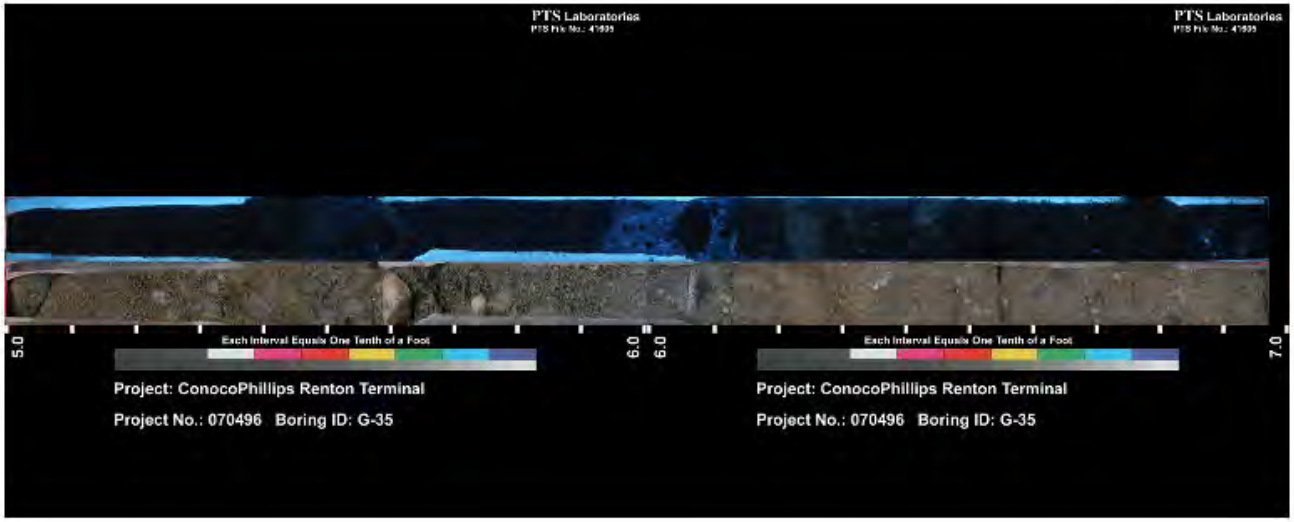

PTS Laboratories
8.0
Each Interval Equals One Tenth of a Foot
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30
PTS Laboratories
9.0
Each Interval Equals One Tenth of a Foot
10.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30
PTS Laboratories
10.0
Each Interval Equals One Tenth of a Foot
11.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30

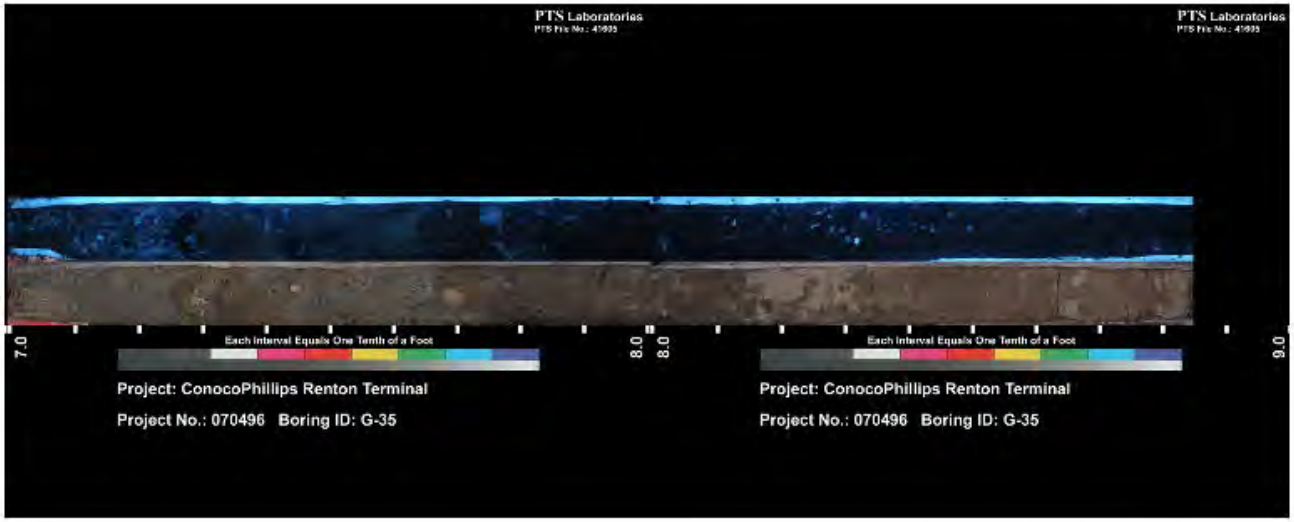

PTS Laboratories
PTS File No.: 41835
11.0
12.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30
PTS Laboratories
PTS File No.: 41835
12.0
13.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30
PTS Laboratories
PTS File No.: 41835
13.0
14.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-30

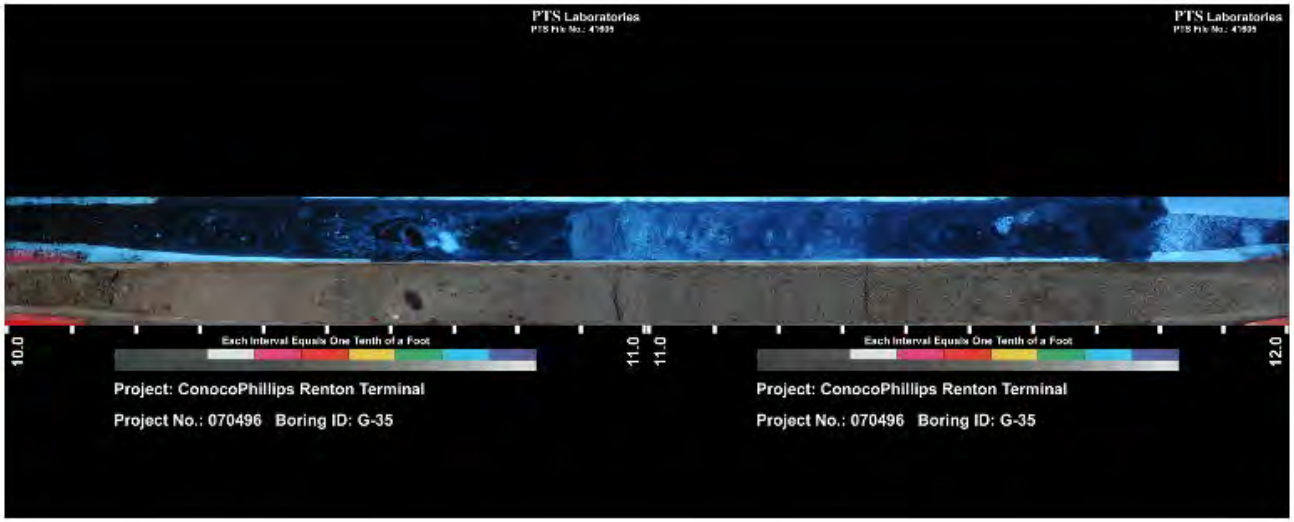

PTS Laboratories
6.0
Each Interval Equals One Tenth of a Foot
7.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31
PTS Laboratories
7.0
Each Interval Equals One Tenth of a Foot
8.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31
PTS Laboratories
8.0
Each Interval Equals One Tenth of a Foot
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31

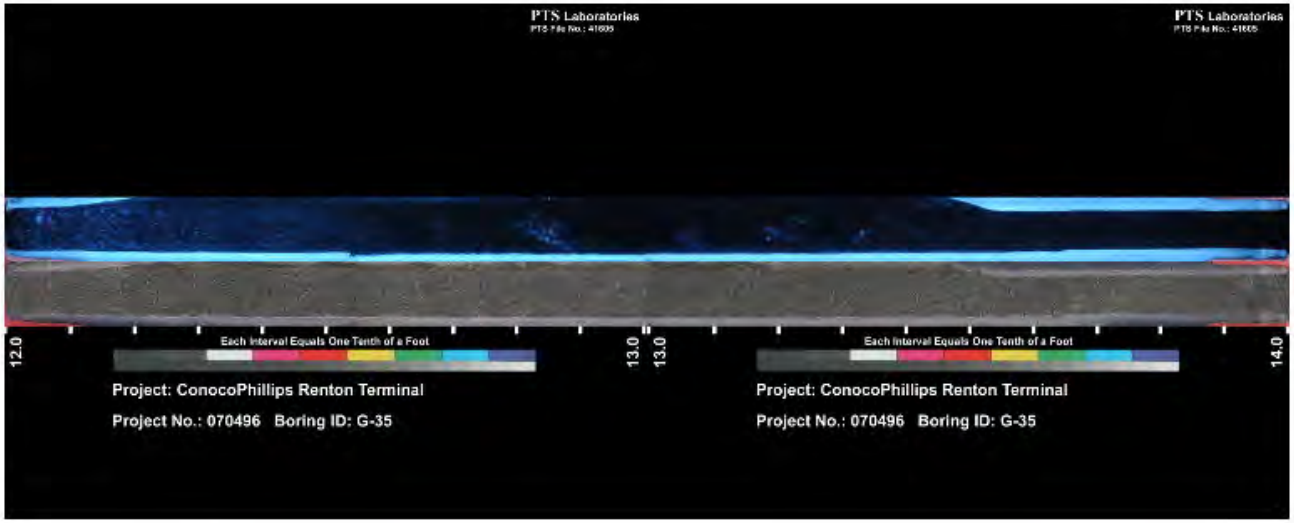

PTS Laboratories
9.0
Each Interval Equals One Tenth of a Foot
10.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31
PTS Laboratories
10.0
Each Interval Equals One Tenth of a Foot
11.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31
PTS Laboratories
11.0
Each Interval Equals One Tenth of a Foot
12.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31

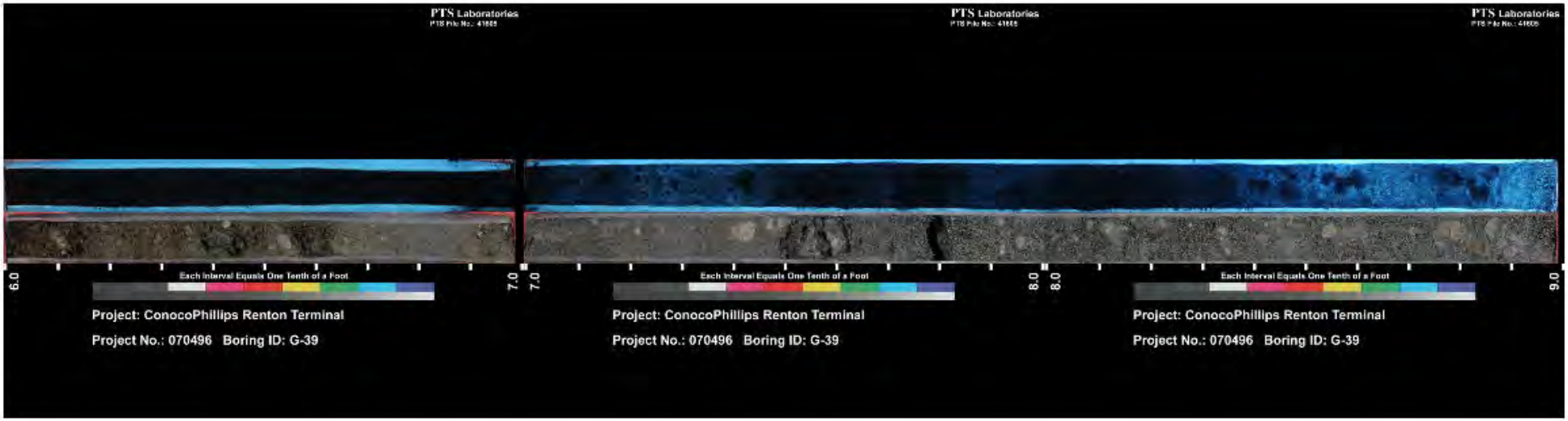

PTS Laboratories
PTS File No.: 41835
12.0
13.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31
PTS Laboratories
PTS File No.: 41835
13.0
14.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31
PTS Laboratories
PTS File No.: 41835
14.0
15.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-31

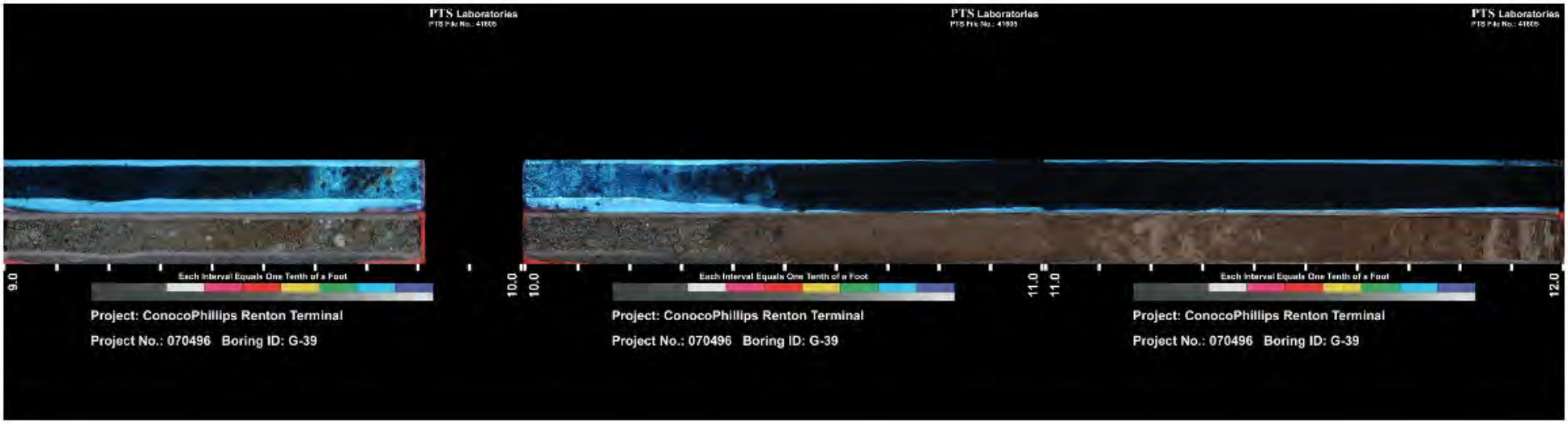

PTS Laboratories
PTS Laboratories
5.0
Each Interval Equals One Tenth of a Foot
6.0
6.0
Each Interval Equals One Tenth of a Foot
7.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35

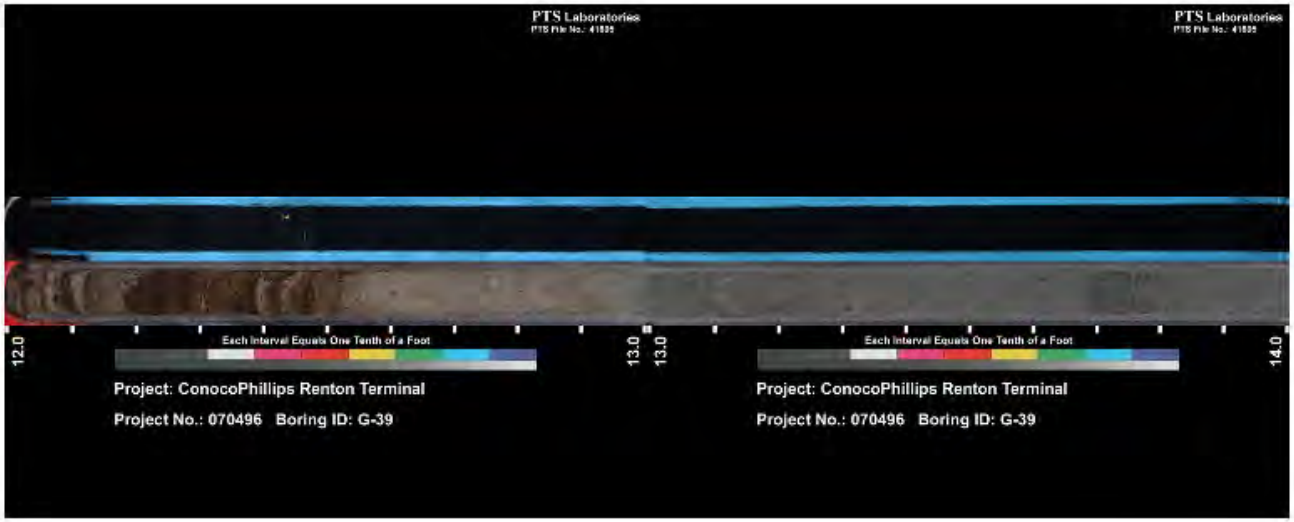

PTS Laboratories
PTS Laboratories
7.0
Each Interval Equals One Tenth of a Foot
8.0
8.0
Each Interval Equals One Tenth of a Foot
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35

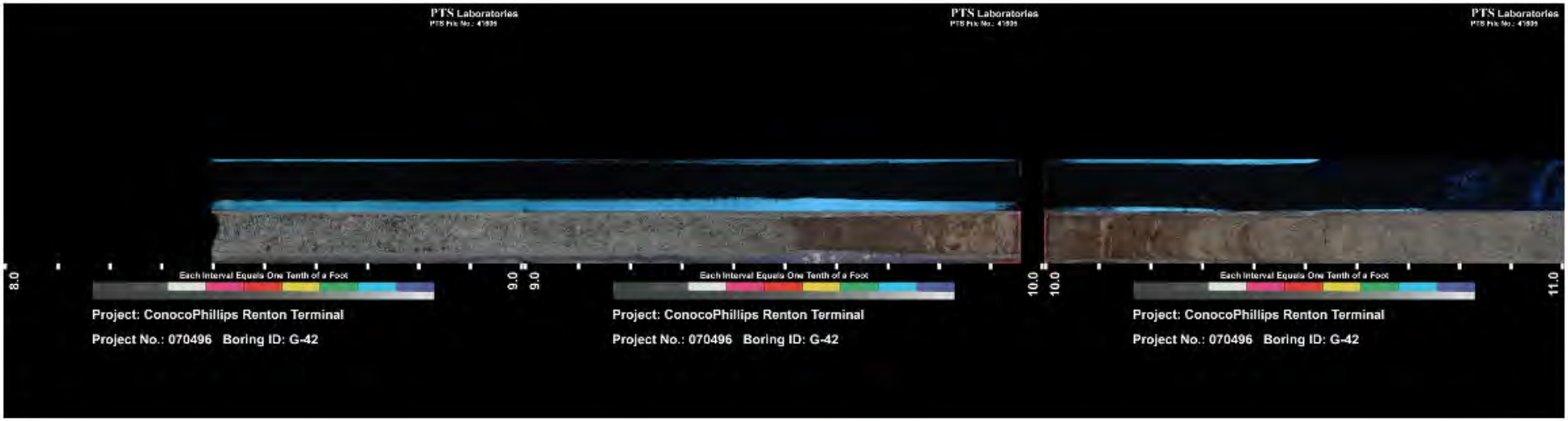

PTS Laboratories
PTS Laboratories
10.0
Each Interval Equals One Tenth of a Foot
11.0
11.0
Each Interval Equals One Tenth of a Foot
12.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35

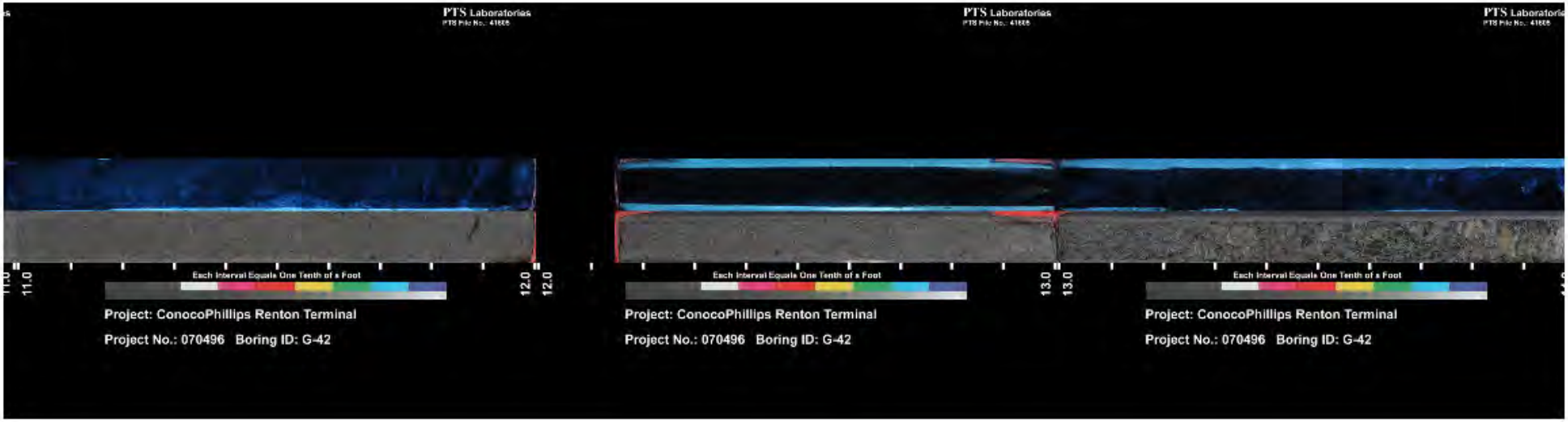

PTS Laboratories
PTS Laboratories
12.0
Each Interval Equals One Tenth of a Foot
13.0
13.0
Each Interval Equals One Tenth of a Foot
14.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-35

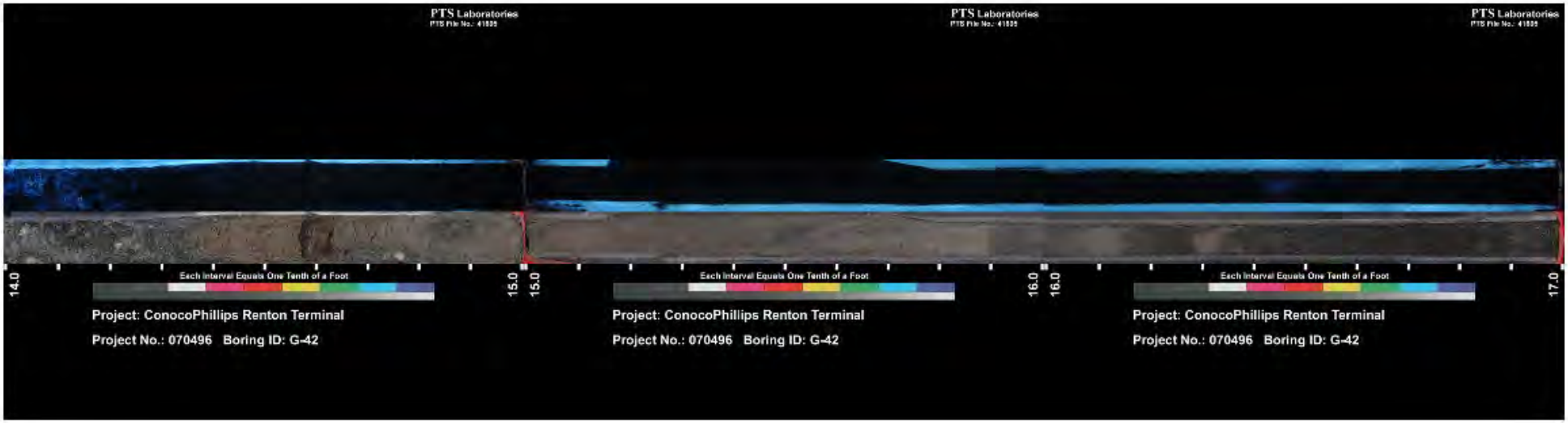

PTS Laboratories
PTS File No.: 41605
6.0
Each Interval Equals One Tenth of a Foot
7.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39
PTS Laboratories
PTS File No.: 41605
7.0
Each Interval Equals One Tenth of a Foot
8.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39
PTS Laboratories
PTS File No.: 41605
8.0
Each Interval Equals One Tenth of a Foot
9.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39


PTS Laboratories
PTS File No.: 41605
9.0
Each Interval Equals One Tenth of a Foot
10.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39
PTS Laboratories
PTS File No.: 41605
10.0
Each Interval Equals One Tenth of a Foot
11.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39
PTS Laboratories
PTS File No.: 41605
11.0
Each Interval Equals One Tenth of a Foot
12.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39


PTS Laboratories
PTS File No.: 41835
PTS Laboratories
PTS File No.: 41835
12.0
Each Interval Equals One Tenth of a Foot
13.0
13.0
Each Interval Equals One Tenth of a Foot
14.0
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-39


PTS Laboratories
8.0
9.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42
PTS Laboratories
9.0
10.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42
PTS Laboratories
10.0
11.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42


PTS Laboratories
11.0
12.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42
PTS Laboratories
12.0
13.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42
PTS Laboratories
13.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42


PTS Laboratories
PTS File No.: 41835
14.0
15.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42
PTS Laboratories
PTS File No.: 41835
15.0
16.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42
PTS Laboratories
PTS File No.: 41835
16.0
17.0
Each Interval Equals One Tenth of a Foot
Project: ConocoPhillips Renton Terminal
Project No.: 070496 Boring ID: G-42

APPENDIX I

SOIL CORE PETROPHYSICAL RESULTS

PTS Laboratories

Project Name: ConocoPhillips Renton Terminal
Project Number: 070496

PTS File No: 41605
Client: Conestoga-Rovers & Associates

TEST PROGRAM - 20110914

CORE ID	Depth ft.	Core Recovery ft.	Slab and Core Photo	Pore Fluid Saturation Package	Grain Size Analyses	A/W Drng. Capillarity Pkg.	Free Product Mobility	Residual Saturation by Water Drive	Fluid Properties Pkg.	Notes
		Plugs:	1/4:3/4	Hor. 1.5"	Grab	Hor. 1"	Hor. 1.5"	Vert. 1.5"	Bulk	Keep core frozen
Date Received: 20110914										
G-23	**7-8**	**1.00**	**1**							
G-23	**8-10**	**2.00**	**2**					**8.85**		
G-18	**6-7**	**1.00**	**1**							
G-18	**7-9**	**1.90**	**2**	**8.3**	**8.5**	**8.5**				Include vG parameters
G-19	**7-8**	**0.95**	**1**							
G-19	**8-10**	**1.95**	**2**	**9.3**						
G-19	**10.75-13**	**2.10**	**3**							
G-19	**13-15**	**2.00**	**2**							
G-25	**7-8**	**0.85**	**1**							
G-25	**8-10**	**1.95**	**2**					**9.1**		
G-25	**10-12**	**2.00**	**2**							
G-25	**12-14**	**2.00**	**2**							
Date Received: 20110917										
G-34	**3.5-6**	**2.50**								
G-34	**6-8**	**2.00**								
G-34	**8.75-11**	**2.25**								
G-34	**11-13**	**2.00**								
G-33	**6-8**	**2.00**								
G-33	**8-10**	**2.00**								
G-33	**11-12**	**1.00**								
G-33	**13-15**	**2.00**								
G-26	**4-6**	**2.15**								
G-35	**5-7**	**1.95**	**2**							
G-35	**7-9**	**1.85**	**2**							

PTS Laboratories

Project Name: ConocoPhillips Renton Terminal
Project Number: 070496

PTS File No: 41605
Client: Conestoga-Rovers & Associates

TEST PROGRAM - 20110914

CORE ID	Depth ft.	Core Recovery ft.	Slab and Core Photo	Pore Fluid Saturation Package	Grain Size Analyses	A/W Drng. Capillarity Pkg.	Free Product Mobility	Residual Saturation by Water Drive	Fluid Properties Pkg.	Notes
		Plugs:	1/4:3/4	Hor. 1.5"	Grab	Hor. 1"	Hor. 1.5"	Vert. 1.5"	Bulk	Keep core frozen
G-35	**10-12**	**2.00**	**2**	**11.2**						
G-35	**12-14**	**2.00**	**2**							
G-31	**6-8**	**1.95**	**2**					**7.2**		
G-31	**8-10**	**1.95**	**2**							
G-31	**10-11**	**0.85**	**1**							
G-31	**11-13**	**1.95**	**2**							
G-31	**13-15**	**2.00**	**2**							
G-30	**5-7**	**1.95**	**2**							
G-30	**7-9**	**1.90**	**2**							
G-30	**9.5-12**	**2.45**	**3**	**10.4**						
G-30	**12-14**	**2.00**	**2**							
G-29	**8-10**	**2.00**								
G-29	**10-12**	**2.00**								
G-27	**6.3-7**	**0.79**								
G-27	**7-9**	**2.00**								
G-27	**10-12**	**2.00**								
G-27	**12-14**	**2.00**								
G-28	**5.8-7**	**1.25**								
G-28	**7-9**	**2.00**								
G-28	**10-12**	**2.00**								
G-28	**12-14**	**2.00**								
G-37	**5-7**	**2.00**								Core Labeled: G-27
G-37	**7-9**	**2.00**								Core Labeled: G-27
G-37	**9-10**	**0.85**								Core Labeled: G-27

PTS Laboratories

Project Name: ConocoPhillips Renton Terminal
Project Number: 070496

PTS File No: 41605
Client: Conestoga-Rovers & Associates

TEST PROGRAM - 20110914

CORE ID	Depth ft.	Core Recovery ft.	Slab and Core Photo	Pore Fluid Saturation Package	Grain Size Analyses	A/W Drng. Capillarity Pkg.	Free Product Mobility	Residual Saturation by Water Drive	Fluid Properties Pkg.	Notes
		Plugs:	1/4:3/4	Hor. 1.5"	Grab	Hor. 1"	Hor. 1.5"	Vert. 1.5"	Bulk	Keep core frozen
G-37	**12-14**	**2.00**								Core Labeled: G-27
G-32	**6.5-8**	**1.50**								
G-32	**8-10**	**2.00**								
G-32	**12-13**	**1.00**								
G-32	**13-15**	**2.00**								
G-40	**5.5-7**	**1.50**								
G-40	**7-9**	**2.00**								
G-40	**9-10**	**0.85**								
G-40	**10-12**	**2.00**								
G-40	**12-14**	**2.00**								
G-41	**9.3-11**	**1.70**								
G-41	**11-13**	**2.00**								
G-38	**4-5**	**0.85**								
G-38	**5-7**	**2.00**								
G-38	**7-9**	**2.00**								
G-38	**10-12**	**2.00**								
G-38	**12-14**	**2.00**								
G-39	**6-7**	**0.95**	**1**							
G-39	**7-9**	**2.00**	**2**					**8.7**		
G-39	**9-10**	**0.80**	**1**							
G-39	**10-12**	**2.00**	**2**							
G-39	**12-14**	**2.00**	**2**							
G-42	**8.4-10**	**1.55**	**2**							
G-42	**10-12**	**2.00**	**2**		**11.5**	**11.5**		**11.25**		Include vG parameters

PTS Laboratories

Project Name: ConocoPhillips Renton Terminal
Project Number: 070496

PTS File No: 41605
Client: Conestoga-Rovers & Associates

TEST PROGRAM - 20110914

CORE ID	Depth ft.	Core Recovery ft.	Slab and Core Photo	Pore Fluid Saturation Package	Grain Size Analyses	A/W Drng. Capillarity Pkg.	Free Product Mobility	Residual Saturation by Water Drive	Fluid Properties Pkg.	Notes
		Plugs:	1/4:3/4	Hor. 1.5"	Grab	Hor. 1"	Hor. 1.5"	Vert. 1.5"	Bulk	Keep core frozen
G-42	**12.15-13**	**0.85**	**1**							
G-42	**13-15**	**2.00**	**2**							
G-42	**15-17**	**2.00**	**2**							
TOTALS:	**74 cores**	**130.84**	**64**	**4**	**2**	**2**	**0**	**5**	**0**	**74**

Laboratory Test Program Notes

Sample locations to be selected by Conestoga-Rovers & Associates personnel from core photography.
Several core intervals listed on the COC were not recovered in the field, per M. Davis/CRA 20110914. These intervals have been omitted from this test program.
The four cores listed on the COC as G-37 were mislabeled as G-27, the times and dates one the cores were verified with the times and dates on the COC. These cores will be relabeled by PTS Laboratories. Ok per M. Davis/CRA 20110919.

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY	CRA
ADDRESS	1117 Tacoma Ave S.
CITY	Tacoma, WA
ZIP CODE	98402
PROJECT MANAGER	ED Turner
PROJECT NAME	CoP Renton Terminal
PHONE NUMBER	253-507-6217
PROJECT NUMBER	070496
FAX NUMBER	
SITE LOCATION	Renton, WA
SAMPLER SIGNATURE	Mark

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	PHOTOLOG: CORE PHOTOGRAPHY	COMMENTS
G-23	9/12/11	1230	5'-10'		X	Cores Frozen
G-18	9/12/11	1400	6'-12'		X	Hold for
G-19	9/13/11	945	7'-15'		X	additional
G-25	9/13/11	1100	7'-14'		X	analyses

ANALYSIS REQUEST

- SOIL PROPERTIES PACKAGE
- HYDRAULIC CONDUCTIVITY PACKAGE
- PORE FLUID SATURATIONS PACKAGE
- TCEQ/TNRCC PROPERTIES PACKAGE
- CAPILLARITY PACKAGE
- FLUID PROPERTIES PACKAGE
- MOISTURE CONTENT, ASTM D2216
- POROSITY: TOTAL, API RP40
- POROSITY: EFFECTIVE, ASTM D425M
- SPECIFIC GRAVITY, ASTM D854
- BULK DENSITY (DRY), API RP40 or ASTM D2937
- AIR PERMEABILITY, API RP40
- HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084
- GRAIN SIZE DISTRIBUTION, ASTM D422/4464M
- TOC: WALKLEY-BLACK
- ATTERBERG LIMITS, ASTM D4318

PO#

TURNAROUND TIME

24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☒
72 HOURS ☐

OTHER: _____

SAMPLE INTEGRITY (CHECK):

INTACT ✓ ON ICE ____

PTS QUOTE NO.

PTS FILE: 41605

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Mark	Joel Jr		
COMPANY: CRA	COMPANY: PTS Labs Inc	COMPANY:	COMPANY:
DATE: 9/12/11 TIME: 1330	DATE: 9-14-11 TIME: 1330	DATE: TIME:	DATE: TIME:

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE OF

COMPANY: CRA

ADDRESS: 1117 Tacoma Ave. S. CITY: Tacoma, WA ZIP CODE: 98402

PROJECT MANAGER: Ed Turner/Matt Davis

PROJECT NAME: Renton Terminal PHONE NUMBER: 253-507-6217

PROJECT NUMBER: 070496 FAX NUMBER:

SITE LOCATION: Renton, WA

SAMPLER SIGNATURE: Matt Davis

PO#:

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☒
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT ____ ON ICE ____

PTS QUOTE NO.:

PTS FILE: 41669

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE	TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE	FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: TOTAL, API RP40	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	COMMENTS
G-32	9/15	850	6.5-10, 12-15																			Cores on dry ice.
G-40	9/15	1000	5.5 - 14																			Hold photographed
G-41	9/15	1050	9.3 - 13																			core for additional
G-38	9/15	1150	4-9, 10-14																			analysis.
G-39	9/15	1350	6 - 14								X											
G-42	9/15	1450	8-17								X											- Hold all samples
																						not marked for
																						analysis until
																						further notice.

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY: CRA	COMPANY: PTS Labs.	COMPANY:	COMPANY:
DATE: 9/16/11 TIME: 1405	DATE: 9/17/11 TIME: 1043	DATE: TIME:	DATE: TIME:

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE OF

COMPANY: CRA

ADDRESS: 1117 Tacoma Ave. S. CITY: Tacoma, WA ZIP CODE: 98402

PROJECT MANAGER: ED Turner

PROJECT NAME: 070496 - Renton Terminal PHONE NUMBER: 253-507-6217

PROJECT NUMBER: 070496 FAX NUMBER:

SITE LOCATION: Renton, WA

SAMPLER SIGNATURE:

PO#:

TURNAROUND TIME
24 HOURS ☐ 5 DAYS ☐
48 HOURS ☐ NORMAL ☒
72 HOURS ☐
OTHER: _____

SAMPLE INTEGRITY (CHECK):
INTACT ____ ON ICE ____

PTS QUOTE NO.:

PTS FILE: 41669

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	NUMBER OF SAMPLES	PHOTOLOG: CORE PHOTOGRAPHY	COMMENTS
G-34	9/13	1495	3-13			Cores on dry Ice
G-33	9/13	1530	5-15			Hold for additional
G-26	9/13	1650	4-6			analyses.
G-35	9/14	855	5-14		X	
G-31	9/14	1020	6-15		X	Hold all samples
G-30	9/14	1120	5-14		X	not marked for
G-29	9/14	1320	8-12			analysis until
G-27	9/14	1415	6-14			further notice.
G-28	9/14	1510	5.8-14			
G-37	9/14	1640	5-14			

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY: CRA	COMPANY: PTS Labs. Inc.	COMPANY:	COMPANY:
DATE: 9/16/11 TIME: 1405	DATE: 9/17/11 TIME: 1043	DATE: TIME:	DATE: TIME:

PTS File No: 41605
Client: Conestoga-Rovers & Associates

SAMPLE PROPERTIES - AIR/WATER CAPILLARY PRESSURE

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 070496

		METHODS:	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40
		SAMPLE	MOISTURE	DENSITY		POROSITY, %Vb (2)		TOTAL PORE FLUID
SAMPLE ID.	DEPTH, ft.	ORIENTATION (1)	CONTENT, % weight	DRY BULK, g/cc	GRAIN, g/cc	TOTAL	AIR FILLED	SATURATIONS (3), % Pv
G-18	8.5	H	9.7	2.08	2.71	23.3	3.2	86.2
G-42	11.5	H	19.5	1.61	2.68	40.0	8.7	78.3

(1) Sample Orientation: H = horizontal; V = vertical
(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids
(3) Water = 0.9996 g/cc
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS Laboratories, Inc.

Conestoga-Rovers & Associates
PTS File No: 41605

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 70496

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
G-18	8.5	Coarse sand	0.876	30.43	10.68	24.92	27.50	(2)	(2)	6.48
G-42	11.5	Fine sand	0.254	0.00	0.00	26.48	58.81	12.61	2.10	14.71

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fractions

PTS File No: 41605
Client: Conestoga-Rovers & Associates

PHYSICAL PROPERTIES DATA - PORE FLUID SATURATIONS

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 070496

		METHODS:	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	MOISTURE CONTENT, % weight	DENSITY BULK, g/cc	DENSITY GRAIN, g/cc	POROSITY, %Vb (2) TOTAL	POROSITY, %Vb (2) AIR FILLED	PORE FLUID SATURATIONS, % Pv (3) WATER	PORE FLUID SATURATIONS, % Pv (3) NAPL
G-18	8.3	V	7.3	2.15	2.74	21.2	5.1	65.6	10.1
G-19	9.3	V	7.7	2.09	2.71	23.0	6.7	66.5	4.3
G-35	11.2	V	19.9	1.61	2.71	40.5	8.0	74.2	6.0
G-30	10.4	V	9.9	1.93	2.71	28.7	9.3	62.7	4.7

(1) Sample Orientation: H = horizontal; V = vertical
(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids
(3) Water = 0.9996 g/cc, Hydrocarbon = 0.8600 g/cc
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS File No: 41605
Client: Conestoga-Rovers & Associates

PTS Laboratories

ENDPOINT SATURATION WATER DRIVE TEST: INITIAL AND RESIDUAL SATURATIONS

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 070496

		METHODS:	API RP 40		API RP 40	API RP 40, DEAN-STARK			
						PORE FLUID SATURATIONS, % Pv			
		SAMPLE	DENSITY		TOTAL	Initial Fluid Saturations		After Waterflood Test	
SAMPLE ID.	DEPTH, ft.	ORIENTATION (1)	BULK, g/cc	GRAIN, g/cc	POROSITY, %Vb	WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
G-23	8.85	V	1.84	2.74	32.7	63.2	8.0	63.2	8.0
NOTE:	**No visible NAPL produced; 12.7 pore volumes of water injected. Produced water slightly cloudy with strong hydrocarbon odor. Sample compressed slightly from confining pressure.**								
G-25	9.1	V	2.02	2.73	26.0	52.9	7.2	58.7	7.2
NOTE:	**No visible NAPL produced; 16.0 pore volumes of water injected. Produced water clear with moderate hydrocarbon odor.**								
G-31	7.2	V	1.84	2.73	32.7	43.6	3.2	77.2	3.2
NOTE:	**No visible NAPL produced; 14.3 pore volumes of water injected. Produced water slightly cloudy with moderate hydrocarbon odor.**								
G-39	8.7	V	1.94	2.71	28.4	36.9	3.6	67.2	3.6
NOTE:	**No visible NAPL produced; 15.6 pore volumes of water injected. Produced water slightly cloudy with faint hydrocarbon odor.**								
G-42	11.25	V	1.57	2.68	41.5	63.5	5.6	69.7	5.6
NOTE:	**No visible NAPL produced; 10.2 pore volumes of water injected. Produced water clear with faint hydrocarbon odor.**								

Water drives conducted at 25 psi confining pressure and 70°F. Laboratory fresh water (tap) used as injection fluid.
N/A = Not Analyzed. Vb = Bulk Volume, Pv = Pore Volume. (1) H = horizontal, V = vertical
Soi = Initial NAPL Saturation as received prior to water flooding, Swi = Initial Water Saturation as received prior to waterflooding
Sor = Residual NAPL Saturation after waterflooding, Srw = Residual Water Saturation after waterflooding
Water =0.9996 g/cc, NAPL = 0.8600 g/cc.

PTS File No: 41605
Client: Conestoga-Rovers & Associates

PTS Laboratories

TABLE 1

SOIL MOISTURE RETENTION CURVE FITTING FOR QUANTIFYING THE HYDRAULIC FUNCTIONS OF UNSATURATED SOILS

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 070496
SAMPLE ID: G-18 at 8.5 ft.

van Genuchten Parameters	
alpha (1/cm)	2.304E-02
n	1.688
residual water	0.391
total water	1.015
m	0.408
Water Perm (mD)	23.7
Air Perm (mD)	1590
R^2	0.99299

Notes: alpha, n, and residual saturation are capillary parameters defined by the following equation (van Genuchten, 1980), with m = 1-1/n, S = water saturation, and h = capillary head (cm):

$$S_r + [(S_s - S_r)/(1 + (\alpha h)^n)^m]$$

Laboratory Measured Data

Capillary Head (cm)	**G-18 at 8.5 ft.** Volumetric Moisture	Predicted Moisture by Curve Fit	RPD (%)
0	1.000	1.015	0.75%
5	1.000	1.008	0.39%
12	0.992	0.990	0.09%
23	0.972	0.946	1.37%
33	0.923	0.901	1.18%
48	0.851	0.845	0.36%
65	0.766	0.790	1.58%
85	0.711	0.741	2.11%
133	0.661	0.664	0.18%
225	0.601	0.587	1.12%
341	0.559	0.540	1.72%
532	0.518	0.502	1.60%
1198	0.449	0.455	0.62%
2130	0.416	0.434	2.11%

PTS File No: 41605
Client: Conestoga-Rovers & Associates

PTS Laboratories

TABLE 1

SOIL MOISTURE RETENTION CURVE FITTING FOR QUANTIFYING THE HYDRAULIC FUNCTIONS OF UNSATURATED SOILS

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 070496
SAMPLE ID: G-42 at 11.5 ft.

van Genuchten Parameters	
alpha (1/cm)	6.930E-03
n	2.115
residual water	0.111
total water	1.012
m	0.527
Water Perm (mD)	1020
Air Perm (mD)	2610
R^2	0.99831

Notes: alpha, n, and residual saturation are capillary parameters defined by the following equation (van Genuchten, 1980), with m = 1-1/n, S = water saturation, and h = capillary head (cm):

$$S_r + [(S_s - S_r)/(1 + (\alpha h)^n)^m]$$

Laboratory Measured Data

Capillary Head (cm)	**G-42 at 11.5 ft.** Volumetric Moisture	Predicted Moisture by Curve Fit	RPD (%)
0	1.000	1.012	0.58%
5	1.000	1.011	0.56%
12	1.000	1.009	0.47%
23	1.000	1.002	0.12%
33	1.000	0.991	0.46%
48	0.991	0.968	1.15%
65	0.946	0.934	0.68%
85	0.893	0.886	0.39%
133	0.746	0.763	1.07%
226	0.559	0.571	1.11%
342	0.429	0.430	0.11%
534	0.339	0.314	3.86%
1201	0.196	0.196	0.21%
2136	0.143	0.156	4.35%

PTS File No: 41605
Client: Conestoga-Rovers & Associates

PHYSICAL PROPERTIES DATA - HYDRAULIC CONDUCTIVITY

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 070496

		METHODS:	API RP 40; EPA 9100	
			25 PSI CONFINING STRESS	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	EFFECTIVE (2,3) PERMEABILITY TO WATER, millidarcy	HYDRAULIC CONDUCTIVITY (2,3), cm/s
G-19	12	H	6.90	6.55E-06
G-25	12.5	H	10.7	1.02E-05
G-30	11.5	H	7.06	6.73E-06

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Native State or Effective = With as-received pore fluids in place
(3) Permeability to water and hydraulic conductivity measured at saturated conditions

PTS Laboratories, Inc.

Conestoga-Rovers & Associates
PTS File No: 41605

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: ConocoPhillips Renton Terminal
PROJECT NO: 70496

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
G-19	12	Silt	0.013	0.00	0.00	0.00	13.87	60.00	26.13	86.13
G-25	12.5	Fine sand	0.079	0.00	0.00	17.07	34.23	41.74	6.96	48.70
G-30	11.5	Silt	0.012	0.00	0.00	0.00	18.62	53.46	27.93	81.38

(1) Based on Mean from Trask

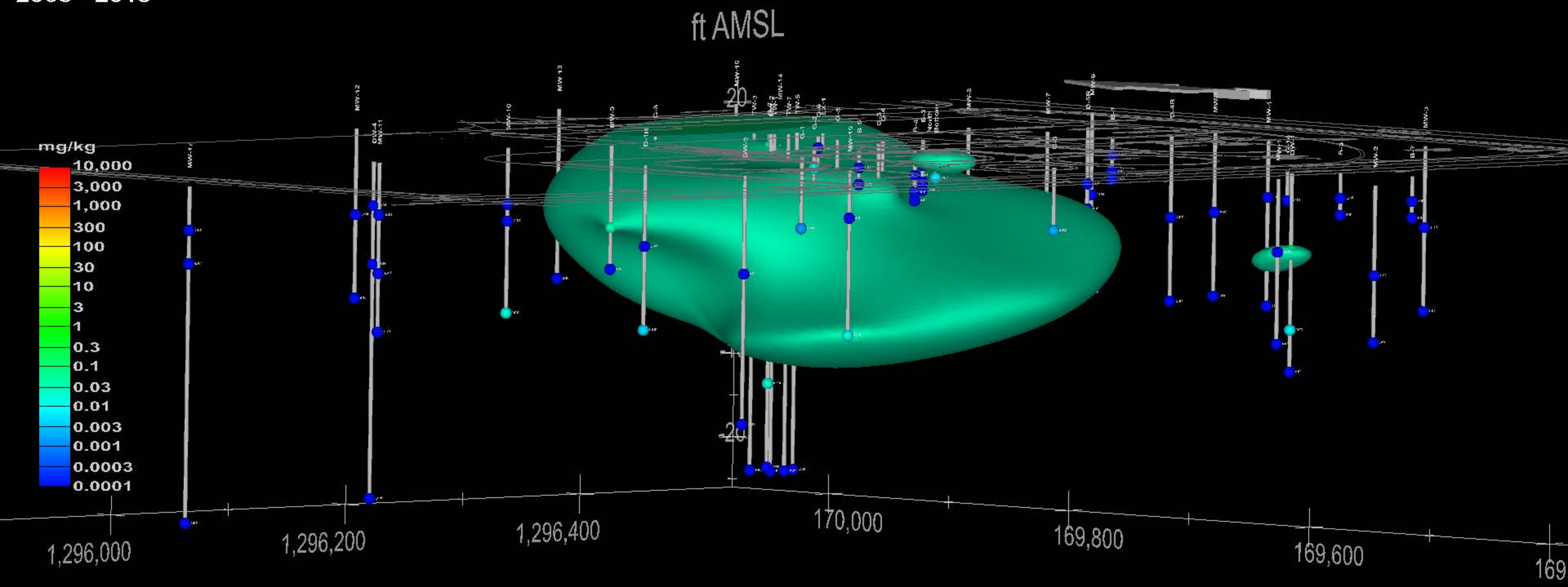
APPENDIX J

SOIL ANALYTICAL 4-DIM FILES

SOIL CHEMISTRY - BENZENE

2005 - 2013

Phillips 66 Renton Terminal
Renton, Washington
5x vertical exaggeration

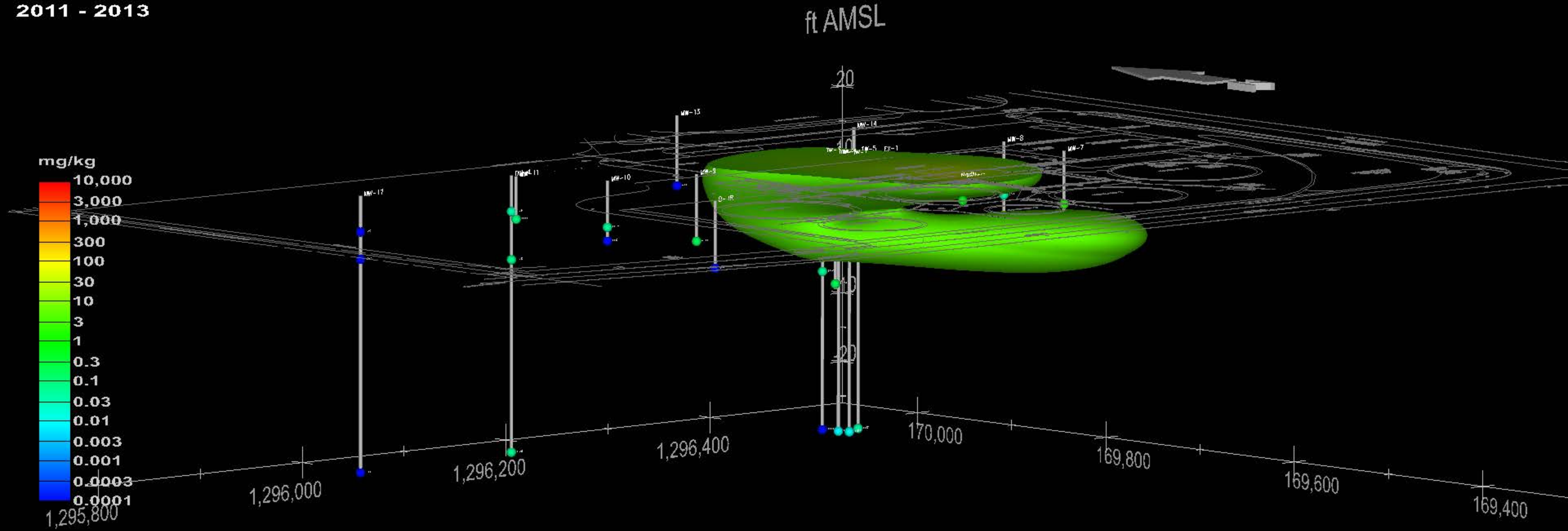


Plume extent above 0.03 mg/kg

SOIL CHEMISTRY - NAPHTHALENE

2011 - 2013

Phillips 66 Renton Terminal
Renton, Washington
5x vertical exaggeration

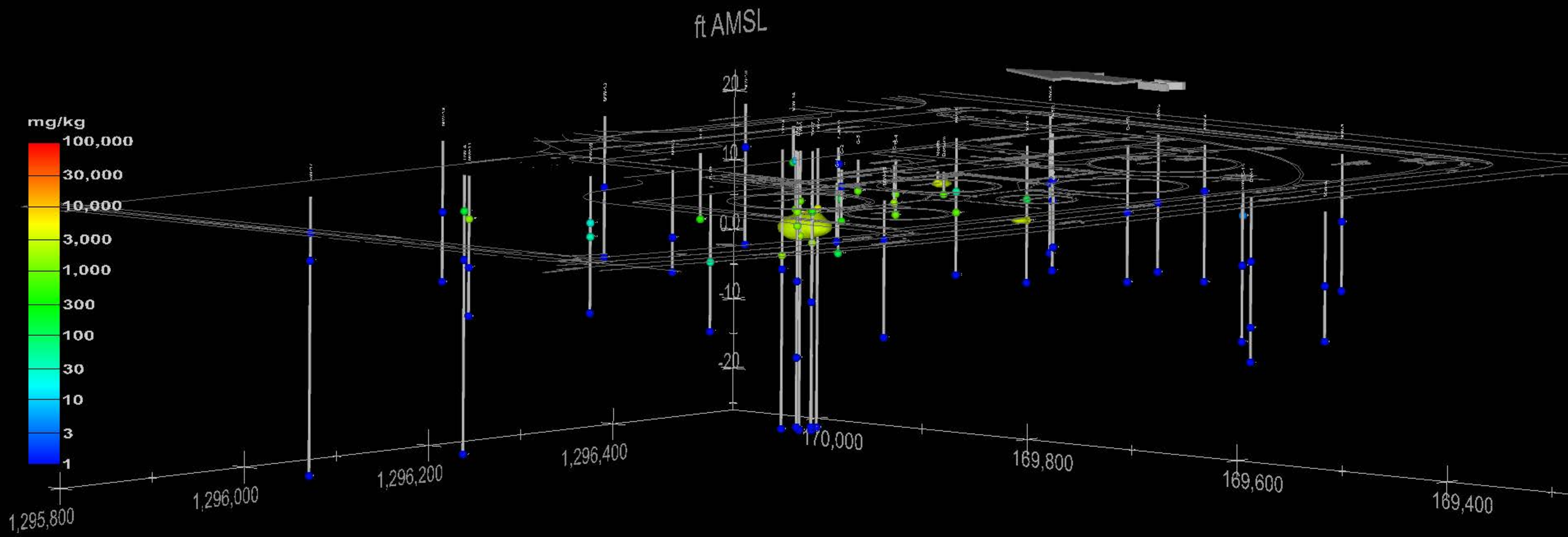


Plume extent above 5 mg/kg

SOIL CHEMISTRY - TPHd

2009 - 2013

Phillips 66 Renton Terminal
Renton, Washington
5x vertical exaggeration

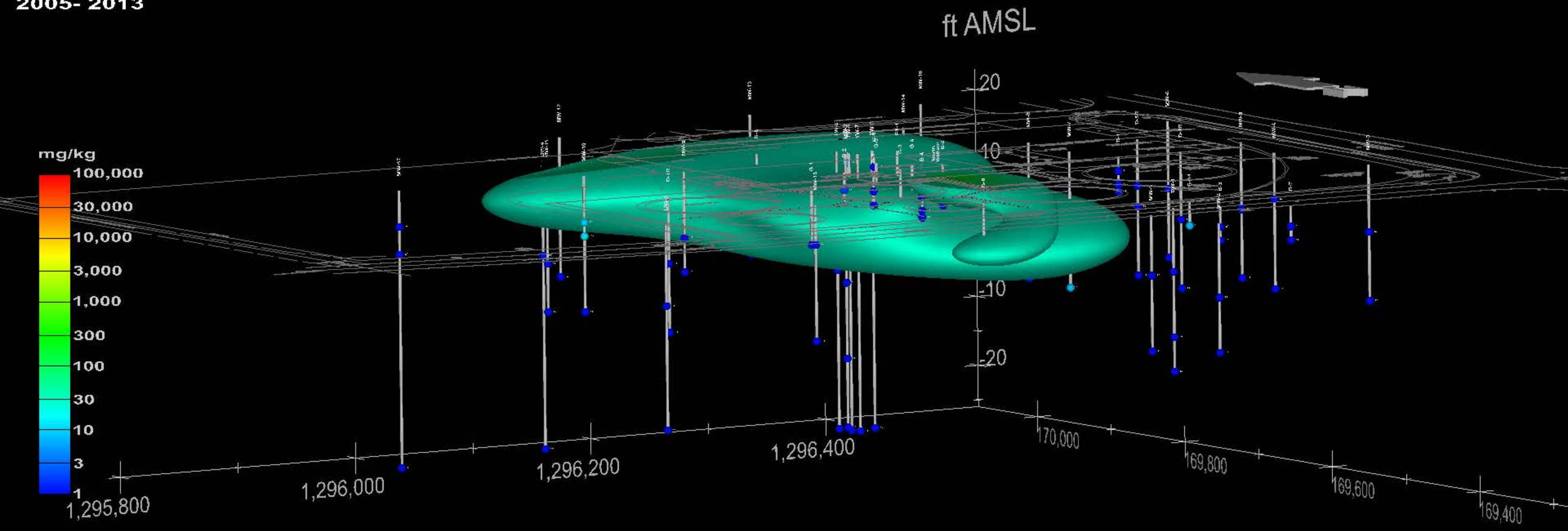


Plume extent above 3,000 mg/kg

SOIL CHEMISTRY - TPHg

2005- 2013

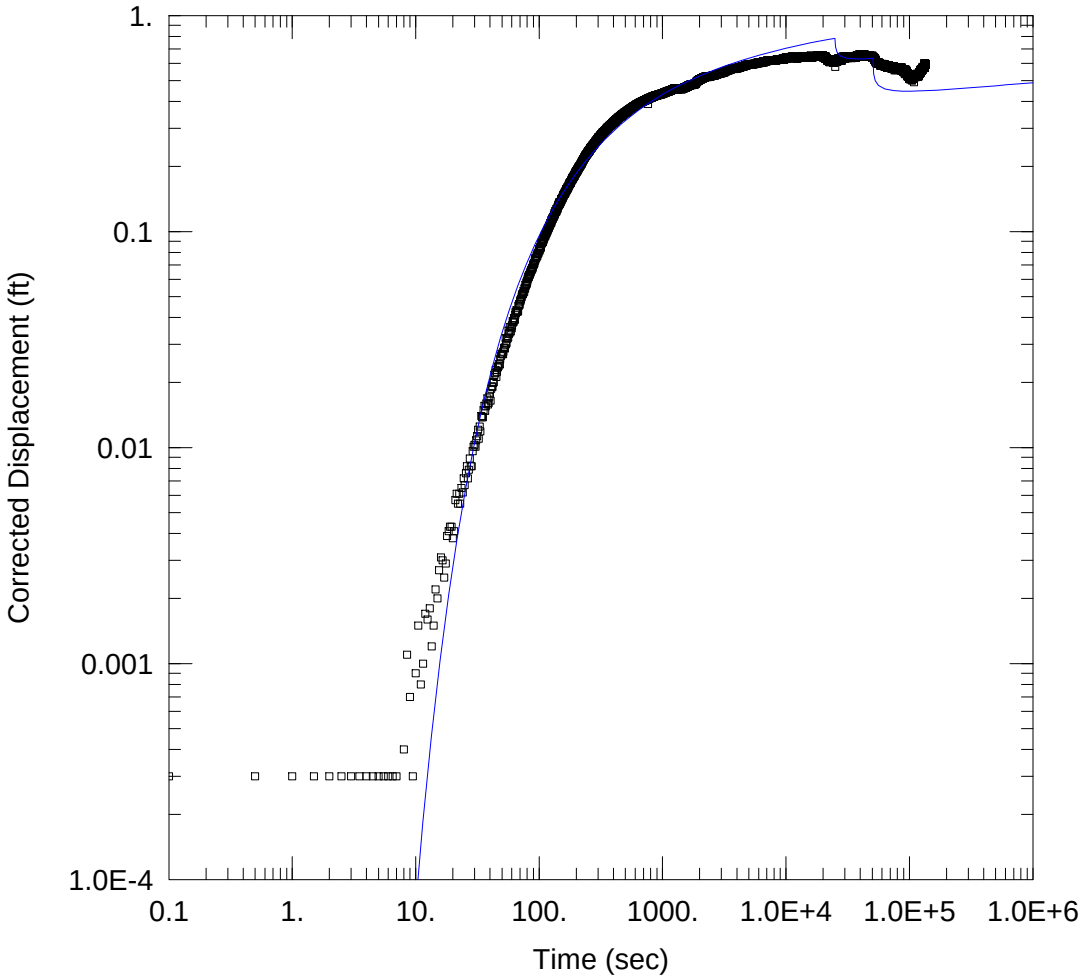
Phillips 66 Renton Terminal
Renton, Washington
5x vertical exaggeration



Plume extent above 30 mg/kg

APPENDIX L

PUMP TEST HYDROGRAPHS AND AQTESOLV Ê REPORTS



DW-2 PUMPING

Data Set: \...\DW-2_Pumping.aqt
Date: 06/26/13 Time: 15:24:08

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	3	0

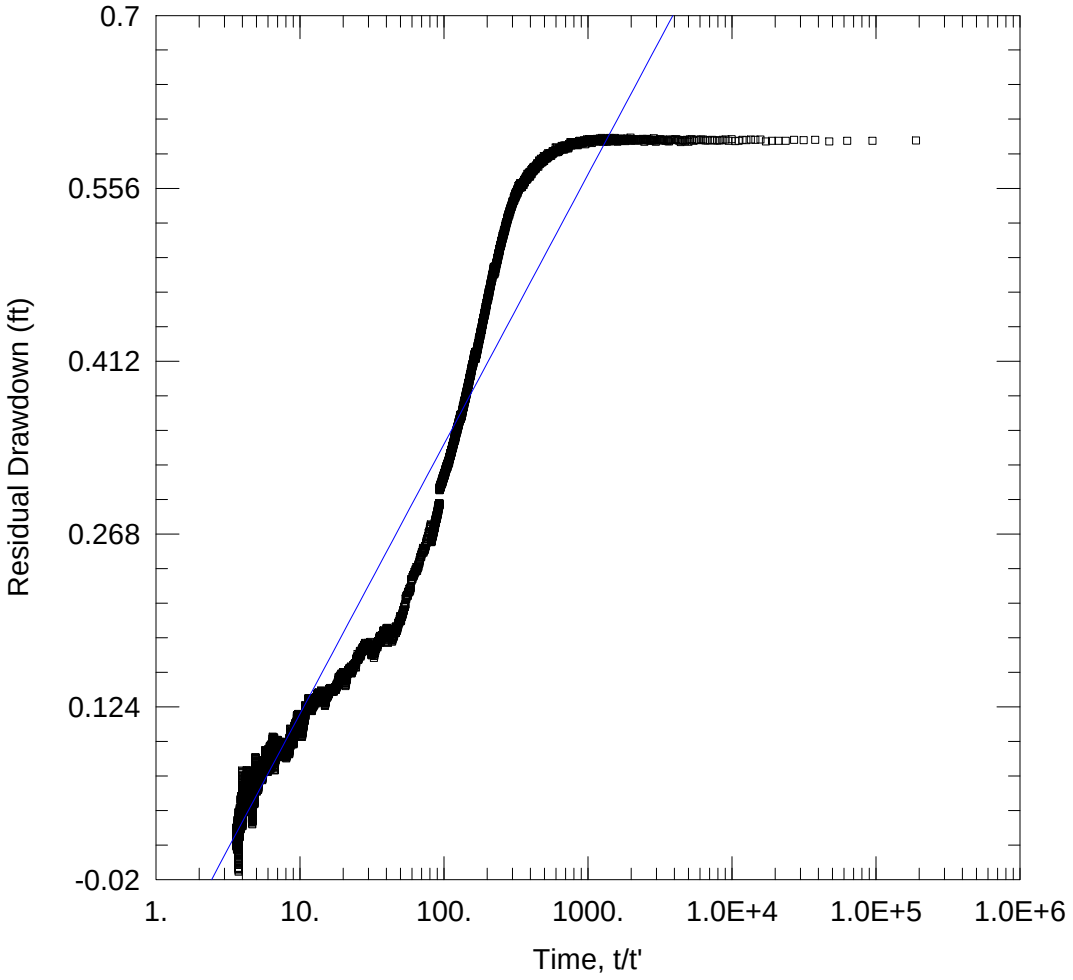
Observation Wells

Well Name	X (ft)	Y (ft)
▫ DW-2	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 13.95 cm^2/sec
S = 0.4028
Kz/Kr = 1.
b = 100. ft



DW-2 RECOVERY

Data Set: \...\DW-2_Recovery.aqt
Date: 06/26/13 Time: 15:24:09

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	3	0

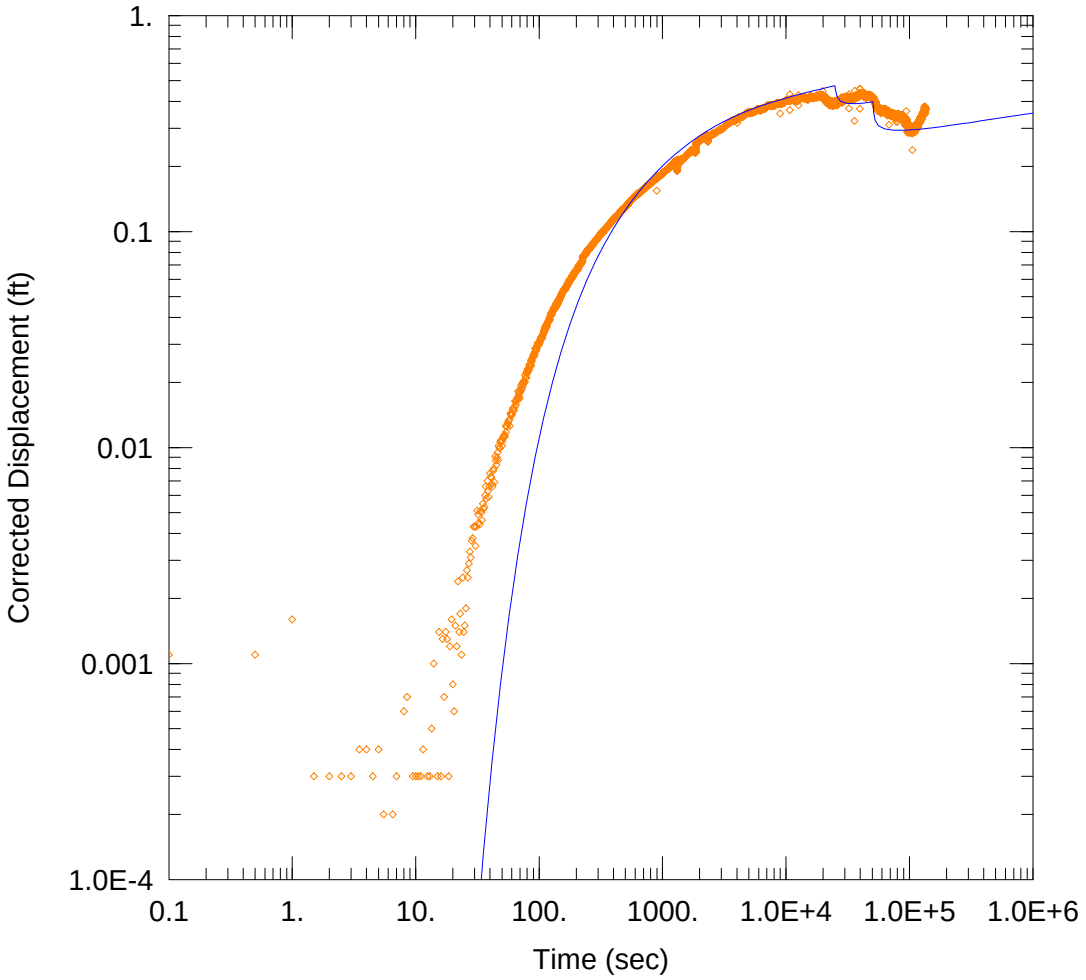
Observation Wells

Well Name	X (ft)	Y (ft)
▫ DW-2	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 3.376 cm^2/sec S/S' = 2.991



TW-3 PUMPING

Data Set: \...\TW-3_pumping.aqt
Date: 06/26/13 Time: 15:24:09

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	0	0

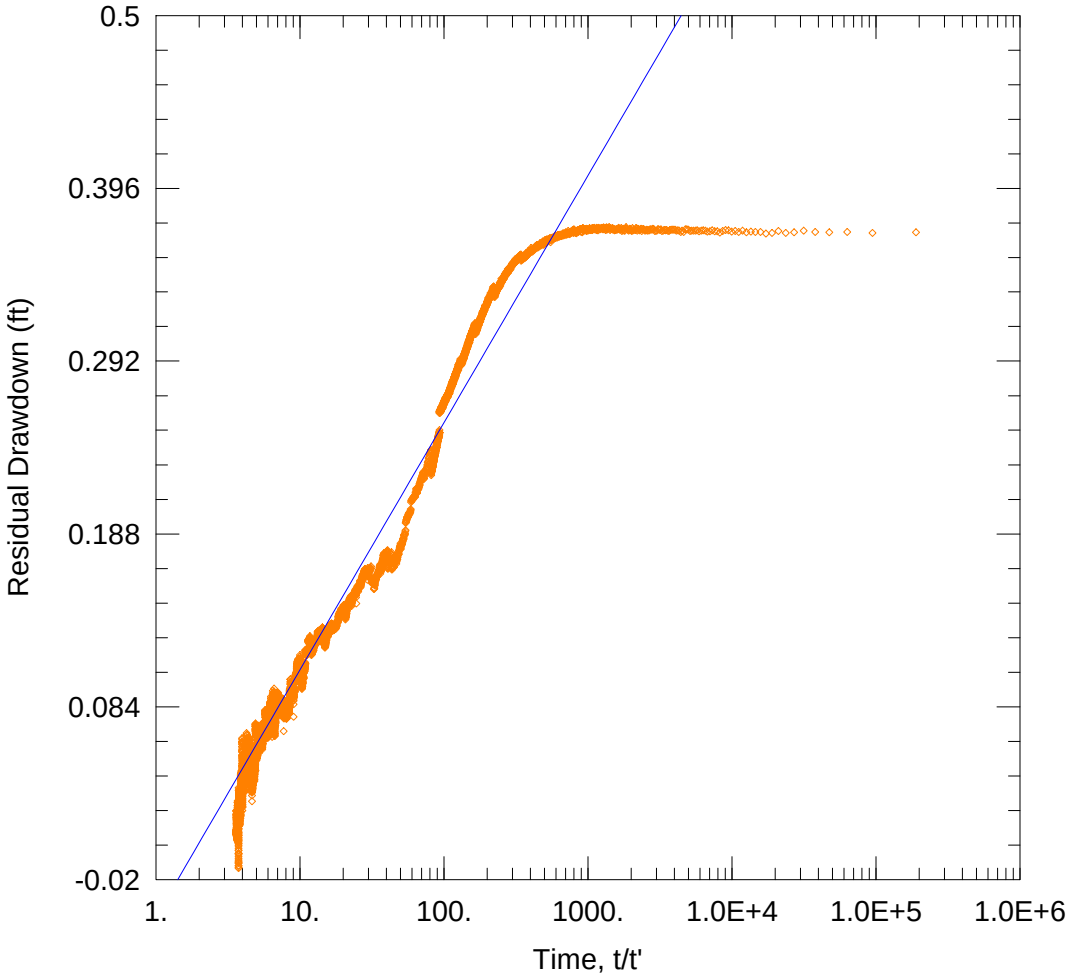
Observation Wells

Well Name	X (ft)	Y (ft)
◇ TW-3	0	15

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 10.5 cm^2/sec
S = 0.04044
Kz/Kr = 1.
b = 100. ft



TW-3 RECOVERY

Data Set: \...\TW-3_recovery.aqt
Date: 06/26/13 Time: 15:24:10

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	0	0

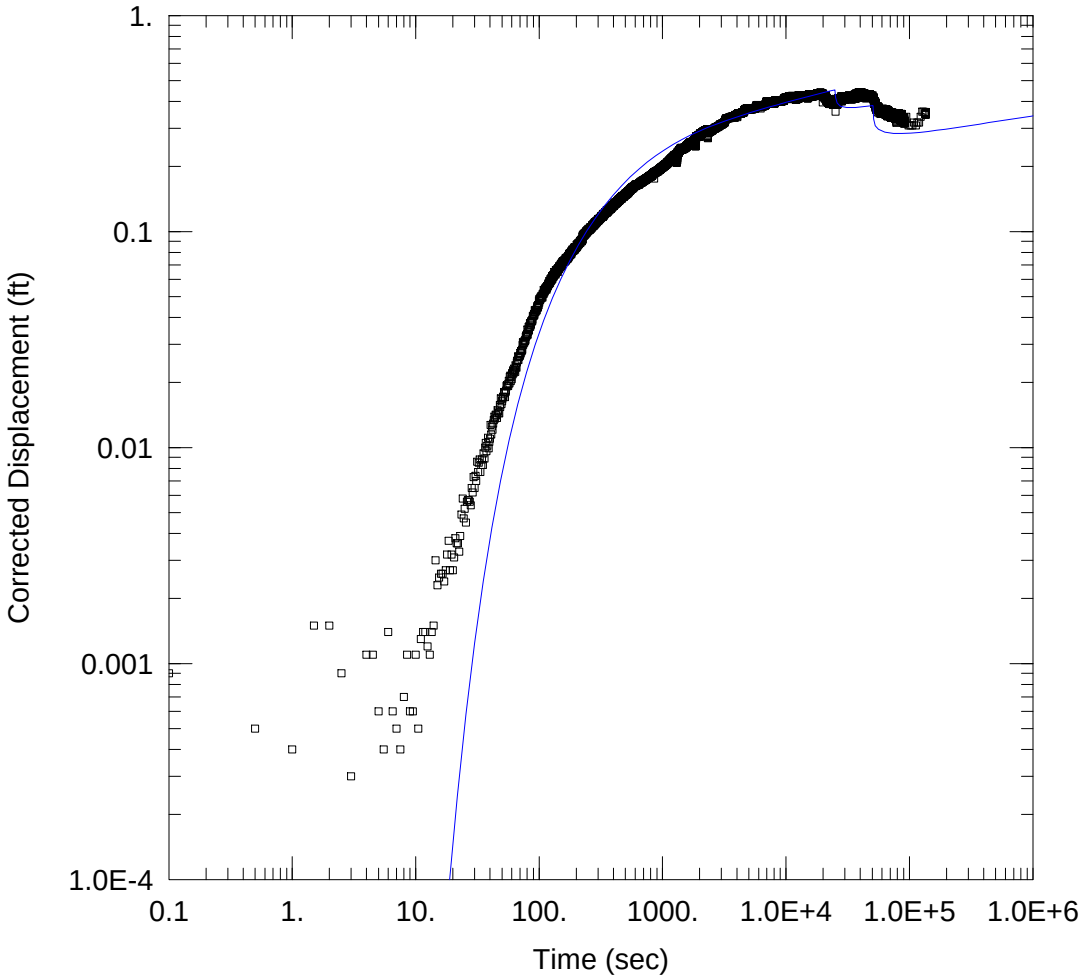
Observation Wells

Well Name	X (ft)	Y (ft)
◇ TW-3	0	15

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 5.102 cm^2/sec S/S' = 1.934



TW-5 PUMPING

Data Set: \...\TW-5_pumping.aqt
Date: 06/26/13 Time: 15:24:10

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	0	0

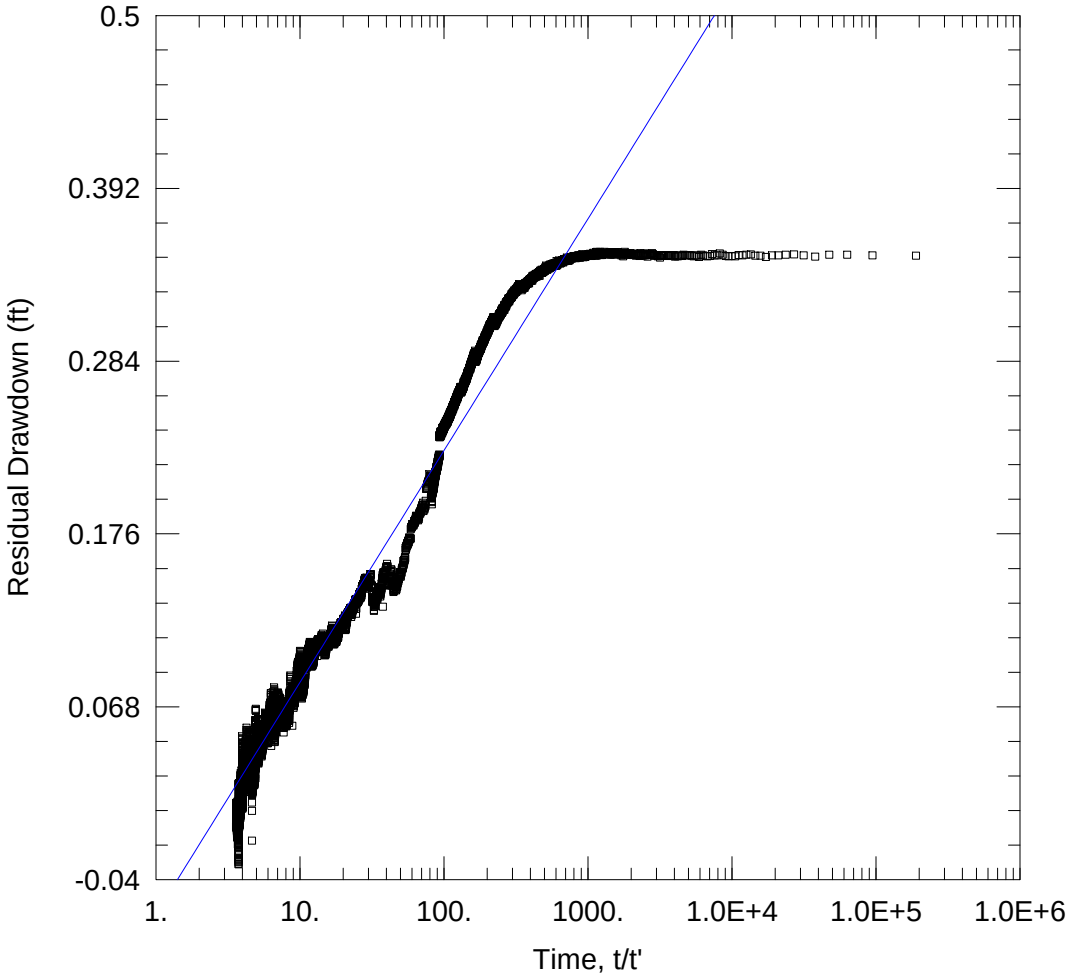
Observation Wells

Well Name	X (ft)	Y (ft)
▫ TW-5	20	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 10.51 cm^2/sec
S = 0.01254
Kz/Kr = 1.
b = 100. ft



TW-5 RECOVERY

Data Set: \...\TW-5_recovery.aqt
Date: 06/26/13 Time: 15:24:11

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	0	0

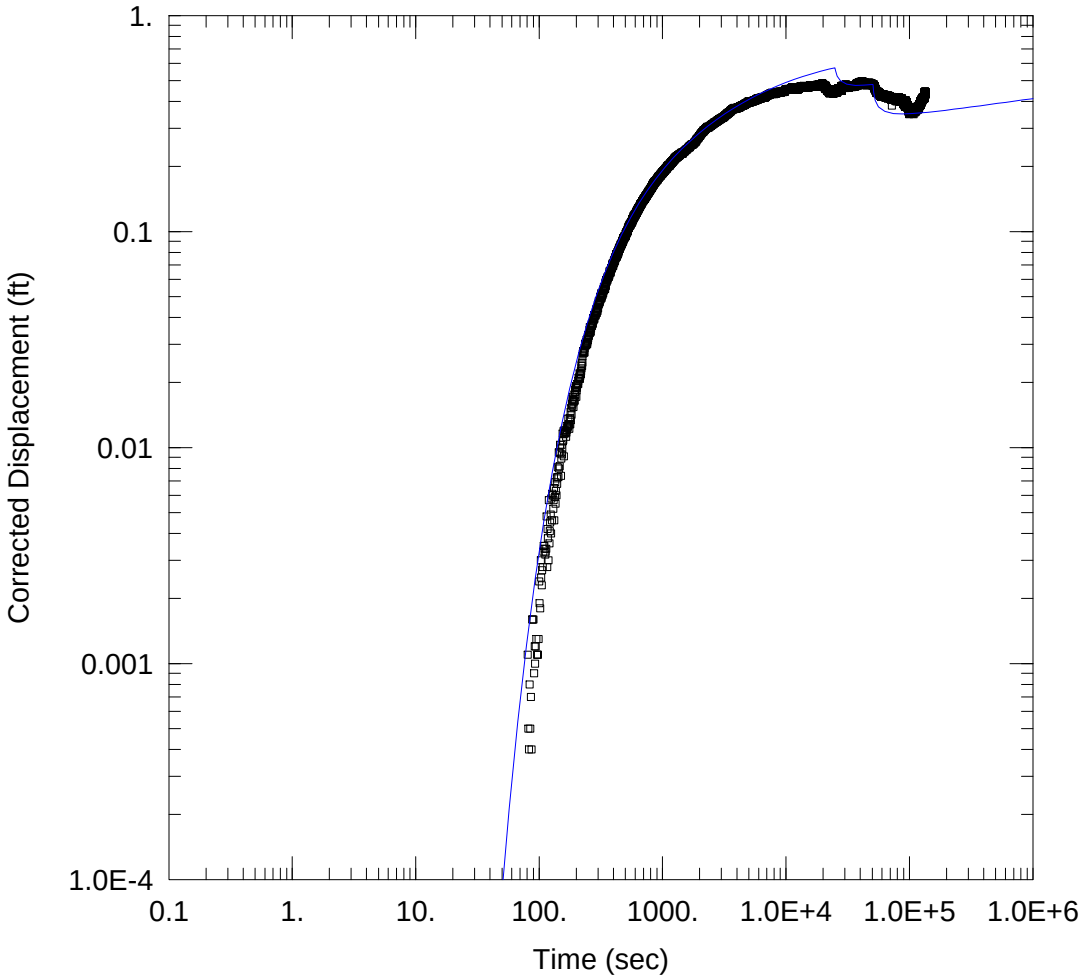
Observation Wells

Well Name	X (ft)	Y (ft)
▫ TW-5	20	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 5.238 cm^2/sec S/S' = 2.669



TW-7 PUMPING

Data Set: \...\TW-7_Pumping.aqt
Date: 06/26/13 Time: 15:24:11

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	0	10

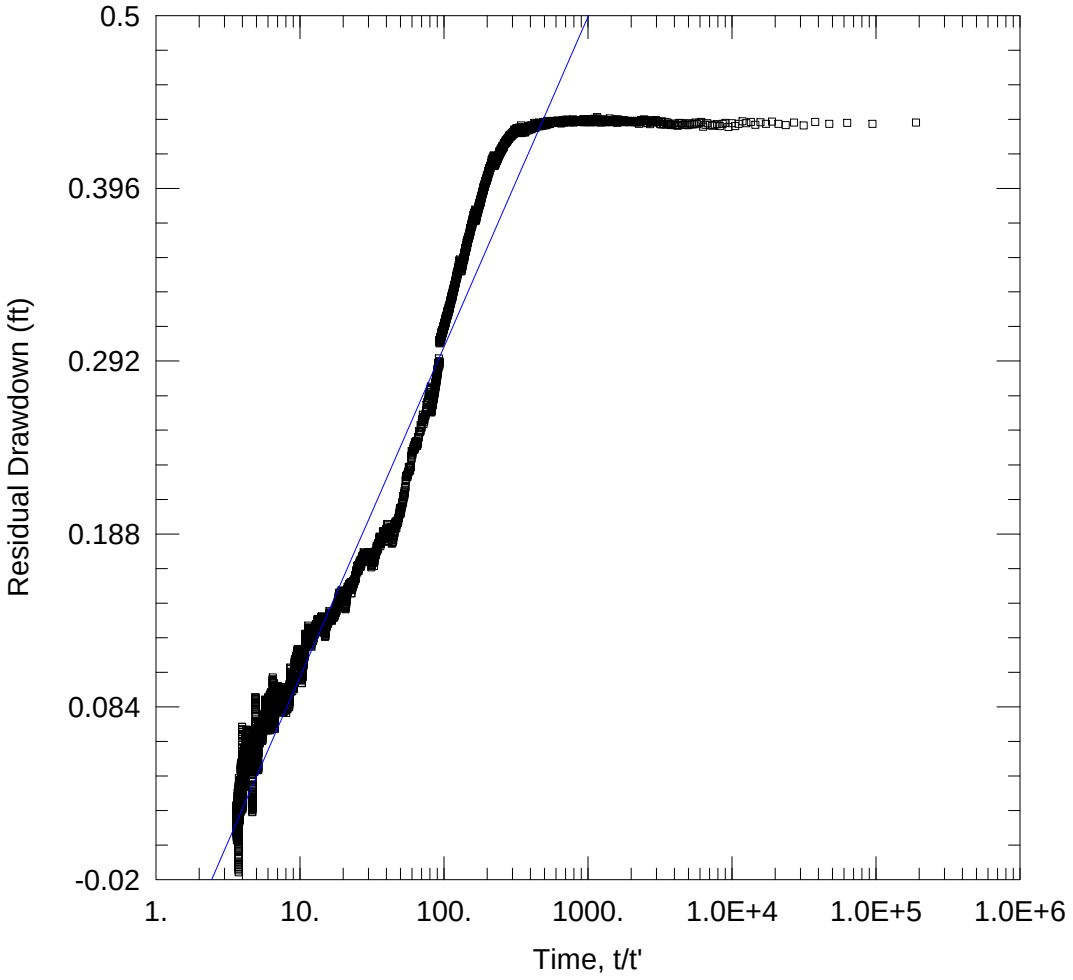
Observation Wells

Well Name	X (ft)	Y (ft)
▫ TW-7	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 9.914 cm^2/sec
S = 0.1314
Kz/Kr = 1.
b = 100. ft



TW-7 RECOVERY

Data Set: \...\TW-7_recovery.aqt
Date: 06/26/13 Time: 15:24:11

PROJECT INFORMATION

Company: CRA
Client: P66
Project: 070496
Location: Renton Terminal
Test Well: TW-1
Test Date: 8/16/12

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TW-1	0	10

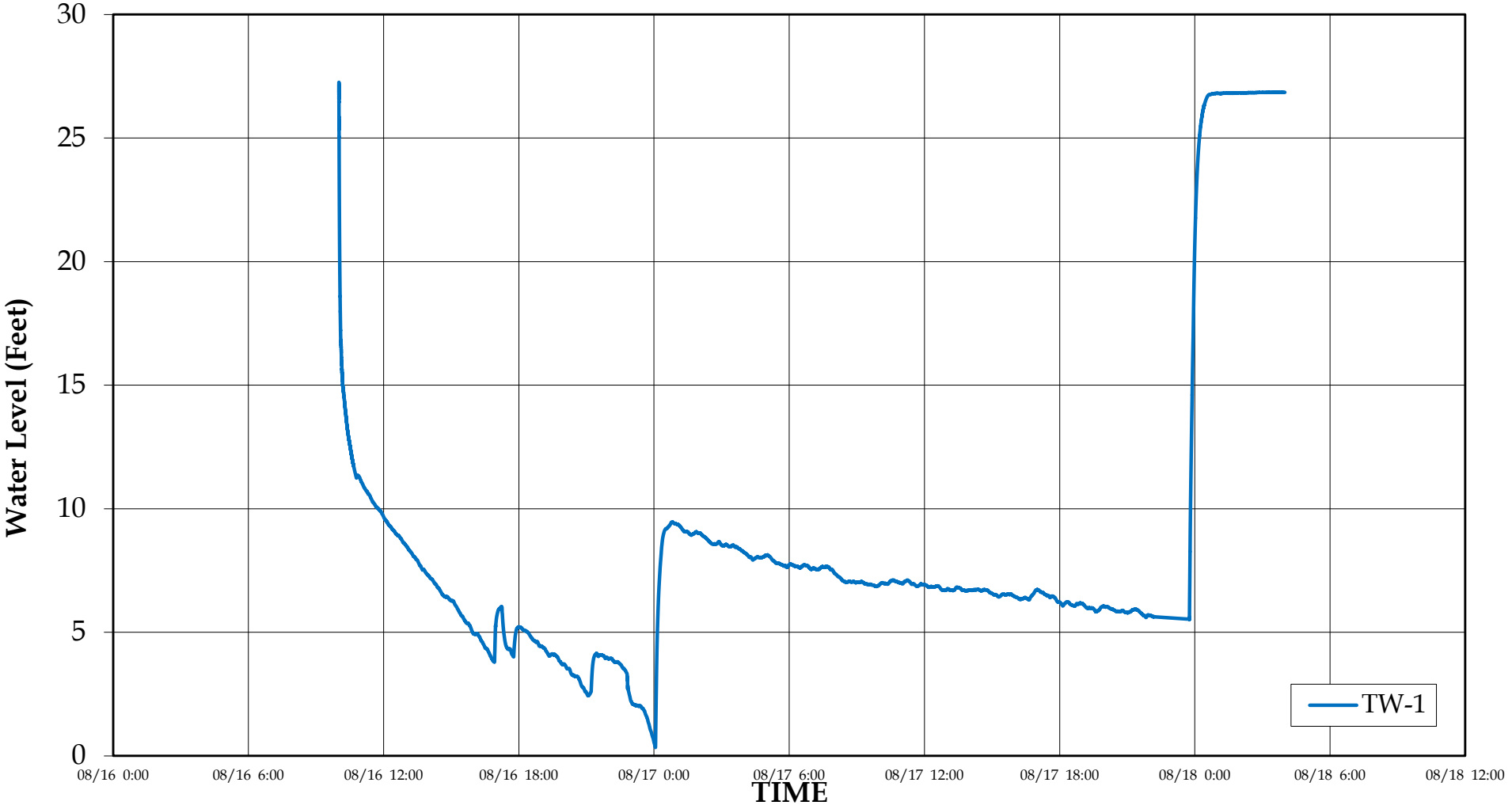
Observation Wells

Well Name	X (ft)	Y (ft)
▫ TW-7	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 3.819 cm^2/sec S/S' = 3.076



TW-1 HYDROGRAPH
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

APPENDIX K

DATA VALIDATION AND LABORATORY ANALYTICAL REPORTS

CONESTOGA-ROVERS & ASSOCIATES

2055 Niagara Falls Blvd., Suite #3
Niagara Falls, New York 14304
Telephone: (716) 297-6150 Fax: (716) 297-2265
www.CRAworld.com

MEMORANDUM

TO: Edwin Turner

REF. NO.: 070496

FROM: Kathleen Willy/bjw/6 ww

DATE: August 31, 2012

C.C.: Matt Davis, Jeff Cloud

E-Mail and Hard Copy if Requested

RE: **Data Quality Assessment and Validation of Report 2512090**
Quarterly Groundwater Sampling
ConocoPhillips Renton Terminal
Renton, Washington
May 2012

INTRODUCTION

The following details a quality assessment and validation of the analytical data resulting from the May 2012, collection of groundwater samples in Renton, Washington. Samples were submitted to Pace Analytical Laboratories (Pace), in Seattle, Washington, and analyzed for the following:

Parameter	*Methodology*
Volatile Organic Compounds (VOCs)	SW846 8260B
Semi-Volatile Organic Compounds (SVOCs)	SW846 8270C SIM
Gasoline Range Organics (GRO)	NWTPH-Gx
Diesel Range Organics (DRO)/Motor Oil Range Organics (ORO)	NWTPH-Dx
Metals	SW846 6020

The analytical results are summarized in Table 1. The QC criteria used to assess the data were established by the methods and with the following guidance documents:

i) "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", USEPA 540/R-99/008, October 1999

ii) "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Review", USEPA 540/R-94/013, February 1994

These guidelines are collectively referred to as "Guidelines" in this memorandum.

SAMPLE QUANTITATION

The laboratory did not report any detected concentrations below the laboratory's practical quantitation limit (PQL)/report limit (RL).

SAMPLE PRESERVATION AND HOLDING TIMES

Sample holding time periods and preservation requirements are summarized in the analytical methods. All sample extractions and/or analyses were performed within the specified holding times.

All samples were properly preserved and cooled after collection.

METHOD BLANK SAMPLES

Method blank samples are prepared from a purified sample matrix and are processed concurrently with investigative samples to assess the presence and the magnitude of sample contamination introduced during sample analysis. Method blank samples are analyzed at a minimum frequency of one per analytical batch and target analytes should be non-detect.

Method blanks were analyzed at the recommended frequency and all results were non-detect for the compounds of interest.

SURROGATE COMPOUNDS – ORGANIC ANALYSES

Individual sample performance for organic analyses was monitored by assessing the results of surrogate compound percent recoveries. Surrogate percent recoveries are reviewed against the laboratory developed control limits provided in the analytical report.

All surrogate recoveries met the method criteria, demonstrating acceptable analytical efficiency for these analyses with a few exceptions. Several sample results were qualified as estimated due to low surrogate recoveries and some results were rejected due to severely low recoveries (See Table 2).

LABORATORY CONTROL SAMPLE (LCS)

The LCS analysis serves as a monitor of the overall performance in all steps of the sample analysis and is analyzed with each sample batch. The LCS percent recoveries were evaluated against method and laboratory established control limits.

Laboratory control samples (LCS) were analyzed for all parameters. All recoveries were within required control limits showing adequate analytical accuracy.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSES

To assess the long term accuracy and precision of the analytical methods on various matrices, MS/MSD percent recoveries and relative percent differences (RPD) of the concentrations were determined. The organic MS/MSD percent recovery and RPD control limits are established by the laboratory. The inorganic control limits are defined by the methods and the "Guidelines", which require recoveries between 75 to 125 percent with RPDs less than 20 percent for water samples and 30 percent for soil samples.

Matrix spike/matrix spike duplicates were prepared and analyzed for all parameters. All recoveries were within required control limits showing adequate analytical accuracy and precision.

FIELD QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The field QA/QC consisted of field duplicate sample sets and trip blanks.

Overall precision for the sampling event and laboratory procedures was monitored using the results of the field duplicate sample sets. The RPDs associated with these duplicate samples must be less than 50 percent for water or 100 percent for soil/sediment. If the reported concentration in either the investigative sample or its duplicate is less than five times the RL, the evaluation criteria are; one times the RL value for water or two times for soil/sediment.

All field duplicate results were acceptable indicating good field and analytical precision.

To monitor potential cross-contamination during sample transportation and storage, trip blanks were submitted to the laboratory for analysis.

All trip blank results were non-detect for the compounds of interest.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*B-1*	*B-6*	*D-1R*	*D-4R*	*D-5R*	*D-6*
	Sample ID:	*GW-050912-NH-B1*	*GW-051012-DE-B6*	*GW-051112-NH-D1R*	*GW-050912-DE-D4R*	*GW-050912-DE-D5R*	*GW-051012-NH-D6*
	Sample Date:	*5/9/2012*	*5/10/2012*	*5/11/2012*	*5/9/2012*	*5/9/2012*	*5/10/2012*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1-Trichloroethane	µg/L	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/L	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	-	-	-
1,2-Dichloroethane	µg/L	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/L	-	-	-	-	-	-
1,2-Dichloropropane	µg/L	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/L	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-
1,3-Dichloropropane	µg/L	-	-	-	-	-	-
2,2-Dichloropropane	µg/L	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	-	-	-	-	-
2-Chlorotoluene	µg/L	-	-	-	-	-	-
2-Hexanone	µg/L	-	-	-	-	-	-
4-Chlorotoluene	µg/L	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	-	-	-	-	-
Acetone	µg/L	-	-	-	-	-	-
Benzene	µg/L	-	-	-	-	-	-
Bromobenzene	µg/L	-	-	-	-	-	-
Bromodichloromethane	µg/L	-	-	-	-	-	-
Bromoform	µg/L	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	-	-	-	-	-	-
Carbon disulfide	µg/L	-	-	-	-	-	-
Carbon tetrachloride	µg/L	-	-	-	-	-	-
Chlorobenzene	µg/L	-	-	-	-	-	-
Chlorobromomethane	µg/L	-	-	-	-	-	-
Chloroethane	µg/L	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*B-1*	*B-6*	*D-1R*	*D-4R*	*D-5R*	*D-6*
	Sample ID:	*GW-050912-NH-B1*	*GW-051012-DE-B6*	*GW-051112-NH-D1R*	*GW-050912-DE-D4R*	*GW-050912-DE-D5R*	*GW-051012-NH-D6*
	Sample Date:	*5/9/2012*	*5/10/2012*	*5/11/2012*	*5/9/2012*	*5/9/2012*	*5/10/2012*
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
Chloroform (Trichloromethane)	µg/L	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-
Dibromochloromethane	µg/L	-	-	-	-	-	-
Dibromomethane	µg/L	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-
Hexachlorobutadiene	µg/L	-	-	-	-	-	-
Isopropyl benzene	µg/L	-	-	-	-	-	-
m&p-Xylenes	µg/L	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	-	-	-	-	-	-
Methylene chloride	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Styrene	µg/L	-	-	-	-	-	-
Tetrachloroethene	µg/L	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-
Trichloroethene	µg/L	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	-	-	-	-	-	-
Vinyl chloride	µg/L	-	-	-	-	-	-
Xylenes (total)	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds							
1,2,4-Trichlorobenzene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	-	ND (5.1)	-
1,2-Dichlorobenzene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
1,3-Dichlorobenzene	µg/L	ND (4.8)	-	-	ND (5.2)	ND (5.1)	-
1,4-Dichlorobenzene	µg/L	-	ND (5.3)	ND (4.8)	-	-	-
2,4,5-Trichlorophenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
2,4,6-Trichlorophenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
2,4-Dichlorophenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
2,4-Dimethylphenol	µg/L	ND (4.8)	19.5	ND (4.8)	ND (5.2)	ND (5.1)	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*B-1*	*B-6*	*D-1R*	*D-4R*	*D-5R*	*D-6*
	Sample ID:	*GW-050912-NH-B1*	*GW-051012-DE-B6*	*GW-051112-NH-D1R*	*GW-050912-DE-D4R*	*GW-050912-DE-D5R*	*GW-051012-NH-D6*
	Sample Date:	*5/9/2012*	*5/10/2012*	*5/11/2012*	*5/9/2012*	*5/9/2012*	*5/10/2012*
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
2,6-Dinitrotoluene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
2-Chloronaphthalene	µg/L	-	ND (5.3)	ND (4.8)	-	-	-
2-Chlorophenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
2-Methylnaphthalene	µg/L	ND (4.8)	75.7	ND (4.8)	ND (5.2)	ND (5.1)	-
2-Methylphenol	µg/L	ND (4.8)	16.7	ND (4.8)	ND (5.2)	ND (5.1)	-
2-Nitroaniline	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
2-Nitrophenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
3&4-Methylphenol	µg/L	ND (4.8)	24.9	ND (4.8)	ND (5.2)	ND (5.1)	-
3,3'-Dichlorobenzidine	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
3-Nitroaniline	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
4,6-Dinitro-2-methylphenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
4-Bromophenyl phenyl ether	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
4-Chloro-3-methylphenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
4-Chloroaniline	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
4-Chlorophenyl phenyl ether	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
4-Nitroaniline	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
4-Nitrophenol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Acenaphthene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Acenaphthylene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Anthracene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Benzo(a)anthracene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Benzo(a)pyrene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Benzo(b)fluoranthene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Benzo(g,h,i)perylene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Benzo(k)fluoranthene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Benzoic acid	µg/L	ND (23.8)	ND (26.6)	ND (24.0)	ND (26.0)	ND (25.5)	-
Benzyl alcohol	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Butyl benzylphthalate (BBP)	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*B-1*	*B-6*	*D-1R*	*D-4R*	*D-5R*	*D-6*
	Sample ID:	*GW-050912-NH-B1*	*GW-051012-DE-B6*	*GW-051112-NH-D1R*	*GW-050912-DE-D4R*	*GW-050912-DE-D5R*	*GW-051012-NH-D6*
	Sample Date:	*5/9/2012*	*5/10/2012*	*5/11/2012*	*5/9/2012*	*5/9/2012*	*5/10/2012*
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
Carbazole	µg/L	7.4	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Chrysene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Dibenz(a,h)anthracene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Dibenzofuran	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Diethyl phthalate	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Dimethyl phthalate	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Di-n-butylphthalate (DBP)	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Di-n-octyl phthalate (DnOP)	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Fluoranthene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Fluorene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Hexachlorobenzene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Hexachlorobutadiene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Hexachlorocyclopentadiene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Hexachloroethane	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Indeno(1,2,3-cd)pyrene	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Naphthalene	µg/L	ND (4.8)	166	ND (4.8)	ND (5.2)	ND (5.1)	-
Nitrobenzene	µg/L	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	ND (4.8)	ND (5.3)	ND (4.8)	ND (5.2)	ND (5.1)	-
Semi-volatile Organic Compounds - SPLPIM							
Anthracene	µg/L	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*B-1*	*B-6*	*D-1R*	*D-4R*	*D-5R*	*D-6*
	Sample ID:	*GW-050912-NH-B1*	*GW-051012-DE-B6*	*GW-051112-NH-D1R*	*GW-050912-DE-D4R*	*GW-050912-DE-D5R*	*GW-051012-NH-D6*
	Sample Date:	*5/9/2012*	*5/10/2012*	*5/11/2012*	*5/9/2012*	*5/9/2012*	*5/10/2012*
Parameters	*Units*						
Metals							
Arsenic	µg/L	2.9	8.2	5.4	27.9	27.4	16.9
Lead	µg/L	0.47	17.9	18.2	11.0	1.2	3.4
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/L	0.13	2.5	0.13	0.11	0.096	0.095
Total Petroleum Hydrocarbons - Gas	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Motor Oil	mg/L	ND (0.38)	0.81	ND (0.38)	ND (0.40)	ND (0.41)	ND (0.38)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*D-6*	*DW-1*	*DW-2*	*DW-3*	*HA-1*	*HA-2*
	Sample ID:	*GW-051012-NH-FD1*	*GW-051612-NH-DW1*	*GW-050912-NH-DW2*	*GW-051512-NH-DW3*	*GW-051512-NH-HA1*	*GW-051512-DE-HA2*
	Sample Date:	*5/10/2012 (Duplicate)*	*5/16/2012*	*5/9/2012*	*5/15/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1-Trichloroethane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/L	-	ND (1.0)	-	ND (1.0)	-	2590
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	ND (1.0)	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
1,2-Dichloroethane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
1,2-Dichloroethene (total)	µg/L	-	ND (2.0)	-	ND (2.0)	-	ND (2.0)
1,2-Dichloropropane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
1,3,5-Trimethylbenzene	µg/L	-	ND (1.0)	-	ND (1.0)	-	653
1,3-Dichlorobenzene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
1,3-Dichloropropane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
2,2-Dichloropropane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	-	ND (5.0)	-	ND (5.0)	-	26.2
2-Chlorotoluene	µg/L	-	ND (1.0)	-	ND (1.0)	-	114
2-Hexanone	µg/L	-	ND (5.0)	-	ND (5.0)	-	ND (5.0)
4-Chlorotoluene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	-	ND (5.0)	-	ND (5.0)	-	ND (5.0)
Acetone	µg/L	-	ND (5.0)	-	ND (5.0)	-	61.7
Benzene	µg/L	-	10.9	-	ND (1.0)	ND (1.0)	6490
Bromobenzene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Bromodichloromethane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Bromoform	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Bromomethane (Methyl bromide)	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Carbon disulfide	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Carbon tetrachloride	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Chlorobenzene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Chlorobromomethane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Chloroethane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*D-6*	*DW-1*	*DW-2*	*DW-3*	*HA-1*	*HA-2*
	Sample ID:	*GW-051012-NH-FD1*	*GW-051612-NH-DW1*	*GW-050912-NH-DW2*	*GW-051512-NH-DW3*	*GW-051512-NH-HA1*	*GW-051512-DE-HA2*
	Sample Date:	*5/10/2012 (Duplicate)*	*5/16/2012*	*5/9/2012*	*5/15/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
Chloroform (Trichloromethane)	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Chloromethane (Methyl chloride)	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
cis-1,2-Dichloroethene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
cis-1,3-Dichloropropene	µg/L	-	ND (1.0)	-	-	-	-
Dibromochloromethane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Dibromomethane	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Dichlorodifluoromethane (CFC-12)	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Ethylbenzene	µg/L	-	ND (1.0)	-	ND (1.0)	ND (1.0)	2230
Hexachlorobutadiene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Isopropyl benzene	µg/L	-	ND (1.0)	-	ND (1.0)	-	91.2
m&p-Xylenes	µg/L	-	-	-	ND (2.0)	-	10600
Methyl tert butyl ether (MTBE)	µg/L	-	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Methylene chloride	µg/L	-	ND (5.0)	-	ND (5.0)	-	ND (5.0)
Naphthalene	µg/L	-	4.3	-	ND (1.0)	-	952
Styrene	µg/L	-	ND (1.0)	-	ND (1.0)	-	103
Tetrachloroethene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Toluene	µg/L	-	ND (1.0)	-	ND (1.0)	ND (1.0)	2780
Trichloroethene	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Trichlorofluoromethane (CFC-11)	µg/L	-	ND (1.0)	-	ND (1.0)	-	ND (1.0)
Vinyl chloride	µg/L	-	ND (1.0)	-	ND (0.20)	-	ND (0.20)
Xylenes (total)	µg/L	-	ND (3.0)	-	ND (3.0)	ND (3.0)	14000
Semi-volatile Organic Compounds							
1,2,4-Trichlorobenzene	µg/L	-	-	-	ND (4.8)	-	-
1,2-Dichlorobenzene	µg/L	-	-	-	ND (4.8)	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	ND (4.8)	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	ND (4.8)	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	ND (4.8)	-	-
2,4-Dichlorophenol	µg/L	-	-	-	ND (4.8)	-	-
2,4-Dimethylphenol	µg/L	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*D-6*	*DW-1*	*DW-2*	*DW-3*	*HA-1*	*HA-2*
	Sample ID:	*GW-051012-NH-FD1*	*GW-051612-NH-DW1*	*GW-050912-NH-DW2*	*GW-051512-NH-DW3*	*GW-051512-NH-HA1*	*GW-051512-DE-HA2*
	Sample Date:	*5/10/2012 (Duplicate)*	*5/16/2012*	*5/9/2012*	*5/15/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
2,4-Dinitrophenol	µg/L	-	-	-	ND (9.6)	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	ND (4.8)	-	-
2,6-Dinitrotoluene	µg/L	-	-	-	ND (4.8)	-	-
2-Chloronaphthalene	µg/L	-	-	-	ND (4.8)	-	-
2-Chlorophenol	µg/L	-	-	-	ND (4.8)	-	-
2-Methylnaphthalene	µg/L	-	-	-	ND (4.8)	-	-
2-Methylphenol	µg/L	-	-	-	ND (4.8)	-	-
2-Nitroaniline	µg/L	-	-	-	ND (4.8)	-	-
2-Nitrophenol	µg/L	-	-	-	ND (4.8)	-	-
3&4-Methylphenol	µg/L	-	-	-	ND (4.8)	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	-	ND (4.8)	-	-
3-Nitroaniline	µg/L	-	-	-	ND (4.8)	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	ND (4.8)	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	-	ND (4.8)	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	ND (4.8)	-	-
4-Chloroaniline	µg/L	-	-	-	ND (4.8)	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	-	ND (4.8)	-	-
4-Nitroaniline	µg/L	-	-	-	ND (4.8)	-	-
4-Nitrophenol	µg/L	-	-	-	ND (4.8)	-	-
Acenaphthene	µg/L	-	-	-	ND (4.8)	-	-
Acenaphthylene	µg/L	-	-	-	ND (4.8)	-	-
Anthracene	µg/L	-	-	-	ND (4.8)	-	-
Benzo(a)anthracene	µg/L	-	-	-	ND (4.8)	-	-
Benzo(a)pyrene	µg/L	-	-	-	ND (4.8)	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	ND (4.8)	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	ND (4.8)	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	ND (4.8)	-	-
Benzoic acid	µg/L	-	-	-	ND (24.0)	-	-
Benzyl alcohol	µg/L	-	-	-	ND (4.8)	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	-	ND (4.8)	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	D-6	DW-1	DW-2	DW-3	HA-1	HA-2
	Sample ID:	GW-051012-NH-FD1	GW-051612-NH-DW1	GW-050912-NH-DW2	GW-051512-NH-DW3	GW-051512-NH-HA1	GW-051512-DE-HA2
	Sample Date:	5/10/2012 (Duplicate)	5/16/2012	5/9/2012	5/15/2012	5/15/2012	5/15/2012
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
Carbazole	µg/L	-	-	-	ND (4.8)	-	-
Chrysene	µg/L	-	-	-	ND (4.8)	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	ND (4.8)	-	-
Dibenzofuran	µg/L	-	-	-	ND (4.8)	-	-
Diethyl phthalate	µg/L	-	-	-	ND (4.8)	-	-
Dimethyl phthalate	µg/L	-	-	-	ND (4.8)	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	-	ND (4.8)	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	ND (4.8)	-	-
Fluoranthene	µg/L	-	-	-	ND (4.8)	-	-
Fluorene	µg/L	-	-	-	ND (4.8)	-	-
Hexachlorobenzene	µg/L	-	-	-	ND (4.8)	-	-
Hexachlorobutadiene	µg/L	-	-	-	ND (4.8)	-	-
Hexachlorocyclopentadiene	µg/L	-	-	-	ND (4.8)	-	-
Hexachloroethane	µg/L	-	-	-	ND (4.8)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	ND (4.8)	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	ND (4.8)	-	-
Semi-volatile Organic Compounds - SPLPIM							
Anthracene	µg/L	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	ND (0.096)	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND (0.096)	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	ND (0.096)	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	ND (0.096)	-	-	-	-
Fluoranthene	µg/L	-	ND (0.096)	-	-	-	-
Fluorene	µg/L	-	ND (0.096)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND (0.096)	-	-	-	-
Naphthalene	µg/L	-	ND (0.096)	-	-	-	-
Phenanthrene	µg/L	-	ND (0.096)	-	-	-	-
Pyrene	µg/L	-	ND (0.096)	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*D-6*	*DW-1*	*DW-2*	*DW-3*	*HA-1*	*HA-2*
	Sample ID:	*GW-051012-NH-FD1*	*GW-051612-NH-DW1*	*GW-050912-NH-DW2*	*GW-051512-NH-DW3*	*GW-051512-NH-HA1*	*GW-051512-DE-HA2*
	Sample Date:	*5/10/2012 (Duplicate)*	*5/16/2012*	*5/9/2012*	*5/15/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Metals							
Arsenic	µg/L	18.7	3.6	7.9	6.1	1.4	-
Lead	µg/L	1.7	ND (0.10)	0.22	0.75	1.2	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/L	ND (0.12)	ND (0.076)	0.39	ND (0.076)	ND (0.076)	5.1
Total Petroleum Hydrocarbons - Gas	µg/L	-	ND (50.0)	-	ND (50.0)	ND (50.0)	93000
Total Petroleum Hydrocarbons - Motor Oil	mg/L	ND (0.62)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	0.46

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*HA-3*	*HA-4*	*HA-6*	*HA-7*	*HA-9*	*HA-10*
	Sample ID:	*GW-051612-DE-HA-3*	*GW-051612-DE-HA-4*	*GW-051112-DE-HA6*	*GW-051112-NH-HA7*	*GW-051512-DE-HA9*	*GW-051512-DE-HA-10*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/11/2012*	*5/11/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1-Trichloroethane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/L	4.2	ND (1.0)	-	-	10.1	6.2
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	ND (1.0)	-	-	-	-
1,2-Dichlorobenzene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
1,2-Dichloroethane	µg/L	ND (1.0)	ND (1.0)	-	-	6.5	ND (1.0)
1,2-Dichloroethene (total)	µg/L	ND (2.0)	ND (2.0)	-	-	ND (2.0)	ND (2.0)
1,2-Dichloropropane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
1,3,5-Trimethylbenzene	µg/L	1.3	ND (1.0)	-	-	2.2	4.5
1,3-Dichlorobenzene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
1,3-Dichloropropane	µg/L	ND (1.0)	ND (1.0)	-	-	-	ND (1.0)
2,2-Dichloropropane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	ND (5.0)	ND (5.0)	-	-	ND (5.0)	5.1
2-Chlorotoluene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
2-Hexanone	µg/L	ND (5.0)	ND (5.0)	-	-	ND (5.0)	ND (5.0)
4-Chlorotoluene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	ND (5.0)	ND (5.0)	-	-	ND (5.0)	ND (5.0)
Acetone	µg/L	5.4	ND (5.0)	-	-	16.7	9.2
Benzene	µg/L	8.8	ND (1.0)	-	-	218	1.5
Bromobenzene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Bromodichloromethane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Bromoform	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Bromomethane (Methyl bromide)	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Carbon disulfide	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Carbon tetrachloride	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Chlorobenzene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Chlorobromomethane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Chloroethane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*HA-3*	*HA-4*	*HA-6*	*HA-7*	*HA-9*	*HA-10*
	Sample ID:	*GW-051612-DE-HA-3*	*GW-051612-DE-HA-4*	*GW-051112-DE-HA6*	*GW-051112-NH-HA7*	*GW-051512-DE-HA9*	*GW-051512-DE-HA-10*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/11/2012*	*5/11/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
Chloroform (Trichloromethane)	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Chloromethane (Methyl chloride)	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
cis-1,3-Dichloropropene	µg/L	ND (1.0)	ND (1.0)	-	-	-	-
Dibromochloromethane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Dibromomethane	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Dichlorodifluoromethane (CFC-12)	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Ethylbenzene	µg/L	2.4	ND (1.0)	-	-	152	15.0
Hexachlorobutadiene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Isopropyl benzene	µg/L	ND (1.0)	ND (1.0)	-	-	34.8	3.2
m&p-Xylenes	µg/L	-	-	-	-	26.0	10.1
Methyl tert butyl ether (MTBE)	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Methylene chloride	µg/L	ND (5.0)	ND (5.0)	-	-	ND (5.0)	ND (5.0)
Naphthalene	µg/L	4.1	ND (1.0)	-	-	198	11.0
Styrene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Tetrachloroethene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Toluene	µg/L	3.0	49.7	-	-	8.8	3.7
Trichloroethene	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Trichlorofluoromethane (CFC-11)	µg/L	ND (1.0)	ND (1.0)	-	-	ND (1.0)	ND (1.0)
Vinyl chloride	µg/L	ND (1.0)	ND (1.0)	-	-	ND (0.20)	ND (1.0)
Xylenes (total)	µg/L	16.8	ND (3.0)	-	-	32.1	10.3
Semi-volatile Organic Compounds							
1,2,4-Trichlorobenzene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
1,2-Dichlorobenzene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2,4,5-Trichlorophenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2,4,6-Trichlorophenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2,4-Dichlorophenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2,4-Dimethylphenol	µg/L	-	-	ND (5.3)	6.6	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*HA-3*	*HA-4*	*HA-6*	*HA-7*	*HA-9*	*HA-10*
	Sample ID:	*GW-051612-DE-HA-3*	*GW-051612-DE-HA-4*	*GW-051112-DE-HA6*	*GW-051112-NH-HA7*	*GW-051512-DE-HA9*	*GW-051512-DE-HA-10*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/11/2012*	*5/11/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2,6-Dinitrotoluene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2-Chloronaphthalene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2-Chlorophenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2-Methylnaphthalene	µg/L	-	-	80.6	88.8	-	-
2-Methylphenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2-Nitroaniline	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
2-Nitrophenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
3&4-Methylphenol	µg/L	-	-	6.2	ND (4.8)	-	-
3,3'-Dichlorobenzidine	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
3-Nitroaniline	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
4-Bromophenyl phenyl ether	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
4-Chloro-3-methylphenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
4-Chloroaniline	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
4-Chlorophenyl phenyl ether	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
4-Nitroaniline	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
4-Nitrophenol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Acenaphthene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Acenaphthylene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Anthracene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Benzo(a)anthracene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Benzo(a)pyrene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Benzo(b)fluoranthene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Benzo(g,h,i)perylene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Benzo(k)fluoranthene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Benzoic acid	µg/L	-	-	ND (26.3)	ND (24.0)	-	-
Benzyl alcohol	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Butyl benzylphthalate (BBP)	µg/L	-	-	ND (5.3)	ND (4.8)	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*HA-3*	*HA-4*	*HA-6*	*HA-7*	*HA-9*	*HA-10*
	Sample ID:	*GW-051612-DE-HA-3*	*GW-051612-DE-HA-4*	*GW-051112-DE-HA6*	*GW-051112-NH-HA7*	*GW-051512-DE-HA9*	*GW-051512-DE-HA-10*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/11/2012*	*5/11/2012*	*5/15/2012*	*5/15/2012*
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
Carbazole	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Chrysene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Dibenzofuran	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Diethyl phthalate	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Dimethyl phthalate	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Di-n-butylphthalate (DBP)	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Fluoranthene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Fluorene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Hexachlorobenzene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Hexachlorobutadiene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Hexachlorocyclopentadiene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Hexachloroethane	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Naphthalene	µg/L	-	-	249	209	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	ND (5.3)	ND (4.8)	-	-
Semi-volatile Organic Compounds - SPLPIM							
Anthracene	µg/L	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	HA-3	HA-4	HA-6	HA-7	HA-9	HA-10
	Sample ID:	GW-051612-DE-HA-3	GW-051612-DE-HA-4	GW-051112-DE-HA6	GW-051112-NH-HA7	GW-051512-DE-HA9	GW-051512-DE-HA-10
	Sample Date:	5/16/2012	5/16/2012	5/11/2012	5/11/2012	5/15/2012	5/15/2012
Parameters	*Units*						
Metals							
Arsenic	µg/L	-	-	7.7	20.1	-	-
Lead	µg/L	-	-	21.5	8.2	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/L	ND (0.13)	ND (0.085)	0.90	0.79	0.98	-
Total Petroleum Hydrocarbons - Gas	µg/L	152	215	-	-	4610	816
Total Petroleum Hydrocarbons - Motor Oil	mg/L	ND (0.63)	ND (0.43)	ND (0.42)	ND (0.38)	ND (0.41)	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*HA-11*	*HA-12*	*HA-19*	*HA-20*	*LAI-10*	*LAI-12*
	Sample ID:	*GW-051512-NH-HA11*	*GW-051112-NH-HA12*	*GW-051112-DE-HA19*	*GW-051612-NH-HA 20*	*GW-050812-NH-LAI10*	*GW-050812-NH-LAI12*
	Sample Date:	*5/15/2012*	*5/11/2012*	*5/11/2012*	*5/16/2012*	*5/8/2012*	*5/8/2012*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1-Trichloroethane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/L	180	-	-	20.2	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	ND (1.0)	-	-
1,2-Dichlorobenzene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
1,2-Dichloroethane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
1,2-Dichloroethene (total)	µg/L	ND (2.0)	-	-	ND (2.0)	-	-
1,2-Dichloropropane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
1,3,5-Trimethylbenzene	µg/L	43.1	-	-	4.5	-	-
1,3-Dichlorobenzene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
1,3-Dichloropropane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
2,2-Dichloropropane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	ND (5.0)	-	-	ND (5.0)	-	-
2-Chlorotoluene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
2-Hexanone	µg/L	7.4	-	-	ND (5.0)	-	-
4-Chlorotoluene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	ND (5.0)	-	-	ND (5.0)	-	-
Acetone	µg/L	8.1	-	-	ND (5.0)	-	-
Benzene	µg/L	318	-	-	280	ND (1.0)	ND (1.0)
Bromobenzene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Bromodichloromethane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Bromoform	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Bromomethane (Methyl bromide)	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Carbon disulfide	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Carbon tetrachloride	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Chlorobenzene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Chlorobromomethane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Chloroethane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*HA-11*	*HA-12*	*HA-19*	*HA-20*	*LAI-10*	*LAI-12*
	Sample ID:	*GW-051512-NH-HA11*	*GW-051112-NH-HA12*	*GW-051112-DE-HA19*	*GW-051612-NH-HA 20*	*GW-050812-NH-LAI10*	*GW-050812-NH-LAI12*
	Sample Date:	*5/15/2012*	*5/11/2012*	*5/11/2012*	*5/16/2012*	*5/8/2012*	*5/8/2012*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
Chloroform (Trichloromethane)	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Chloromethane (Methyl chloride)	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
cis-1,2-Dichloroethene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	ND (1.0)	-	-
Dibromochloromethane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Dibromomethane	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Ethylbenzene	µg/L	198	-	-	35.1	ND (1.0)	ND (1.0)
Hexachlorobutadiene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Isopropyl benzene	µg/L	14.2	-	-	1.8	-	-
m&p-Xylenes	µg/L	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	ND (1.0)	-	-	ND (1.0)	ND (1.0)	ND (1.0)
Methylene chloride	µg/L	ND (5.0)	-	-	ND (5.0)	-	-
Naphthalene	µg/L	92.6	-	-	7.6	-	-
Styrene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Tetrachloroethene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Toluene	µg/L	7.0	-	-	37.7	ND (1.0)	ND (1.0)
Trichloroethene	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Trichlorofluoromethane (CFC-11)	µg/L	ND (1.0)	-	-	ND (1.0)	-	-
Vinyl chloride	µg/L	ND (0.20)	-	-	ND (1.0)	-	-
Xylenes (total)	µg/L	463	-	-	85.5	ND (3.0)	ND (3.0)
Semi-volatile Organic Compounds							
1,2,4-Trichlorobenzene	µg/L	-	ND (4.8)	-	-	-	-
1,2-Dichlorobenzene	µg/L	-	ND (4.8)	-	-	-	-
1,3-Dichlorobenzene	µg/L	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	ND (4.8)	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	R	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	R	-	-	-	-
2,4-Dichlorophenol	µg/L	-	R	-	-	-	-
2,4-Dimethylphenol	µg/L	-	R	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*HA-11*	*HA-12*	*HA-19*	*HA-20*	*LAI-10*	*LAI-12*
	Sample ID:	*GW-051512-NH-HA11*	*GW-051112-NH-HA12*	*GW-051112-DE-HA19*	*GW-051612-NH-HA 20*	*GW-050812-NH-LAI10*	*GW-050812-NH-LAI12*
	Sample Date:	*5/15/2012*	*5/11/2012*	*5/11/2012*	*5/16/2012*	*5/8/2012*	*5/8/2012*
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	ND (4.8)	-	-	-	-
2,6-Dinitrotoluene	µg/L	-	ND (4.8)	-	-	-	-
2-Chloronaphthalene	µg/L	-	ND (4.8)	-	-	-	-
2-Chlorophenol	µg/L	-	R	-	-	-	-
2-Methylnaphthalene	µg/L	-	ND (4.8)	-	-	-	-
2-Methylphenol	µg/L	-	R	-	-	-	-
2-Nitroaniline	µg/L	-	ND (4.8)	-	-	-	-
2-Nitrophenol	µg/L	-	R	-	-	-	-
3&4-Methylphenol	µg/L	-	R	-	-	-	-
3,3'-Dichlorobenzidine	µg/L	-	ND (4.8)	-	-	-	-
3-Nitroaniline	µg/L	-	ND (4.8)	-	-	-	-
4,6-Dinitro-2-methylphenol	µg/L	-	R	-	-	-	-
4-Bromophenyl phenyl ether	µg/L	-	ND (4.8)	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	R	-	-	-	-
4-Chloroaniline	µg/L	-	ND (4.8)	-	-	-	-
4-Chlorophenyl phenyl ether	µg/L	-	ND (4.8)	-	-	-	-
4-Nitroaniline	µg/L	-	ND (4.8)	-	-	-	-
4-Nitrophenol	µg/L	-	R	-	-	-	-
Acenaphthene	µg/L	-	ND (4.8)	-	-	-	-
Acenaphthylene	µg/L	-	ND (4.8)	-	-	-	-
Anthracene	µg/L	-	ND (4.8)	-	-	-	-
Benzo(a)anthracene	µg/L	-	ND (4.8)	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND (4.8)	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	ND (4.8)	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	ND (4.8)	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	ND (4.8)	-	-	-	-
Benzoic acid	µg/L	-	ND (23.8)	-	-	-	-
Benzyl alcohol	µg/L	-	R	-	-	-	-
Butyl benzylphthalate (BBP)	µg/L	-	ND (4.8)	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	HA-11	HA-12	HA-19	HA-20	LAI-10	LAI-12
	Sample ID:	GW-051512-NH-HA11	GW-051112-NH-HA12	GW-051112-DE-HA19	GW-051612-NH-HA 20	GW-050812-NH-LAI10	GW-050812-NH-LAI12
	Sample Date:	5/15/2012	5/11/2012	5/11/2012	5/16/2012	5/8/2012	5/8/2012
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
Carbazole	µg/L	-	ND (4.8)	-	-	-	-
Chrysene	µg/L	-	ND (4.8)	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	ND (4.8)	-	-	-	-
Dibenzofuran	µg/L	-	ND (4.8)	-	-	-	-
Diethyl phthalate	µg/L	-	ND (4.8)	-	-	-	-
Dimethyl phthalate	µg/L	-	ND (4.8)	-	-	-	-
Di-n-butylphthalate (DBP)	µg/L	-	ND (4.8)	-	-	-	-
Di-n-octyl phthalate (DnOP)	µg/L	-	ND (4.8)	-	-	-	-
Fluoranthene	µg/L	-	ND (4.8)	-	-	-	-
Fluorene	µg/L	-	ND (4.8)	-	-	-	-
Hexachlorobenzene	µg/L	-	ND (4.8)	-	-	-	-
Hexachlorobutadiene	µg/L	-	ND (4.8)	-	-	-	-
Hexachlorocyclopentadiene	µg/L	-	ND (4.8)	-	-	-	-
Hexachloroethane	µg/L	-	ND (4.8)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND (4.8)	-	-	-	-
Naphthalene	µg/L	-	ND (4.8)	-	-	-	-
Nitrobenzene	µg/L	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	ND (4.8)	-	-	-	-
Semi-volatile Organic Compounds - SPLPIM							
Anthracene	µg/L	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	ND (0.095)	-	-
Benzo(a)pyrene	µg/L	-	-	-	ND (0.095)	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	ND (0.095)	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	ND (0.095)	-	-
Fluoranthene	µg/L	-	-	-	ND (0.095)	-	-
Fluorene	µg/L	-	-	-	ND (0.095)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	ND (0.095)	-	-
Naphthalene	µg/L	-	-	-	3.3	-	-
Phenanthrene	µg/L	-	-	-	ND (0.095)	-	-
Pyrene	µg/L	-	-	-	ND (0.095)	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	HA-11	HA-12	HA-19	HA-20	LAI-10	LAI-12
	Sample ID:	GW-051512-NH-HA11	GW-051112-NH-HA12	GW-051112-DE-HA19	GW-051612-NH-HA 20	GW-050812-NH-LAI10	GW-050812-NH-LAI12
	Sample Date:	5/15/2012	5/11/2012	5/11/2012	5/16/2012	5/8/2012	5/8/2012
Parameters	*Units*						
Metals							
Arsenic	µg/L	-	1.9	-	3.8	-	-
Lead	µg/L	-	2.5	-	4.6	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/L	-	ND (0.077)	ND (0.10)	ND (0.076)	ND (0.076)	ND (0.076)
Total Petroleum Hydrocarbons - Gas	µg/L	3890	-	-	660	ND (50.0)	ND (50.0)
Total Petroleum Hydrocarbons - Motor Oil	mg/L	-	ND (0.38)	ND (0.50)	ND (0.38)	ND (0.38)	ND (0.38)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*LAIX-3*	*MW-1*	*MW-2*	*MW-3*	*MW-4*	*MW-5*
	Sample ID:	*GW-050812-NH-LAIx3*	*GW-050812-NH-MW1*	*GW-051412-NH-MW2*	*GW-051412-NH-MW3*	*GW-051412-DE-MW4*	*GW-051412-DE-MW5*
	Sample Date:	*5/8/2012*	*5/8/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1-Trichloroethane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	µg/L	ND (5.0) UJ	ND (1.0)	-	-	ND (1.0)	ND (1.0)
1,2,4-Trimethylbenzene	µg/L	-	-	-	ND (1.0)	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethene (total)	µg/L	ND (10.0) UJ	ND (2.0)	-	ND (2.0)	ND (2.0)	ND (2.0)
1,2-Dichloropropane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
1,3,5-Trimethylbenzene	µg/L	287 J	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
1,3-Dichlorobenzene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
1,3-Dichloropropane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
2,2-Dichloropropane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	ND (25.0) UJ	ND (5.0)	-	ND (5.0)	ND (5.0)	ND (5.0)
2-Chlorotoluene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
2-Hexanone	µg/L	ND (25.0) UJ	ND (5.0)	-	ND (5.0)	ND (5.0)	ND (5.0)
4-Chlorotoluene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	ND (25.0) UJ	ND (5.0)	-	ND (5.0)	ND (5.0)	ND (5.0)
Acetone	µg/L	ND (25.0) UJ	ND (5.0)	-	ND (5.0)	ND (5.0)	ND (5.0)
Benzene	µg/L	7960 J	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Bromobenzene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Bromodichloromethane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Bromoform	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Bromomethane (Methyl bromide)	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Carbon disulfide	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Carbon tetrachloride	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Chlorobenzene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Chlorobromomethane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*LAIX-3*	*MW-1*	*MW-2*	*MW-3*	*MW-4*	*MW-5*
	Sample ID:	*GW-050812-NH-LAIx3*	*GW-050812-NH-MW1*	*GW-051412-NH-MW2*	*GW-051412-NH-MW3*	*GW-051412-DE-MW4*	*GW-051412-DE-MW5*
	Sample Date:	*5/8/2012*	*5/8/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
Chloroform (Trichloromethane)	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Chloromethane (Methyl chloride)	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-
Dibromochloromethane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Dibromomethane	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Dichlorodifluoromethane (CFC-12)	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Ethylbenzene	µg/L	1520 J	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Hexachlorobutadiene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Isopropyl benzene	µg/L	56.2 J	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
m&p-Xylenes	µg/L	4090 J	ND (2.0)	-	ND (2.0)	ND (2.0)	ND (2.0)
Methyl tert butyl ether (MTBE)	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Methylene chloride	µg/L	ND (25.0) UJ	ND (5.0)	-	ND (5.0)	ND (5.0)	ND (5.0)
Naphthalene	µg/L	264 J	ND (1.0)	-	3.9	ND (1.0)	ND (1.0)
Styrene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Toluene	µg/L	6160 J	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Trichlorofluoromethane (CFC-11)	µg/L	ND (5.0) UJ	ND (1.0)	-	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	µg/L	ND (1.0) UJ	ND (0.20)	-	ND (0.20)	ND (1.0)	ND (0.20)
Xylenes (total)	µg/L	5780 J	ND (3.0)	-	ND (3.0)	ND (3.0)	ND (3.0)
Semi-volatile Organic Compounds							
1,2,4-Trichlorobenzene	µg/L	-	-	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
1,2-Dichlorobenzene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
1,3-Dichlorobenzene	µg/L	ND (4.8)	ND (4.8)	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2,4,5-Trichlorophenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2,4,6-Trichlorophenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2,4-Dichlorophenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2,4-Dimethylphenol	µg/L	70.1	ND (4.8)	-	-	ND (5.1)	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*LAIX-3*	*MW-1*	*MW-2*	*MW-3*	*MW-4*	*MW-5*
	Sample ID:	*GW-050812-NH-LAIx3*	*GW-050812-NH-MW1*	*GW-051412-NH-MW2*	*GW-051412-NH-MW3*	*GW-051412-DE-MW4*	*GW-051412-DE-MW5*
	Sample Date:	*5/8/2012*	*5/8/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
2,4-Dinitrophenol	µg/L	-	-	-	ND (9.5)	-	-
2,4-Dinitrotoluene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2,6-Dinitrotoluene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2-Chloronaphthalene	µg/L	-	-	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2-Chlorophenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2-Methylnaphthalene	µg/L	46.7	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2-Methylphenol	µg/L	25.3	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2-Nitroaniline	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
2-Nitrophenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
3&4-Methylphenol	µg/L	9.5	ND (4.8)	ND (4.7)	27.9	ND (5.1)	ND (5.2)
3,3'-Dichlorobenzidine	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
3-Nitroaniline	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
4,6-Dinitro-2-methylphenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
4-Bromophenyl phenyl ether	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
4-Chloro-3-methylphenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
4-Chloroaniline	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
4-Chlorophenyl phenyl ether	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
4-Nitroaniline	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
4-Nitrophenol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Acenaphthene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Acenaphthylene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Anthracene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Benzo(a)anthracene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Benzo(a)pyrene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Benzo(b)fluoranthene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Benzo(g,h,i)perylene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Benzo(k)fluoranthene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Benzoic acid	µg/L	ND (23.8)	ND (23.8)	ND (23.7)	ND (23.8)	ND (25.5)	ND (26.0)
Benzyl alcohol	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Butyl benzylphthalate (BBP)	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	LAIX-3	MW-1	MW-2	MW-3	MW-4	MW-5
	Sample ID:	GW-050812-NH-LAIx3	GW-050812-NH-MW1	GW-051412-NH-MW2	GW-051412-NH-MW3	GW-051412-DE-MW4	GW-051412-DE-MW5
	Sample Date:	5/8/2012	5/8/2012	5/14/2012	5/14/2012	5/14/2012	5/14/2012
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
Carbazole	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Chrysene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Dibenz(a,h)anthracene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Dibenzofuran	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Diethyl phthalate	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Dimethyl phthalate	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Di-n-butylphthalate (DBP)	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Di-n-octyl phthalate (DnOP)	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Fluoranthene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Fluorene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Hexachlorobenzene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Hexachlorobutadiene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Hexachlorocyclopentadiene	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Hexachloroethane	µg/L	ND (4.8)	ND (4.8)	-	ND (4.8)	ND (5.1)	ND (5.2)
Indeno(1,2,3-cd)pyrene	µg/L	ND (4.8)	ND (4.8)	-	-	ND (5.1)	-
Naphthalene	µg/L	237	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Nitrobenzene	µg/L	ND (4.8)	ND (4.8)	-	-	-	-
N-Nitrosodiphenylamine	µg/L	ND (4.8)	ND (4.8)	ND (4.7)	ND (4.8)	ND (5.1)	ND (5.2)
Semi-volatile Organic Compounds - SPLPIM							
Anthracene	µg/L	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*LAIX-3*	*MW-1*	*MW-2*	*MW-3*	*MW-4*	*MW-5*
	Sample ID:	*GW-050812-NH-LAIx3*	*GW-050812-NH-MW1*	*GW-051412-NH-MW2*	*GW-051412-NH-MW3*	*GW-051412-DE-MW4*	*GW-051412-DE-MW5*
	Sample Date:	*5/8/2012*	*5/8/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*	*5/14/2012*
Parameters	*Units*						
Metals							
Arsenic	µg/L	6.1	11.9	1.2	91.8	3.8	3.2
Lead	µg/L	1.6	0.99	0.11	102	0.53	0.49
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/L	0.62	ND (0.076)	ND (0.076)	0.35	ND (0.082)	ND (0.083)
Total Petroleum Hydrocarbons - Gas	µg/L	33500	ND (50.0)	-	ND (50.0)	ND (50.0)	ND (50.0)
Total Petroleum Hydrocarbons - Motor Oil	mg/L	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.41)	ND (0.42)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-6*	*MW-7*	*MW-8*	*MW-8*	*MW-9*	*MW-10*
	Sample ID:	*GW-051412-DE-MW6*	*GW-050912-NH-MW7*	*GW-051012-DE-FD2*	*GW-051012-DE-MW8*	*GW-050912-DE-MW9*	*GW-051012-DE-MW10*
	Sample Date:	*5/14/2012*	*5/9/2012*	*5/10/2012*	*5/10/2012*	*5/9/2012*	*5/10/2012*
				(Duplicate)			
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1-Trichloroethane	µg/L	ND (1.0)	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	ND (1.0)	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/L	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/L	ND (1.0)	-	-	-	-	-
1,2-Dichloroethane	µg/L	ND (1.0)	-	-	-	-	-
1,2-Dichloroethene (total)	µg/L	ND (2.0)	-	-	-	-	-
1,2-Dichloropropane	µg/L	ND (1.0)	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/L	ND (1.0)	-	-	-	-	-
1,3-Dichlorobenzene	µg/L	ND (1.0)	-	-	-	-	-
1,3-Dichloropropane	µg/L	ND (1.0)	-	-	-	-	-
2,2-Dichloropropane	µg/L	ND (1.0)	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	ND (5.0)	-	-	-	-	-
2-Chlorotoluene	µg/L	ND (1.0)	-	-	-	-	-
2-Hexanone	µg/L	ND (5.0)	-	-	-	-	-
4-Chlorotoluene	µg/L	ND (1.0)	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	ND (5.0)	-	-	-	-	-
Acetone	µg/L	6.7	-	-	-	-	-
Benzene	µg/L	ND (1.0)	-	-	-	-	-
Bromobenzene	µg/L	ND (1.0)	-	-	-	-	-
Bromodichloromethane	µg/L	ND (1.0)	-	-	-	-	-
Bromoform	µg/L	ND (1.0)	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/L	ND (1.0)	-	-	-	-	-
Carbon disulfide	µg/L	ND (1.0)	-	-	-	-	-
Carbon tetrachloride	µg/L	ND (1.0)	-	-	-	-	-
Chlorobenzene	µg/L	ND (1.0)	-	-	-	-	-
Chlorobromomethane	µg/L	ND (1.0)	-	-	-	-	-
Chloroethane	µg/L	ND (1.0)	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-6*	*MW-7*	*MW-8*	*MW-8*	*MW-9*	*MW-10*
	Sample ID:	*GW-051412-DE-MW6*	*GW-050912-NH-MW7*	*GW-051012-DE-FD2*	*GW-051012-DE-MW8*	*GW-050912-DE-MW9*	*GW-051012-DE-MW10*
	Sample Date:	*5/14/2012*	*5/9/2012*	*5/10/2012*	*5/10/2012*	*5/9/2012*	*5/10/2012*
				(Duplicate)			
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
Chloroform (Trichloromethane)	µg/L	ND (1.0)	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/L	ND (1.0)	-	-	-	-	-
cis-1,2-Dichloroethene	µg/L	ND (1.0)	-	-	-	-	-
cis-1,3-Dichloropropene	µg/L	-	-	-	-	-	-
Dibromochloromethane	µg/L	ND (1.0)	-	-	-	-	-
Dibromomethane	µg/L	ND (1.0)	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	ND (1.0)	-	-	-	-	-
Ethylbenzene	µg/L	ND (1.0)	-	-	-	-	-
Hexachlorobutadiene	µg/L	ND (1.0)	-	-	-	-	-
Isopropyl benzene	µg/L	ND (1.0)	-	-	-	-	-
m&p-Xylenes	µg/L	ND (2.0)	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	ND (1.0)	-	-	-	-	-
Methylene chloride	µg/L	ND (5.0)	-	-	-	-	-
Naphthalene	µg/L	ND (1.0)	-	-	-	-	-
Styrene	µg/L	ND (1.0)	-	-	-	-	-
Tetrachloroethene	µg/L	ND (1.0)	-	-	-	-	-
Toluene	µg/L	ND (1.0)	-	-	-	-	-
Trichloroethene	µg/L	ND (1.0)	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	ND (1.0)	-	-	-	-	-
Vinyl chloride	µg/L	ND (0.20)	-	-	-	-	-
Xylenes (total)	µg/L	ND (3.0)	-	-	-	-	-
Semi-volatile Organic Compounds							
1,2,4-Trichlorobenzene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
1,2-Dichlorobenzene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
1,3-Dichlorobenzene	µg/L	-	-	-	-	ND (4.8)	-
1,4-Dichlorobenzene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	-	ND (5.1)
2,4,5-Trichlorophenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2,4,6-Trichlorophenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2,4-Dichlorophenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2,4-Dimethylphenol	µg/L	-	36.3	15.5	ND (4.7)	ND (4.8)	ND (5.1)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-6*	*MW-7*	*MW-8*	*MW-8*	*MW-9*	*MW-10*
	Sample ID:	*GW-051412-DE-MW6*	*GW-050912-NH-MW7*	*GW-051012-DE-FD2*	*GW-051012-DE-MW8*	*GW-050912-DE-MW9*	*GW-051012-DE-MW10*
	Sample Date:	*5/14/2012*	*5/9/2012*	*5/10/2012*	*5/10/2012*	*5/9/2012*	*5/10/2012*
				(Duplicate)			
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
2,4-Dinitrophenol	µg/L	-	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2,6-Dinitrotoluene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2-Chloronaphthalene	µg/L	ND (5.3)	-	ND (5.1)	ND (4.7)	-	ND (5.1)
2-Chlorophenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2-Methylnaphthalene	µg/L	ND (5.3)	190	59.8	59.8	14.6	ND (5.1)
2-Methylphenol	µg/L	ND (5.3)	5.5	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2-Nitroaniline	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
2-Nitrophenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
3&4-Methylphenol	µg/L	ND (5.3)	18.1	30.5	29.6	ND (4.8)	ND (5.1)
3,3'-Dichlorobenzidine	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
3-Nitroaniline	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
4,6-Dinitro-2-methylphenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
4-Bromophenyl phenyl ether	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
4-Chloro-3-methylphenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
4-Chloroaniline	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
4-Chlorophenyl phenyl ether	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
4-Nitroaniline	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
4-Nitrophenol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Acenaphthene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Acenaphthylene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Anthracene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Benzo(a)anthracene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Benzo(a)pyrene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Benzo(b)fluoranthene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Benzo(g,h,i)perylene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Benzo(k)fluoranthene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Benzoic acid	µg/L	ND (26.3)	ND (24.0)	ND (25.5)	ND (23.7)	ND (24.0)	ND (25.5)
Benzyl alcohol	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Butyl benzylphthalate (BBP)	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-6*	*MW-7*	*MW-8*	*MW-8*	*MW-9*	*MW-10*
	Sample ID:	*GW-051412-DE-MW6*	*GW-050912-NH-MW7*	*GW-051012-DE-FD2*	*GW-051012-DE-MW8*	*GW-050912-DE-MW9*	*GW-051012-DE-MW10*
	Sample Date:	*5/14/2012*	*5/9/2012*	*5/10/2012*	*5/10/2012*	*5/9/2012*	*5/10/2012*
				(Duplicate)			
Parameters	*Units*						
Semi-volatile Organic Compounds (Cont'd.)							
Carbazole	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Chrysene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Dibenz(a,h)anthracene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Dibenzofuran	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Diethyl phthalate	µg/L	ND (5.3)	8.4	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Dimethyl phthalate	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Di-n-butylphthalate (DBP)	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Di-n-octyl phthalate (DnOP)	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Fluoranthene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Fluorene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Hexachlorobenzene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Hexachlorobutadiene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Hexachlorocyclopentadiene	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Hexachloroethane	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Indeno(1,2,3-cd)pyrene	µg/L	-	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Naphthalene	µg/L	ND (5.3)	495	232	240	73.4	ND (5.1)
Nitrobenzene	µg/L	-	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	ND (5.3)	ND (4.8)	ND (5.1)	ND (4.7)	ND (4.8)	ND (5.1)
Semi-volatile Organic Compounds - SPLPIM							
Anthracene	µg/L	-	-	-	-	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-6*	*MW-7*	*MW-8*	*MW-8*	*MW-9*	*MW-10*
	Sample ID:	*GW-051412-DE-MW6*	*GW-050912-NH-MW7*	*GW-051012-DE-FD2*	*GW-051012-DE-MW8*	*GW-050912-DE-MW9*	*GW-051012-DE-MW10*
	Sample Date:	*5/14/2012*	*5/9/2012*	*5/10/2012*	*5/10/2012*	*5/9/2012*	*5/10/2012*
				(Duplicate)			
Parameters	*Units*						
Metals							
Arsenic	µg/L	8.3	52.4	31.4	31.6	31.8	6.4
Lead	µg/L	0.10	13.6	0.63	0.64	0.55	1.7
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/L	ND (0.084)	1.5	0.94	0.67	0.29	0.14
Total Petroleum Hydrocarbons - Gas	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons - Motor Oil	mg/L	ND (0.42)	ND (0.38)	ND (0.38)	ND (0.41)	ND (0.43)	ND (0.39)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	***MW-11***	***MW-12***	***MW-13***	***MW-14***	***MW-15***
	Sample ID:	***GW-051612-NH-MW11***	***GW-051612-DE-MW-12***	***GW-051612-DE-MW-13***	***GW-051412-NH-MW14***	***GW-051112-NH-MW15***
	Sample Date:	***5/16/2012***	***5/16/2012***	***5/16/2012***	***5/14/2012***	***5/11/2012***
Parameters	***Units***					
Volatile Organic Compounds						
1,1,1-Trichloroethane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	ND (10.0) UJ	-
1,2,4-Trimethylbenzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	1420 J	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	-	-
1,2-Dichlorobenzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
1,2-Dichloroethane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
1,2-Dichloroethene (total)	µg/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (20.0) UJ	-
1,2-Dichloropropane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
1,3,5-Trimethylbenzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	362 J	-
1,3-Dichlorobenzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
1,3-Dichloropropane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
2,2-Dichloropropane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (50.0) UJ	-
2-Chlorotoluene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
2-Hexanone	µg/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (50.0) UJ	-
4-Chlorotoluene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (50.0) UJ	-
Acetone	µg/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (50.0) UJ	-
Benzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	18400 J	-
Bromobenzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Bromodichloromethane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Bromoform	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Bromomethane (Methyl bromide)	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Carbon disulfide	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Carbon tetrachloride	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Chlorobenzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Chlorobromomethane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Chloroethane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-11*	*MW-12*	*MW-13*	*MW-14*	*MW-15*
	Sample ID:	*GW-051612-NH-MW11*	*GW-051612-DE-MW-12*	*GW-051612-DE-MW-13*	*GW-051412-NH-MW14*	*GW-051112-NH-MW15*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/16/2012*	*5/14/2012*	*5/11/2012*
Parameters	***Units***					
Volatile Organic Compounds (Cont'd.)						
Chloroform (Trichloromethane)	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Chloromethane (Methyl chloride)	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
cis-1,2-Dichloroethene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
cis-1,3-Dichloropropene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	-	-
Dibromochloromethane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Dibromomethane	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Dichlorodifluoromethane (CFC-12)	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Ethylbenzene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	2090 J	-
Hexachlorobutadiene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Isopropyl benzene	µg/L	1.6	ND (1.0)	ND (1.0)	76.8 J	-
m&p-Xylenes	µg/L	-	-	-	8520 J	-
Methyl tert butyl ether (MTBE)	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Methylene chloride	µg/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (50.0) UJ	-
Naphthalene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	617 J	-
Styrene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Tetrachloroethene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) UJ	-
Toluene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	23400 J	-
Trichloroethene	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0) UJ	-
Trichlorofluoromethane (CFC-11)	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (10.0) UJ	-
Vinyl chloride	µg/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0) UJ	-
Xylenes (total)	µg/L	ND (3.0)	ND (3.0)	ND (3.0)	11900 J	-
Semi-volatile Organic Compounds						
1,2,4-Trichlorobenzene	µg/L	-	-	-	ND (4.8)	ND (4.8)
1,2-Dichlorobenzene	µg/L	-	-	-	ND (4.8)	ND (4.8)
1,3-Dichlorobenzene	µg/L	-	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	-	-	ND (4.8)	ND (4.8)
2,4,5-Trichlorophenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
2,4,6-Trichlorophenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
2,4-Dichlorophenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
2,4-Dimethylphenol	µg/L	-	-	-	-	ND (4.8)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-11*	*MW-12*	*MW-13*	*MW-14*	*MW-15*
	Sample ID:	*GW-051612-NH-MW11*	*GW-051612-DE-MW-12*	*GW-051612-DE-MW-13*	*GW-051412-NH-MW14*	*GW-051112-NH-MW15*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/16/2012*	*5/14/2012*	*5/11/2012*
Parameters	***Units***					
Semi-volatile Organic Compounds (Cont'd.)						
2,4-Dinitrophenol	µg/L	-	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	-	-	ND (4.8)	ND (4.8)
2,6-Dinitrotoluene	µg/L	-	-	-	ND (4.8)	ND (4.8)
2-Chloronaphthalene	µg/L	-	-	-	ND (4.8)	ND (4.8)
2-Chlorophenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
2-Methylnaphthalene	µg/L	-	-	-	158	ND (4.8)
2-Methylphenol	µg/L	-	-	-	13.5	ND (4.8)
2-Nitroaniline	µg/L	-	-	-	ND (4.8)	ND (4.8)
2-Nitrophenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
3&4-Methylphenol	µg/L	-	-	-	38.8	ND (4.8)
3,3'-Dichlorobenzidine	µg/L	-	-	-	ND (4.8)	ND (4.8)
3-Nitroaniline	µg/L	-	-	-	ND (4.8)	ND (4.8)
4,6-Dinitro-2-methylphenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
4-Bromophenyl phenyl ether	µg/L	-	-	-	ND (4.8)	ND (4.8)
4-Chloro-3-methylphenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
4-Chloroaniline	µg/L	-	-	-	ND (4.8)	ND (4.8)
4-Chlorophenyl phenyl ether	µg/L	-	-	-	ND (4.8)	ND (4.8)
4-Nitroaniline	µg/L	-	-	-	ND (4.8)	ND (4.8)
4-Nitrophenol	µg/L	-	-	-	ND (4.8)	ND (4.8)
Acenaphthene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Acenaphthylene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Anthracene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Benzo(a)anthracene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Benzo(a)pyrene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Benzo(b)fluoranthene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Benzo(g,h,i)perylene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Benzo(k)fluoranthene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Benzoic acid	µg/L	-	-	-	ND (23.8)	ND (23.8)
Benzyl alcohol	µg/L	-	-	-	ND (4.8)	ND (4.8)
Butyl benzylphthalate (BBP)	µg/L	-	-	-	ND (4.8)	ND (4.8)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-11*	*MW-12*	*MW-13*	*MW-14*	*MW-15*
	Sample ID:	*GW-051612-NH-MW11*	*GW-051612-DE-MW-12*	*GW-051612-DE-MW-13*	*GW-051412-NH-MW14*	*GW-051112-NH-MW15*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/16/2012*	*5/14/2012*	*5/11/2012*
Parameters	***Units***					
Semi-volatile Organic Compounds (Cont'd.)						
Carbazole	µg/L	-	-	-	ND (4.8)	ND (4.8)
Chrysene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Dibenz(a,h)anthracene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Dibenzofuran	µg/L	-	-	-	ND (4.8)	ND (4.8)
Diethyl phthalate	µg/L	-	-	-	ND (4.8)	ND (4.8)
Dimethyl phthalate	µg/L	-	-	-	ND (4.8)	ND (4.8)
Di-n-butylphthalate (DBP)	µg/L	-	-	-	ND (4.8)	ND (4.8)
Di-n-octyl phthalate (DnOP)	µg/L	-	-	-	ND (4.8)	ND (4.8)
Fluoranthene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Fluorene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Hexachlorobenzene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Hexachlorobutadiene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Hexachlorocyclopentadiene	µg/L	-	-	-	ND (4.8)	ND (4.8)
Hexachloroethane	µg/L	-	-	-	ND (4.8)	ND (4.8)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND (4.8)
Naphthalene	µg/L	-	-	-	485	ND (4.8)
Nitrobenzene	µg/L	-	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	-	-	ND (4.8)	ND (4.8)
Semi-volatile Organic Compounds - SPLPIM						
Anthracene	µg/L	-	-	-	-	-
Benzo(a)anthracene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Benzo(a)pyrene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Benzo(b)fluoranthene	µg/L	-	ND (0.10)	ND (0.10)	-	-
Dibenz(a,h)anthracene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Fluoranthene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Fluorene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Naphthalene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Phenanthrene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-
Pyrene	µg/L	ND (0.20)	ND (0.10)	ND (0.10)	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-11*	*MW-12*	*MW-13*	*MW-14*	*MW-15*
	Sample ID:	*GW-051612-NH-MW11*	*GW-051612-DE-MW-12*	*GW-051612-DE-MW-13*	*GW-051412-NH-MW14*	*GW-051112-NH-MW15*
	Sample Date:	*5/16/2012*	*5/16/2012*	*5/16/2012*	*5/14/2012*	*5/11/2012*
Parameters	***Units***					
Metals						
Arsenic	µg/L	6.0	7.3	3.4	43.7	10.9
Lead	µg/L	0.95	0.75	1.5	17.7	6.3
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/L	ND (0.077)	ND (0.40)	ND (0.078)	2.0	0.13
Total Petroleum Hydrocarbons - Gas	µg/L	177	ND (50.0)	ND (50.0)	133000	-
Total Petroleum Hydrocarbons - Motor Oil	mg/L	ND (0.38)	ND (2.0)	ND (0.39)	ND (0.38)	ND (0.38)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	***MW-16***	***RW-4***	***RWX-5***	***W-1***
	Sample ID:	***GW-051612-NH-MW16***	***GW-051112-DE-RW4***	***GW-051112-DE-RWX-5***	***GW-051012-NH-W1***
	Sample Date:	***5/16/2012***	***5/11/2012***	***5/11/2012***	***5/10/2012***
Parameters	***Units***				
Volatile Organic Compounds					
1,1,1-Trichloroethane	µg/L	ND (1.0)	-	-	-
1,1,2,2-Tetrachloroethane	µg/L	-	-	-	-
1,2,4-Trimethylbenzene	µg/L	ND (1.0)	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/L	ND (1.0)	-	-	-
1,2-Dichlorobenzene	µg/L	ND (1.0)	-	-	-
1,2-Dichloroethane	µg/L	ND (1.0)	-	-	-
1,2-Dichloroethene (total)	µg/L	ND (2.0)	-	-	-
1,2-Dichloropropane	µg/L	ND (1.0)	-	-	-
1,3,5-Trimethylbenzene	µg/L	ND (1.0)	-	-	-
1,3-Dichlorobenzene	µg/L	ND (1.0)	-	-	-
1,3-Dichloropropane	µg/L	ND (1.0)	-	-	-
2,2-Dichloropropane	µg/L	ND (1.0)	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/L	ND (5.0)	-	-	-
2-Chlorotoluene	µg/L	ND (1.0)	-	-	-
2-Hexanone	µg/L	ND (5.0)	-	-	-
4-Chlorotoluene	µg/L	ND (1.0)	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/L	ND (5.0)	-	-	-
Acetone	µg/L	ND (5.0)	-	-	-
Benzene	µg/L	ND (1.0)	-	-	-
Bromobenzene	µg/L	ND (1.0)	-	-	-
Bromodichloromethane	µg/L	ND (1.0)	-	-	-
Bromoform	µg/L	ND (1.0)	-	-	-
Bromomethane (Methyl bromide)	µg/L	ND (1.0)	-	-	-
Carbon disulfide	µg/L	ND (1.0)	-	-	-
Carbon tetrachloride	µg/L	ND (1.0)	-	-	-
Chlorobenzene	µg/L	ND (1.0)	-	-	-
Chlorobromomethane	µg/L	ND (1.0)	-	-	-
Chloroethane	µg/L	ND (1.0)	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	***MW-16***	***RW-4***	***RWX-5***	***W-1***
	Sample ID:	***GW-051612-NH-MW16***	***GW-051112-DE-RW4***	***GW-051112-DE-RWX-5***	***GW-051012-NH-W1***
	Sample Date:	***5/16/2012***	***5/11/2012***	***5/11/2012***	***5/10/2012***
Parameters	***Units***				
Volatile Organic Compounds (Cont'd.)					
Chloroform (Trichloromethane)	µg/L	ND (1.0)	-	-	-
Chloromethane (Methyl chloride)	µg/L	ND (1.0)	-	-	-
cis-1,2-Dichloroethene	µg/L	-	-	-	-
cis-1,3-Dichloropropene	µg/L	ND (1.0)	-	-	-
Dibromochloromethane	µg/L	ND (1.0)	-	-	-
Dibromomethane	µg/L	ND (1.0)	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/L	ND (1.0)	-	-	-
Ethylbenzene	µg/L	ND (1.0)	-	-	-
Hexachlorobutadiene	µg/L	ND (1.0)	-	-	-
Isopropyl benzene	µg/L	ND (1.0)	-	-	-
m&p-Xylenes	µg/L	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/L	ND (1.0)	-	-	-
Methylene chloride	µg/L	ND (5.0)	-	-	-
Naphthalene	µg/L	ND (1.0)	-	-	-
Styrene	µg/L	ND (1.0)	-	-	-
Tetrachloroethene	µg/L	ND (1.0)	-	-	-
Toluene	µg/L	ND (1.0)	-	-	-
Trichloroethene	µg/L	ND (1.0)	-	-	-
Trichlorofluoromethane (CFC-11)	µg/L	ND (1.0)	-	-	-
Vinyl chloride	µg/L	ND (0.20)	-	-	-
Xylenes (total)	µg/L	ND (3.0)	-	-	-
Semi-volatile Organic Compounds					
1,2,4-Trichlorobenzene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
1,2-Dichlorobenzene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
1,3-Dichlorobenzene	µg/L	-	-	-	-
1,4-Dichlorobenzene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2,4,5-Trichlorophenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2,4,6-Trichlorophenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2,4-Dichlorophenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2,4-Dimethylphenol	µg/L	-	ND (5.2)	ND (5.2)	1140

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	*MW-16*	*RW-4*	*RWX-5*	*W-1*
	Sample ID:	*GW-051612-NH-MW16*	*GW-051112-DE-RW4*	*GW-051112-DE-RWX-5*	*GW-051012-NH-W1*
	Sample Date:	*5/16/2012*	*5/11/2012*	*5/11/2012*	*5/10/2012*
Parameters	***Units***				
Semi-volatile Organic Compounds (Cont'd.)					
2,4-Dinitrophenol	µg/L	-	-	-	-
2,4-Dinitrotoluene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2,6-Dinitrotoluene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2-Chloronaphthalene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2-Chlorophenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2-Methylnaphthalene	µg/L	-	ND (5.2)	ND (5.2)	294
2-Methylphenol	µg/L	-	ND (5.2)	ND (5.2)	303
2-Nitroaniline	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
2-Nitrophenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
3&4-Methylphenol	µg/L	-	ND (5.2)	ND (5.2)	616
3,3'-Dichlorobenzidine	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
3-Nitroaniline	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
4,6-Dinitro-2-methylphenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
4-Bromophenyl phenyl ether	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
4-Chloro-3-methylphenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
4-Chloroaniline	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
4-Chlorophenyl phenyl ether	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
4-Nitroaniline	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
4-Nitrophenol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Acenaphthene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Acenaphthylene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Anthracene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Benzo(a)anthracene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Benzo(a)pyrene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Benzo(b)fluoranthene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Benzo(g,h,i)perylene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Benzo(k)fluoranthene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Benzoic acid	µg/L	-	ND (25.8)	ND (26.0)	ND (23.7)
Benzyl alcohol	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Butyl benzylphthalate (BBP)	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	***MW-16***	***RW-4***	***RWX-5***	***W-1***
	Sample ID:	***GW-051612-NH-MW16***	***GW-051112-DE-RW4***	***GW-051112-DE-RWX-5***	***GW-051012-NH-W1***
	Sample Date:	***5/16/2012***	***5/11/2012***	***5/11/2012***	***5/10/2012***
Parameters	***Units***				
Semi-volatile Organic Compounds (Cont'd.)					
Carbazole	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Chrysene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Dibenz(a,h)anthracene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Dibenzofuran	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Diethyl phthalate	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Dimethyl phthalate	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Di-n-butylphthalate (DBP)	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Di-n-octyl phthalate (DnOP)	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Fluoranthene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Fluorene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Hexachlorobenzene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Hexachlorobutadiene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Hexachlorocyclopentadiene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Hexachloroethane	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Indeno(1,2,3-cd)pyrene	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Naphthalene	µg/L	-	ND (5.2)	10.4	897
Nitrobenzene	µg/L	-	-	-	-
N-Nitrosodiphenylamine	µg/L	-	ND (5.2)	ND (5.2)	ND (4.7)
Semi-volatile Organic Compounds - SPLPIM					
Anthracene	µg/L	ND (0.095)	-	-	-
Benzo(a)anthracene	µg/L	ND (0.095)	-	-	-
Benzo(a)pyrene	µg/L	ND (0.095)	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	ND (0.095)	-	-	-
Fluoranthene	µg/L	ND (0.095)	-	-	-
Fluorene	µg/L	ND (0.095)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND (0.095)	-	-	-
Naphthalene	µg/L	ND (0.095)	-	-	-
Phenanthrene	µg/L	ND (0.095)	-	-	-
Pyrene	µg/L	ND (0.095)	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON,
MAY 2012

	Sample Location:	***MW-16***	***RW-4***	***RWX-5***	***W-1***
	Sample ID:	***GW-051612-NH-MW16***	***GW-051112-DE-RW4***	***GW-051112-DE-RWX-5***	***GW-051012-NH-W1***
	Sample Date:	***5/16/2012***	***5/11/2012***	***5/11/2012***	***5/10/2012***
Parameters	***Units***				
Metals					
Arsenic	µg/L	2.4	0.86	1.5	23.9
Lead	µg/L	0.11	0.30	ND (0.10)	5.1
Petroleum Products					
Total Petroleum Hydrocarbons - Diesel	mg/L	0.12	ND (0.080)	ND (0.079)	10
Total Petroleum Hydrocarbons - Gas	µg/L	68.7	-	-	-
Total Petroleum Hydrocarbons - Motor Oil	mg/L	ND (0.38)	ND (0.40)	ND (0.40)	ND (0.38)

Notes:

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
UJ - Estimated reporting limit.
R - Rejected.
- - Not analyzed.

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHNGTON
MAY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*	*Units*
VOCs	Dibromofluoromethane	66	81 - 119	GW-050812-NH-LAIx3	Ethylbenzene	1520 J	µg/L
					Toluene	6160 J	µg/L
					Xylenes (total)	5780 J	µg/L
					Benzene	7960 J	µg/L
					m&p-Xylenes	4090 J	µg/L
					1,3,5-Trimethylbenzene	287 J	µg/L
					Naphthalene	264 J	µg/L
					Isopropyl benzene	56.2 J	µg/L
					Styrene	5.0 UJ	µg/L
					4-Chlorotoluene	5.0 UJ	µg/L
					1,2-Dichloroethane	5.0 UJ	µg/L
					4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	25.0 UJ	µg/L
					Bromobenzene	5.0 UJ	µg/L
					Chlorobenzene	5.0 UJ	µg/L
					Dibromochloromethane	5.0 UJ	µg/L
					Tetrachloroethene	5.0 UJ	µg/L
					1,3-Dichloropropane	5.0 UJ	µg/L
					cis-1,2-Dichloroethene	5.0 UJ	µg/L
					Methyl tert butyl ether (MTBE)	5.0 UJ	µg/L
					1,2-Dichloroethene (total)	10.0 UJ	µg/L
					1,3-Dichlorobenzene	5.0 UJ	µg/L
					Carbon tetrachloride	5.0 UJ	µg/L
					2-Hexanone	25.0 UJ	µg/L
					2,2-Dichloropropane	5.0 UJ	µg/L
					Acetone	25.0 UJ	µg/L
					Chloroform (Trichloromethane)	5.0 UJ	µg/L
					1,1,1-Trichloroethane	5.0 UJ	µg/L

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHNGTON
MAY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*	*Units*
VOCs	Dibromofluoromethane	66	81 - 119	GW-050812-NH-LAIx3	Bromomethane (Methyl bromide)	5.0 UJ	µg/L
					Chloromethane (Methyl chloride)	5.0 UJ	µg/L
					Dibromomethane	5.0 UJ	µg/L
					Chlorobromomethane	5.0 UJ	µg/L
					Chloroethane	5.0 UJ	µg/L
					Vinyl chloride	1.0 UJ	µg/L
					Methylene chloride	25.0 UJ	µg/L
					Carbon disulfide	5.0 UJ	µg/L
					Bromoform	5.0 UJ	µg/L
					Bromodichloromethane	5.0 UJ	µg/L
					Trichlorofluoromethane (CFC-11)	5.0 UJ	µg/L
					Dichlorodifluoromethane (CFC-12)	5.0 UJ	µg/L
					1,2-Dichloropropane	5.0 UJ	µg/L
					2-Butanone (Methyl ethyl ketone) (MEK)	25.0 UJ	µg/L
					Trichloroethene	5.0 UJ	µg/L
					1,1,2,2-Tetrachloroethane	5.0 UJ	µg/L
					Hexachlorobutadiene	5.0 UJ	µg/L
					2-Chlorotoluene	5.0 UJ	µg/L
					1,2-Dichlorobenzene	5.0 UJ	µg/L
VOCs	Dibromofluoromethane	79	81 - 119	GW-051412-NH-MW14	Toluene	23400 J	µg/L
					1,3,5-Trimethylbenzene	362 J	µg/L
					Naphthalene	617 J	µg/L
					1,2,4-Trimethylbenzene	1420 J	µg/L
					Isopropyl benzene	76.8 J	µg/L
					Ethylbenzene	2090 J	µg/L
					Xylenes (total)	11900 J	µg/L

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHNGTON
MAY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*	*Units*
VOCs	Dibromofluoromethane	79	81 - 119	GW-051412-NH-MW14	Benzene	18400 J	µg/L
					m&p-Xylenes	8520 J	µg/L
					Tetrachloroethene	1.0 UJ	µg/L
					Trichloroethene	1.0 UJ	µg/L
					Styrene	10.0 UJ	µg/L
					4-Chlorotoluene	10.0 UJ	µg/L
					1,2-Dichloroethane	10.0 UJ	µg/L
					4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	50.0 UJ	µg/L
					Bromobenzene	10.0 UJ	µg/L
					Chlorobenzene	10.0 UJ	µg/L
					Dibromochloromethane	10.0 UJ	µg/L
					1,3-Dichloropropane	10.0 UJ	µg/L
					cis-1,2-Dichloroethene	10.0 UJ	µg/L
					Methyl tert butyl ether (MTBE)	10.0 UJ	µg/L
					1,2-Dichloroethene (total)	20.0 UJ	µg/L
					1,3-Dichlorobenzene	10.0 UJ	µg/L
					Carbon tetrachloride	10.0 UJ	µg/L
					2-Hexanone	50.0 UJ	µg/L
					2,2-Dichloropropane	10.0 UJ	µg/L
					Acetone	50.0 UJ	µg/L
					Chloroform (Trichloromethane)	10.0 UJ	µg/L
					1,1,1-Trichloroethane	10.0 UJ	µg/L
					Bromomethane (Methyl bromide)	10.0 UJ	µg/L
					Chloromethane (Methyl chloride)	10.0 UJ	µg/L
					Dibromomethane	10.0 UJ	µg/L
					Chlorobromomethane	10.0 UJ	µg/L
					Chloroethane	10.0 UJ	µg/L

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHNGTON
MAY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*	*Units*
VOCs	Dibromofluoromethane	79	81 - 119	GW-051412-NH-MW14	Vinyl chloride	2.0 UJ	µg/L
					Methylene chloride	50.0 UJ	µg/L
					Carbon disulfide	10.0 UJ	µg/L
					Bromoform	10.0 UJ	µg/L
					Bromodichloromethane	10.0 UJ	µg/L
					Trichlorofluoromethane (CFC-11)	10.0 UJ	µg/L
					Dichlorodifluoromethane (CFC-12)	10.0 UJ	µg/L
					1,2-Dichloropropane	10.0 UJ	µg/L
					2-Butanone (Methyl ethyl ketone) (MEK)	50.0 UJ	µg/L
					1,1,2,2-Tetrachloroethane	10.0 UJ	µg/L
					Hexachlorobutadiene	10.0 UJ	µg/L
					2-Chlorotoluene	10.0 UJ	µg/L
					1,2-Dichlorobenzene	10.0 UJ	µg/L
VOCs	p-Bromofluorobenzene	75	79 - 121	GW-051512-DE-HA2	Styrene	103 J	µg/L
					Acetone	61.7 J	µg/L
					2-Butanone (Methyl ethyl ketone) (MEK)	26.2 J	µg/L
					2-Chlorotoluene	114 J	µg/L
					Isopropyl benzene	91.2 J	µg/L
					Ethylbenzene	2230 J	µg/L
					1,3,5-Trimethylbenzene	653 J	µg/L
					Toluene	2780 J	µg/L
					Xylenes (total)	14000 J	µg/L
					Benzene	6490 J	µg/L
					Naphthalene	952 J	µg/L
					1,2,4-Trimethylbenzene	2590 J	µg/L
					m&p-Xylenes	10600 J	µg/L

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHNGTON
MAY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*	*Units*
VOCs	p-Bromofluorobenzene	75	79 - 121	GW-051512-DE-HA2	4-Chlorotoluene	1.0 UJ	µg/L
					1,2-Dichloroethane	1.0 UJ	µg/L
					4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	5.0 UJ	µg/L
					Bromobenzene	1.0 UJ	µg/L
					Chlorobenzene	1.0 UJ	µg/L
					Dibromochloromethane	1.0 UJ	µg/L
					Tetrachloroethene	1.0 UJ	µg/L
					1,3-Dichloropropane	1.0 UJ	µg/L
					cis-1,2-Dichloroethene	1.0 UJ	µg/L
					Methyl tert butyl ether (MTBE)	1.0 UJ	µg/L
					1,2-Dichloroethene (total)	2.0 UJ	µg/L
					1,3-Dichlorobenzene	1.0 UJ	µg/L
					Carbon tetrachloride	1.0 UJ	µg/L
					2-Hexanone	5.0 UJ	µg/L
					2,2-Dichloropropane	1.0 UJ	µg/L
					Chloroform (Trichloromethane)	1.0 UJ	µg/L
					1,1,1-Trichloroethane	1.0 UJ	µg/L
					Bromomethane (Methyl bromide)	1.0 UJ	µg/L
					Chloromethane (Methyl chloride)	1.0 UJ	µg/L
					Dibromomethane	1.0 UJ	µg/L
					Chlorobromomethane	1.0 UJ	µg/L
					Chloroethane	1.0 UJ	µg/L
					Vinyl chloride	0.20 UJ	µg/L
					Methylene chloride	5.0 UJ	µg/L
					Carbon disulfide	1.0 UJ	µg/L
					Bromoform	1.0 UJ	µg/L
					Bromodichloromethane	1.0 UJ	µg/L

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHNGTON
MAY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*	*Units*
VOCs	p-Bromofluorobenzene	75	79 - 121	GW-051512-DE-HA2	Trichlorofluoromethane (CFC-11)	1.0 UJ	µg/L
					Dichlorodifluoromethane (CFC-12)	1.0 UJ	µg/L
					1,2-Dichloropropane	1.0 UJ	µg/L
					Trichloroethene	1.0 UJ	µg/L
					Hexachlorobutadiene	1.0 UJ	µg/L
					1,2-Dichlorobenzene	1.0 UJ	µg/L
SVOCs	2,4,6-Tribromophenol	11	30 - 126	GW-051112-DE-RW4	4-Nitrophenol	5.2 UJ	µg/L
	2-Fluorophenol	11	12 - 110		Benzyl alcohol	5.2 UJ	µg/L
					2,4-Dimethylphenol	5.2 UJ	µg/L
					2,4-Dichlorophenol	5.2 UJ	µg/L
					3&4-Methylphenol	5.2 UJ	µg/L
					4,6-Dinitro-2-methylphenol	5.2 UJ	µg/L
					4-Chloro-3-methylphenol	5.2 UJ	µg/L
					2,4,6-Trichlorophenol	5.2 UJ	µg/L
					2-Nitrophenol	5.2 UJ	µg/L
					2-Methylphenol	5.2 UJ	µg/L
					2-Chlorophenol	5.2 UJ	µg/L
					2,4,5-Trichlorophenol	5.2 UJ	µg/L
SVOCs	2,4,6-Tribromophenol	7	30 - 126	GW-051112-NH-HA12	4-Nitrophenol	R	µg/L
	2-Fluorophenol	4	12 - 110		Benzyl alcohol	R	µg/L
					2,4-Dimethylphenol	R	µg/L
					2,4-Dichlorophenol	R	µg/L
					3&4-Methylphenol	R	µg/L
					4,6-Dinitro-2-methylphenol	R	µg/L
					4-Chloro-3-methylphenol	R	µg/L

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING SURROGATE RECOVERIES
QUARTERLY GROUNDWATER SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHNGTON
MAY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*	*Units*
SVOCs	2-Fluorophenol	4	12 - 110	GW-051112-NH-HA12	2,4,6-Trichlorophenol	R	µg/L
					2-Nitrophenol	R	µg/L
					2-Methylphenol	R	µg/L
					2-Chlorophenol	R	µg/L
					2,4,5-Trichlorophenol	R	µg/L

Notes:

J	Estimated.
UJ	Not detected, estimated reporting limit.
R	Rejected.
SVOCs	Semi-Volatile Organic Compounds.
VOCs	Volatile Organic Compounds.

CONESTOGA-ROVERS & ASSOCIATES

20818 44th Avenue West, Suite 190
Lynnwood, WA 98036
Telephone: (425) 563-6515 Fax: (425) 563-6599
www.CRAworld.com

MEMORANDUM

TO: Edwin Turner

REF. NO.: 070496

FROM: Jeffrey Cloud/bjw/7-NF

DATE: September 18, 2012

C.C.: Matt Davis

E-Mail and Hard Copy if Requested

RE: Data Quality Assessment and Validation of Reports 259503, 2510370, 2511958 & 2512839
Soil Sampling
ConocoPhillips Renton Terminal
Renton, Washington
October 2011 - July 2012

INTRODUCTION

The following details a quality assessment and validation of the analytical data resulting from the October 2011 - July 2012, collection of soil samples in Renton, Washington. Samples were submitted to Pace Analytical Services (Pace), in Seattle, Washington, and analyzed for the following:

Parameter	*Methodology*
Volatile Organic Compounds (VOCs)	SW846 8260B
Semi-Volatile Organic Compounds (SVOCs)	SW846 8270C SIM
Gasoline Range Organics (GRO)	NWTPH-Gx
Diesel Range Organics (DRO)/Motor Oil Range Organics (ORO)	NWTPH-Dx
Lead	SW846 6010/6020

The analytical results are summarized in Table 1. The QC criteria used to assess the data were established by the methods and with the following guidance documents:

i) "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", USEPA 540/R-99/008, October 1999

ii) "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Review", USEPA 540/R-94/013, February 1994

These guidelines are collectively referred to as "Guidelines" in this memorandum.

SAMPLE QUANTITATION

The laboratory reported detected concentrations of analytes below the laboratory's practical quantitation limit (PQL)/report limit (RL). The detections between the PQL/RL and the method detection limit (MDL) have been qualified as estimated.

SAMPLE PRESERVATION AND HOLDING TIMES

Sample holding time periods and preservation requirements are summarized in the analytical methods. All sample extractions and/or analyses were performed within the specified holding times with a few exceptions. Several sample results were qualified as estimated (See Table 2).

All samples were properly preserved and cooled after collection.

METHOD BLANK SAMPLES

Method blank samples are prepared from a purified sample matrix and are processed concurrently with investigative samples to assess the presence and the magnitude of sample contamination introduced during sample analysis. Method blank samples are analyzed at a minimum frequency of one per analytical batch and target analytes should be non-detect.

Method blanks were analyzed at the recommended frequency and all results were non-detect for the compounds of interest with a few exceptions. All associated sample results were significantly greater than the level of contamination observed in the method blank. The sample results would not have been impacted, no qualification of the data was deemed necessary.

SURROGATE COMPOUNDS – ORGANIC ANALYSES

Individual sample performance for organic analyses was monitored by assessing the results of surrogate compound percent recoveries. Surrogate percent recoveries are reviewed against the laboratory developed control limits provided in the analytical report.

All surrogate recoveries met the method criteria, demonstrating acceptable analytical efficiency for these analyses with a few exceptions. Several sample results were qualified as estimated (See Table 3).

LABORATORY CONTROL SAMPLE (LCS)

The LCS analysis serves as a monitor of the overall performance in all steps of the sample analysis and are analyzed with each sample batch. The LCS percent recoveries were evaluated against method and laboratory established control limits.

Laboratory control samples (LCS) were analyzed for all parameters. All recoveries were within required control limits showing adequate analytical accuracy with a few exceptions. All associated sample results were non-detect for the analytes with recoveries outside of the acceptable limits. The sample results would not have been impacted, no qualification of the data was deemed necessary.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSES

To assess the long term accuracy and precision of the analytical methods on various matrices, MS/MSD percent recoveries and relative percent differences (RPD) of the concentrations were determined. The organic MS/MSD percent recovery and RPD control limits are established by the laboratory. The inorganic control limits are defined by the methods and the "Guidelines", which require recoveries between 75 to 125 percent with RPDs less than 20 percent for water samples and 30 percent for soil samples.

Matrix spikes (MS) were prepared and analyzed in duplicate for VOCs, SVOCs, GRO and lead. All recoveries were within required control limits showing adequate analytical accuracy and precision with a few exceptions. Several sample results were qualified as estimated and several sample results were qualified as rejected (See Table 4). Precision, for GRO and DRO/ORO, was determined to be acceptable based on laboratory duplicate recoveries.

FIELD QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

No field QA/QC samples were submitted to the laboratory for analysis.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications and exceptions noted.

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*Bottom*	*D-1R*	*D-1R*	*D-4R*	*D-4R*	*D-5R*
	Sample ID:	*S-043012-MD-Bottom-3'*	*S-101011-MD-D-1R-10*	*S-101011-MD-D-1R-20*	*S-101311-MD-D-4R-10*	*S-101311-MD-D-4R-20*	*S-100611-MD-D-5R-7*
	Sample Date:	*4/30/2012*	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/6/2011*
	Sample Depth:	*(3-3.5) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(6.5-7) ft BGS*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	ND (2.8)	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	ND (2.8)	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	ND (2.8)	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	ND (2.8)	-	-	-	-	-
1,1-Dichloroethane	µg/kg	ND (2.8)	-	-	-	-	-
1,1-Dichloroethene	µg/kg	ND (2.8)	-	-	-	-	-
1,1-Dichloropropene	µg/kg	ND (2.8)	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	ND (2.8)	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	ND (2.8)	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	ND (2.8)	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	8950 J	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	ND (4.7)	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	ND (2.8)	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	ND (2.8)	-	-	-	-	-
1,2-Dichloroethane	µg/kg	ND (2.8)	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	ND (5.6)	-	-	-	-	-
1,2-Dichloropropane	µg/kg	ND (2.8)	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	39.7 J	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	ND (2.8)	-	-	-	-	-
1,3-Dichloropropane	µg/kg	ND (2.8)	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	ND (2.8)	-	-	-	-	-
2,2-Dichloropropane	µg/kg	ND (2.8)	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	ND (9.3)	-	-	-	-	-
2-Chlorotoluene	µg/kg	ND (2.8)	-	-	-	-	-
2-Hexanone	µg/kg	ND (9.3)	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	711 J	-	-	-	-	-
4-Chlorotoluene	µg/kg	ND (2.8)	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	ND (9.3)	-	-	-	-	-
Acetone	µg/kg	ND (9.3)	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*Bottom*	*D-1R*	*D-1R*	*D-4R*	*D-4R*	*D-5R*
	Sample ID:	*S-043012-MD-Bottom-3'*	*S-101011-MD-D-1R-10*	*S-101011-MD-D-1R-20*	*S-101311-MD-D-4R-10*	*S-101311-MD-D-4R-20*	*S-100611-MD-D-5R-7*
	Sample Date:	*4/30/2012*	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/6/2011*
	Sample Depth:	*(3-3.5) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(6.5-7) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	-	ND (0.0033)	0.0046	ND (0.0034)	ND (0.0033)	ND (0.0027)
Benzene	µg/kg	6.5 J	-	-	-	-	-
Bromobenzene	µg/kg	ND (2.8)	-	-	-	-	-
Bromodichloromethane	µg/kg	ND (2.8)	-	-	-	-	-
Bromoform	µg/kg	ND (2.8)	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	ND (2.8)	-	-	-	-	-
Carbon disulfide	µg/kg	22.2 J	-	-	-	-	-
Carbon tetrachloride	µg/kg	ND (2.8)	-	-	-	-	-
Chlorobenzene	µg/kg	ND (2.8)	-	-	-	-	-
Chlorobromomethane	µg/kg	ND (2.8)	-	-	-	-	-
Chloroethane	µg/kg	ND (2.8)	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	ND (2.8)	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	ND (2.8)	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	ND (2.8)	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	ND (2.8)	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	548 J	-	-	-	-	-
Dibromochloromethane	µg/kg	ND (2.8)	-	-	-	-	-
Dibromomethane	µg/kg	ND (2.8)	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	ND (2.8)	-	-	-	-	-
Ethylbenzene	µg/kg	-	ND (0.0033)	ND (0.0042)	ND (0.0034)	ND (0.0033)	ND (0.0027)
Ethylbenzene	µg/kg	121 J	-	-	-	-	-
Hexachlorobutadiene	µg/kg	ND (2.8)	-	-	-	-	-
Isopropyl benzene	µg/kg	116 J	-	-	-	-	-
m&p-Xylenes	µg/kg	182 J	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	-	ND (0.0033)	ND (0.0042)	ND (0.0034)	ND (0.0033)	ND (0.0027)
Methyl tert butyl ether (MTBE)	µg/kg	ND (2.8)	-	-	-	-	-
Methylene chloride	µg/kg	ND (9.3)	-	-	-	-	-
Naphthalene	µg/kg	101 J	-	-	-	-	-
N-Butylbenzene	µg/kg	ND (2.8)	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*Bottom*	*D-1R*	*D-1R*	*D-4R*	*D-4R*	*D-5R*
	Sample ID:	*S-043012-MD-Bottom-3'*	*S-101011-MD-D-1R-10*	*S-101011-MD-D-1R-20*	*S-101311-MD-D-4R-10*	*S-101311-MD-D-4R-20*	*S-100611-MD-D-5R-7*
	Sample Date:	*4/30/2012*	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/6/2011*
	Sample Depth:	*(3-3.5) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(6.5-7) ft BGS*
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	1350 J	-	-	-	-	-
o-Xylene	µg/kg	4.0 J	-	-	-	-	-
Styrene	µg/kg	ND (2.8)	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	ND (2.8)	-	-	-	-	-
tert-Butylbenzene	µg/kg	ND (2.8)	-	-	-	-	-
Tetrachloroethene	µg/kg	ND (2.8)	-	-	-	-	-
Toluene	µg/kg	-	ND (0.0033)	ND (0.0042)	ND (0.0034)	ND (0.0033)	ND (0.0027)
Toluene	µg/kg	4.5 J	-	-	-	-	-
trans-1,2-Dichloroethene	µg/kg	ND (2.8)	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	ND (2.8)	-	-	-	-	-
Trichloroethene	µg/kg	ND (2.8)	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	ND (2.8)	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	ND (2.8)	-	-	-	-	-
Vinyl chloride	µg/kg	ND (2.8)	-	-	-	-	-
Xylenes (total)	µg/kg	-	ND (0.0099)	ND (0.013)	ND (0.010)	ND (0.0099)	ND (0.0080)
Xylenes (total)	µg/kg	186 J	-	-	-	-	-
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	-	ND (0.0079)	-	-	-	-
1-Methylnaphthalene	µg/kg	7470	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	ND (0.0079)	-	-	-	-
2-Methylnaphthalene	µg/kg	1480	-	-	-	-	-
Acenaphthene	mg/kg	-	ND (0.0079)	-	-	-	-
Acenaphthene	µg/kg	323	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*Bottom*	*D-1R*	*D-1R*	*D-4R*	*D-4R*	*D-5R*
	Sample ID:	*S-043012-MD-Bottom-3'*	*S-101011-MD-D-1R-10*	*S-101011-MD-D-1R-20*	*S-101311-MD-D-4R-10*	*S-101311-MD-D-4R-20*	*S-100611-MD-D-5R-7*
	Sample Date:	*4/30/2012*	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/6/2011*
	Sample Depth:	*(3-3.5) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(6.5-7) ft BGS*
Parameters	*Units*						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	-	ND (0.0079)	-	-	-	-
Acenaphthylene	µg/kg	ND (74.8)	-	-	-	-	-
Anthracene	mg/kg	-	0.010	-	-	-	-
Anthracene	µg/kg	ND (74.8)	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	0.013	-	-	-	-
Benzo(a)anthracene	µg/kg	ND (74.8)	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	0.014	-	-	-	-
Benzo(a)pyrene	µg/kg	ND (74.8)	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	0.019	-	-	-	-
Benzo(b)fluoranthene	µg/kg	ND (74.8)	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	0.012	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	ND (74.8)	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	0.0082	-	-	-	-
Benzo(k)fluoranthene	µg/kg	ND (74.8)	-	-	-	-	-
Chrysene	mg/kg	-	0.019	-	-	-	-
Chrysene	µg/kg	ND (74.8)	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	ND (0.0079)	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	ND (74.8)	-	-	-	-	-
Fluoranthene	mg/kg	-	0.037	-	-	-	-
Fluoranthene	µg/kg	ND (74.8)	-	-	-	-	-
Fluorene	mg/kg	-	0.017	-	-	-	-
Fluorene	µg/kg	633	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	0.013	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	ND (74.8)	-	-	-	-	-
Naphthalene	mg/kg	-	ND (0.0079)	-	-	-	-
Naphthalene	µg/kg	1210	-	-	-	-	-
Phenanthrene	mg/kg	-	0.0097	-	-	-	-
Phenanthrene	µg/kg	1070	-	-	-	-	-
Pyrene	mg/kg	-	0.039	-	-	-	-
Pyrene	µg/kg	120	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*Bottom*	*D-1R*	*D-1R*	*D-4R*	*D-4R*	*D-5R*
	Sample ID:	*S-043012-MD-Bottom-3'*	*S-101011-MD-D-1R-10*	*S-101011-MD-D-1R-20*	*S-101311-MD-D-4R-10*	*S-101311-MD-D-4R-20*	*S-100611-MD-D-5R-7*
	Sample Date:	*4/30/2012*	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/6/2011*
	Sample Depth:	*(3-3.5) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(6.5-7) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	-	3.2	-	-	-	-
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	827	40.2	ND (20.0)	ND (19.1)	ND (19.2)	ND (17.4)
Total Petroleum Hydrocarbons - Gas	mg/kg	498 J	ND (6.6)	ND (7.7)	ND (7.4)	ND (7.5)	ND (5.1)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (68.5)	ND (71.9)	ND (79.9)	ND (76.3)	ND (76.7)	ND (69.4)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*D-5R*	*D-5R*	*DW-1*	*DW-1*	*DW-1*	*DW-2*
	Sample ID:	*S-100611-MD-D-5R-10*	*S-100611-MD-D-5R-20*	*S-100411-MD-DW-1-9.5*	*S-100411-MD-DW-1-19*	*S-100411-MD-DW-1-24*	*S-100511-MD-DW-2-9*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/4/2011*	*10/4/2011*	*10/4/2011*	*10/5/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9-9.5) ft BGS*	*(18.5-19) ft BGS*	*(23.5-24) ft BGS*	*(8.5-9) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Parameters	*Units*	*Sample Location:* D-5R *Sample ID:* S-100611-MD-D-5R-10 *Sample Date:* 10/6/2011 *Sample Depth:* (9.5-10) ft BGS	*Sample Location:* D-5R *Sample ID:* S-100611-MD-D-5R-20 *Sample Date:* 10/6/2011 *Sample Depth:* (19.5-20) ft BGS	*Sample Location:* DW-1 *Sample ID:* S-100411-MD-DW-1-9.5 *Sample Date:* 10/4/2011 *Sample Depth:* (9-9.5) ft BGS	*Sample Location:* DW-1 *Sample ID:* S-100411-MD-DW-1-19 *Sample Date:* 10/4/2011 *Sample Depth:* (18.5-19) ft BGS	*Sample Location:* DW-1 *Sample ID:* S-100411-MD-DW-1-24 *Sample Date:* 10/4/2011 *Sample Depth:* (23.5-24) ft BGS	*Sample Location:* DW-2 *Sample ID:* S-100511-MD-DW-2-9 *Sample Date:* 10/5/2011 *Sample Depth:* (8.5-9) ft BGS
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	ND (0.0034)	ND (0.0031)	0.15	0.0075	ND (0.0036)	4.7
Benzene	µg/kg	-	-	-	-	-	-
Bromobenzene	µg/kg	-	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	ND (0.0034)	ND (0.0031)	0.056	0.0047	ND (0.0036)	44.6
Ethylbenzene	µg/kg	-	-	-	-	-	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0034)	ND (0.0031)	ND (0.0033)	ND (0.0031)	ND (0.0036)	ND (0.0025)
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*D-5R*	*D-5R*	*DW-1*	*DW-1*	*DW-1*	*DW-2*
	Sample ID:	*S-100611-MD-D-5R-10*	*S-100611-MD-D-5R-20*	*S-100411-MD-DW-1-9.5*	*S-100411-MD-DW-1-19*	*S-100411-MD-DW-1-24*	*S-100511-MD-DW-2-9*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/4/2011*	*10/4/2011*	*10/4/2011*	*10/5/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9-9.5) ft BGS*	*(18.5-19) ft BGS*	*(23.5-24) ft BGS*	*(8.5-9) ft BGS*
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	-	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	ND (0.0034)	ND (0.0031)	0.0064	ND (0.0031)	ND (0.0036)	54.2
Toluene	µg/kg	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	ND (0.010)	ND (0.0093)	0.21	0.017	ND (0.011)	265
Xylenes (total)	µg/kg	-	-	-	-	-	-
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-
Acenaphthene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*D-5R*	*D-5R*	*DW-1*	*DW-1*	*DW-1*	*DW-2*
	Sample ID:	*S-100611-MD-D-5R-10*	*S-100611-MD-D-5R-20*	*S-100411-MD-DW-1-9.5*	*S-100411-MD-DW-1-19*	*S-100411-MD-DW-1-24*	*S-100511-MD-DW-2-9*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/4/2011*	*10/4/2011*	*10/4/2011*	*10/5/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9-9.5) ft BGS*	*(18.5-19) ft BGS*	*(23.5-24) ft BGS*	*(8.5-9) ft BGS*
Parameters	*Units*						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	-	-	-	-	-	-
Acenaphthylene	µg/kg	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-
Anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-
Chrysene	µg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-
Fluoranthene	µg/kg	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-
Fluorene	µg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-
Phenanthrene	µg/kg	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-
Pyrene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*D-5R*	*D-5R*	*DW-1*	*DW-1*	*DW-1*	*DW-2*
	Sample ID:	*S-100611-MD-D-5R-10*	*S-100611-MD-D-5R-20*	*S-100411-MD-DW-1-9.5*	*S-100411-MD-DW-1-19*	*S-100411-MD-DW-1-24*	*S-100511-MD-DW-2-9*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/4/2011*	*10/4/2011*	*10/4/2011*	*10/5/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9-9.5) ft BGS*	*(18.5-19) ft BGS*	*(23.5-24) ft BGS*	*(8.5-9) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	-	-	-	-	-	-
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (18.3)	ND (17.7)	ND (21.0)	ND (18.5)	ND (18.9)	1410
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (6.6)	ND (5.4)	ND (7.6)	ND (5.6)	ND (6.6)	2580
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (73.1)	ND (70.8)	ND (84.1)	ND (74.1)	ND (75.5)	ND (66.4)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-2*	*DW-2*	*DW-2*	*DW-2*	*DW-3*	*DW-3*
	Sample ID:	*S-100511-MD-DW-2-11*	*S-100511-MD-DW-2-19*	*S-100511-MD-DW-2-30*	*S-100511-MD-DW-2-40*	*S-100511-MD-DW-3-12*	*S-100511-MD-DW-3-30*
	Sample Date:	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*
	Sample Depth:	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(29.5-30) ft BGS*	*(39.5-40) ft BGS*	*(11.5-12) ft BGS*	*(29.5-30) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-2*	*DW-2*	*DW-2*	*DW-2*	*DW-3*	*DW-3*
	Sample ID:	*S-100511-MD-DW-2-11*	*S-100511-MD-DW-2-19*	*S-100511-MD-DW-2-30*	*S-100511-MD-DW-2-40*	*S-100511-MD-DW-3-12*	*S-100511-MD-DW-3-30*
	Sample Date:	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*
	Sample Depth:	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(29.5-30) ft BGS*	*(39.5-40) ft BGS*	*(11.5-12) ft BGS*	*(29.5-30) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	112	0.25	0.018	ND (0.0035)	ND (0.0032)	ND (0.0031)
Benzene	µg/kg	-	-	-	-	-	-
Bromobenzene	µg/kg	-	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	161	0.24	ND (0.0032)	ND (0.0035)	ND (0.0032)	ND (0.0031)
Ethylbenzene	µg/kg	-	-	-	-	-	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (1.5)	ND (0.0035)	ND (0.0032)	ND (0.0035)	ND (0.0032)	ND (0.0031)
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-2*	*DW-2*	*DW-2*	*DW-2*	*DW-3*	*DW-3*
	Sample ID:	*S-100511-MD-DW-2-11*	*S-100511-MD-DW-2-19*	*S-100511-MD-DW-2-30*	*S-100511-MD-DW-2-40*	*S-100511-MD-DW-3-12*	*S-100511-MD-DW-3-30*
	Sample Date:	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*
	Sample Depth:	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(29.5-30) ft BGS*	*(39.5-40) ft BGS*	*(11.5-12) ft BGS*	*(29.5-30) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	-	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	478	0.52	0.015	ND (0.0035)	ND (0.0032)	ND (0.0031)
Toluene	µg/kg	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	846	1.2	0.010	ND (0.011)	ND (0.0096)	ND (0.0094)
Xylenes (total)	µg/kg	-	-	-	-	-	-
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	17.6	0.15	-	-	-	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	35.3	0.31	-	-	-	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-	-
Acenaphthene	mg/kg	0.39	ND (0.0087)	-	-	-	-
Acenaphthene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-2*	*DW-2*	*DW-2*	*DW-2*	*DW-3*	*DW-3*
	Sample ID:	*S-100511-MD-DW-2-11*	*S-100511-MD-DW-2-19*	*S-100511-MD-DW-2-30*	*S-100511-MD-DW-2-40*	*S-100511-MD-DW-3-12*	*S-100511-MD-DW-3-30*
	Sample Date:	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*
	Sample Depth:	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(29.5-30) ft BGS*	*(39.5-40) ft BGS*	*(11.5-12) ft BGS*	*(29.5-30) ft BGS*
Parameters	***Units***						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	0.091	ND (0.0087)	-	-	-	-
Acenaphthylene	µg/kg	-	-	-	-	-	-
Anthracene	mg/kg	0.14	ND (0.0087)	-	-	-	-
Anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.095	ND (0.0087)	-	-	-	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.068	ND (0.0087)	-	-	-	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.089	ND (0.0087)	-	-	-	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.036	ND (0.0087)	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.029	ND (0.0087)	-	-	-	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-	-
Chrysene	mg/kg	0.093	ND (0.0087)	-	-	-	-
Chrysene	µg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.0099	ND (0.0087)	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-	-
Fluoranthene	mg/kg	0.26	ND (0.0087)	-	-	-	-
Fluoranthene	µg/kg	-	-	-	-	-	-
Fluorene	mg/kg	0.59	ND (0.0087)	-	-	-	-
Fluorene	µg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.041	ND (0.0087)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-	-
Naphthalene	mg/kg	25.4	0.18	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
Phenanthrene	mg/kg	1.3	0.014	-	-	-	-
Phenanthrene	µg/kg	-	-	-	-	-	-
Pyrene	mg/kg	0.25	ND (0.0087)	-	-	-	-
Pyrene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-2*	*DW-2*	*DW-2*	*DW-2*	*DW-3*	*DW-3*
	Sample ID:	*S-100511-MD-DW-2-11*	*S-100511-MD-DW-2-19*	*S-100511-MD-DW-2-30*	*S-100511-MD-DW-2-40*	*S-100511-MD-DW-3-12*	*S-100511-MD-DW-3-30*
	Sample Date:	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*	*10/5/2011*
	Sample Depth:	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(29.5-30) ft BGS*	*(39.5-40) ft BGS*	*(11.5-12) ft BGS*	*(29.5-30) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	4.7	1.6	-	-	-	-
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	1280	ND (20.3)	ND (18.5)	ND (17.5)	ND (18.2)	ND (17.2)
Total Petroleum Hydrocarbons - Gas	mg/kg	7930	ND (7.3)	ND (6.4)	ND (5.7)	ND (7.4)	ND (5.9)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	154	ND (81.4)	ND (74.1)	ND (70.0)	ND (72.7)	ND (68.8)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-4*	*DW-4*	*DW-4*	*DW-5*	*DW-5*	*DW-5*
	Sample ID:	*S-071112-NH-DW4-5*	*S-071112-NH-DW4-12*	*S-071112-NH-DW4-40*	*S-071112-NH-DW5-7*	*S-071112-NH-DW5-12*	*S-071112-NH-DW5-40*
	Sample Date:	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*
	Sample Depth:	*(5-5.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*	*(7-7.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-4*	*DW-4*	*DW-4*	*DW-5*	*DW-5*	*DW-5*
	Sample ID:	*S-071112-NH-DW4-5*	*S-071112-NH-DW4-12*	*S-071112-NH-DW4-40*	*S-071112-NH-DW5-7*	*S-071112-NH-DW5-12*	*S-071112-NH-DW5-40*
	Sample Date:	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*
	Sample Depth:	*(5-5.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*	*(7-7.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	-	-	-	-	-	-
Benzene	µg/kg	ND (36.8)	ND (58.4)	ND (33.2)	24300	253000	ND (27.3)
Bromobenzene	µg/kg	-	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	78.1	ND (117)	ND (66.4)	36600	283000	ND (54.5)
Hexachlorobutadiene	µg/kg	-	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-4*	*DW-4*	*DW-4*	*DW-5*	*DW-5*	*DW-5*
	Sample ID:	*S-071112-NH-DW4-5*	*S-071112-NH-DW4-12*	*S-071112-NH-DW4-40*	*S-071112-NH-DW5-7*	*S-071112-NH-DW5-12*	*S-071112-NH-DW5-40*
	Sample Date:	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*
	Sample Depth:	*(5-5.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*	*(7-7.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	-	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	ND (73.7)	ND (117)	ND (66.4)	94900	879000	ND (54.5)
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	674	ND (350)	ND (199)	213000	1540000	ND (164)
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-
1-Methylnaphthalene	µg/kg	91.5	60.7	24.6	9990	16900	ND (8.0)
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-
2-Methylnaphthalene	µg/kg	123	93.2	52.2	17900	52400	13.4
Acenaphthene	mg/kg	-	-	-	-	-	-
Acenaphthene	µg/kg	200	ND (11.5)	ND (8.5)	309	489	ND (8.0)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-4*	*DW-4*	*DW-4*	*DW-5*	*DW-5*	*DW-5*
	Sample ID:	*S-071112-NH-DW4-5*	*S-071112-NH-DW4-12*	*S-071112-NH-DW4-40*	*S-071112-NH-DW5-7*	*S-071112-NH-DW5-12*	*S-071112-NH-DW5-40*
	Sample Date:	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*
	Sample Depth:	*(5-5.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*	*(7-7.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	*Units*						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	-	-	-	-	-	-
Acenaphthylene	µg/kg	ND (7.5)	ND (11.5)	ND (8.5)	ND (80.2)	198	ND (8.0)
Anthracene	mg/kg	-	-	-	-	-	-
Anthracene	µg/kg	462	ND (11.5)	ND (8.5)	125	148	ND (8.0)
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	µg/kg	530	ND (11.5)	ND (8.5)	82.0	54.6	ND (8.0)
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	µg/kg	494	ND (11.5)	ND (8.5)	55.2	35.8	ND (8.0)
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/kg	607	11.9	ND (8.5)	67.2	45.9	ND (8.0)
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	255	ND (11.5)	ND (8.5)	26.7	18.7	ND (8.0)
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/kg	244	ND (11.5)	ND (8.5)	27.9	14.9	ND (8.0)
Chrysene	mg/kg	-	-	-	-	-	-
Chrysene	µg/kg	495	12.9	ND (8.5)	69.5	58.7	ND (8.0)
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	90.4	ND (11.5)	ND (8.5)	8.4	ND (7.9)	ND (8.0)
Fluoranthene	mg/kg	-	-	-	-	-	-
Fluoranthene	µg/kg	1200	23.2	ND (8.5)	227	177	ND (8.0)
Fluorene	mg/kg	-	-	-	-	-	-
Fluorene	µg/kg	247	11.7	ND (8.5)	451	715	ND (8.0)
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	317	ND (11.5)	ND (8.5)	32.9	19.6	ND (8.0)
Naphthalene	mg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	35.2	74.6	66.8	11700	17400	9.9
Phenanthrene	mg/kg	-	-	-	-	-	-
Phenanthrene	µg/kg	1260	31.8	ND (8.5)	732	1190	ND (8.0)
Pyrene	mg/kg	-	-	-	-	-	-
Pyrene	µg/kg	971	25.0	ND (8.5)	241	209	ND (8.0)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*DW-4*	*DW-4*	*DW-4*	*DW-5*	*DW-5*	*DW-5*
	Sample ID:	*S-071112-NH-DW4-5*	*S-071112-NH-DW4-12*	*S-071112-NH-DW4-40*	*S-071112-NH-DW5-7*	*S-071112-NH-DW5-12*	*S-071112-NH-DW5-40*
	Sample Date:	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/11/2012*
	Sample Depth:	*(5-5.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*	*(7-7.5) ft BGS*	*(12-12.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	28.2	36.4	2.1	6.4	3.3	1.8
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	169	ND (27.3)	ND (19.8)	1000	1820	ND (18.7)
Total Petroleum Hydrocarbons - Gas	mg/kg	137 J	ND (11.7)	ND (6.6)	2390	13700	ND (5.5)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	593	ND (109)	ND (79.2)	ND (75.3)	87.2	ND (74.6)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-1*	*MW-1*	*MW-2*	*MW-2*	*MW-3*	*MW-3*
	Sample ID:	*S-101011-MD-MW-1-9*	*S-101011-MD-MW-1-20*	*S-101311-MD-MW-2-11*	*S-101311-MD-MW-2-19*	*S-101111-MD-MW-3-10*	*S-101111-MD-MW-3-20*
	Sample Date:	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/11/2011*	*10/11/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-1*	*MW-1*	*MW-2*	*MW-2*	*MW-3*	*MW-3*
	Sample ID:	*S-101011-MD-MW-1-9*	*S-101011-MD-MW-1-20*	*S-101311-MD-MW-2-11*	*S-101311-MD-MW-2-19*	*S-101111-MD-MW-3-10*	*S-101111-MD-MW-3-20*
	Sample Date:	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/11/2011*	*10/11/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	ND (0.0020)	ND (0.0028)	ND (0.0034)	ND (0.0034)	ND (0.0030)	ND (0.0037)
Benzene	µg/kg	-	-	-	-	-	-
Bromobenzene	µg/kg	-	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	ND (0.0020)	ND (0.0028)	ND (0.0034)	ND (0.0034)	ND (0.0030)	ND (0.0037)
Ethylbenzene	µg/kg	-	-	-	-	-	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0020)	ND (0.0028)	ND (0.0034)	ND (0.0034)	ND (0.0030)	ND (0.0037)
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-1*	*MW-1*	*MW-2*	*MW-2*	*MW-3*	*MW-3*
	Sample ID:	*S-101011-MD-MW-1-9*	*S-101011-MD-MW-1-20*	*S-101311-MD-MW-2-11*	*S-101311-MD-MW-2-19*	*S-101111-MD-MW-3-10*	*S-101111-MD-MW-3-20*
	Sample Date:	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/11/2011*	*10/11/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	-	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	ND (0.0020)	ND (0.0028)	ND (0.0034)	ND (0.0034)	ND (0.0030)	ND (0.0037)
Toluene	µg/kg	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	ND (0.0060)	ND (0.0085)	ND (0.010)	ND (0.010)	ND (0.0091)	ND (0.011)
Xylenes (total)	µg/kg	-	-	-	-	-	-
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-
Acenaphthene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-1*	*MW-1*	*MW-2*	*MW-2*	*MW-3*	*MW-3*
	Sample ID:	*S-101011-MD-MW-1-9*	*S-101011-MD-MW-1-20*	*S-101311-MD-MW-2-11*	*S-101311-MD-MW-2-19*	*S-101111-MD-MW-3-10*	*S-101111-MD-MW-3-20*
	Sample Date:	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/11/2011*	*10/11/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	-	-	-	-	-	-
Acenaphthylene	µg/kg	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-
Anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-
Chrysene	µg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-
Fluoranthene	µg/kg	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-
Fluorene	µg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-
Phenanthrene	µg/kg	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-
Pyrene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-1*	*MW-1*	*MW-2*	*MW-2*	*MW-3*	*MW-3*
	Sample ID:	*S-101011-MD-MW-1-9*	*S-101011-MD-MW-1-20*	*S-101311-MD-MW-2-11*	*S-101311-MD-MW-2-19*	*S-101111-MD-MW-3-10*	*S-101111-MD-MW-3-20*
	Sample Date:	*10/10/2011*	*10/10/2011*	*10/13/2011*	*10/13/2011*	*10/11/2011*	*10/11/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*	*(10.5-11) ft BGS*	*(18.5-19) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	-	-	-	-	-	-
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (18.0)	ND (17.5)	ND (19.2)	ND (18.4)	ND (16.0)	ND (20.8)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (7.5)	ND (6.4)	ND (6.3)	ND (7.5)	ND (6.2)	ND (7.6)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (72.1)	ND (69.9)	ND (76.9)	ND (73.8)	ND (64.1)	ND (83.4)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-4*	*MW-4*	*MW-5*	*MW-5*	*MW-6*	*MW-6*
	Sample ID:	*S-101111-MD-MW-4-7*	*S-101111-MD-MW-4-20*	*S-101211-MD-MW-5-10*	*S-101211-MD-MW-5-20*	*S-101211-MD-MW-6-10*	*S-101211-MD-MW-6-20*
	Sample Date:	*10/11/2011*	*10/11/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*
	Sample Depth:	*(6.5-7) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	MW-4	MW-4	MW-5	MW-5	MW-6	MW-6
	Sample ID:	S-101111-MD-MW-4-7	S-101111-MD-MW-4-20	S-101211-MD-MW-5-10	S-101211-MD-MW-5-20	S-101211-MD-MW-6-10	S-101211-MD-MW-6-20
	Sample Date:	10/11/2011	10/11/2011	10/12/2011	10/12/2011	10/12/2011	10/12/2011
	Sample Depth:	(6.5-7) ft BGS	(19.5-20) ft BGS	(9.5-10) ft BGS	(19.5-20) ft BGS	(9.5-10) ft BGS	(19.5-20) ft BGS
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	ND (0.0032)	ND (0.0038)	ND (0.0033)	ND (0.0039)	ND (0.0027)	ND (0.0032)
Benzene	µg/kg	-	-	-	-	-	-
Bromobenzene	µg/kg	-	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	ND (0.0032)	ND (0.0038)	ND (0.0033)	ND (0.0039)	ND (0.0027)	ND (0.0032)
Ethylbenzene	µg/kg	-	-	-	-	-	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0032)	ND (0.0038)	ND (0.0033)	ND (0.0039)	ND (0.0027)	ND (0.0032)
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-4*	*MW-4*	*MW-5*	*MW-5*	*MW-6*	*MW-6*
	Sample ID:	*S-101111-MD-MW-4-7*	*S-101111-MD-MW-4-20*	*S-101211-MD-MW-5-10*	*S-101211-MD-MW-5-20*	*S-101211-MD-MW-6-10*	*S-101211-MD-MW-6-20*
	Sample Date:	*10/11/2011*	*10/11/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*
	Sample Depth:	*(6.5-7) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	-	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	ND (0.0032)	ND (0.0038)	ND (0.0033)	ND (0.0039)	ND (0.0027)	ND (0.0032)
Toluene	µg/kg	-	-	-	-	-	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	ND (0.0095)	ND (0.011)	ND (0.0099)	ND (0.012)	ND (0.0081)	ND (0.0097)
Xylenes (total)	µg/kg	-	-	-	-	-	-
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-
Acenaphthene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-4*	*MW-4*	*MW-5*	*MW-5*	*MW-6*	*MW-6*
	Sample ID:	*S-101111-MD-MW-4-7*	*S-101111-MD-MW-4-20*	*S-101211-MD-MW-5-10*	*S-101211-MD-MW-5-20*	*S-101211-MD-MW-6-10*	*S-101211-MD-MW-6-20*
	Sample Date:	*10/11/2011*	*10/11/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*
	Sample Depth:	*(6.5-7) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	-	-	-	-	-	-
Acenaphthylene	µg/kg	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-
Anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-	-
Chrysene	mg/kg	-	-	-	-	-	-
Chrysene	µg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-	-
Fluoranthene	mg/kg	-	-	-	-	-	-
Fluoranthene	µg/kg	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-
Fluorene	µg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-
Phenanthrene	µg/kg	-	-	-	-	-	-
Pyrene	mg/kg	-	-	-	-	-	-
Pyrene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-4*	*MW-4*	*MW-5*	*MW-5*	*MW-6*	*MW-6*
	Sample ID:	*S-101111-MD-MW-4-7*	*S-101111-MD-MW-4-20*	*S-101211-MD-MW-5-10*	*S-101211-MD-MW-5-20*	*S-101211-MD-MW-6-10*	*S-101211-MD-MW-6-20*
	Sample Date:	*10/11/2011*	*10/11/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*	*10/12/2011*
	Sample Depth:	*(6.5-7) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*	*(9.5-10) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	-	-	-	-	-	-
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (18.0)	ND (18.2)	ND (17.2)	ND (19.5)	ND (17.0)	ND (18.7)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (6.7)	ND (6.5)	ND (5.8)	ND (7.2)	ND (5.3)	ND (6.0)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (72.1)	ND (73.0)	ND (69.0)	ND (78.1)	ND (68.2)	ND (74.9)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-7*	*MW-7*	*MW-7*	*MW-8*	*MW-8*	*MW-8*
	Sample ID:	*S-100611-MD-MW-7-8*	*S-100611-MD-MW-7-11*	*S-100611-MD-MW-7-20*	*S-100611-MD-MW-8-8*	*S-100611-MD-MW-8-11*	*S-100611-MD-MW-8-20*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*
	Sample Depth:	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-7*	*MW-7*	*MW-7*	*MW-8*	*MW-8*	*MW-8*
	Sample ID:	*S-100611-MD-MW-7-8*	*S-100611-MD-MW-7-11*	*S-100611-MD-MW-7-20*	*S-100611-MD-MW-8-8*	*S-100611-MD-MW-8-11*	*S-100611-MD-MW-8-20*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*
	Sample Depth:	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	-	-	-	0.24	-	ND (0.0042)
Benzene	µg/kg	125	88300	27.1	-	10900	-
Bromobenzene	µg/kg	-	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	-	-	-	0.012	-	ND (0.0042)
Ethylbenzene	µg/kg	1650	207000	48.0	-	35500	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0027)	-	ND (0.0035)	ND (0.0035)	ND (0.0032) UJ	ND (0.0042)
Methyl tert butyl ether (MTBE)	µg/kg	-	ND (6220)	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-7*	*MW-7*	*MW-7*	*MW-8*	*MW-8*	*MW-8*
	Sample ID:	*S-100611-MD-MW-7-8*	*S-100611-MD-MW-7-11*	*S-100611-MD-MW-7-20*	*S-100611-MD-MW-8-8*	*S-100611-MD-MW-8-11*	*S-100611-MD-MW-8-20*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*
	Sample Depth:	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	-	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	-	-	-	0.0044	-	ND (0.0042)
Toluene	µg/kg	113	491000	108	-	3850	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	-	-	-	0.029	-	ND (0.012)
Xylenes (total)	µg/kg	3030	1170000	288	-	130000	-
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	2.1	60.7	-	0.032	10.4	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	4.1	124	-	0.055	20.8	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-	-
Acenaphthene	mg/kg	0.084	0.83	-	0.11	0.13	-
Acenaphthene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-7*	*MW-7*	*MW-7*	*MW-8*	*MW-8*	*MW-8*
	Sample ID:	*S-100611-MD-MW-7-8*	*S-100611-MD-MW-7-11*	*S-100611-MD-MW-7-20*	*S-100611-MD-MW-8-8*	*S-100611-MD-MW-8-11*	*S-100611-MD-MW-8-20*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*
	Sample Depth:	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	0.016	0.24	-	ND (0.0074)	0.035	-
Acenaphthylene	µg/kg	-	-	-	-	-	-
Anthracene	mg/kg	0.086	0.29	-	0.11	0.077	-
Anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.20	0.061	-	0.26	0.076	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.17	0.031	-	0.24	0.064	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.23	0.030	-	0.34	0.082	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.11	0.022	-	0.14	0.037	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.084	0.016	-	0.11	0.035	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-	-
Chrysene	mg/kg	0.22	0.057	-	0.31	0.087	-
Chrysene	µg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.031	ND (0.0078)	-	0.046	0.011	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-	-
Fluoranthene	mg/kg	0.55	0.16	-	0.95	0.24	-
Fluoranthene	µg/kg	-	-	-	-	-	-
Fluorene	mg/kg	0.13	1.5	-	0.11	0.21	-
Fluorene	µg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.13	0.017	-	0.18	0.043	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-	-
Naphthalene	mg/kg	1.8	81.8	-	0.040	12.0	-
Naphthalene	µg/kg	-	-	-	-	-	-
Phenanthrene	mg/kg	0.60	2.9	-	0.68	0.67	-
Phenanthrene	µg/kg	-	-	-	-	-	-
Pyrene	mg/kg	0.46	0.24	-	0.61	0.23	-
Pyrene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-7*	*MW-7*	*MW-7*	*MW-8*	*MW-8*	*MW-8*
	Sample ID:	*S-100611-MD-MW-7-8*	*S-100611-MD-MW-7-11*	*S-100611-MD-MW-7-20*	*S-100611-MD-MW-8-8*	*S-100611-MD-MW-8-11*	*S-100611-MD-MW-8-20*
	Sample Date:	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*	*10/6/2011*
	Sample Depth:	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*	*(7.5-8) ft BGS*	*(10.5-11) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	3.3	5.4	-	3.3	3.8	-
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	149	4910	ND (19.8)	44.7	851	ND (19.8)
Total Petroleum Hydrocarbons - Gas	mg/kg	256	14000	7.7	153 J	2930	ND (6.8)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	78.5	90.5	ND (79.3)	442	93.0	ND (79.3)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-9*	*MW-9*	*MW-10*	*MW-10*	*MW-10*
	Sample ID:	*S-100711-MD-MW-9-10*	*S-100711-MD-MW-9-15*	*S-100711-MD-MW-10-7*	*S-100711-MD-MW-10-9*	*S-100711-MD-MW-10-20*
	Sample Date:	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(14.5-15) ft BGS*	*(6.5-7) ft BGS*	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-9*	*MW-9*	*MW-10*	*MW-10*	*MW-10*
	Sample ID:	*S-100711-MD-MW-9-10*	*S-100711-MD-MW-9-15*	*S-100711-MD-MW-10-7*	*S-100711-MD-MW-10-9*	*S-100711-MD-MW-10-20*
	Sample Date:	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(14.5-15) ft BGS*	*(6.5-7) ft BGS*	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
Benzene	µg/kg	0.038	ND (0.012)	ND (0.0034)	ND (0.0039)	0.015
Benzene	µg/kg	-	-	-	-	-
Bromobenzene	µg/kg	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-
Ethylbenzene	µg/kg	ND (0.0034)	ND (0.012)	0.0040	ND (0.0039)	ND (0.0036)
Ethylbenzene	µg/kg	-	-	-	-	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0034)	ND (0.012)	ND (0.0034)	ND (0.0039)	ND (0.0036)
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-9*	*MW-9*	*MW-10*	*MW-10*	*MW-10*
	Sample ID:	*S-100711-MD-MW-9-10*	*S-100711-MD-MW-9-15*	*S-100711-MD-MW-10-7*	*S-100711-MD-MW-10-9*	*S-100711-MD-MW-10-20*
	Sample Date:	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(14.5-15) ft BGS*	*(6.5-7) ft BGS*	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
N-Propylbenzene	µg/kg	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-
Toluene	µg/kg	ND (0.0034)	ND (0.012)	ND (0.0034)	ND (0.0039)	ND (0.0036)
Toluene	µg/kg	-	-	-	-	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-
Xylenes (total)	µg/kg	ND (0.010)	ND (0.037)	ND (0.010)	ND (0.012)	ND (0.011)
Xylenes (total)	µg/kg	-	-	-	-	-
Volatile Organic Compounds - TCLP						
Benzene	µg/L	-	-	-	-	-
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	mg/kg	0.024	-	0.15	ND (0.0075)	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.031	-	0.21	ND (0.0075)	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-
Acenaphthene	mg/kg	ND (0.0072)	-	ND (0.0075)	ND (0.0075)	-
Acenaphthene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Sample Location:	*MW-9*	*MW-9*	*MW-10*	*MW-10*	*MW-10*
Sample ID:	*S-100711-MD-MW-9-10*	*S-100711-MD-MW-9-15*	*S-100711-MD-MW-10-7*	*S-100711-MD-MW-10-9*	*S-100711-MD-MW-10-20*
Sample Date:	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*
Sample Depth:	*(9.5-10) ft BGS*	*(14.5-15) ft BGS*	*(6.5-7) ft BGS*	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*				
Semi-volatile Organic Compounds - SIM (Cont'd.)					
Acenaphthylene	mg/kg	ND (0.0072)	-	ND (0.0075)	ND (0.0075)	-
Acenaphthylene	µg/kg	-	-	-	-	-
Anthracene	mg/kg	ND (0.0072)	-	ND (0.0075)	0.0084	-
Anthracene	µg/kg	-	-	-	-	-
Benzo(a)anthracene	mg/kg	ND (0.0072)	-	ND (0.0075)	0.0079	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-
Benzo(a)pyrene	mg/kg	ND (0.0072)	-	ND (0.0075)	ND (0.0075)	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	ND (0.0072)	-	ND (0.0075)	0.0092	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	ND (0.0072)	-	ND (0.0075)	ND (0.0075)	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	ND (0.0072)	-	ND (0.0075)	ND (0.0075)	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-
Chrysene	mg/kg	ND (0.0072)	-	ND (0.0075)	0.0088	-
Chrysene	µg/kg	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	ND (0.0072)	-	ND (0.0075)	ND (0.0075)	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-
Fluoranthene	mg/kg	ND (0.0072)	-	ND (0.0075)	0.019	-
Fluoranthene	µg/kg	-	-	-	-	-
Fluorene	mg/kg	ND (0.0072)	-	0.019	0.010	-
Fluorene	µg/kg	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	ND (0.0072)	-	ND (0.0075)	ND (0.0075)	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-
Naphthalene	mg/kg	0.18	-	0.053	ND (0.0075)	-
Naphthalene	µg/kg	-	-	-	-	-
Phenanthrene	mg/kg	ND (0.0072)	-	0.035	ND (0.0075)	-
Phenanthrene	µg/kg	-	-	-	-	-
Pyrene	mg/kg	ND (0.0072)	-	ND (0.0075)	0.017	-
Pyrene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-9*	*MW-9*	*MW-10*	*MW-10*	*MW-10*
	Sample ID:	*S-100711-MD-MW-9-10*	*S-100711-MD-MW-9-15*	*S-100711-MD-MW-10-7*	*S-100711-MD-MW-10-9*	*S-100711-MD-MW-10-20*
	Sample Date:	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*	*10/7/2011*
	Sample Depth:	*(9.5-10) ft BGS*	*(14.5-15) ft BGS*	*(6.5-7) ft BGS*	*(8.5-9) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*					
Metals						
Lead	mg/kg	2.0	-	ND (4.1)	ND (1.9)	-
Metals - TCLP						
Arsenic	mg/L	-	-	-	-	-
Barium	mg/L	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-
Lead	mg/L	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-
Silver	mg/L	-	-	-	-	-
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (16.9)	ND (23.2)	24.4	34.1	ND (19.0)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (5.3)	ND (9.9)	9.5	12.5	ND (6.9)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (67.7)	ND (92.6)	68.9	ND (70.0)	ND (76.0)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-11*	*MW-11*	*MW-11*	*MW-12*	*MW-12*
	Sample ID:	*S-120111-NH-MW11 - 6*	*S-120111-NH-MW11 - 13*	*S-120111-NH-MW11 - 20*	*S-120111-NH-MW12 - 10*	*S-120111-NH-MW12 - 20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*
	Sample Depth:	*(6-6.5) ft BGS*	*(13-13.5) ft BGS*	*(20-20.5) ft BGS*	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*
Parameters	***Units***					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-11*	*MW-11*	*MW-11*	*MW-12*	*MW-12*
	Sample ID:	*S-120111-NH-MW11 - 6*	*S-120111-NH-MW11 - 13*	*S-120111-NH-MW11 - 20*	*S-120111-NH-MW12 - 10*	*S-120111-NH-MW12 - 20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*
	Sample Depth:	*(6-6.5) ft BGS*	*(13-13.5) ft BGS*	*(20-20.5) ft BGS*	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*
Parameters	***Units***					
Volatile Organic Compounds (Cont'd.)						
Benzene	µg/kg	ND (0.0026)	ND (0.0031)	ND (0.0032)	ND (0.0028)	ND (0.0036)
Benzene	µg/kg	-	-	-	-	-
Bromobenzene	µg/kg	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-
Ethylbenzene	µg/kg	ND (0.0026)	ND (0.0031)	ND (0.0032)	ND (0.0028)	ND (0.0036)
Ethylbenzene	µg/kg	-	-	-	-	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0026)	ND (0.0031)	ND (0.0032)	ND (0.0028)	ND (0.0036)
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-11*	*MW-11*	*MW-11*	*MW-12*	*MW-12*
	Sample ID:	*S-120111-NH-MW11 - 6*	*S-120111-NH-MW11 - 13*	*S-120111-NH-MW11 - 20*	*S-120111-NH-MW12 - 10*	*S-120111-NH-MW12 - 20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*
	Sample Depth:	*(6-6.5) ft BGS*	*(13-13.5) ft BGS*	*(20-20.5) ft BGS*	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*
Parameters	***Units***					
Volatile Organic Compounds (Cont'd.)						
N-Propylbenzene	µg/kg	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-
Toluene	µg/kg	ND (0.0026)	ND (0.0031)	ND (0.0032)	ND (0.0028)	ND (0.0036)
Toluene	µg/kg	-	-	-	-	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-
Xylenes (total)	µg/kg	ND (0.0078)	ND (0.0092)	ND (0.0096)	ND (0.0083)	ND (0.011)
Xylenes (total)	µg/kg	-	-	-	-	-
Volatile Organic Compounds - TCLP						
Benzene	µg/L	-	-	-	-	-
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	mg/kg	0.14	-	-	-	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-
2-Methylnaphthalene	mg/kg	0.12	-	-	-	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-
Acenaphthene	mg/kg	0.15	-	-	-	-
Acenaphthene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-11*	*MW-11*	*MW-11*	*MW-12*	*MW-12*
	Sample ID:	*S-120111-NH-MW11 - 6*	*S-120111-NH-MW11 - 13*	*S-120111-NH-MW11 - 20*	*S-120111-NH-MW12 - 10*	*S-120111-NH-MW12 - 20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*
	Sample Depth:	*(6-6.5) ft BGS*	*(13-13.5) ft BGS*	*(20-20.5) ft BGS*	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*
Parameters	*Units*					
Semi-volatile Organic Compounds - SIM (Cont'd.)						
Acenaphthylene	mg/kg	ND (0.074)	-	-	-	-
Acenaphthylene	µg/kg	-	-	-	-	-
Anthracene	mg/kg	0.40	-	-	-	-
Anthracene	µg/kg	-	-	-	-	-
Benzo(a)anthracene	mg/kg	0.74	-	-	-	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.70	-	-	-	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.80	-	-	-	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.31	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.29	-	-	-	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-
Chrysene	mg/kg	1.0	-	-	-	-
Chrysene	µg/kg	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.10	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-
Fluoranthene	mg/kg	1.5	-	-	-	-
Fluoranthene	µg/kg	-	-	-	-	-
Fluorene	mg/kg	0.16	-	-	-	-
Fluorene	µg/kg	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.32	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-
Naphthalene	mg/kg	0.095	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-
Phenanthrene	mg/kg	1.3	-	-	-	-
Phenanthrene	µg/kg	-	-	-	-	-
Pyrene	mg/kg	1.5	-	-	-	-
Pyrene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-11*	*MW-11*	*MW-11*	*MW-12*	*MW-12*
	Sample ID:	*S-120111-NH-MW11 - 6*	*S-120111-NH-MW11 - 13*	*S-120111-NH-MW11 - 20*	*S-120111-NH-MW12 - 10*	*S-120111-NH-MW12 - 20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*	*12/1/2011*
	Sample Depth:	*(6-6.5) ft BGS*	*(13-13.5) ft BGS*	*(20-20.5) ft BGS*	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*
Parameters	***Units***					
Metals						
Lead	mg/kg	-	-	-	-	-
Metals - TCLP						
Arsenic	mg/L	-	-	-	-	-
Barium	mg/L	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-
Lead	mg/L	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-
Silver	mg/L	-	-	-	-	-
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	1480	ND (20.4)	ND (20.7)	ND (21.6)	ND (20.5)
Total Petroleum Hydrocarbons - Gas	mg/kg	159	ND (8.0)	ND (6.9)	ND (8.3)	ND (7.7)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	3020	ND (81.6)	ND (82.8)	ND (86.5)	ND (81.9)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-13*	*MW-13*	*MW-14*	*MW-15*	*MW-15*
	Sample ID:	*S-120111-NH-MW13 - 10*	*S-120111-NH-MW13 - 20*	*S-100711-MD-MW-14-5.5*	*S-101011-MD-MW-15-6*	*S-101011-MD-MW-15-20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*10/7/2011*	*10/10/2011*	*10/10/2011*
	Sample Depth:	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(5.5-6) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-13*	*MW-13*	*MW-14*	*MW-15*	*MW-15*
	Sample ID:	*S-120111-NH-MW13 - 10*	*S-120111-NH-MW13 - 20*	*S-100711-MD-MW-14-5.5*	*S-101011-MD-MW-15-6*	*S-101011-MD-MW-15-20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*10/7/2011*	*10/10/2011*	*10/10/2011*
	Sample Depth:	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(5.5-6) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***					
Volatile Organic Compounds (Cont'd.)						
Benzene	µg/kg	ND (0.0032)	ND (0.0027)	-	ND (0.0028)	0.015
Benzene	µg/kg	-	-	3170	-	-
Bromobenzene	µg/kg	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-
Ethylbenzene	µg/kg	ND (0.0032)	ND (0.0027)	-	ND (0.0028)	ND (0.0033)
Ethylbenzene	µg/kg	-	-	10000	-	-
Hexachlorobutadiene	µg/kg	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0032)	ND (0.0027)	ND (0.0027)	ND (0.0028)	ND (0.0033)
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-13*	*MW-13*	*MW-14*	*MW-15*	*MW-15*
	Sample ID:	*S-120111-NH-MW13 - 10*	*S-120111-NH-MW13 - 20*	*S-100711-MD-MW-14-5.5*	*S-101011-MD-MW-15-6*	*S-101011-MD-MW-15-20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*10/7/2011*	*10/10/2011*	*10/10/2011*
	Sample Depth:	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(5.5-6) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***					
Volatile Organic Compounds (Cont'd.)						
N-Propylbenzene	µg/kg	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-
Toluene	µg/kg	ND (0.0032)	ND (0.0027)	-	ND (0.0028)	ND (0.0033)
Toluene	µg/kg	-	-	18100	-	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-
Xylenes (total)	µg/kg	ND (0.0095)	ND (0.0080)	-	ND (0.0085)	ND (0.0098)
Xylenes (total)	µg/kg	-	-	54600	-	-
Volatile Organic Compounds - TCLP						
Benzene	µg/L	-	-	-	-	-
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	mg/kg	ND (0.0080)	-	5.2	-	-
1-Methylnaphthalene	µg/kg	-	-	-	-	-
2-Methylnaphthalene	mg/kg	ND (0.0080)	-	10.2	-	-
2-Methylnaphthalene	µg/kg	-	-	-	-	-
Acenaphthene	mg/kg	ND (0.0080)	-	0.074	-	-
Acenaphthene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-13*	*MW-13*	*MW-14*	*MW-15*	*MW-15*
	Sample ID:	*S-120111-NH-MW13 - 10*	*S-120111-NH-MW13 - 20*	*S-100711-MD-MW-14-5.5*	*S-101011-MD-MW-15-6*	*S-101011-MD-MW-15-20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*10/7/2011*	*10/10/2011*	*10/10/2011*
	Sample Depth:	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(5.5-6) ft BGS*	*(19.5-20) ft BGS*
Parameters	*Units*					
Semi-volatile Organic Compounds - SIM (Cont'd.)						
Acenaphthylene	mg/kg	ND (0.0080)	-	0.021	-	-
Acenaphthylene	µg/kg	-	-	-	-	-
Anthracene	mg/kg	ND (0.0080)	-	0.029	-	-
Anthracene	µg/kg	-	-	-	-	-
Benzo(a)anthracene	mg/kg	ND (0.0080)	-	0.010	-	-
Benzo(a)anthracene	µg/kg	-	-	-	-	-
Benzo(a)pyrene	mg/kg	ND (0.0080)	-	ND (0.0073)	-	-
Benzo(a)pyrene	µg/kg	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	ND (0.0080)	-	0.0073	-	-
Benzo(b)fluoranthene	µg/kg	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	ND (0.0080)	-	ND (0.0073)	-	-
Benzo(g,h,i)perylene	µg/kg	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	ND (0.0080)	-	ND (0.0073)	-	-
Benzo(k)fluoranthene	µg/kg	-	-	-	-	-
Chrysene	mg/kg	ND (0.0080)	-	0.0094	-	-
Chrysene	µg/kg	-	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	ND (0.0080)	-	ND (0.0073)	-	-
Dibenz(a,h)anthracene	µg/kg	-	-	-	-	-
Fluoranthene	mg/kg	ND (0.0080)	-	0.031	-	-
Fluoranthene	µg/kg	-	-	-	-	-
Fluorene	mg/kg	ND (0.0080)	-	0.13	-	-
Fluorene	µg/kg	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	ND (0.0080)	-	ND (0.0073)	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	-	-	-
Naphthalene	mg/kg	ND (0.0080)	-	6.2	-	-
Naphthalene	µg/kg	-	-	-	-	-
Phenanthrene	mg/kg	ND (0.0080)	-	0.31	-	-
Phenanthrene	µg/kg	-	-	-	-	-
Pyrene	mg/kg	ND (0.0080)	-	0.040	-	-
Pyrene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-13*	*MW-13*	*MW-14*	*MW-15*	*MW-15*
	Sample ID:	*S-120111-NH-MW13 - 10*	*S-120111-NH-MW13 - 20*	*S-100711-MD-MW-14-5.5*	*S-101011-MD-MW-15-6*	*S-101011-MD-MW-15-20*
	Sample Date:	*12/1/2011*	*12/1/2011*	*10/7/2011*	*10/10/2011*	*10/10/2011*
	Sample Depth:	*(10-10.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(5.5-6) ft BGS*	*(19.5-20) ft BGS*
Parameters	***Units***					
Metals						
Lead	mg/kg	-	-	1.8	-	-
Metals - TCLP						
Arsenic	mg/L	-	-	-	-	-
Barium	mg/L	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-
Lead	mg/L	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-
Silver	mg/L	-	-	-	-	-
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (19.1)	ND (21.0)	241	ND (17.5)	ND (19.2)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (6.4)	ND (7.2)	998	ND (5.7)	ND (6.6)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (76.2)	ND (83.9)	ND (69.2)	ND (70.1)	ND (76.9)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-16*	*MW-16*	*MW-17*	*MW-17*	*MW-17*	*MW-18*
	Sample ID:	*S-120111-NH-MW16 - 6*	*S-120111-NH-MW16 - 20*	*S-071112-NH-MW17-5*	*S-071112-NH-MW17-9*	*S-071112-NH-MW17-40*	*S-071012-NH-MW18-15*
	Sample Date:	*12/1/2011*	*12/1/2011*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/10/2012*
	Sample Depth:	*(6-6.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(9-9.5) ft BGS*	*(40-40.5) ft BGS*	*(15-15.5) ft BGS*
Parameters	*Units*						
Volatile Organic Compounds							
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-16*	*MW-16*	*MW-17*	*MW-17*	*MW-17*	*MW-18*
	Sample ID:	*S-120111-NH-MW16 - 6*	*S-120111-NH-MW16 - 20*	*S-071112-NH-MW17-5*	*S-071112-NH-MW17-9*	*S-071112-NH-MW17-40*	*S-071012-NH-MW18-15*
	Sample Date:	*12/1/2011*	*12/1/2011*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/10/2012*
	Sample Depth:	*(6-6.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(9-9.5) ft BGS*	*(40-40.5) ft BGS*	*(15-15.5) ft BGS*
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
Benzene	µg/kg	ND (0.0035)	ND (0.0033)	-	-	-	-
Benzene	µg/kg	-	-	ND (44.4)	ND (51.4)	ND (38.1)	56500
Bromobenzene	µg/kg	-	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-	-
Ethylbenzene	µg/kg	ND (0.0035)	ND (0.0033)	-	-	-	-
Ethylbenzene	µg/kg	-	-	ND (88.8)	ND (103)	ND (76.2)	122000
Hexachlorobutadiene	µg/kg	-	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	ND (0.0035)	ND (0.0033)	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-16*	*MW-16*	*MW-17*	*MW-17*	*MW-17*	*MW-18*
	Sample ID:	*S-120111-NH-MW16 - 6*	*S-120111-NH-MW16 - 20*	*S-071112-NH-MW17-5*	*S-071112-NH-MW17-9*	*S-071112-NH-MW17-40*	*S-071012-NH-MW18-15*
	Sample Date:	*12/1/2011*	*12/1/2011*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/10/2012*
	Sample Depth:	*(6-6.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(9-9.5) ft BGS*	*(40-40.5) ft BGS*	*(15-15.5) ft BGS*
Parameters	*Units*						
Volatile Organic Compounds (Cont'd.)							
N-Propylbenzene	µg/kg	-	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-	-
Toluene	µg/kg	ND (0.0035)	ND (0.0033)	-	-	-	-
Toluene	µg/kg	-	-	ND (88.8)	ND (103)	ND (76.2)	311000
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-	-
Xylenes (total)	µg/kg	ND (0.011)	ND (0.010)	-	-	-	-
Xylenes (total)	µg/kg	-	-	ND (266)	ND (309)	ND (229)	683000
Volatile Organic Compounds - TCLP							
Benzene	µg/L	-	-	-	-	-	-
Semi-volatile Organic Compounds - SIM							
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-
1-Methylnaphthalene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	18300
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-
2-Methylnaphthalene	µg/kg	-	-	10.0	ND (9.5)	ND (8.2)	56200
Acenaphthene	mg/kg	-	-	-	-	-	-
Acenaphthene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	644

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-16*	*MW-16*	*MW-17*	*MW-17*	*MW-17*	*MW-18*
	Sample ID:	*S-120111-NH-MW16 - 6*	*S-120111-NH-MW16 - 20*	*S-071112-NH-MW17-5*	*S-071112-NH-MW17-9*	*S-071112-NH-MW17-40*	*S-071012-NH-MW18-15*
	Sample Date:	*12/1/2011*	*12/1/2011*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/10/2012*
	Sample Depth:	*(6-6.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(9-9.5) ft BGS*	*(40-40.5) ft BGS*	*(15-15.5) ft BGS*
Parameters	*Units*						
Semi-volatile Organic Compounds - SIM (Cont'd.)							
Acenaphthylene	mg/kg	-	-	-	-	-	-
Acenaphthylene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	250
Anthracene	mg/kg	-	-	-	-	-	-
Anthracene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	185
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-
Benzo(a)anthracene	µg/kg	-	-	13.2	ND (9.5)	ND (8.2)	113
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-
Benzo(a)pyrene	µg/kg	-	-	14.6	ND (9.5)	ND (8.2)	77.9
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(b)fluoranthene	µg/kg	-	-	18.9	ND (9.5)	ND (8.2)	99.2
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	-	-	10.1	ND (9.5)	ND (8.2)	36.5
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	32.1
Chrysene	mg/kg	-	-	-	-	-	-
Chrysene	µg/kg	-	-	17.1	ND (9.5)	ND (8.2)	109
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	11.5
Fluoranthene	mg/kg	-	-	-	-	-	-
Fluoranthene	µg/kg	-	-	24.4	ND (9.5)	ND (8.2)	337
Fluorene	mg/kg	-	-	-	-	-	-
Fluorene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	956
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	-	-	10.9	ND (9.5)	ND (8.2)	43.3
Naphthalene	mg/kg	-	-	-	-	-	-
Naphthalene	µg/kg	-	-	ND (8.4)	ND (9.5)	ND (8.2)	18300
Phenanthrene	mg/kg	-	-	-	-	-	-
Phenanthrene	µg/kg	-	-	12.6	ND (9.5)	ND (8.2)	1300
Pyrene	mg/kg	-	-	-	-	-	-
Pyrene	µg/kg	-	-	26.0	ND (9.5)	ND (8.2)	362

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-16*	*MW-16*	*MW-17*	*MW-17*	*MW-17*	*MW-18*
	Sample ID:	*S-120111-NH-MW16 - 6*	*S-120111-NH-MW16 - 20*	*S-071112-NH-MW17-5*	*S-071112-NH-MW17-9*	*S-071112-NH-MW17-40*	*S-071012-NH-MW18-15*
	Sample Date:	*12/1/2011*	*12/1/2011*	*7/11/2012*	*7/11/2012*	*7/11/2012*	*7/10/2012*
	Sample Depth:	*(6-6.5) ft BGS*	*(20-20.5) ft BGS*	*(5-5.5) ft BGS*	*(9-9.5) ft BGS*	*(40-40.5) ft BGS*	*(15-15.5) ft BGS*
Parameters	***Units***						
Metals							
Lead	mg/kg	-	-	17.0	5.9	2.0	2.2
Metals - TCLP							
Arsenic	mg/L	-	-	-	-	-	-
Barium	mg/L	-	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-	-
Lead	mg/L	-	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-	-
Silver	mg/L	-	-	-	-	-	-
Petroleum Products							
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (19.2)	ND (18.7)	ND (19.7)	ND (21.9)	ND (19.3)	1730
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (6.8)	ND (5.7)	ND (8.9)	ND (10.3)	ND (7.6)	7200
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (76.7)	ND (74.8)	ND (78.9)	ND (87.4)	ND (77.2)	ND (72.9)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-18*	*MW-18*	*MW-20*	*MW-20*	*MW-20*
	Sample ID:	*S-071012-NH-MW18-17*	*S-071012-NH-MW18-40*	*S-070912-NH-MW20-8.5*	*S-070912-NH-MW20-11*	*S-070912-NH-MW20-40*
	Sample Date:	*7/10/2012*	*7/10/2012*	*7/9/2012*	*7/9/2012*	*7/9/2012*
	Sample Depth:	*(17-17.5) ft BGS*	*(40-40.5) ft BGS*	*(8.5-9) ft BGS*	*(11-11.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,1-Trichloroethane	µg/kg	-	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	-	-
1,1,2-Trichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethane	µg/kg	-	-	-	-	-
1,1-Dichloroethene	µg/kg	-	-	-	-	-
1,1-Dichloropropene	µg/kg	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,3-Trichloropropane	µg/kg	-	-	-	-	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	-	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	-	-
1,2-Dichlorobenzene	µg/kg	-	-	-	-	-
1,2-Dichloroethane	µg/kg	-	-	-	-	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	-	-
1,2-Dichloropropane	µg/kg	-	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	-	-
1,3-Dichlorobenzene	µg/kg	-	-	-	-	-
1,3-Dichloropropane	µg/kg	-	-	-	-	-
1,4-Dichlorobenzene	µg/kg	-	-	-	-	-
2,2-Dichloropropane	µg/kg	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	-	-
2-Chlorotoluene	µg/kg	-	-	-	-	-
2-Hexanone	µg/kg	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	-	-
4-Chlorotoluene	µg/kg	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	-	-
Acetone	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-18*	*MW-18*	*MW-20*	*MW-20*	*MW-20*
	Sample ID:	*S-071012-NH-MW18-17*	*S-071012-NH-MW18-40*	*S-070912-NH-MW20-8.5*	*S-070912-NH-MW20-11*	*S-070912-NH-MW20-40*
	Sample Date:	*7/10/2012*	*7/10/2012*	*7/9/2012*	*7/9/2012*	*7/9/2012*
	Sample Depth:	*(17-17.5) ft BGS*	*(40-40.5) ft BGS*	*(8.5-9) ft BGS*	*(11-11.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
Benzene	µg/kg	-	-	-	-	-
Benzene	µg/kg	10300	ND (53.3)	137000	931000	ND (26.8)
Bromobenzene	µg/kg	-	-	-	-	-
Bromodichloromethane	µg/kg	-	-	-	-	-
Bromoform	µg/kg	-	-	-	-	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	-	-
Carbon disulfide	µg/kg	-	-	-	-	-
Carbon tetrachloride	µg/kg	-	-	-	-	-
Chlorobenzene	µg/kg	-	-	-	-	-
Chlorobromomethane	µg/kg	-	-	-	-	-
Chloroethane	µg/kg	-	-	-	-	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	-	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	-	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	-	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	-	-
Dibromochloromethane	µg/kg	-	-	-	-	-
Dibromomethane	µg/kg	-	-	-	-	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	-	-
Ethylbenzene	µg/kg	-	-	-	-	-
Ethylbenzene	µg/kg	ND (74.6)	ND (107)	196000	1110000	ND (53.6)
Hexachlorobutadiene	µg/kg	-	-	-	-	-
Isopropyl benzene	µg/kg	-	-	-	-	-
m&p-Xylenes	µg/kg	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-
Methylene chloride	µg/kg	-	-	-	-	-
Naphthalene	µg/kg	-	-	-	-	-
N-Butylbenzene	µg/kg	-	-	-	-	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-18*	*MW-18*	*MW-20*	*MW-20*	*MW-20*
	Sample ID:	*S-071012-NH-MW18-17*	*S-071012-NH-MW18-40*	*S-070912-NH-MW20-8.5*	*S-070912-NH-MW20-11*	*S-070912-NH-MW20-40*
	Sample Date:	*7/10/2012*	*7/10/2012*	*7/9/2012*	*7/9/2012*	*7/9/2012*
	Sample Depth:	*(17-17.5) ft BGS*	*(40-40.5) ft BGS*	*(8.5-9) ft BGS*	*(11-11.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
N-Propylbenzene	µg/kg	-	-	-	-	-
o-Xylene	µg/kg	-	-	-	-	-
Styrene	µg/kg	-	-	-	-	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	-	-
Tetrachloroethene	µg/kg	-	-	-	-	-
Toluene	µg/kg	-	-	-	-	-
Toluene	µg/kg	ND (74.6)	ND (107)	638000	3100000	ND (53.6)
trans-1,2-Dichloroethene	µg/kg	-	-	-	-	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	-	-
Trichloroethene	µg/kg	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	-	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	-	-
Xylenes (total)	µg/kg	-	-	-	-	-
Xylenes (total)	µg/kg	ND (224)	ND (320)	1200000	6570000	ND (161)
Volatile Organic Compounds - TCLP						
Benzene	µg/L	-	-	-	-	-
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	mg/kg	-	-	-	-	-
1-Methylnaphthalene	µg/kg	14.3	ND (8.3)	67300	484000	20.5
2-Methylnaphthalene	mg/kg	-	-	-	-	-
2-Methylnaphthalene	µg/kg	25.2	ND (8.3)	129000	907000	45.0
Acenaphthene	mg/kg	-	-	-	-	-
Acenaphthene	µg/kg	ND (8.9)	ND (8.3)	1270	8600	ND (8.2)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-18*	*MW-18*	*MW-20*	*MW-20*	*MW-20*
	Sample ID:	*S-071012-NH-MW18-17*	*S-071012-NH-MW18-40*	*S-070912-NH-MW20-8.5*	*S-070912-NH-MW20-11*	*S-070912-NH-MW20-40*
	Sample Date:	*7/10/2012*	*7/10/2012*	*7/9/2012*	*7/9/2012*	*7/9/2012*
	Sample Depth:	*(17-17.5) ft BGS*	*(40-40.5) ft BGS*	*(8.5-9) ft BGS*	*(11-11.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	*Units*					
Semi-volatile Organic Compounds - SIM (Cont'd.)						
Acenaphthylene	mg/kg	-	-	-	-	-
Acenaphthylene	µg/kg	ND (8.9)	ND (8.3)	358	2220	ND (8.2)
Anthracene	mg/kg	-	-	-	-	-
Anthracene	µg/kg	ND (8.9)	ND (8.3)	314	4490	ND (8.2)
Benzo(a)anthracene	mg/kg	-	-	-	-	-
Benzo(a)anthracene	µg/kg	ND (8.9)	ND (8.3)	168	4630	ND (8.2)
Benzo(a)pyrene	mg/kg	-	-	-	-	-
Benzo(a)pyrene	µg/kg	ND (8.9)	ND (8.3)	129	4340	ND (8.2)
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-
Benzo(b)fluoranthene	µg/kg	ND (8.9)	ND (8.3)	160	5630	ND (8.2)
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	ND (8.9)	ND (8.3)	82.8	2630	ND (8.2)
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-
Benzo(k)fluoranthene	µg/kg	ND (8.9)	ND (8.3)	52.7	2280	ND (8.2)
Chrysene	mg/kg	-	-	-	-	-
Chrysene	µg/kg	ND (8.9)	ND (8.3)	180	4600	ND (8.2)
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	ND (8.9)	ND (8.3)	20.4	798	ND (8.2)
Fluoranthene	mg/kg	-	-	-	-	-
Fluoranthene	µg/kg	ND (8.9)	ND (8.3)	478	14500	ND (8.2)
Fluorene	mg/kg	-	-	-	-	-
Fluorene	µg/kg	ND (8.9)	ND (8.3)	2000	11900	ND (8.2)
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	ND (8.9)	ND (8.3)	78.1	3150	ND (8.2)
Naphthalene	mg/kg	-	-	-	-	-
Naphthalene	µg/kg	54.8	ND (8.3)	91700	633000	43.7
Phenanthrene	mg/kg	-	-	-	-	-
Phenanthrene	µg/kg	ND (8.9)	ND (8.3)	3190	25800	ND (8.2)
Pyrene	mg/kg	-	-	-	-	-
Pyrene	µg/kg	ND (8.9)	ND (8.3)	571	10000	ND (8.2)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-18*	*MW-18*	*MW-20*	*MW-20*	*MW-20*
	Sample ID:	*S-071012-NH-MW18-17*	*S-071012-NH-MW18-40*	*S-070912-NH-MW20-8.5*	*S-070912-NH-MW20-11*	*S-070912-NH-MW20-40*
	Sample Date:	*7/10/2012*	*7/10/2012*	*7/9/2012*	*7/9/2012*	*7/9/2012*
	Sample Depth:	*(17-17.5) ft BGS*	*(40-40.5) ft BGS*	*(8.5-9) ft BGS*	*(11-11.5) ft BGS*	*(40-40.5) ft BGS*
Parameters	***Units***					
Metals						
Lead	mg/kg	2.0	2.8	11.0	9.8	2.6
Metals - TCLP						
Arsenic	mg/L	-	-	-	-	-
Barium	mg/L	-	-	-	-	-
Cadmium	mg/L	-	-	-	-	-
Chromium	mg/L	-	-	-	-	-
Lead	mg/L	-	-	-	-	-
Mercury	µg/kg	-	-	-	-	-
Selenium	mg/L	-	-	-	-	-
Silver	mg/L	-	-	-	-	-
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (20.1)	ND (19.3)	4490	29100	ND (19.1)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (7.5)	ND (10.7)	10200	49200	ND (5.4)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (80.3)	ND (77.1)	147	1920	ND (76.4)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-22*	*MW-22*	*MW-22*	*North*	*Soil Waste Sample*
	Sample ID:	*S-070912-NH-MW22-8.5*	*S-070912-NH-MW22-13.0*	*S-070912-NH-MW22-40*	*S-043012-MD-North-1.5'*	*S-101411-MD-Waste Disposal*
	Sample Date:	*7/9/2012*	*7/9/2012*	*7/9/2012*	*4/30/2012*	*10/14/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(13-13.5) ft BGS*	*(40-40.5) ft BGS*	*(1.5-2) ft BGS*	*-*
Parameters	*Units*					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	-	-	-	ND (531) UJ	-
1,1,1-Trichloroethane	µg/kg	-	-	-	ND (531) UJ	-
1,1,2,2-Tetrachloroethane	µg/kg	-	-	-	ND (531) UJ	-
1,1,2-Trichloroethane	µg/kg	-	-	-	ND (531) UJ	-
1,1-Dichloroethane	µg/kg	-	-	-	ND (531) UJ	-
1,1-Dichloroethene	µg/kg	-	-	-	ND (531) UJ	-
1,1-Dichloropropene	µg/kg	-	-	-	ND (531) UJ	-
1,2,3-Trichlorobenzene	µg/kg	-	-	-	ND (531) UJ	-
1,2,3-Trichloropropane	µg/kg	-	-	-	ND (531) UJ	-
1,2,4-Trichlorobenzene	µg/kg	-	-	-	ND (531) UJ	-
1,2,4-Trimethylbenzene	µg/kg	-	-	-	514000 J	-
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	-	-	-	ND (2660) UJ	-
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	-	-	-	ND (531) UJ	-
1,2-Dichlorobenzene	µg/kg	-	-	-	ND (531) UJ	-
1,2-Dichloroethane	µg/kg	-	-	-	ND (531) UJ	-
1,2-Dichloroethene (total)	µg/kg	-	-	-	ND (1060) UJ	-
1,2-Dichloropropane	µg/kg	-	-	-	ND (531) UJ	-
1,3,5-Trimethylbenzene	µg/kg	-	-	-	17600 J	-
1,3-Dichlorobenzene	µg/kg	-	-	-	ND (531) UJ	-
1,3-Dichloropropane	µg/kg	-	-	-	ND (531) UJ	-
1,4-Dichlorobenzene	µg/kg	-	-	-	ND (531) UJ	-
2,2-Dichloropropane	µg/kg	-	-	-	ND (531) UJ	-
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	-	-	-	ND (5310) UJ	-
2-Chlorotoluene	µg/kg	-	-	-	ND (531) UJ	-
2-Hexanone	µg/kg	-	-	-	ND (5310) UJ	-
2-Phenylbutane (sec-Butylbenzene)	µg/kg	-	-	-	18300 J	-
4-Chlorotoluene	µg/kg	-	-	-	ND (531) UJ	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	-	-	-	ND (5310) UJ	-
Acetone	µg/kg	-	-	-	ND (5310) UJ	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-22*	*MW-22*	*MW-22*	*North*	*Soil Waste Sample*
	Sample ID:	*S-070912-NH-MW22-8.5*	*S-070912-NH-MW22-13.0*	*S-070912-NH-MW22-40*	*S-043012-MD-North-1.5'*	*S-101411-MD-Waste Disposal*
	Sample Date:	*7/9/2012*	*7/9/2012*	*7/9/2012*	*4/30/2012*	*10/14/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(13-13.5) ft BGS*	*(40-40.5) ft BGS*	*(1.5-2) ft BGS*	*-*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
Benzene	µg/kg	-	-	-	-	-
Benzene	µg/kg	28200	174000	ND (33.6)	5200 J	-
Bromobenzene	µg/kg	-	-	-	ND (531) UJ	-
Bromodichloromethane	µg/kg	-	-	-	ND (531) UJ	-
Bromoform	µg/kg	-	-	-	ND (531) UJ	-
Bromomethane (Methyl bromide)	µg/kg	-	-	-	ND (531) UJ	-
Carbon disulfide	µg/kg	-	-	-	ND (531) UJ	-
Carbon tetrachloride	µg/kg	-	-	-	ND (531) UJ	-
Chlorobenzene	µg/kg	-	-	-	ND (531) UJ	-
Chlorobromomethane	µg/kg	-	-	-	ND (531) UJ	-
Chloroethane	µg/kg	-	-	-	ND (531) UJ	-
Chloroform (Trichloromethane)	µg/kg	-	-	-	ND (531) UJ	-
Chloromethane (Methyl chloride)	µg/kg	-	-	-	ND (531) UJ	-
cis-1,2-Dichloroethene	µg/kg	-	-	-	ND (531) UJ	-
cis-1,3-Dichloropropene	µg/kg	-	-	-	ND (531) UJ	-
Cymene (p-Isopropyltoluene)	µg/kg	-	-	-	106000 J	-
Dibromochloromethane	µg/kg	-	-	-	ND (531) UJ	-
Dibromomethane	µg/kg	-	-	-	ND (531) UJ	-
Dichlorodifluoromethane (CFC-12)	µg/kg	-	-	-	ND (531) UJ	-
Ethylbenzene	µg/kg	-	-	-	-	-
Ethylbenzene	µg/kg	32400	184000	ND (67.1)	50300 J	-
Hexachlorobutadiene	µg/kg	-	-	-	ND (1060) UJ	-
Isopropyl benzene	µg/kg	-	-	-	103000 J	-
m&p-Xylenes	µg/kg	-	-	-	91300 J	-
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	-	-
Methyl tert butyl ether (MTBE)	µg/kg	-	-	-	ND (531) UJ	-
Methylene chloride	µg/kg	-	-	-	ND (3190) UJ	-
Naphthalene	µg/kg	-	-	-	212000 J	-
N-Butylbenzene	µg/kg	-	-	-	58200 J	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-22*	*MW-22*	*MW-22*	*North*	*Soil Waste Sample*
	Sample ID:	*S-070912-NH-MW22-8.5*	*S-070912-NH-MW22-13.0*	*S-070912-NH-MW22-40*	*S-043012-MD-North-1.5'*	*S-101411-MD-Waste Disposal*
	Sample Date:	*7/9/2012*	*7/9/2012*	*7/9/2012*	*4/30/2012*	*10/14/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(13-13.5) ft BGS*	*(40-40.5) ft BGS*	*(1.5-2) ft BGS*	*-*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
N-Propylbenzene	µg/kg	-	-	-	57600 J	-
o-Xylene	µg/kg	-	-	-	15400 J	-
Styrene	µg/kg	-	-	-	ND (531) UJ	-
tert-Amyl methyl ether	µg/kg	-	-	-	-	-
tert-Butylbenzene	µg/kg	-	-	-	1150 J	-
Tetrachloroethene	µg/kg	-	-	-	ND (531) UJ	-
Toluene	µg/kg	-	-	-	-	-
Toluene	µg/kg	54400	685000	ND (67.1)	2090 J	-
trans-1,2-Dichloroethene	µg/kg	-	-	-	ND (531) UJ	-
trans-1,3-Dichloropropene	µg/kg	-	-	-	ND (531) UJ	-
Trichloroethene	µg/kg	-	-	-	ND (531) UJ	-
Trichlorofluoromethane (CFC-11)	µg/kg	-	-	-	ND (531) UJ	-
Trifluorotrichloroethane (Freon 113)	µg/kg	-	-	-	-	-
Vinyl chloride	µg/kg	-	-	-	ND (531) UJ	-
Xylenes (total)	µg/kg	-	-	-	-	-
Xylenes (total)	µg/kg	184000	1010000	ND (201)	93300 J	-
Volatile Organic Compounds - TCLP						
Benzene	µg/L	-	-	-	-	ND (25.0)
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	mg/kg	-	-	-	-	-
1-Methylnaphthalene	µg/kg	3630	17200	ND (8.0)	66000	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-
2-Methylnaphthalene	µg/kg	6920	45400	13.2	130000	-
Acenaphthene	mg/kg	-	-	-	-	-
Acenaphthene	µg/kg	111	446	ND (8.0)	1930	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-22*	*MW-22*	*MW-22*	*North*	*Soil Waste Sample*
	Sample ID:	*S-070912-NH-MW22-8.5*	*S-070912-NH-MW22-13.0*	*S-070912-NH-MW22-40*	*S-043012-MD-North-1.5'*	*S-101411-MD-Waste Disposal*
	Sample Date:	*7/9/2012*	*7/9/2012*	*7/9/2012*	*4/30/2012*	*10/14/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(13-13.5) ft BGS*	*(40-40.5) ft BGS*	*(1.5-2) ft BGS*	*-*
Parameters	*Units*					
Semi-volatile Organic Compounds - SIM (Cont'd.)						
Acenaphthylene	mg/kg	-	-	-	-	-
Acenaphthylene	µg/kg	27.4	122	ND (8.0)	R	-
Anthracene	mg/kg	-	-	-	-	-
Anthracene	µg/kg	49.7	199	ND (8.0)	ND (761)	-
Benzo(a)anthracene	mg/kg	-	-	-	-	-
Benzo(a)anthracene	µg/kg	32.3	75.4	ND (8.0)	ND (761)	-
Benzo(a)pyrene	mg/kg	-	-	-	-	-
Benzo(a)pyrene	µg/kg	21.0	51.7	ND (8.0)	R	-
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-
Benzo(b)fluoranthene	µg/kg	26.5	61.0	ND (8.0)	ND (761)	-
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-
Benzo(g,h,i)perylene	µg/kg	10.4	24.8	ND (8.0)	ND (761)	-
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-
Benzo(k)fluoranthene	µg/kg	9.2	24.6	ND (8.0)	ND (761)	-
Chrysene	mg/kg	-	-	-	-	-
Chrysene	µg/kg	25.2	70.0	ND (8.0)	R	-
Dibenz(a,h)anthracene	mg/kg	-	-	-	-	-
Dibenz(a,h)anthracene	µg/kg	ND (8.2)	ND (8.1)	ND (8.0)	ND (761)	-
Fluoranthene	mg/kg	-	-	-	-	-
Fluoranthene	µg/kg	93.4	246	ND (8.0)	R	-
Fluorene	mg/kg	-	-	-	-	-
Fluorene	µg/kg	175	678	ND (8.0)	2510	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/kg	13.0	28.1	ND (8.0)	ND (761)	-
Naphthalene	mg/kg	-	-	-	-	-
Naphthalene	µg/kg	4690	17700	10	55900	-
Phenanthrene	mg/kg	-	-	-	-	-
Phenanthrene	µg/kg	322	1220	ND (8.0)	4340	-
Pyrene	mg/kg	-	-	-	-	-
Pyrene	µg/kg	90.6	248	ND (8.0)	865	-

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

	Sample Location:	*MW-22*	*MW-22*	*MW-22*	*North*	*Soil Waste Sample*
	Sample ID:	*S-070912-NH-MW22-8.5*	*S-070912-NH-MW22-13.0*	*S-070912-NH-MW22-40*	*S-043012-MD-North-1.5'*	*S-101411-MD-Waste Disposal*
	Sample Date:	*7/9/2012*	*7/9/2012*	*7/9/2012*	*4/30/2012*	*10/14/2011*
	Sample Depth:	*(8.5-9) ft BGS*	*(13-13.5) ft BGS*	*(40-40.5) ft BGS*	*(1.5-2) ft BGS*	*-*
Parameters	*Units*					
Metals						
Lead	mg/kg	9.4	3.6	2.9	-	-
Metals - TCLP						
Arsenic	mg/L	-	-	-	-	ND (1.0)
Barium	mg/L	-	-	-	-	ND (5.0)
Cadmium	mg/L	-	-	-	-	ND (0.20)
Chromium	mg/L	-	-	-	-	ND (1.0)
Lead	mg/L	-	-	-	-	ND (1.0)
Mercury	µg/kg	-	-	-	-	ND (5.0)
Selenium	mg/L	-	-	-	-	ND (0.20)
Silver	mg/L	-	-	-	-	ND (1.0)
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	435	1680	ND (18.7)	6090	23.7
Total Petroleum Hydrocarbons - Gas	mg/kg	1700	9550	ND (6.7)	7710	10.7
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (77.1)	ND (76.2)	ND (74.9)	ND (352)	113

Notes:

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
UJ - Estimated reporting limit.
R - Rejected.
- - Not analyzed.

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO HOLDING TIME EXCEEDANCES
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Parameter	*Analyte*	*Sample ID*	*Holding Time (days)*	*Holding Time Criteria (days)*	*Qualified Sample Results*		*Units*
SW8260	Styrene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	cis-1,3-Dichloropropene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	trans-1,3-Dichloropropene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	4-Chlorotoluene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,4-Dichlorobenzene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2-Dibromoethane (Ethylene dibromide)	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2-Dichloroethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	S-043012-MD-North-1.5'	17	14	5310	UJ	µg/kg
SW8260	1,3,5-Trimethylbenzene	S-043012-MD-North-1.5'	17	14	17600	J	µg/kg
SW8260	Bromobenzene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Toluene	S-043012-MD-North-1.5'	17	14	2090	J	µg/kg
SW8260	Chlorobenzene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2,4-Trichlorobenzene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Dibromochloromethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Tetrachloroethene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,3-Dichloropropane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	cis-1,2-Dichloroethene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	trans-1,2-Dichloroethene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Methyl tert butyl ether (MTBE)	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2-Dichloroethene (total)	S-043012-MD-North-1.5'	17	14	1060	UJ	µg/kg
SW8260	1,3-Dichlorobenzene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Carbon tetrachloride	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,1-Dichloropropene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	2-Hexanone	S-043012-MD-North-1.5'	17	14	5310	UJ	µg/kg
SW8260	2,2-Dichloropropane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,1,1,2-Tetrachloroethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Acetone	S-043012-MD-North-1.5'	17	14	5310	UJ	µg/kg
SW8260	Chloroform (Trichloromethane)	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO HOLDING TIME EXCEEDANCES
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Parameter	*Analyte*	*Sample ID*	*Holding Time (days)*	*Holding Time Criteria (days)*	*Qualified Sample Results*		*Units*
SW8260	Benzene	S-043012-MD-North-1.5'	17	14	5200	J	µg/kg
SW8260	1,1,1-Trichloroethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Bromomethane (Methyl bromide)	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Chloromethane (Methyl chloride)	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Dibromomethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Chlorobromomethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Chloroethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Vinyl chloride	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Methylene chloride	S-043012-MD-North-1.5'	17	14	3190	UJ	µg/kg
SW8260	Carbon disulfide	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Bromoform	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Bromodichloromethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,1-Dichloroethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,1-Dichloroethene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Trichlorofluoromethane (CFC-11)	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Dichlorodifluoromethane (CFC-12)	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2-Dichloropropane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	2-Butanone (Methyl ethyl ketone) (MEK)	S-043012-MD-North-1.5'	17	14	5310	UJ	µg/kg
SW8260	1,1,2-Trichloroethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Trichloroethene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,1,2,2-Tetrachloroethane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2,3-Trichlorobenzene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	Hexachlorobutadiene	S-043012-MD-North-1.5'	17	14	1060	UJ	µg/kg
SW8260	o-Xylene	S-043012-MD-North-1.5'	17	14	15400	J	µg/kg
SW8260	2-Chlorotoluene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2-Dichlorobenzene	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg
SW8260	1,2-Dibromo-3-chloropropane (DBCP)	S-043012-MD-North-1.5'	17	14	2660	UJ	µg/kg
SW8260	1,2,3-Trichloropropane	S-043012-MD-North-1.5'	17	14	531	UJ	µg/kg

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO HOLDING TIME EXCEEDANCES
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Parameter	*Analyte*	*Sample ID*	*Holding Time (days)*	*Holding Time Criteria (days)*	*Qualified Sample Results*	*Units*
SW8260	tert-Butylbenzene	S-043012-MD-North-1.5'	17	14	1150 J	µg/kg
SW8260	Isopropyl benzene	S-043012-MD-North-1.5'	17	14	103000 J	µg/kg
SW8260	Cymene (p-Isopropyltoluene)	S-043012-MD-North-1.5'	17	14	106000 J	µg/kg
SW8260	Ethylbenzene	S-043012-MD-North-1.5'	23	14	50300 J	µg/kg
SW8260	N-Propylbenzene	S-043012-MD-North-1.5'	23	14	57600 J	µg/kg
SW8260	N-Butylbenzene	S-043012-MD-North-1.5'	23	14	58200 J	µg/kg
SW8260	Xylenes (total)	S-043012-MD-North-1.5'	23	14	93300 J	µg/kg
SW8260	2-Phenylbutane (sec-Butylbenzene)	S-043012-MD-North-1.5'	23	14	18300 J	µg/kg
SW8260	Naphthalene	S-043012-MD-North-1.5'	23	14	212000 J	µg/kg
SW8260	m&p-Xylenes	S-043012-MD-North-1.5'	23	14	91300 J	µg/kg
SW8260	1,2,4-Trimethylbenzene	S-043012-MD-North-1.5'	23	14	514000 J	µg/kg

Notes:

J Estimated.
UJ Not detected, estimated reporting limit.

TABLE 3

QUALIFIED SAMPLE DATA DUE TO OUTLYING SURROGATE RECOVERIES
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*		*Units*
SW8260	Toluene-d8	276	69-133	S-100611-MD-MW-8-11	Methyl tert butyl ether (MTBE)	0.0032	UJ	mg/kg
	4-Bromofluorobenzene	66	67-142					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	Ethylbenzene	121	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	1,3,5-Trimethylbenzene	39.7	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	Toluene	4.5	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	Xylenes (total)	186	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	Benzene	6.5	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	Carbon disulfide	22.2	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	276	69-133	S-043012-MD-Bottom-3'	Naphthalene	101	J	µg/kg
	4-Bromofluorobenzene	66	67-142					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	o-Xylene	4.0	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	Isopropyl benzene	116	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	m&p-Xylenes	182	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	N-Propylbenzene	1350	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	2-Phenylbutane (sec-Butylbenzene)	711	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	1,2,4-Trimethylbenzene	8950	J	µg/kg
	4-Bromofluorobenzene	637	68-141					

TABLE 3

QUALIFIED SAMPLE DATA DUE TO OUTLYING SURROGATE RECOVERIES
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Parameter	*Surrogate*	*Surrogate Recovery (percent)*	*Control Limits (percent)*	*Sample ID*	*Analytes*	*Qualified Sample Results*		*Units*
SW8260	Toluene-d8	224	71-130	S-043012-MD-Bottom-3'	Cymene (p-Isopropyltoluene)	548	J	µg/kg
	4-Bromofluorobenzene	637	68-141					
NWTPH-Gx	4-Bromofluorobenzene	239	50-150	S-100611-MD-MW-8-8	Total Petroleum Hydrocarbons - Gas	153	J	mg/kg
NWTPH-Gx	4-Bromofluorobenzene	275	50-150	S-043012-MD-Bottom-3'	Total Petroleum Hydrocarbons - Gas	498	J	mg/kg
NWTPH-Gx	4-Bromofluorobenzene	184	50-150	S-071112-NH-DW4-5	Total Petroleum Hydrocarbons - Gas	137	J	mg/kg

Notes:

J Estimated.
UJ Not detected, estimated reporting limit.

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
OCTOBER 2011 - JULY 2012

Parameter	*Associated Sample ID*	*Analyte*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits*		*Qualified Sample Result*	*Units*
						Recovery (percent)	*RPD (percent)*		
SW8270SIM	S-043012-MD-North-1.5'	Fluoranthene	17	3	0	21-129	38	R	µg/kg
SW8270SIM	S-043012-MD-North-1.5'	Acenaphthylene	0.8	-39	0	24-120	32	R	µg/kg
SW8270SIM	S-043012-MD-North-1.5'	Chrysene	4	0	0	16-132	38	R	µg/kg
SW8270SIM	S-043012-MD-North-1.5'	Benzo(a)pyrene	0	0	0	20-141	38	R	µg/kg

Notes:

MS Matrix Spike.
MSD Matrix Spike Duplicate.
RPD Relative Percent Difference.
R Rejected.

CONESTOGA-ROVERS & ASSOCIATES

20818 44th Avenue West, Suite 190
Lynnwood, WA 98036
Telephone: (425) 563-6515 Fax: (425) 563-6599
www.CRAworld.com

MEMORANDUM

TO: Ed Turner

REF. NO.: 070496

FROM: Jeffrey Cloud/bjw/8-NF

DATE: September 19, 2012

C.C.: Matt Davis

E-Mail and Hard Copy if Requested

RE: **Data Quality Assessment and Validation of Report 2511908**
Soil Sampling
ConocoPhillips Renton Terminal
Renton, Washington
April 2012

INTRODUCTION

The following details a quality assessment and validation of the analytical data resulting from the April 2012, collection of soil samples in Renton, Washington. Samples were submitted to Pace Analytical Services (Pace), in Seattle, Washington, and analyzed for the following:

Parameter	*Methodology*
Volatile Organic Compounds (VOCs)	SW846 8260B
Semi-Volatile Organic Compounds (SVOCs)	SW846 8270C SIM
Gasoline Range Organics (GRO)	NWTPH-Gx
Diesel Range Organics (DRO)/Motor Oil Range Organics (ORO)	NWTPH-Dx
Metals	SW846 6020
Total Organic Carbon (TOC)	EPA 9060

The analytical results are summarized in Table 1. The QC criteria used to assess the data were established by the methods and with the following guidance documents:

i) "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", USEPA 540/R-99/008, October 1999

ii) "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Review", USEPA 540/R-94/013, February 1994

These guidelines are collectively referred to as "Guidelines" in this memorandum.

SAMPLE QUANTITATION

The laboratory reported detected concentrations of analytes below the laboratory's practical quantitation limit (PQL)/report limit (RL). The detections between the PQL/RL and the method detection limit (MDL) have been qualified as estimated.

SAMPLE PRESERVATION AND HOLDING TIMES

Sample holding time periods and preservation requirements are summarized in the analytical methods. All sample extractions and/or analyses were performed within the specified holding times.

All samples were properly preserved and cooled after collection.

METHOD BLANK SAMPLES

Method blank samples are prepared from a purified sample matrix and are processed concurrently with investigative samples to assess the presence and the magnitude of sample contamination introduced during sample analysis. Method blank samples are analyzed at a minimum frequency of one per analytical batch and target analytes should be non-detect.

Method blanks were analyzed at the recommended frequency and all results were non-detect for the compounds of interest with one exception. Several sample results were qualified as non-detect (See Table 2).

SURROGATE COMPOUNDS – ORGANIC ANALYSES

Individual sample performance for organic analyses was monitored by assessing the results of surrogate compound percent recoveries. Surrogate percent recoveries are reviewed against the laboratory developed control limits provided in the analytical report.

All surrogate recoveries met the method criteria, demonstrating acceptable analytical efficiency for these analyses.

LABORATORY CONTROL SAMPLE (LCS)

The LCS analysis serves as a monitor of the overall performance in all steps of the sample analysis and is analyzed with each sample batch. The LCS percent recoveries were evaluated against method and laboratory established control limits.

Laboratory control samples (LCS) were analyzed for all parameters. All recoveries were within required control limits showing adequate analytical accuracy with a few exceptions. Several sample results were qualified as estimated (See Table 3).

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) ANALYSES

To assess the long term accuracy and precision of the analytical methods on various matrices, MS/MSD percent recoveries and relative percent differences (RPD) of the concentrations were determined. The organic MS/MSD percent recovery and RPD control limits are established by the laboratory. The inorganic control limits are defined by the methods and the "Guidelines", which require recoveries between 75 to 125 percent with RPDs less than 20 percent for water samples and 30 percent for soil samples.

Matrix spikes (MS) were prepared and analyzed for VOCs, SVOCs, metals and TOC. MS for VOCs, SVOCs and metals were analyzed in duplicate. All recoveries were within required control limits showing adequate analytical accuracy and precision with a few exceptions. Several sample results were qualified as estimated (See Table 4). Precision, for GRO, DRO/ORO and TOC, was determined to be acceptable based on laboratory duplicate recoveries.

FIELD QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The field QA/QC consisted of trip blanks.

Overall precision for the sampling event and laboratory procedures was monitored using the results of the field duplicate sample sets. The RPDs associated with these duplicate samples must be less than 50 percent for water or 100 percent for soil/sediment. If the reported concentration in either the investigative sample or its duplicate is less than five times the RL, the evaluation criteria are; one times the RL value for water or two times for soil/sediment.

All field duplicate results were acceptable indicating good field and analytical precision.

To monitor potential cross-contamination during sample transportation and storage, trip blanks were submitted to the laboratory for analysis.

All trip blank results were non-detect for the compounds of interest.

OVERALL ASSESSMENT

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*BG-1*	*SE-1*	*SE-2*	*SE-3*	*SE-4*
	Sample ID:	*SE-042512-MD-BG-1*	*SE-042412-MD-SE-1*	*SE-042412-MD-SE-2*	*SE-042412-MD-SE-3*	*SE-042412-MD-SE-4*
	Sample Date:	*4/25/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,1,1-Trichloroethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,1,2,2-Tetrachloroethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,1,2-Trichloroethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,1-Dichloroethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,1-Dichloroethene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,1-Dichloropropene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,2,3-Trichlorobenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,2,3-Trichloropropane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,2,4-Trichlorobenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,2,4-Trimethylbenzene	µg/kg	ND (4.7)	12.2	ND (6.6)	ND (5.6)	ND (5.2)
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	ND (7.8)	ND (14.5)	ND (11.0)	ND (9.3)	ND (8.6)
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,2-Dichlorobenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,2-Dichloroethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,2-Dichloroethene (total)	µg/kg	ND (9.4)	ND (17.4)	ND (13.2)	ND (11.1)	ND (10.3)
1,2-Dichloropropane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,3,5-Trimethylbenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,3-Dichlorobenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,3-Dichloropropane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
1,4-Dichlorobenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
2,2-Dichloropropane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	ND (15.7)	ND (29.0)	ND (22.1)	ND (18.6)	ND (17.2)
2-Chlorotoluene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
2-Hexanone	µg/kg	ND (15.7)	ND (29.0)	ND (22.1)	ND (18.6)	ND (17.2)
2-Phenylbutane (sec-Butylbenzene)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
4-Chlorotoluene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	ND (15.7)	ND (29.0)	ND (22.1)	ND (18.6)	ND (17.2)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*BG-1*	*SE-1*	*SE-2*	*SE-3*	*SE-4*
	Sample ID:	*SE-042512-MD-BG-1*	*SE-042412-MD-SE-1*	*SE-042412-MD-SE-2*	*SE-042412-MD-SE-3*	*SE-042412-MD-SE-4*
	Sample Date:	*4/25/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
Acetone	µg/kg	ND (44.2) U	458	ND (77.9) U	ND (104) U	ND (122) U
Benzene	µg/kg	ND (4.7)	22.2	11.2	19.2	ND (5.2)
Bromobenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Bromodichloromethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Bromoform	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Bromomethane (Methyl bromide)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Carbon disulfide	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Carbon tetrachloride	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Chlorobenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Chlorobromomethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Chloroethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Chloroform (Trichloromethane)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Chloromethane (Methyl chloride)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
cis-1,2-Dichloroethene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
cis-1,3-Dichloropropene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Cymene (p-Isopropyltoluene)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Dibromochloromethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Dibromomethane	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Dichlorodifluoromethane (CFC-12)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Ethylbenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Hexachlorobutadiene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Isopropyl benzene	µg/kg	ND (4.7)	13.2	ND (6.6)	ND (5.6)	ND (5.2)
m&p-Xylenes	µg/kg	ND (9.4)	ND (17.4)	ND (13.2)	ND (11.1)	ND (10.3)
Methyl tert butyl ether (MTBE)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Methylene chloride	µg/kg	ND (15.7)	ND (29.0)	ND (22.1)	ND (18.6)	ND (17.2)
Naphthalene	µg/kg	ND (4.7)	26.5	ND (6.6)	ND (5.6)	ND (5.2)
N-Butylbenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
N-Propylbenzene	µg/kg	ND (4.7)	27.9	ND (6.6)	ND (5.6)	ND (5.2)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*BG-1*	*SE-1*	*SE-2*	*SE-3*	*SE-4*
	Sample ID:	*SE-042512-MD-BG-1*	*SE-042412-MD-SE-1*	*SE-042412-MD-SE-2*	*SE-042412-MD-SE-3*	*SE-042412-MD-SE-4*
	Sample Date:	*4/25/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
o-Xylene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Styrene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
tert-Amyl methyl ether	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
tert-Butylbenzene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Tetrachloroethene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Toluene	µg/kg	ND (4.7)	15.1	ND (6.6)	ND (5.6)	ND (5.2)
trans-1,2-Dichloroethene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
trans-1,3-Dichloropropene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Trichloroethene	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Trichlorofluoromethane (CFC-11)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Trifluorotrichloroethane (Freon 113)	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Vinyl chloride	µg/kg	ND (4.7)	ND (8.7)	ND (6.6)	ND (5.6)	ND (5.2)
Xylenes (total)	µg/kg	ND (14.1)	ND (26.1)	ND (19.9)	ND (16.7)	ND (15.5)
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	ND (12.5)	ND (10.8)
2-Methylnaphthalene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	12.9	17.0
Acenaphthene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	ND (12.5)	ND (10.8)
Acenaphthylene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	ND (12.5)	ND (10.8)
Anthracene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	ND (12.5)	ND (10.8)
Benzo(a)anthracene	µg/kg	ND (10.8)	ND (15.6)	13.9	15.2	18.8
Benzo(a)pyrene	µg/kg	ND (10.8)	ND (15.6)	15.2	15.8	17.1
Benzo(b)fluoranthene	µg/kg	ND (10.8)	17.3	28.6	42.2	56.6
Benzo(g,h,i)perylene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	23.1	28.3
Benzo(k)fluoranthene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	ND (12.5)	13.5
Chrysene	µg/kg	ND (10.8)	ND (15.6)	17.8	20.8	30.0
Dibenz(a,h)anthracene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	ND (12.5)	ND (10.8)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*BG-1*	*SE-1*	*SE-2*	*SE-3*	*SE-4*
	Sample ID:	*SE-042512-MD-BG-1*	*SE-042412-MD-SE-1*	*SE-042412-MD-SE-2*	*SE-042412-MD-SE-3*	*SE-042412-MD-SE-4*
	Sample Date:	*4/25/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*	*4/24/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Semi-volatile Organic Compounds - SIM (Cont'd.)						
Fluoranthene	µg/kg	ND (10.8)	17.9	28.7	31.1	31.4
Fluorene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	ND (12.5)	ND (10.8)
Indeno(1,2,3-cd)pyrene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	31.0	36.9
Naphthalene	µg/kg	ND (10.8)	ND (15.6)	ND (13.1)	24.4	34.9
Phenanthrene	µg/kg	ND (10.8)	ND (15.6)	18.1	21.9	23.5
Pyrene	µg/kg	ND (10.8)	18.9	28.5	29.3	31.4
Metals						
Arsenic	mg/kg	15.1	11.1	18.5	7.3	16.0
Lead	mg/kg	19.0	26.1	56.0	71.9	33.4
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (25.3)	ND (35.0)	ND (30.9)	53.2	ND (24.2)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (7.6)	ND (19.1)	ND (16.4)	ND (15.3)	ND (10.8)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (101)	ND (140)	ND (124)	ND (114)	ND (97.0)
General Chemistry						
Total organic carbon (TOC)	%	6.49	4.69	4.04	3.12	5.47

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-5*	*SE-6*	*SE-7*	*SE-8*	*SE-9*
	Sample ID:	*SE-042412-MD-SE-5*	*SE-042412-MD-SE-6*	*SE-042512-MD-SE-7*	*SE-042512-MD-SE-8*	*SE-042512-MD-SE-9*
	Sample Date:	*4/24/2012*	*4/24/2012*	*4/25/2012*	*4/25/2012*	*4/25/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,1,1-Trichloroethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,1,2,2-Tetrachloroethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,1,2-Trichloroethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,1-Dichloroethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,1-Dichloroethene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,1-Dichloropropene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2,3-Trichlorobenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2,3-Trichloropropane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2,4-Trichlorobenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2,4-Trimethylbenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	ND (9.4)	ND (7.8)	ND (11.7)	ND (11.2)	ND (13.9)
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2-Dichlorobenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2-Dichloroethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,2-Dichloroethene (total)	µg/kg	ND (11.3)	ND (9.4)	ND (14.0)	ND (13.5)	ND (16.7)
1,2-Dichloropropane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,3,5-Trimethylbenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,3-Dichlorobenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,3-Dichloropropane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
1,4-Dichlorobenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
2,2-Dichloropropane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	ND (18.8)	ND (15.7)	ND (23.4)	ND (22.4)	ND (27.8)
2-Chlorotoluene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
2-Hexanone	µg/kg	ND (18.8)	ND (15.7)	ND (23.4)	ND (22.4)	ND (27.8)
2-Phenylbutane (sec-Butylbenzene)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
4-Chlorotoluene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	ND (18.8)	ND (15.7)	ND (23.4)	ND (22.4)	ND (27.8)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-5*	*SE-6*	*SE-7*	*SE-8*	*SE-9*
	Sample ID:	*SE-042412-MD-SE-5*	*SE-042412-MD-SE-6*	*SE-042512-MD-SE-7*	*SE-042512-MD-SE-8*	*SE-042512-MD-SE-9*
	Sample Date:	*4/24/2012*	*4/24/2012*	*4/25/2012*	*4/25/2012*	*4/25/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
Acetone	µg/kg	ND (119) U	ND (77.9) U	334	173	320
Benzene	µg/kg	ND (5.6)	ND (4.7)	54.9	ND (6.7)	13.6
Bromobenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Bromodichloromethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Bromoform	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Bromomethane (Methyl bromide)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Carbon disulfide	µg/kg	ND (5.6)	7.5 J	7.4 J	28.4 J	ND (8.3)
Carbon tetrachloride	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Chlorobenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Chlorobromomethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Chloroethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Chloroform (Trichloromethane)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Chloromethane (Methyl chloride)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
cis-1,2-Dichloroethene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
cis-1,3-Dichloropropene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Cymene (p-Isopropyltoluene)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Dibromochloromethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Dibromomethane	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Dichlorodifluoromethane (CFC-12)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Ethylbenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Hexachlorobutadiene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Isopropyl benzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
m&p-Xylenes	µg/kg	ND (11.3)	ND (9.4)	ND (14.0)	ND (13.5)	ND (16.7)
Methyl tert butyl ether (MTBE)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Methylene chloride	µg/kg	ND (18.8)	ND (15.7)	ND (23.4)	ND (22.4)	ND (27.8)
Naphthalene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
N-Butylbenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
N-Propylbenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-5*	*SE-6*	*SE-7*	*SE-8*	*SE-9*
	Sample ID:	*SE-042412-MD-SE-5*	*SE-042412-MD-SE-6*	*SE-042512-MD-SE-7*	*SE-042512-MD-SE-8*	*SE-042512-MD-SE-9*
	Sample Date:	*4/24/2012*	*4/24/2012*	*4/25/2012*	*4/25/2012*	*4/25/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
o-Xylene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Styrene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
tert-Amyl methyl ether	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
tert-Butylbenzene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Tetrachloroethene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Toluene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	11.0
trans-1,2-Dichloroethene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
trans-1,3-Dichloropropene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Trichloroethene	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Trichlorofluoromethane (CFC-11)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Trifluorotrichloroethane (Freon 113)	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Vinyl chloride	µg/kg	ND (5.6)	ND (4.7)	ND (7.0)	ND (6.7)	ND (8.3)
Xylenes (total)	µg/kg	ND (16.9)	ND (14.1)	ND (21.0)	ND (20.2)	ND (25.0)
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	µg/kg	ND (11.7)	ND (10.6)	ND (12.7)	ND (13.7)	ND (14.2)
2-Methylnaphthalene	µg/kg	ND (11.7)	ND (10.6)	ND (12.7)	ND (13.7)	ND (14.2)
Acenaphthene	µg/kg	ND (11.7)	ND (10.6)	ND (12.7)	ND (13.7)	ND (14.2)
Acenaphthylene	µg/kg	ND (11.7)	ND (10.6)	ND (12.7)	ND (13.7)	ND (14.2)
Anthracene	µg/kg	ND (11.7)	ND (10.6)	22.6	ND (13.7)	ND (14.2)
Benzo(a)anthracene	µg/kg	ND (11.7)	ND (10.6)	78.7	ND (13.7)	24.9
Benzo(a)pyrene	µg/kg	ND (11.7)	11.5	105	ND (13.7)	32.5
Benzo(b)fluoranthene	µg/kg	16.3	24.6	159	19.7	58.5
Benzo(g,h,i)perylene	µg/kg	ND (11.7)	16.8	110	13.8	31.7
Benzo(k)fluoranthene	µg/kg	ND (11.7)	ND (10.6)	52.8	ND (13.7)	16.8
Chrysene	µg/kg	ND (11.7)	14.6	111	ND (13.7)	36.7
Dibenz(a,h)anthracene	µg/kg	ND (11.7)	ND (10.6)	22.4	ND (13.7)	ND (14.2)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-5*	*SE-6*	*SE-7*	*SE-8*	*SE-9*
	Sample ID:	*SE-042412-MD-SE-5*	*SE-042412-MD-SE-6*	*SE-042512-MD-SE-7*	*SE-042512-MD-SE-8*	*SE-042512-MD-SE-9*
	Sample Date:	*4/24/2012*	*4/24/2012*	*4/25/2012*	*4/25/2012*	*4/25/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Semi-volatile Organic Compounds - SIM (Cont'd.)						
Fluoranthene	µg/kg	12.6	20.4	149	ND (13.7)	54.6
Fluorene	µg/kg	ND (11.7)	ND (10.6)	ND (12.7)	ND (13.7)	ND (14.2)
Indeno(1,2,3-cd)pyrene	µg/kg	ND (11.7)	17.4	130	15.5	36.4
Naphthalene	µg/kg	ND (11.7)	ND (10.6)	ND (12.7)	ND (13.7)	ND (14.2)
Phenanthrene	µg/kg	ND (11.7)	13.7	77.1	ND (13.7)	34.6
Pyrene	µg/kg	12.7	22.4	147	ND (13.7)	60.9
Metals						
Arsenic	mg/kg	13.4	20.2	22.5	8.8	16.4
Lead	mg/kg	20.2	41.3	34.7	10.9	55.1
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (26.7)	ND (24.7)	ND (29.4)	ND (32.5)	ND (32.5)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (13.4)	ND (10.9)	ND (15.6)	ND (15.0)	ND (18.5)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (107)	ND (98.8)	ND (118)	ND (130)	ND (130)
General Chemistry						
Total organic carbon (TOC)	%	3.15	3.87	5.50	2.90	2.11

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-10*	*SE-11*	*SE-12*	*SE-13*	*SE-14*
	Sample ID:	*SE-042512-MD-SE-10*	*SE-042512-MD-SE-11*	*SE-042512-MD-SE-12*	*SE-042612-MD-SE-13*	*SE-042612-MD-SE-14*
	Sample Date:	*4/25/2012*	*4/25/2012*	*4/25/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds						
1,1,1,2-Tetrachloroethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,1,1-Trichloroethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,1,2,2-Tetrachloroethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,1,2-Trichloroethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,1-Dichloroethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,1-Dichloroethene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,1-Dichloropropene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,2,3-Trichlorobenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,2,3-Trichloropropane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,2,4-Trichlorobenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,2,4-Trimethylbenzene	µg/kg	53.3 J	50.1	122	ND (3.1)	ND (2.7)
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	ND (4.7)	ND (4.6)	ND (5.3)	ND (5.2)	ND (4.5)
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,2-Dichlorobenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,2-Dichloroethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,2-Dichloroethene (total)	µg/kg	ND (5.7)	ND (5.5)	ND (6.4)	ND (6.3)	ND (5.5)
1,2-Dichloropropane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,3,5-Trimethylbenzene	µg/kg	17.4 J	13.7	36.7	ND (3.1)	ND (2.7)
1,3-Dichlorobenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,3-Dichloropropane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
1,4-Dichlorobenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
2,2-Dichloropropane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	ND (9.5)	ND (9.1)	ND (10.7)	ND (10.4)	ND (9.1)
2-Chlorotoluene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
2-Hexanone	µg/kg	ND (9.5)	ND (9.1)	ND (10.7)	ND (10.4)	ND (9.1)
2-Phenylbutane (sec-Butylbenzene)	µg/kg	5.0 J	3.2	4.0	ND (3.1)	ND (2.7)
4-Chlorotoluene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	ND (9.5)	ND (9.1)	ND (10.7)	ND (10.4)	ND (9.1)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-10*	*SE-11*	*SE-12*	*SE-13*	*SE-14*
	Sample ID:	*SE-042512-MD-SE-10*	*SE-042512-MD-SE-11*	*SE-042512-MD-SE-12*	*SE-042612-MD-SE-13*	*SE-042612-MD-SE-14*
	Sample Date:	*4/25/2012*	*4/25/2012*	*4/25/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
Acetone	µg/kg	ND (9.5)	ND (9.1)	ND (10.7)	ND (17.0) U	ND (14.9) U
Benzene	µg/kg	21.7	8.3	12.0	ND (3.1)	ND (2.7)
Bromobenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Bromodichloromethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Bromoform	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Bromomethane (Methyl bromide)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Carbon disulfide	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	13.5 J	ND (2.7)
Carbon tetrachloride	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Chlorobenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Chlorobromomethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Chloroethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Chloroform (Trichloromethane)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Chloromethane (Methyl chloride)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
cis-1,2-Dichloroethene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
cis-1,3-Dichloropropene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Cymene (p-Isopropyltoluene)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Dibromochloromethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Dibromomethane	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Dichlorodifluoromethane (CFC-12)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Ethylbenzene	µg/kg	40.6 J	66.4	40.6	ND (3.1)	ND (2.7)
Hexachlorobutadiene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Isopropyl benzene	µg/kg	14.0 J	10.9	11.7	ND (3.1)	ND (2.7)
m&p-Xylenes	µg/kg	119 J	204	83.3	ND (6.3)	ND (5.5)
Methyl tert butyl ether (MTBE)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Methylene chloride	µg/kg	ND (9.5)	ND (9.1)	ND (10.7)	ND (10.4)	ND (9.1)
Naphthalene	µg/kg	26.2 J	26.7	35.3	ND (3.1)	ND (2.7)
N-Butylbenzene	µg/kg	9.6 J	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
N-Propylbenzene	µg/kg	46.0 J	32.6	34.2	8.9	ND (2.7)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-10*	*SE-11*	*SE-12*	*SE-13*	*SE-14*
	Sample ID:	*SE-042512-MD-SE-10*	*SE-042512-MD-SE-11*	*SE-042512-MD-SE-12*	*SE-042612-MD-SE-13*	*SE-042612-MD-SE-14*
	Sample Date:	*4/25/2012*	*4/25/2012*	*4/25/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Volatile Organic Compounds (Cont'd.)						
o-Xylene	µg/kg	35.8 J	4.8	9.6	ND (3.1)	ND (2.7)
Styrene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
tert-Amyl methyl ether	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
tert-Butylbenzene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Tetrachloroethene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Toluene	µg/kg	118	17.9	38.3	ND (3.1)	ND (2.7)
trans-1,2-Dichloroethene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
trans-1,3-Dichloropropene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Trichloroethene	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Trichlorofluoromethane (CFC-11)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Trifluorotrichloroethane (Freon 113)	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Vinyl chloride	µg/kg	ND (2.8)	ND (2.7)	ND (3.2)	ND (3.1)	ND (2.7)
Xylenes (total)	µg/kg	155 J	209	92.9	ND (9.4)	ND (8.2)
Semi-volatile Organic Compounds - SIM						
1-Methylnaphthalene	µg/kg	126	120	96.0	12.8	ND (8.0)
2-Methylnaphthalene	µg/kg	188	179	161	ND (8.4)	ND (8.0)
Acenaphthene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Acenaphthylene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Anthracene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Benzo(a)anthracene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Benzo(a)pyrene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Benzo(b)fluoranthene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Benzo(g,h,i)perylene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Benzo(k)fluoranthene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Chrysene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Dibenz(a,h)anthracene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-10*	*SE-11*	*SE-12*	*SE-13*	*SE-14*
	Sample ID:	*SE-042512-MD-SE-10*	*SE-042512-MD-SE-11*	*SE-042512-MD-SE-12*	*SE-042612-MD-SE-13*	*SE-042612-MD-SE-14*
	Sample Date:	*4/25/2012*	*4/25/2012*	*4/25/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*					
Semi-volatile Organic Compounds - SIM (Cont'd.)						
Fluoranthene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Fluorene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Indeno(1,2,3-cd)pyrene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Naphthalene	µg/kg	159	251	176	12.0	ND (8.0)
Phenanthrene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Pyrene	µg/kg	ND (8.2)	ND (8.0)	ND (8.2)	ND (8.4)	ND (8.0)
Metals						
Arsenic	mg/kg	ND (2.7)	3.1	ND (2.9)	3.0	ND (2.6)
Lead	mg/kg	3.2	3.1	2.0	3.4	4.0
Petroleum Products						
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (19.4)	ND (19.0)	ND (18.9)	ND (19.3)	ND (18.7)
Total Petroleum Hydrocarbons - Gas	mg/kg	6.5	9.0	ND (5.8)	ND (6.8)	ND (5.8)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (77.8)	ND (76.2)	ND (75.6)	ND (77.3)	ND (74.6)
General Chemistry						
Total organic carbon (TOC)	%	0.413	0.328	0.286	0.463	0.683

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-15*	*SE-16*	*SE-17*	*SE-18*
	Sample ID:	*SE-042612-MD-SE-15*	*SE-042612-MD-SE-16*	*SE-042612-MD-SE-17*	*SE-042612-MD-SE-18*
	Sample Date:	*4/26/2012*	*4/26/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*				
Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,1,1-Trichloroethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,1,2,2-Tetrachloroethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,1,2-Trichloroethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,1-Dichloroethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,1-Dichloroethene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,1-Dichloropropene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2,3-Trichlorobenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2,3-Trichloropropane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2,4-Trichlorobenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2,4-Trimethylbenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2-Dibromo-3-chloropropane (DBCP)	µg/kg	ND (5.3)	ND (5.1)	ND (4.6)	ND (4.7)
1,2-Dibromoethane (Ethylene dibromide)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2-Dichlorobenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2-Dichloroethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,2-Dichloroethene (total)	µg/kg	ND (6.3)	ND (6.1)	ND (5.5)	ND (5.6)
1,2-Dichloropropane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,3,5-Trimethylbenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,3-Dichlorobenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,3-Dichloropropane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
1,4-Dichlorobenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
2,2-Dichloropropane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
2-Butanone (Methyl ethyl ketone) (MEK)	µg/kg	ND (10.5)	ND (10.2)	ND (9.2)	ND (9.4)
2-Chlorotoluene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
2-Hexanone	µg/kg	ND (10.5)	ND (10.2)	ND (9.2)	ND (9.4)
2-Phenylbutane (sec-Butylbenzene)	µg/kg	ND (3.2)	8.9	ND (2.8)	ND (2.8)
4-Chlorotoluene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	µg/kg	ND (10.5)	ND (10.2)	ND (9.2)	ND (9.4)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-15*	*SE-16*	*SE-17*	*SE-18*
	Sample ID:	*SE-042612-MD-SE-15*	*SE-042612-MD-SE-16*	*SE-042612-MD-SE-17*	*SE-042612-MD-SE-18*
	Sample Date:	*4/26/2012*	*4/26/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*				
Volatile Organic Compounds (Cont'd.)					
Acetone	µg/kg	35.4	36.2	18.5	29.6
Benzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Bromobenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Bromodichloromethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Bromoform	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Bromomethane (Methyl bromide)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Carbon disulfide	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Carbon tetrachloride	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Chlorobenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Chlorobromomethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Chloroethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Chloroform (Trichloromethane)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Chloromethane (Methyl chloride)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
cis-1,2-Dichloroethene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
cis-1,3-Dichloropropene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Cymene (p-Isopropyltoluene)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Dibromochloromethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Dibromomethane	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Dichlorodifluoromethane (CFC-12)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Ethylbenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Hexachlorobutadiene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Isopropyl benzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
m&p-Xylenes	µg/kg	ND (6.3)	ND (6.1)	ND (5.5)	ND (5.6)
Methyl tert butyl ether (MTBE)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Methylene chloride	µg/kg	ND (10.5)	ND (10.2)	ND (9.2)	ND (9.4)
Naphthalene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
N-Butylbenzene	µg/kg	ND (3.2)	3.8	ND (2.8)	ND (2.8)
N-Propylbenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-15*	*SE-16*	*SE-17*	*SE-18*
	Sample ID:	*SE-042612-MD-SE-15*	*SE-042612-MD-SE-16*	*SE-042612-MD-SE-17*	*SE-042612-MD-SE-18*
	Sample Date:	*4/26/2012*	*4/26/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*				
Volatile Organic Compounds (Cont'd.)					
o-Xylene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Styrene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
tert-Amyl methyl ether	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
tert-Butylbenzene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Tetrachloroethene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Toluene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
trans-1,2-Dichloroethene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
trans-1,3-Dichloropropene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Trichloroethene	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Trichlorofluoromethane (CFC-11)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Trifluorotrichloroethane (Freon 113)	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Vinyl chloride	µg/kg	ND (3.2)	ND (3.1)	ND (2.8)	ND (2.8)
Xylenes (total)	µg/kg	ND (9.5)	ND (9.2)	ND (8.3)	ND (8.4)
Semi-volatile Organic Compounds - SIM					
1-Methylnaphthalene	µg/kg	ND (9.0)	ND (8.2)	12.0	ND (8.6)
2-Methylnaphthalene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Acenaphthene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Acenaphthylene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Anthracene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Benzo(a)anthracene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Benzo(a)pyrene	µg/kg	ND (9.0)	8.2	ND (8.5)	9.5
Benzo(b)fluoranthene	µg/kg	ND (9.0)	11.1	ND (8.5)	14.9
Benzo(g,h,i)perylene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Benzo(k)fluoranthene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Chrysene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	9.5
Dibenz(a,h)anthracene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)

TABLE 1

ANALYTICAL RESULTS SUMMARY
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

	Sample Location:	*SE-15*	*SE-16*	*SE-17*	*SE-18*
	Sample ID:	*SE-042612-MD-SE-15*	*SE-042612-MD-SE-16*	*SE-042612-MD-SE-17*	*SE-042612-MD-SE-18*
	Sample Date:	*4/26/2012*	*4/26/2012*	*4/26/2012*	*4/26/2012*
	Sample Depth:	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*	*(0.5-1) ft BGS*
Parameters	*Units*				
Semi-volatile Organic Compounds - SIM (Cont'd.)					
Fluoranthene	µg/kg	ND (9.0)	13.9	ND (8.5)	16.2
Fluorene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Indeno(1,2,3-cd)pyrene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	9.3
Naphthalene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Phenanthrene	µg/kg	ND (9.0)	ND (8.2)	ND (8.5)	ND (8.6)
Pyrene	µg/kg	ND (9.0)	12.7	ND (8.5)	15.0
Metals					
Arsenic	mg/kg	3.8	2.9	3.3	ND (3.1)
Lead	mg/kg	12.3	7.9	3.6	10.4
Petroleum Products					
Total Petroleum Hydrocarbons - Diesel	mg/kg	ND (21.2)	ND (18.8)	ND (20.3)	ND (19.6)
Total Petroleum Hydrocarbons - Gas	mg/kg	ND (7.3)	ND (6.5)	ND (6.5)	ND (7.4)
Total Petroleum Hydrocarbons - Motor Oil	mg/kg	ND (84.9)	ND (75.4)	ND (81.2)	ND (78.5)
General Chemistry					
Total organic carbon (TOC)	%	0.982	0.816	0.280	0.355

Notes:

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.

TABLE 2

QUALIFIED SAMPLE RESULTS DUE TO ANALYTE CONCENTRATIONS IN THE METHOD BLANKS
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

Parameter	*Analysis Date*	*Analyte*	*Blank Result*	*Sample ID*	*Qualified Sample Result*		*Units*
SW8260	5/2/2012	Acetone	14.7	SE-042412-MD-SE-2	77.9	U	µg/kg
SW8260	5/2/2012	Acetone	14.7	SE-042412-MD-SE-3	104	U	µg/kg
SW8260	5/2/2012	Acetone	14.7	SE-042412-MD-SE-4	122	U	µg/kg
SW8260	5/2/2012	Acetone	14.7	SE-042412-MD-SE-5	119	U	µg/kg
SW8260	5/2/2012	Acetone	14.7	SE-042412-MD-SE-6	77.9	U	µg/kg
SW8260	5/2/2012	Acetone	14.7	SE-042512-MD-BG-1	44.2	U	µg/kg
SW8260	5/2/2012	Acetone	14.7	SE-042612-MD-SE-13	17.0	U	µg/kg
SW8260	5/2/2012	Acetone	14.7	SE-042612-MD-SE-14	14.9	U	µg/kg

Notes:

U Not detected.

TABLE 3

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING LABORATORY CONTROL SAMPLE RESULTS
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

Parameter	*Compound*	*Percent Recovery*	*Control Limits (percent)*	*Associated Sample ID*	*Qualified Sample Results*	*Units*
SW8260	Carbon disulfide	167	40-160	SE-042412-MD-SE-6	7.5 J	µg/kg
SW8260	Carbon disulfide	167	40-160	SE-042512-MD-SE-7	7.4 J	µg/kg
SW8260	Carbon disulfide	167	40-160	SE-042512-MD-SE-8	28.4 J	µg/kg
SW8260	Carbon disulfide	167	40-160	SE-042612-MD-SE-13	13.5 J	µg/kg

Notes:

J Estimated.

TABLE 4

QUALIFIED SAMPLE RESULTS DUE TO OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERIES
SOIL SAMPLING
CONOCOPHILLIPS RENTON TERMINAL
RENTON, WASHINGTON
APRIL 2012

Parameter	*Associated Sample ID*	*Analyte*	*MS Recovery (percent)*	*MSD Recovery (percent)*	*RPD*	*Control Limits*		*Qualified Sample Result*	*Units*
						Recovery (percent)	*RPD (percent)*		
SW8260	SE-042512-MD-SE-10	Ethylbenzene	116	-16	54	40-146	39	40.6 J	µg/kg
SW8260	SE-042512-MD-SE-10	N-Propylbenzene	389	42	81	40-160	38	46.0 J	µg/kg
SW8260	SE-042512-MD-SE-10	N-Butylbenzene	200	70	76	40-142	39	9.6 J	µg/kg
SW8260	SE-042512-MD-SE-10	1,3,5-Trimethylbenzene	134	30	65	40-160	40	17.4 J	µg/kg
SW8260	SE-042512-MD-SE-10	Xylenes (total)	62	-125	80	40-142	39	155 J	µg/kg
SW8260	SE-042512-MD-SE-10	2-Phenylbutane (sec-Butylbenzene)	150	84	53	40-160	40	5.0 J	µg/kg
SW8260	SE-042512-MD-SE-10	Naphthalene	213	32	75	40-140	38	26.2 J	µg/kg
SW8260	SE-042512-MD-SE-10	o-Xylene	75	-54	68	40-138	39	35.8 J	µg/kg
SW8260	SE-042512-MD-SE-10	1,2,4-Trimethylbenzene	180	-124	102	40-160	40	53.3 J	µg/kg
SW8260	SE-042512-MD-SE-10	Isopropyl benzene	180	87	51	40-157	39	14.0 J	µg/kg
SW8260	SE-042512-MD-SE-10	m&p-Xylenes	55	-160	85	40-144	39	119 J	µg/kg

Notes:

MS Matrix Spike.
MSD Matrix Spike Duplicate.
RPD Relative Percent Difference.
J Estimated.

APPENDIX M

GROUNDWATER MODELING REPORT

TABLE OF CONTENTS

			Page
1.0	INTRODUCTION		1
	1.1	BACKGROUND	1
	1.2	PURPOSE	4
	1.3	SCOPE OF WORK	4
	1.4	REPORT ORGANIZATION	5
2.0	SUMMARY OF HYDROLOGIC, GEOLOGIC, AND HYDROGEOLOGIC CONDITIONS		7
	2.1	PHYSIOGRAPHY	7
	2.2	GEOLOGIC CONDITIONS	7
	2.3	SITE HYDROGEOLOGY	10
3.0	CONCEPTUAL HYDROGEOLOGIC MODEL		16
	3.1	HYDROGEOLOGIC CHARACTERISTICS OF THE SITE	16
	3.2	GROUNDWATER FLOW MODEL DOMAIN LIMITS	17
	3.3	STRATIGRAPHIC REPRESENTATION	19
	3.4	BOUNDARY CONDITIONS	20
4.0	SIMULATION PROGRAM SELECTION		22
	4.1	GROUNDWATER FLOW MODEL	22
	4.2	GRAPHIC USER INTERFACE	23
5.0	GROUNDWATER FLOW MODEL CONSTRUCTION		24
	5.1	GROUNDWATER FLOW MODEL SPATIAL DOMAIN AND DISCRETIZATION	24
	5.2	FLOW MODEL BOUNDARY CONDITIONS	27
	5.3	MODEL HYDRAULIC CONDUCTIVITY	32
	5.4	GROUNDWATER FLOW SIMULATION METHOD	32
6.0	FLOW MODEL CALIBRATION		34
	6.1	CALIBRATION TARGETS	34
	6.2	CALIBRATION METHODOLOGY	34
	6.3	STEADY-STATE CALIBRATION	36
7.0	REFERENCES		41

LIST OF FIGURES
(Following Text)

FIGURE 1.1 VICINITY MAP

FIGURE 1.2 SITE PLAN

FIGURE 2.1 GREEN/DUWAMISH RIVER WATERSHED

FIGURE 2.2 GEOLOGIC MAP OF SITE VICINITY

FIGURE 2.3 REGIONAL GEOLOGIC CROSS-SECTION A-A'

FIGURE 2.4 REGIONAL GEOLOGIC CROSS-SECTION B-B'

FIGURE 2.5 GROUND SURFACE ELEVATIONS

FIGURE 2.6 WETLANDS SURROUNDING SITE AREA

FIGURE 2.7 SITE STRATIGRAPHIC LOCATIONS

FIGURE 2.8 REGIONAL POTENTIOMETRIC SURFACE

FIGURE 2.9 SITE-SPECIFIC GROUNDWATER ELEVATIONS UNDER DRY AND WET CONDITIONS (SHALLOW)

FIGURE 2.10 SITE-SPECIFIC GROUNDWATER ELEVATIONS UNDER DRY AND WET CONDITIONS (INTERMEDIATE)

FIGURE 2.11 SITE-SPECIFIC GROUNDWATER ELEVATIONS UNDER DRY AND WET CONDITIONS (DEEP)

FIGURE 2.12 USGS STREAM GAUGE STATION LOCATIONS

FIGURE 2.13 SITE VICINITY UTILITIES - STORM SEWERS

FIGURE 2.14 SITE VICINITY UTILITIES - SANITARY SEWERS

FIGURE 3.1 MODEL DOMAIN

FIGURE 3.2 3D STRATIGRAPHY CROSS-SECTIONS

FIGURE 5.1 HORIZONTAL DISCRETIZATION OF MODEL DOMAIN

FIGURE 5.2 VERTICAL DISCRETIZATION OF MODEL DOMAIN CROSS-SECTION A-A'

FIGURE 5.3 VERTICAL DISCRETIZATION OF MODEL DOMAIN CROSS-SECTION B-B'

FIGURE 5.4 3D STRATIGRAPHIC LIMITS WITHIN MODEL DOMAIN

FIGURE 5.5 SCHEMATIC OF EFFECTIVE HYDRAULIC CONDUCTIVITY CALCULATION

FIGURE 5.6 CONSTANT HEAD BOUNDARY ASSIGNMENT

FIGURE 5.7 DRAIN CELL DISTRIBUTION IN MODEL DOMAIN

FIGURE 5.8 RECHARGE ZONES APPLIED IN THE WET CONDITIONS GROUNDWATER FLOW MODEL

FIGURE 5.9 GENREAL HEAD BOUNDARY ASSIGNEMENT

FIGURE 6.1 MODEL HYDRAULIC CONDUCTIVITY CROSS-SECTIONS

FIGURE 6.2 SCATTER PLOT OF SIMULATED VS. OBSERVED GROUNDWATER ELEVATIONS - WET CONDITIONS (FEBRUARY 2012)

FIGURE 6.3 CALIBRATED GROUNDWATER ELEVATION CONTOURS - WET CONDITIONS (FEBRUARY 2012) – SHALLOW

FIGURE 6.4 CALIBRATED GROUNDWATER ELEVATION CONTOURS - WET CONDITIONS (FEBRUARY 2012) - INTERMEDIATE

FIGURE 6.5 CALIBRATED GROUNDWATER ELEVATION CONTOURS - WET CONDITIONS (FEBRUARY 2012) - DEEP

FIGURE 6.6 SCATTER PLOT OF SIMULATED VS. OBSERVED GROUNDWATER ELEVATIONS - DRY CONDITIONS (FEBRUARY 2012)

FIGURE 6.7 CALIBRATED GROUNDWATER ELEVATION CONTOURS - DRY CONDITIONS (FEBRUARY 2012) - SHALLOW

FIGURE 6.8 CALIBRATED GROUNDWATER ELEVATION CONTOURS - DRY CONDITIONS (FEBRUARY 2012) - INTERMEDIATE

FIGURE 6.9 CALIBRATED GROUNDWATER ELEVATION CONTOURS - DRY CONDITIONS (FEBRUARY 2012) - DEEP

LIST OF TABLES
(Following Text)

TABLE 2.1 INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3D INDICATOR KRIGING

TABLE 2.2 SUMMARY OF HYDRAULIC CONDUCTIVITY VALUES

TABLE 5.1 SUMMARY OF REMEDIATION WELL PARAMETERS

TABLE 6.1 FEBRUARY AND AUGUST 2012 CALIBRATION TARGETS

TABLE 6.2 FEBRUARY 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS

TABLE 6.3 AUGUST 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS

LIST OF APPENDICES
(Following Text)

APPENDIX B 3D STRATIGRAPHY 4DIM

1.0 INTRODUCTION

1.1 BACKGROUND

The Phillips 66 Company (Phillips 66) (formerly ConocoPhillips) Renton Terminal (Site) is located at 2423 Lind Avenue Southwest (Lind Ave SW), Renton, Washington. The Site is an active bulk petroleum distribution terminal that occupies approximately 7 acres and is situated at the northwest corner of the intersection of Lind Ave SW and SW 27th Street (St). A vicinity map of the Site and surrounding area is presented as Figure 1.1 and a Site Plan is presented as Figure 1.2.

The Site is located in King County in the northwest quarter of section 30; township 23 North; range 5 East. The eastern portion of the parcel is occupied by the terminal facility and the western portion of the parcel is a wetland (King County Tax Parcel Number 3023059086).

Mobile (the predecessor to ExxonMobil) began terminal operations in 1968 and operated the facility until 1988 when the Property was sold to British Petroleum Exploration & Oil (BP). Tosco Corporation (ConocoPhillips) purchased the Property from BP in 1993 and is the current owner.

The Site is the location of four historical documented releases discovered in 1986, 1990, 1991, and 2002, respectively. In 1986, an underground product spill was discovered by Mobil during the installation of a loading rack in the truck loading area. Following the release discovery, liquid phase hydrocarbons (LPH), up to 5.5 feet (ft) thick, was found floating on the groundwater table in the vicinity of the truck loading area. It was later determined that cracks in the concrete catch basin from the loading rack spill collection system were the source of the spill (Woodward-Clyde Consultants, March 21, 1989). A product recovery system was constructed and began operation in November 1987 and between December 1987 and November 1993 approximately 57,000 gallons of product were removed.

In September 1990, Mobil documented in a letter to BP that high free product recovery and product thickness was documented in select wells for a period of eight days in March 1990. Samples were collected of the free product. Analysis indicated that the gas chromatograph (GC) fingerprints of the gasoline fraction of the free product in well B-2 and the product recovery tank were very similar to that of the BP regular leaded gasoline. It was determined that a suspected release of BP regular leaded gasoline had occurred between March 15, and March 21, 1990 (Mobil Oil, September 21, 1990).

In May 1991, Mobil documented in a letter to BP that they had suspected for over a year that there was an on-going leak at the Site. Mobil's consultant, Hart Crowser, had operated a product recovery system since 1987 and despite recovering 34,000 gallons of free product "gasoline" the plume had grown in size. Free product thickness had not exhibited a decreasing trend from November 1987 to December 1990. In fact, free product thickness in most of the wells had increased. A comparative product analysis of free product collected from well B-2 resembled BP regular gasoline. Neither BP nor Mobil had identified the source of the potential leak (Mobil Oil Corporation, May 14, 1991). BP pressure tested all underground lines leading from the tanks to the rack. The results of these tests did not indicate a leak. In July 1991, BP responded to Mobil's letter and indicated that, in BP's opinion, the information reviewed did not indicate that a spill or leak was present. BP interpreted the data and concluded the following (BP, July 1, 1991):

- Regarding the allegation that the sudden increases in product thickness accompanied by abnormally high recovery rates over an eight-day period were a result of a new surface spill: the product recovery pump was not operating during the period of elevated product thickness, however, the water table depression pump was in operation. The depression in the water table caused product to accumulate, showing an increase in product thickness.
- Regarding the allegation that the product sample analyzed from B-2 resembled BP's regular gasoline: the lead content of free product sampled in well B-2 is apparently two to four times higher than the content found in regular gasoline.
- Regarding the allegation that the plume of product had increased in thickness and area during the time period between July 1986 and April 1991: large fluctuations in the groundwater table (as much as 7 ft as documented in well B-3) can cause the size of the free product plume to vary significantly.

There is no indication that an agreement was ever reached regarding whether or not a release had occurred.

In November 2002, a petroleum release consisting of 14,800 gallons of super-unleaded gasoline occurred from the AST designated as AST #2. Following the discovery of the release, ConocoPhillips retained Landau to assess the extent of impact of the release and to conduct interim action LPH recovery efforts. Between November 2002 and December 2003 the following initial efforts were conducted by Landau to recover LPH and define the extent of the release:

- Monitoring groundwater and LPH thickness from existing monitoring wells
- Monitoring groundwater and LPH thickness from 24 advanced hand augured borings surrounding AST #2
- Installation of 28 recovery wells and 6 additional monitoring wells
- In January 2003, LPH was discovered floating on the surface of a stormwater retention pond located to the southeast of AST #2. A diaphragm pump was installed west of the pond to limit the flow of water and LPH to the retention pond. In addition, a network of Venturi-style blowers was temporarily installed near the southern bank of the retention pond to abate vapor concentrations.
- In November 2003, a surface water containment emergency dike was installed near the southwest corner of the stormwater retention pond. The dike was installed as a containment measure to limit the potential for LPH to impact the pond.
- In December 2003, a horizontal interceptor trench (HW-1) was installed near the southern property boundary south of AST #2. The purpose of this trench was to prevent further off-Property migration of impacts to the south. Groundwater and soil vapor recovery points HWx-1W and HWx-1E are situated at the west and east end points of the trench, respectively.

On August 5, 2010 ExxonMobil Oil Corporation (ExxonMobil), ConocoPhillips Risk Management and Remediation (now Phillips 66 company), and The Washington State Department of Ecology (Ecology) entered into an Agreed Order (Order No. DE 7882). The mutual objective of Ecology, ExxonMobil Oil Corporation, and Phillips 66 (PSX) under the Agreed Order is to provide for remedial action at a facility where there has been a release of hazardous substances. The Agreed Order was issued pursuant to the Model Toxics Control Act (MTCA), RCW 70.105D.050(1). The Agreed Order requires ExxonMobil and PSX to complete a remedial investigation in accordance with Washington Administrative Code (WAC) 173-340 to determine the nature and extent of contamination associated with the Site.

1.2 PURPOSE

On behalf of Phillips 66, Conestoga-Rovers & Associates (CRA) has prepared this Report to document the groundwater flow model developed for the Site. This Report documents CRA's development of a numerical groundwater flow model to represent the existing hydrologic (i.e., surface water), geologic, and hydrogeologic (i.e., groundwater flow) conditions observed at the Site and surrounding area.

There are two separate remediation systems currently operating on Site providing shallow groundwater containment. The initial remediation system was installed following the discovery of the initial release in 1986 when ExxonMobil began investigation and cleanup activities under Enforcement Order DE 87-N301 issued by Ecology on October 14, 1987. Cleanup activities consisted of the operation of a groundwater extraction system equipped with two recovery trenches, Trench R-1 and Trench R-2. ConocoPhillips began investigation and cleanup activities associated with the 2002 release under Ecology's Voluntary Cleanup Program (VCP). Cleanup activities consisted of product recovery from wells using a vac truck and operation of a dual phase extraction system. Both remediation systems are presented on Figure 1.2 and are further discussed in Section 2.3 of this Report.

The purpose of the groundwater flow model was to provide a reasonable representation of the observed groundwater flow conditions currently observed at the Site with the operation of the on-Site remediation systems for wet and dry season monitoring events.

1.3 SCOPE OF WORK

The groundwater flow model was constructed based on the Site-specific and available regional data including surface water features, topography, and geological information. The scope of work completed by CRA to develop the groundwater flow for the Site included the following:

- Reviewed available Site and regional hydrologic (i.e., surface water), geologic, and hydrogeologic (i.e., groundwater flow) data;
- Interpolated the observed Site geologic conditions in three-dimensions (3D) using the indicator kriging approach implemented in the Mining Visualization System/Environmental Visualization System (MVS/EVS) software package developed by C Tech Development Corporation (C Tech) (C Tech, 2007);

- Developed a conceptual hydrogeologic model for the Site and surrounding area based on the available regional and Site-specific information;
- Constructed a 3D groundwater flow model to represent the existing Site conditions based on the conceptual hydrogeologic model;
- Calibrated the groundwater flow model under steady-state conditions to the groundwater elevations and groundwater flow directions observed at the Site during multiple monitoring events representative of wet and dry conditions; and
- Documented the groundwater flow model development and its application.

Stated more generally, the groundwater flow model was calibrated to provide a reasonable representation of groundwater elevations and groundwater flow directions observed at the Site.

1.4 REPORT ORGANIZATION

This Report is organized as follows:

- Section 1.0 Introduction

  Presents the introduction, purpose, and scope of the hydrogeologic modeling conducted for the Site.

- Section 2.0 Summary of Hydrologic, Geologic, and Hydrogeologic Conditions

  Presents a summary of the observed regional and Site hydrologic, geologic, and hydrogeologic conditions.

- Section 3.0 Conceptual Hydrogeologic Model

  Presents the conceptual hydrogeologic model developed for the Site that forms the basis for the construction of the numerical groundwater flow model.

- Section 4.0 Simulation Program Selection

  Presents a description of the simulation programs selected to conduct the hydrogeologic modeling.

- Section 5.0 Groundwater Flow Model Construction

  Presents the details regarding the construction of the numerical groundwater flow model for the existing conditions at the Site.

- Section 6.0 Groundwater Flow Model Calibration

  Presents the calibration of the numerical groundwater flow model to the observed groundwater flow conditions at the Site during multiple monitoring events, representative of wet and dry conditions, under steady-state conditions.

- Section 7.0 References

  Lists the references cited in this report.

2.0 SUMMARY OF HYDROLOGIC, GEOLOGIC, AND HYDROGEOLOGIC CONDITIONS

The regional and Site hydrologic, geologic, and hydrogeologic conditions were evaluated for the development of the 3D groundwater flow model. The regional and Site hydrologic, geologic, and hydrogeologic conditions are briefly summarized below.

2.1 PHYSIOGRAPHY

The Duwamish Valley, which is drained by the Green River, is relatively flat with a down-stream slope of about 4.5 ft per mile. The valley ranges from 8,500 to 15,500 ft wide and is incised 240 to 400 ft below the drift plains. The valley walls bordering the incised thalwegs are rather steep-sided bluffs composed of glacial drift from a variety of glacial episodes. Based on reporting from the U.S. Geological Survey (USGS) the soils in the Duwamish Valley and Green River Valley are generally poorly drained silt loams that are best suited for farming (USGS, 1995).

The Site, which is bounded by undeveloped land, includes an earthen tank farm that is surrounded by an earthen berm.

2.2 GEOLOGIC CONDITIONS

Regional Geology

The Site lies near the mouth of the Duwamish-Green River Valley as depicted on Figure 2.1. The regional surficial geology is represented on Figure 2.2 and a regional cross-section is presented on Figure 2.3. As seen on both Figures 2.2 and 2.3, geologic deposition in the Duwamish-Green River Valley consists primarily of alluvial sand, silts, and gravels up to 600 ft in thickness at the south end of the valley, that gradually taper out toward the north end of the valley.

Regionally, the alluvial sand, silts, and gravels are underlain by Pleistocene deposits, which consist of primarily glacial till and outwash, which are themselves underlain by igneous intrusive and volcanic bedrock (Luzier, 1969). As presented on Figure 2.2, the Site is situated on a shallow peat and swamp deposit within a closed topographic

depression. A regional cross-section near the Site area is shown on Figure 2.4 and depicts the increasing depth of silty sand towards the thalweg of the valley.

Site Geology

The Site lies on a relatively flat area of the northern reach of the Duwamish-Green River Valley. As presented on Figure 2.2, native surficial deposits near the Site consist primarily of wetland peat and muck. During Site construction, between 1964 and 1968, portions of the wetlands were filled with structural fill material consisting of medium-dense sand with silt and gravel apparently derived from glacial till.

The Site is underlain by 7 to 10 ft of surficial fill material (primarily silty sand with varying amounts of gravel), resulting in mounding of ground surface elevations (see, for example, Figure 2.5). The surficial fill material is underlain by approximately 1 to 7 ft of highly organic native clayey silt materials, likely wetland deposits, which rest atop a unit of alluvial sand and silt deposits. The total thickness of the alluvial deposits has not been investigated at the Site; however, a well 1,600 ft west of the property indicates that alluvial material was deposited to the full maximum explored depth of 100 ft below ground surface (bgs). The Site-specific geology is derived from a review of historical subsurface investigations completed between 1986 and 2012.

A number of wetlands are situated surrounding the Site, including several wetlands that the City of Renton has been actively mitigating following adverse impacts from highway construction projects by the Washington State Department of Transport (WSDOT). The locations of the wetlands near the Site are presented on Figure 2.6.

The wetlands consist of four main soil types: Puget silty clay loam, Puyallup fine sandy loam, Snohomish silt loam, and Woodinville silt loam. Soil borings obtained by the City of Renton from proposed wetland mitigation sites indicate the presence of sandy gravel and sand to silty sand (fill), interbedded sand and silt underlying surficial fill, underlain by lower permeability silts and silty sands, and poorly graded sand to silt at the bottom of the soil borings. Peat was also intermixed and discovered in many of the soil layers. The surficial materials are generally underlain by a layer of organic silt and peat, which contains fibrous peat in the upper portion, a layer of soft gray plastic silt, underlain with a layer of silty sand at the bottom of the borings. (City of Renton, 2006).

Based on the Trench 2 (i.e., Trench R-2) Investigation Report provided by Acton Michelson Environmental Inc. (2007) backfill materials from within Trench R-2 were predominately course rounded gravel up to approximately 50 mm in diameter. The

backfill materials were classified as poorly-graded gravel (GP), or poorly-graded gravel with sand (GP), with the sand content varying between approximately 5 and 10 percent.

CRA interpolated the observed Site geological conditions into a geological model using 3D indicator kriging implemented through MVS/EVS. The 3D geological model was based on an interpretation of observed lithology documented in 106 available Site boring logs. The interpreted stratigraphy and the corresponding stratigraphic pick elevations are presented in Table 2.1. The locations of borings used for the 3D geological interpolation are shown on Figure 2.7. The stratigraphic boring logs are provided in Appendix D of the RI/FS report. The stratigraphy at locations that do not have completed boring logs were assessed through laser-induced fluorescence (LIF) data that was used to screen petroleum hydrocarbons as referenced in the main body report. An interactive Site-specific 3D geological model animation player (referred to as a 4DIM player by the developer, C Tech) is presented electronically in Appendix A of this report.

Based on the 3D geological model of interpreted geological Site conditions; interpreted stratigraphic picks, including ground surface elevations; and available regional-scale cross-sections, the following stratigraphic features are observed:

- The surficial fill material is present across the entire Site area and varies in thickness from 7 to 10 ft;
- The surficial fill material used to construct the facility creates a topographic mound on top of the native wetland organic clayey silt deposits;
- The thickness of the native wetland organic clayey silt deposits, which underlie the surficial fill, is fairly continuous and ranges from 1 to 7 ft across the Site;
- The native wetland organic clayey silt deposits are thickest towards the southwestern portion of the Site beneath the loading racks and tend to thin out to the east[1]; and
- Towards the center of the Site it appears as though the native wetland organic clayey silt deposits and the lower aquifer silty sand material are partially layered instead of being composed of two distinct well-defined geologic units.

[1] Since regional data indicate that historically a wetland was situated across the entire Site area, it is possible that this observation is a result of deeper boring locations not being available towards the northeastern section of the Site.

2.3 SITE HYDROGEOLOGY

Groundwater Flow and Groundwater Usage

As described in Section 2.1 and 2.2, the soils in the Duwamish-Green River Valleys are relatively poorly drained silt loams regionally underlain by alluvial sand, silts, and gravels. Alluvium found in the Duwamish-Green River Valleys is designated as Holocene alluvium (Qal) and is considered to be an important aquifer. Few wells fully penetrate the Qal unit, so the thickness generally is not known. Up-river, in the Green River Valley, the alluvium exceeds 400 ft in thickness (USGS, 1995).

Figure 2.8 presents the potentiometric surface within the Qal aquifer. Water-level data for the Qal aquifer indicate that lateral ground-water flow in the Qal aquifer is generally toward discharge points along the major river channels. The regional groundwater flow direction in the valley is to the northwest and generally reflects the influence of land-surface topography.

Vertical ground-water flow between hydrogeologic units is from upland recharge areas downward and laterally to the major alluvial valleys (USGS, 1995). In major alluvial valleys, water levels in deeper wells have a higher potentiometric surface than those in shallower wells, indicating an upward hydraulic gradient, discharging into rivers. For example, along the eastern side of the Duwamish Valley between Kent and Renton, several shallow observation wells drilled to depths of less than 50 ft have water levels generally within 10 ft of land surface and three nearby wells drilled to depths of 149 to 182 ft have water levels above land surface and are flowing wells (USGS, 1995).

Regional groundwater levels fluctuate naturally in response to seasonal changes in the distribution and rate of recharge and discharge by about 1.5 to 12 ft. The largest annual fluctuations are in shallow aquifers with relatively low specific storage values; fluctuations generally decrease and are delayed over time with depth (USGS, 1995). Hydraulic conductivity values in the Qal aquifer range between 2 to 7000 ft per day (ft/day) or 7×10^{-4} to 2.5 centimeters per second (cm/s).

Within the Site area, groundwater tends to flow radially, often with steep horizontal hydraulic gradients, from a topographic mound of surficial fill material, described in Section 2.2, and from increased recharge in the berm-enclosed Tank Farm area. Shallow groundwater near the Site likely discharges to the surrounding wetlands, the stormwater retention pond in the southeast corner of the property, and to extraction wells located at the Site. Contrary to regional-scale vertical gradients, the vertical

gradients at the Site are downward indicating that a portion of the shallow groundwater in the fill material likely recharges the deep regional Qal aquifer. Beneath the Site, the deep Qal aquifer has a very shallow horizontal gradient and flows to the west-northwest.

In response to the 1986 and 2002 product releases, described in Section 1.1, remedial measures were implemented on the Site. The remedial measures taken in response to the 1986 release included the installation, in 1987, of a product recovery system and a groundwater extraction and treatment system (GWET). The remediation system consisted of two gravel-filled trenches with a recovery well in each (i.e., Trenches R-1 and R-2)[2]. Each recovery well was initially equipped with a product recovery pump, which ceased operations in 2002, and a groundwater extraction pump, which continues to operate.

Remedial measures implemented in response to the 2002 product release included the installation, in 2003, of a dual phase extraction system. The system is currently operational and consists of a soil vapor extraction (SVE) component and a groundwater pumping component.

The combination of both the GWET and the dual phase extraction system are herein referred to, collectively, as the remediation system and the locations of groundwater pumping components of the remediation system are presented on Figure 1.2.

An extensive groundwater monitoring network, presented on Figure 1.2, has been installed at the Site to conduct quarterly groundwater monitoring events. The hydraulic monitoring network consists of monitoring wells screened at various depths to identify the shallow, intermediate, and deep groundwater flow systems according to the following designations:

- Shallow – Wells screened in the fill material in the top 10 ft bgs;
- Intermediate – Wells screened from 5 to 20 ft bgs; and
- Deep – Wells screened below 20 ft bgs.

Remediation system operating parameters, including interpretations of the water level under operating conditions, are discussed in Section 5.2.

[2] Extraction wells R-1 and R-2 are the extraction wells operating in Trenches R-1 and R-2, respectively

Although groundwater elevations near the Site (presented on Figures 2.9, 2.10, and 2.11 for shallow intermediate, and deep aquifers, respectively) change seasonally (i.e., in response to dry conditions or wet conditions) and in response to remediation system operations, the following general observations have been determined from the potentiometric head monitoring data:

- The shallow and deep groundwater elevations fluctuate in the range of 1 to 3 ft between the wet and dry seasons (i.e., winter/spring and summer) and are assumed to result from seasonal precipitation rates;
- Groundwater elevations indicate that groundwater flows radially out from near the center of the berm-enclosed Tank Farm with the steepest gradients predominantly oriented towards the south;
- Groundwater near the southern portion of the Site tends to mound around Tanks 2 and 3 (the locations of Tanks 2 and 3 are presented on Figure 1.2);
- The groundwater flow pattern near the southern portion of the Site appears to be influenced by groundwater mounding from local recharge and by the operating extraction wells located south of Tank 2;
- Groundwater elevations near the northern portion of the Site tend to flow from the east and south toward Trench R-2 (the location of the Trench R-2 is presented on Figure 1.2);
- Groundwater elevations at intermediate depths indicate a primary flow direction to the west and the dominant groundwater flow pattern appears to be mainly influenced by regional groundwater flow;
- Groundwater elevation contours for the deep wells indicate a flow direction to the northwest;
- The remediation system extraction wells around Tank 2 do not appear to influence groundwater flow in the deep wells that are screened from 20 to 40 ft bgs; and
- Based on the thickness and broad distribution near the Site of the native wetland organic clayey silt deposits, there may exist a hydraulic disconnection between the shallow and deeper groundwater flow systems with the shallow system responding mostly to precipitation recharge events and the lower system responding to deeper aquifer groundwater flow patterns.

Estimates of hydraulic conductivity for the three main geological units observed beneath the Site have been obtained through pumping tests, slug tests, and laboratory tests. A summary of the estimated hydraulic conductivity values is presented in Table 2.2. The

geometric mean hydraulic conductivity of the fill, wetland, and lower silty sand aquifer were estimated to be 0.25 ft/day, 0.02 ft/day, and 6.64 ft/day, respectively.

Surface Water Features

There are three main surface water features near the Site: Green River, Springbrook Creek, and the wetlands that are located to the north, west, and south of the Site.

The Green River, with headwaters at the crest of the Cascade Mountains, flows over a stretch of 93 miles and drains into Elliott Bay. The Green River is located 0.8 miles west of the Site, flows towards the north, and acts a regional discharge boundary for the valley. The USGS has two stage elevation gauges installed along Green River. The locations of the gauge stations are presented on Figure 2.12. The average head drop between the southernmost and northernmost gauge stations, 24,823 ft apart, is 5.4 ft. Based on the head difference and the gauge separation distance, the average gradient between the south and north Green River gauge stations is 0.02 percent. Stage elevations of Green River are not expected to significantly influence groundwater elevations at the Site. Instead, Green River will provide a regional discharge point for deeper aquifer flow, which can be observed in the regional west to northwest groundwater flow direction observed in Figures 2.10 and 2.11.

Springbrook Creek runs immediately west of the wetland that is itself directly west of the Site. Springbrook Creek drains the Black River Subbasin, located east of Green River, within the "Springbrook, Mill, and Garrison Creek Watershed" (SMG Watershed). The Black River Subbasin covers about 15,763 acres (24.6 square miles) and can be partitioned into two distinct topographical areas: the valley floor and the foothill zone. Slope relief in the watershed ranges from 0 to 70 percent (City of Renton, 2006). Springbrook Creek, which is approximately 12 miles long, is the main water channel in the SMG watershed. Mill and Garrison Creeks discharge into Springbrook Creek from the west, in Kent; and Panther and Rolling Hills Creek, which originate on plateaus to the east, discharge into Springbrook Creek near SW 30th Street. The City of Renton has communicated with CRA that, near the Site, the Springbrook Creek channel is not lined and is in direct contact with the groundwater table. Precipitation, groundwater, and surface water runoff from off-site tributary areas, adjacent roads, and developments are the primary sources of water flow to Springbrook Creek. The berms along Springbrook Creek separate the creek from its wetland floodplain, except during extreme flood events (City of Renton, 2006).

Based on stage elevations at USGS Springbrook Creek gauge station U12113346 (see Figure 2.12) and stage elevations at Springbrook Creek wetland mitigation Unit E (see Figure 2.6) that were obtained by CRA through correspondence with the City of Renton, Springbrook Creek has an estimated surface water gradient of approximately 0.039 percent.

The City of Renton is currently in the process of completing a wetland mitigation project intended to create and enhance wetlands that have been lost due to public and private construction projects. Construction began on the Springbrook Creek Wetland and Habitat Mitigation Bank in the spring of 2007. The mitigation sites are shown in Figure 2.6 and consist of Units A through E. Unit A has been redeveloped and is located south of the Site across SW 27th Street. Together Units A and B encompass 62.2 acres, of which 55.5 acres are currently wetland (City of Renton, 2006). Springbrook Creek flows within a straight, bermed corridor between Units A and B. The riverine wetlands present in Units A and B currently function similarly to depressional wetlands, due to the berms isolating Springbrook Creek from its floodplain. The ground surface elevation within Unit A is approximately 12 ft above mean sea level (AMSL) [the elevations presented herein are in reference to the North American Vertical Datum of 1988 (NAVD88)], approximately 6 ft lower than the surrounding ground surface. Some of the wetland areas; however, dip as low as 9 ft AMSL (City of Renton, 2006).

The principal functions of the riverine wetlands include; flow attenuation; reduction of downstream erosion; and removal of excess sediment, nutrients, and metals. The remaining depressional wetlands provide low levels of habitat functions and lack significant hydrologic and water quality functions due to their relative isolation from other wetlands/water sources. These wetlands also have an absence of vegetative and/or habitat diversity (City of Renton, 2006). Based on groundwater flow directions observed near the Site (i.e., Figures 2.9 to 2.11) groundwater flowing off-Site will be directed predominantly towards the wetlands located west of the Site and towards Unit A.

Groundwater Recharge and Discharge

Groundwater in the area of the Site primarily receives recharge from: 1) precipitation at a reported total annual rate of 39.6 inches per year (in/yr) based on 1971-2000 climate normals (National Climatic Data Center, 2004); and 2) lateral groundwater flow from up-gradient areas within the lower silty sand regional aquifer. Groundwater in the shallow fill layers on Site are conceptualized to discharge to the surrounding wetlands

(primarily to the west) and Springbrook Creek. Deeper groundwater is conceptualized to travel towards and exit along Green River.

Utilities

Several underground utilities exist to the east, south, and west of the Site. Underground utility lines that come into contact or are below the groundwater table have the potential to serve as conduits/preferential pathways for the advection of groundwater off-Site and utility lines need to be represented adequately in a groundwater flow model.

Locations and inverts of storm sewer lines surrounding the Site are presented on Figure 2.13. The general dip direction of storm sewers along Lind Ave is from south to north and east to west along SW 27th St. An outflow for the storm sewer line exists just west of the Site along SW 27th St that drains the sewer into Springbrook Creek.

Locations and inverts for the sanitary sewer line surrounding the Site are presented on Figure 2.14. The sanitary sewer dip direction is from north to south along Lind Ave SW and east to west along SW 27th St. The sanitary sewer line runs under Springbrook Creek along SW 27th Street and terminates at Oakesdale Ave SW. Based on Site visits, it has been observed that the south most monitoring wells of MW-2 and LAI-16 are located north of the sanitary sewer line that runs along SW 27th St.

3.0 CONCEPTUAL HYDROGEOLOGIC MODEL

Development of the conceptual hydrogeologic model involves the selection of the model domain, stratigraphic representation, and boundary conditions taking into consideration the observed Site and regional hydrogeologic conditions. The conceptual hydrogeologic model then forms the basis for constructing the numerical groundwater flow model for the Site.

3.1 HYDROGEOLOGIC CHARACTERISTICS OF THE SITE

Understanding the hydrogeologic characteristics of the groundwater flow system for the Site is fundamental to developing a representative conceptual hydrogeologic model, and guides the development of the groundwater flow model. Based on the available regional and Site-specific information, the hydrogeologic characteristics are briefly summarized as follows:

- Soil materials beneath the Site are mainly composed of three soil types: surficial fill material consisting of silty sand and gravel, native wetland organic clayey silt deposits, and buried silty sand composing the deeper regional aquifer system that spans the Duwamish-Green River Valley.
- Although the native wetland organic clayey silt deposits were interpolated through 3D indicator kriging to be thickest towards the southwestern area of the Site and thin toward the northeastern area of the Site, regional data indicates that the distribution of the native wetland organic clayey silt deposits is regionally extensive (i.e., see discussion in Footnote 1).
- Hydraulic conductivities collected at the Site indicate that of three generalized soil types, the deep silty sand regional aquifer is the most permissive to groundwater flow and has a geometric mean hydraulic conductivity value of 6.64 ft/day. The native wetland organic clayey silt is the least permissive to groundwater flow and has a geometric mean hydraulic conductivity value of 0.02 ft/day.
- The surficial fill material used in Site construction, which was deposited on top of the native wetland organic clayey silt material, has created a mounding condition that results in radial groundwater flow away from the Site.
- The radial flow condition from the Tank Farm area is further intensified during precipitation events when water ponds within the berm-enclosed Tank Farm area and slowly enters the subsurface as shallow groundwater recharge.
- The native wetland organic clayey silt material acts to provide hydraulic separation between the two flow systems.

- The current Site remediation systems influence mainly the shallow groundwater flow system and does not influence the deeper regional groundwater flow system.
- The shallow groundwater flow system discharges to the adjacent wetlands west and south of the Site, Springbrook Creek, remediation system extraction wells, the stormwater retention pond at the southeast corner of the Site, and as leakage through the native wetland deposits into the deeper regional aquifer system.
- The deeper groundwater flow system has a west to north-west regional groundwater flow direction, as presented on Figure 2.11, and discharges to the Green River.
- The main sources of groundwater recharge at the Site include precipitation events and lateral groundwater flow from upgradient areas.

3.2 GROUNDWATER FLOW MODEL DOMAIN LIMITS

The model domain should extend to where reasonably defensible boundary conditions can be established. Model domain limits, and the associated boundary conditions, should be based on regional-scale natural hydrogeologic features where possible. Boundary conditions are selected to minimize potentially incorrect bias to the model predictions within the area of interest in the interior of the model domain[3].

The selected model domain for this study is presented on Figure 3.1 and extends 6,095 ft in the north-south direction and 8,560 ft in the west-east direction. The model domain is aligned in the north direction and is not rotated.

Since the bottom of the regional silty sand aquifer can potentially be up to 600 ft in thickness and the bottom of the aquifer has not been identified within the Site vicinity, a reasonable model depth was selected to represent the deep silty sand regional aquifer. Vertically the model domain extends from ground surface to approximately 70 ft BGS or -50 ft AMSL and a general head boundary condition (discussed further in Section 5.2) was applied to represent the groundwater flow exchange across the deep regional silty sand aquifer.

Inactive areas of the model domain, depicted by grey-hatched and yellow-shaded no-flow cells on Figure 3.1 define the limits of active groundwater flow represented within

[3] For example, specifying a constant head boundary condition located in close proximity to a pumping well when there is no physical basis to do so, such as the absence of a major surface water body nearby, could supply an unlimited amount of water to the well introducing a reduced effect (i.e., a potentially incorrect bias) of the pumping on the simulated groundwater flow field).

the model domain. The inactive areas were assigned based on the observed groundwater flow directions and topographical features. Where constant hydraulic head boundaries were applied at the limits of the active model domain, the applied head values correspond to measured surface water elevations or estimated regional groundwater flow potentiometric surfaces. The head values projected from observed groundwater elevations were adjusted during model calibration.

The boundary conditions assigned in the model are described in general terms below.

- North: The horizontal limit of the active model domain approximately 3,100 ft north of the Site (i.e., downgradient) corresponds with the approximate location of Interstate 405. A geospacially variable constant head condition (i.e., constant head value used changes with location) was applied along the northern model domain to represent lateral groundwater outflow from the Site to downgradient areas. The geospacially variable constant head values were specified with a decreasing gradient from the eastern bluff areas to the western Green River boundary. The variable constant head values were adjusted during the model calibration process.

- South: The horizontal limit of the active model domain is located approximately 2,000 ft south of the Site (i.e., upgradient). A geospacially variable constant head boundary condition was applied along the southern extent of the model to account for lateral groundwater inflow toward the Site from upgradient areas. The geospacially variable constant head values were specified with a predominantly decreasing gradient from the eastern bluff areas to the western Green River boundary, with higher values assigned in the area between Green River and Springbrook Creek since Springbrook Creek is the primary discharge location for the adjacent surface water bodies. The variable constant head values were adjusted during the model calibration process.

- East: The Eastern limit of the active model domain, more than 1,300 ft east of the Site, corresponds to a no-flow boundary condition where the deep silty sand regional aquifer contacts the much less permeable till deposits and sandstone (see, for example, Figure 2.2). The location and extent of the no-flow boundary condition is represented by grey-hatch and yellow-shading on Figure 3.1.

- West: The western extent of the active model domain is located approximately 7,900 ft west of the Site and corresponds with Green River. The Green River

is represented in the model by a geospacially variable constant head boundary condition. Areas west of Green River are represented as no flow boundaries since the Green River provides a natural flow divide.

3.3 STRATIGRAPHIC REPRESENTATION

As described in Section 2.2, the lithology in the top 100 ft of the Site area (i.e., throughout the 70 ft vertical extent of the model domain) is composed of three geological units: surficial fill, native wetland organic clayey silt, and deep silty sand regional aquifer. As described in Section 2.2 a 3D geological model was developed based on interpretations of the geological conditions documented in 106 borehole logs. The Site borehole logs are included in Appendix D of the RI/FS report and the interpreted stratigraphic pick elevations are presented on Table 2.1. Representations of the 3D geological model at various cross-sections are provided as an electronic attachment in Appendix A.

Figure 3.2 provides screen shots of several cross-sections from the 3D geological model (viewable in Appendix A using a 4DIM application). The darker brown material just beneath the Site represents the surficial fill material used to construct the Site and extends across the entire Site area. Beneath the fill material, the native wetland organic clayey silt material, represented by a pale yellow color, increases in thickness towards the southwest of the Site area. The increase in native wetland organic clayey silt thickness is demonstrated by a comparison of Cross-Section B-B' in the northern area of the Site with Cross-Section C-C' in the southern area of the Site (Figure 3.2). The native wetland organic clayey silt deposit has been interpolated as being thinner in the north (i.e., in Cross-Section B-B') and thicker in the south (i.e., Cross-Section C-C'); however, based on regional data, the native wetland organic clayey silt is regionally extensive as was discussed in Footnote 1. Cross-Section A-A' also shows a thickening of native wetland organic clayey silt materials from north to south. An examination of Cross-Sections B-B' and C-C' also indicates a thickening of the native wetland organic clayey silt deposits from east to west across the Site. A limited number of stratigraphic logs exist for the northeastern area of the Site compared to the Tank Farm area. The paucity of data within this area may explain the interpolated decrease in native wetland material thickness in the northeastern area of the Site.

Ground surface elevations were initially generated by combining USGS Digital Elevation Model (DEM) data and survey results associated with the monitoring wells in the Site investigations (Figure 1.2). However, due to the coarseness and sparse detail of the USGS DEM data across the region, the interpolated ground surface elevations

formed a depression near the Site that does not, in reality, physically exist, as confirmed through review of topographic maps and ground-truthing Site visits. The USGS DEM data also failed to represent a topographic gradient across the model domain except to identify the presence of Green River. This lack of a topographic gradient is inconsistent with data observed and collected throughout the valley. Following this investigation CRA removed the model ground surface that was based on USGS DEM data and instead developed a conceptualized ground surface that decreased in elevation towards the northwest. Since groundwater elevations in the area closely follow ground surface elevations, the conceptual ground surface was constructed to approximate changes in regional groundwater elevations. This conceptualized ground surface was then merged with the Site data and spatially interpolated using the Universal Kriging method with linear drift implemented in Surfer 8.02 (Golden Software, 2008). Figure 2.5 illustrates the spatially interpolated ground surface both throughout the model domain and in the Site area. As seen in Figure 2.5, ground surface elevations near the Site that have been developed with surficial fill are slightly higher than the surrounding ground surface while the wetlands to the west and south of the model are shown to have depressed ground surface elevations. This ground surface representation is consistent with the regional and Site observations discussed in Section 2.0.

3.4 BOUNDARY CONDITIONS

The western model domain limit corresponds with the Green River where a constant hydraulic head boundary condition was assigned as shown on Figure 3.1. To the west of the Green River constant hydraulic head boundary, a no-flow boundary condition was applied to represent the Green River as a natural groundwater flow divide. A no-flow boundary condition was also applied to the east representing the eastern sandstone and till bluffs. The northern and southern model domains were set as geospacially variable constant hydraulic head boundary conditions based on regional groundwater elevations. The geospacially variable constant head boundary conditions were assigned to represent regional groundwater inflow (in the south) and outflow (in the north) along the valley coincident with the Green River surface water flow direction.

Recharge from precipitation infiltration was represented over the top of the model domain by a uniform recharge zone under dry conditions and by two recharge zones under wet conditions. The recharge zones assigned for wet conditions consisted of a regional recharge zone and a second zone with increased recharge rates above the berm-enclosed Tank Farm area. Under dry conditions, the berm-enclosed Tank Farm area was assumed to have a recharge rate consistent with the surrounding areas since there were

no precipitation events in the month prior to the August 2012 monitoring event (i.e., dry condition) and there would have been no increased moisture retention in the soils relative to the surrounding areas. At the bottom of the model domain, a general head boundary was applied to represent the deep regional aquifer and help establish a west-northwest regional groundwater flow direction.

Interior surface water features such as the groundwater pumping components of the remediation system, the wetlands surrounding the Site, and the stormwater retention ponds on Site and across Lind Ave SW were represented in the model as drain cells at their appropriate elevations.

Springbrook Creek was represented in the model using a river boundary condition, which has the feature that it behaves as a drain when adjacent groundwater elevations are higher than the river stage elevations and it contributes groundwater (i.e., it behaves like a constant head boundary condition) when adjacent groundwater elevations are lower than the river stage elevation.

The details regarding the boundary condition specifications are presented in Section 5.2.

4.0 SIMULATION PROGRAM SELECTION

The simulation program selection for the Site hydrogeologic modeling was based on the following considerations:

- The ability of the program to represent the key components of the conceptual hydrogeologic model;
- The demonstrated verification of the program to correctly represent the hydrogeologic processes being considered; and
- The proven acceptance of the program by regulatory agencies and the scientific/engineering community.

4.1 GROUNDWATER FLOW MODEL

MODFLOW (developed by the United States Geological Survey) is capable of simulating steady-state or transient groundwater flow in one, two, or three dimensions. MODFLOW is based on the finite-difference method; a method leading to a numerical approximation that allows for a description and solution of complex groundwater flow problems. A rectangular grid is superimposed over the study area to subdivide the region of interest into a number of rectangular cells. Layers are used to subdivide the study area vertically into units of common hydrogeologic properties. Groundwater flow is formulated as a differential water balance for every model cell and solved for the hydraulic head at the center of every cell. MODFLOW allows for the specification of flows associated with wells, areal groundwater recharge, rivers, drains, streams, and other sources/sinks.

MODFLOW-2000 (Harbaugh et al., 2000) was selected to simulate groundwater flow for this study. MODFLOW-2000 is an update to the original MODFLOW (McDonald and Harbaugh, 1988). MODFLOW has been extensively verified and readily accepted by many regulatory agencies throughout North America and Europe. MODFLOW-2000 is capable of representing the hydrogeologic components included in the conceptual hydrogeologic model for the Site. The Preconditioned Conjugate-Gradient 2 Solver (PCG2) (Hill, 1990) matrix solution method included in MODFLOW-2000 was employed to solve the groundwater flow equation. For convergence, the PCG2 solution technique requires the satisfaction of both hydraulic head change and flow residual criterion providing a more rigorous and reliably simulated water balance.

The calibration of the groundwater flow model was aided through the use of the parameter estimation program PEST (which is an acronym for Parameter Estimation) (Watermark Numerical Computing, 2004). PEST is a model-independent parameter estimator that has become a groundwater industry standard for groundwater model calibration. It has a powerful inversion engine which provides the ability to set bounds on model input parameters such as hydraulic conductivity and groundwater recharge. PEST serves to convey input parameters at variable values within their bounds collectively to MODFLOW for the purpose of establishing optimal input parameter values for the specific groundwater model under development. For each run of input parameters, PEST calculates objective function values (OFV) at model observation points or cells. OFVs represent the error of calculated versus observed groundwater elevations. Of the numerous runs, PEST selects the run that exhibits the lowest overall OFVs as the optimal solution.

4.2 GRAPHIC USER INTERFACE

The graphical user interface (GUI) Groundwater Vistas Version 6.20 (Rumbaugh, 2005) was used as the interface between the assembled hydrogeologic data and the required MODFLOW-2000. The GUI provides pre- and post-processing capabilities for the MODFLOW-2000 input/output files.

5.0 GROUNDWATER FLOW MODEL CONSTRUCTION

The construction of the numerical groundwater flow model is the process of developing the horizontal and vertical discretization of the selected model domain, the specification of hydraulic properties, and implementation of boundary conditions consistent with the conceptual hydrogeologic model. The model construction in relation to these aspects of the groundwater flow model is presented in the following sections.

5.1 GROUNDWATER FLOW MODEL SPATIAL DOMAIN AND DISCRETIZATION

A rectangular finite-difference grid was extended over the groundwater flow model domain described in Section 3.2 (see Figure 3.1). Horizontally, the model domain is discretized into rows and columns. A uniform finite-difference grid spacing of 10 ft by 10 ft was applied over the model domain covering the Site area. The grid spacing is expanded to a maximum of 200 ft beyond the Site toward the model domain boundaries. The finite-difference grid for the model domain is illustrated on Figure 5.1. Horizontally, the model domain is discretized into 175 rows and 154 columns.

As described in Section 3.2, the model extends vertically from the interpolated ground surface to -50 ft AMSL (i.e., approximately 70 ft below ground surface). The model domain is vertically subdivided into a total of 27 model layers and the structure of the model layers is presented on Figures 5.2 and 5.3 along Cross-Section A-A' and Cross-Section B-B', respectively. The top model layer is of variable thickness and is meant to represent the varied ground surface throughout the model domain and Site. Layer 1 is generally thickest to the southeast and thins towards the northwest direction in a manner that coincides with groundwater flow towards Green River and Lake Washington, as described in Section 3.3. Beneath the Site, Layer 1 is approximately 7 to 8 ft in thickness. The thickness of Layer 1 was selected to ensure that the model cells would not dry out during simulations for both wet and dry conditions. The bottom of layer 1 was assigned a uniform elevation of 10 ft AMSL across the model domain because the Site groundwater table was not observed below this elevation.

All model layers were assigned flat layers with finer vertical discretization near ground surface and increasing in thickness toward the bottom of the model domain as shown on Figures 5.2 and 5.3. There are 727,650 finite-difference model cells of which 700,542 are active for flow.

Horizontally, the 3D geological model using indicator kriging applied a 10 foot by 10 foot node spacing that coincided with the finite-difference grid spacing of the groundwater flow model to interpolate Site-specific stratigraphy. The longitudinal extent of the 3D geological model in relation to the finite-difference grid for the groundwater flow model are illustrated on Figure 5.4. Vertically, the 3D geological model applied uniformly flat 0.25-foot thick layers extending from the variable ground surface (approximately 20 ft AMSL at the Site) to an elevation of -19.5 ft AMSL, corresponding with the vertical extent of available Site stratigraphic data. The geological model was constructed using ordinary geologic indicator kriging, implemented in MVS/EVS. The stratigraphy was numerically interpolated using integers to represent each of the three geological units: surficial fill, numerically represented by 0; native wetland organic clayey silt, numerically represented by 1; and deep silty sand regional aquifer, numerically represented by 2. The integers representing the geological units were interpolated at the cell centroids of the kriging interpolation grid. The integers representing the geological units at the interpolation grid cell centroids were used in developing the effective hydraulic conductivity distribution.

Due to the relative coarseness of the groundwater flow model (having a minimum layer thickness of 1 foot) in relation to the 3D geological model (having a uniform layer thickness of 0.25 foot), each groundwater flow model cell, within the domain of the 3D geological model, contains a minimum of four vertically layered integers representing the geological units. A schematic of the layering of the geological units within a 10-foot by 10-foot cell in model Layer 2 is presented on Figure 5.5.

Each of the three geological units was assigned a horizontal hydraulic conductivity value and a horizontal to vertical hydraulic conductivity anisotropy ratio. Vertical hydraulic conductivities were assigned to each node centroid by dividing the node-specific horizontal hydraulic conductivity by the anisotropy ratio. The effective horizontal and effective vertical hydraulic conductivity values for each model cell were then calculated using the following equations (Freeze and Cherry, 1979):

$$K_H^{eff} = \sum_{i=1}^{n} \frac{K_H^i d_i}{d} \qquad \text{Equation 5.1}$$

and:

$$K_V^{eff} = \frac{d}{\sum_{i=1}^{n} \frac{d_i}{K_V^i}}$$ Equation 5.2

Where:

K_H^{eff} = horizontal effective hydraulic conductivity

K_V^{eff} = vertical effective hydraulic conductivity

d = total thickness of model layer

d_i = geological unit layer thickness (i.e., 0.25 foot)

K_H^i = horizontal hydraulic conductivity of EVS cell

K_V^i = vertical hydraulic conductivity of EVS cell

n = number of 0.25-foot thick geological unit layers in the model cell

The calculation strategy is schematically illustrated on Figure 5.5. During model calibration, the horizontal hydraulic conductivity and anisotropy values for each of the geological units were adjusted. The distribution of the geological units based on the 3D geological model was held constant in model Layers 5 to 27. Manual adjustments were made to Model Layers 1 through 4 during model calibration to address areas that did not appear to fit the conceptual model and that were not based on observed Site data, particularly areas to the northeast that were interpolated as having a relatively thin native wetland organic clayey silt thickness as described in Footnote 1 in Section 2.2.

Beyond the limits of the 3D geological model domain, hydraulic conductivity values were assigned based on the layer geometric mean average of effective hydraulic conductivity values that were specified within the extent of the 3D geological model. To calculate the layer average vertical hydraulic conductivity throughout the remaining model domain (i.e., the area between the 3D geological model domain and the extent of the groundwater flow model domain), the following relationship between layer-wide effective vertical and horizontal hydraulic conductivities was employed:

$$\tilde{K}_V^{eff} = \frac{\tilde{K}_H^{eff}}{\overline{\alpha}}$$ Equation 5.3

Where:

$\widetilde{K}_V^{eff}$ = layer-wide geometric mean effective vertical hydraulic conductivity from within the 3D geological model domain

$\widetilde{K}_H^{eff}$ = layer-wide geometric mean effective horizontal hydraulic conductivity from within the 3D geological model domain

$\overline{\alpha}$ = layer-wide arithmetic mean of anisotropy ratios from within the 3D geological model domain

As described in Section 2.3, subsurface utilities in contact with groundwater have the potential to act as preferential pathways for groundwater flow and need to be adequately represented in the groundwater flow model. Utilities identified in Figures 2.9 and 2.10 were represented in the groundwater flow model through elevated hydraulic conductivity values relative to the surrounding media. Equations 5.1 and 5.2 were used to assign hydraulic conductivity values to the Trenches R-1 and R-2 and storm/sanitary sewers based on the trench or sewer thickness and estimated bedding hydraulic conductivity. The bedding hydraulic conductivity was adjusted during model calibration and is further discussed in Section 6.3.

5.2 FLOW MODEL BOUNDARY CONDITIONS

As described in Section 3.4, the boundary conditions for the groundwater flow model consist of:

- Constant head boundary conditions applied to represent the major regional surface water bodies surrounding the Site (i.e., Green River) in the shallow model layers and applied to the north and south to reflect the regional groundwater flow system in deeper model layers
- River boundary conditions assigned to represent Springbrook Creek west of the Site
- Drain boundary conditions to represent surface water features near the Site such as the groundwater pumping components of the remediation system, the wetlands near the Site, and the stormwater retention ponds located on Site and across Lind Ave SW
- Recharge over the top of the model
- No-flow boundary conditions applied along the western limits of the model domain representing a natural flow divide

- No-flow boundary conditions applied along the eastern limits of the model domain representing the eastern sandstone and till bluffs
- General head boundary condition applied at the bottom of the model domain to represent the exchange of groundwater flow within the deeper aquifer system

The specification of these boundary conditions in the model are described further below.

Constant Head Boundary

Constant head boundary conditions with a decreasing gradient of approximately 0.02 percent in the northern direction were assigned to the model cells representing Green River. Based on the cross-section shown on Figure 2.4, the bottom elevation of Green River was estimated to be approximately 0 ft AMSL and corresponds with Model Layer 11. The constant head boundary conditions representing the Green River were in Model Layers 1 through to 11 and influence groundwater flow throughout the active model domain. Although the calculated gradient for Green River was held constant during model calibration, the head elevations across the boundary condition were increased or decreased to represent the average surface water elevations during the wet and dry monitoring events.

Geospacially variable constant head boundary conditions were applied to the north and south model domain to reflect the regional groundwater flow system. The gradient applied to the constant heads is presented on Figure 5.6. The gradient was held constant during model calibration to reflect the regional groundwater flow conceptual model, which assumes a west-northwest regional groundwater flow direction, but the head values were adjusted during model calibration.

Drain Boundary

A drain boundary can simulate the interaction between surface water and groundwater. However, a drain boundary condition can only represent groundwater discharge from the model domain to the drain boundary (i.e., a gaining stream, rather than a losing stream that can recharge the aquifer). The drain boundary condition is active if the specified drain stage elevation is lower than the simulated groundwater elevation, and inactive when the specified drain stage elevation is higher than the simulated groundwater elevation. The quantity of discharge is equal to the difference between the simulated groundwater elevation within the drain cell and the specified drain stage elevation multiplied by a conductance term. The conductance term reflects the relative ease of flow through the drain-bedding material.

Drain boundaries were assigned to the model cells in Model Layer 1 aligned along the wetlands, the stormwater retention ponds on and near the Site, and to represent the groundwater pumping components of the remediation system (i.e., the extraction wells). A drain boundary condition was selected to represent the groundwater pumping conditions of the remediation system instead of well boundary conditions because the pumping rates are not known to the level of accuracy that is required for a groundwater flow model. Model drain cell locations are presented on Figure 5.7.

In order to represent the groundwater components of the remediation system, drain stage elevations were assigned in the surficial fill material only. The observed native wetland organic clayey silt material has significantly lower hydraulic conductivity values compared to the overlying fill material, and as such is not a significant source of groundwater to the groundwater pumping components of the remediation system. The drain cell stage elevations were assigned to be either representative of the physical well intake of the extraction well (i.e., for extraction wells R-1 and R-2, whose locations are presented on Figure 1.2) or the top elevation of native wetland organic clayey silt material at the well location as documented in the stratigraphic logs. The drain stage elevations assigned in the model are presented in Table 5.1. The water intake elevations for groundwater pumping remediation wells R-1 and R-2 were measured manually and represent the stage elevations for those wells in the model.

In addition to extraction wells R-1 and R-2, seven other well locations were operational at the Site during the February 2012 monitoring event: LAIx-5, LAIx-6, LAIx-7, LAIx-9, RWx-2, HWx-1E, and HWx-1W. These seven wells and wells R-1 and R-2 were shut down during and prior to the dry season monitoring event in August 2012. Therefore, drain cells representing the extraction wells were applied to the model representing wet conditions only (i.e., they were not included in the model representing dry conditions).

A drain boundary condition was also assigned to the wetland areas surrounding the Site as well as the storm water retention ponds located at the southeast corner of the Site and across Lind Ave SW, as shown on Figure 5.7. Drain stage elevations for the wetland and stormwater retention ponds were initially set to the observed or estimated ground surface elevations as shown in Figure 2.5 but were adjusted during model calibration.

The conductance of the drain cells was estimated as follows:

$$C_{drain} = \frac{K\,A}{M}$$ Equation 5.4

Where:

C_{drain} = drain cell conductance (ft^2/day)

K = hydraulic conductivity of drain bed material (ft/day)

A = area of the drain cell (ft^2)

M = thickness of the drain bed material

The conductance value was adjusted during model calibration.

River Boundary

A river boundary can simulate the interaction between surface water and groundwater. It can represent both groundwater discharge (i.e., a gaining stream) from the model domain and recharge (i.e., a losing stream) to the aquifer. If the specified river stage elevation is lower than the simulated groundwater elevation, the river boundary receives discharge from groundwater, and if the specified river stage elevation is higher than the simulated groundwater elevation, the river boundary serves as a recharge to groundwater. Similar to the calculation for drain cells, the quantity of the surface and groundwater exchange is equal to the difference between the simulated groundwater elevation within the river cell and the specified river stage elevation multiplied by a conductance term.

River boundaries were assigned to the model cells in Model Layer 1, aligned along Springbrook Creek. The stage elevations for Springbrook Creek were estimated based on the measured stage elevations at USGS Springbrook Creek gauge station U12113346, presented on Figure 2.12, and measured stage elevations at Springbrook Creek wetland mitigation Unit E, presented on Figure 2.6, as was discussed in Section 2.3. The conductance of the river cells was estimated as follows:

$$C_{river} = \frac{K\,A}{M}$$ Equation 5.5

Where:

C_{river} = river cell conductance (ft^2/day)

K = hydraulic conductivity of river bed material (ft/day)

A = area of the river cell (ft^2)

M = thickness of the river bed material

The conductance value was adjusted during model calibration.

Recharge

Recharge from precipitation infiltration was applied as the top model domain boundary condition. As discussed in Section 2.3, the regional, 30-year normal annual rate of precipitation (based on rainfall in Kent, Washington) between 1971 and 2000 was 39.6 in/yr (National Climatic Data Center, 2004). The amount of precipitation reaching the groundwater table is typically considered to range from approximately 10 to 40 percent of the average annual precipitation (Arnold et al., 2000; and Rushton and Ward, 1979). However, under wet conditions a higher recharge rate was applied in the berm-enclosed Tank Farm area on Site because rainwater is not permitted to run-off in this area but instead accumulates resulting in a higher percentage of precipitation infiltrating as recharge relative to the surrounding areas. The regional and berm-enclosed Tank Farm recharge zones under wet conditions are presented on Figure 5.8. For the dry conditions groundwater flow model, a uniform recharge zone was applied across the entire active model domain.

The recharge rates were adjusted during model calibration within the typical range of 10 to 40 percent of precipitation over the Site and model domain and a higher recharge range of 20 to 75 percent of precipitation was adjusted over the berm-enclosed Tank Farm area, as described in Section 6.3.

No-Flow Boundary

No-flow boundary conditions were specified in the various model layers where negligible groundwater flow across the boundary reasonably could be expected (e.g., regional groundwater flow divide beneath Green River or at the interface of the sandstone/till material along the eastern edge of the model domain). No flow boundaries assigned in the model domain are presented on Figure 5.1.

General Head Boundary

General head boundary conditions were applied to the bottom of the model domain to represent the deep regional aquifer flow. A gradient, similar to that of the regional ground surface, was applied in the model to represent northwestern regional

groundwater flow. The flow gradient applied to the heads for the general head boundary condition are presented on Figure 5.9. The heads were either increased or decreased during model calibration but the gradient shown in Figure 5.9 was not adjusted. The conductance term for the general head boundary condition was calculated using the following equation:

$$C_{GHB} = \frac{K\,A}{M} \qquad \text{Equation 5.6}$$

Where:

C_{GHB} = general head boundary cell conductance (ft^2/day)

K = hydraulic conductivity of the aquifer material (ft/day)

A = area of the general head boundary cell (ft^2)

M = thickness of the general head boundary material

The conductance value was adjusted during model calibration.

5.3 MODEL HYDRAULIC CONDUCTIVITY

As presented in Section 5.1, variable effective hydraulic conductivities were applied in the model domain to represent the complexity of the observed geological units. Effective hydraulic conductivities were calculated and adjusted to coincide with the interpretation of the geological units in the available Site stratigraphic logs using: 1) 3D indicator kriging implemented in MVS/EVS; 2) available hydraulic conductivity testing results; and 3) measured groundwater elevation data. Hydraulic conductivity values determined from pumping tests, slug tests, and laboratory tests conducted at the Site are summarized in Table 2.2. The hydraulic conductivity values and spatial variability of some hydraulic conductivity areas were adjusted during model calibration, as described in Section 6.3.

5.4 GROUNDWATER FLOW SIMULATION METHOD

The flow model calibration was calibrated under steady-state conditions against the complete round of groundwater elevations measured in February and August 2012, which served to represent groundwater flow under wet and dry conditions. In order to obtain a simulated groundwater flow field within the model domain, the solution to the

groundwater flow equation was obtained using a numerical solver with specified convergence criteria. As described in Section 4.1, the PCG2 numerical solver was used.

The convergence criteria for the solution routine were specified as 1×10^{-5} foot for the maximum hydraulic head change and 0.001 cubic feet per day (ft^3/day) for the maximum flow residual throughout the solution domain. A maximum of fifteen inner solver iterations were used. With the above criteria, the solver converged readily and a small water balance discrepancy (less than 0.1 percent) was achieved.

6.0 FLOW MODEL CALIBRATION

6.1 CALIBRATION TARGETS

Selection of the model calibration targets for a steady-state model normally considers whether the groundwater elevation monitoring event:

- Represents average groundwater flow conditions as opposed to only low (i.e., dry) or high (i.e., wet) groundwater flow conditions
- Groundwater stresses (i.e., extraction rates) represent the average conditions affecting groundwater elevations
- Provides spatial coverage of the model domain with measurements at the majority of the monitoring well locations
- Includes the key area of interest within the model domain

Multiple synoptic groundwater elevation monitoring events have been conducted for the on-Site monitoring well network. Based on a review of quarterly monitoring event data groundwater elevations have seasonal variability in response to wet conditions in winter and dry conditions in summer. For the 2012 quarterly monitoring events, February groundwater elevations corresponded with wet conditions and August, for which there was zero precipitation for the month leading up to the monitoring event, represented dry conditions. The August monitoring event was also conducted while the remediation system was not operational. Groundwater elevation contours for wet and dry conditions are presented on Figures 2.9, 2.10, and 2.11 for shallow, intermediate, and deep monitoring well horizons, respectively.

A steady-state model calibration was completed using both the February and August 2012 groundwater elevation measurements as calibration targets. The February and August 2012 calibration targets are presented in Table 6.1.

6.2 CALIBRATION METHODOLOGY

Model calibration was performed in an iterative manner by manually adjusting the distribution and values of hydraulic conductivity, horizontal to vertical hydraulic conductivity anisotropy ratios, recharge rates, and boundary conditions. From time to time, PEST was applied to optimize the input parameters. The input parameters associated with the PEST results were evaluated manually in terms of the overall model

calibration. The hydraulic conductivity distribution within the Site was based on the 3D geological model discussed in Section 2.2.

Recharge area zones were based on hydrogeological conditions. For example, under wet conditions the area over the berm-enclosed Tank Farm was assumed to be a unique recharge area and was assigned relatively higher recharge rates to account for the mitigated runoff in that area. Under dry conditions, a uniform recharge rate was applied across the entire active model domain.

Manual adjustments to the recharge rates, hydraulic conductivity values, boundary conditions, and areas of inferred geological conditions (i.e., areas beyond where observed geological data exist) were performed to obtain reasonable agreement between simulated and observed wet and dry groundwater flow conditions. Adjustments were continued iteratively until a reasonable agreement was achieved between observed and simulated groundwater elevations (i.e., minimization of the residual differences between observed and simulated groundwater elevations), and between observed and simulated groundwater flow patterns. The model calibration was evaluated both qualitatively and quantitatively. Qualitative evaluations were conducted for wet and dry steady-state calibrations by visually comparing the simulated versus observed groundwater elevations and flow directions. This comparison provided a qualitative measure of the spatial distribution of calibration error and a measure to judge whether the calibrated model could reasonably represent the observed conditions.

The quantitative assessment of the calibration was conducted by examining the calibration target errors, or residuals. Residuals were calculated by subtracting the simulated groundwater elevations from the observed groundwater elevations. The mean residual, absolute mean residual, and residual sum of square statistics, standard deviation, normalized error, etc., were calculated to quantify the discrepancy between observed and simulated groundwater elevations provided by the calibrated model. The objective of the model calibration was to minimize this discrepancy.

A second quantitative measure of the calibration was provided by the simulated volumetric water budget reported by MODFLOW-2000 indicating the quantities of flow into and out of the model domain via the groundwater flow components specified in the model. The volumetric budget was reviewed to ensure that the total inflows and outflows were consistent with the conceptual hydrogeologic model. The volumetric water budget also provided a percent discrepancy between the total simulated inflows and outflows; a discrepancy of less than 0.1 percent indicates a satisfactory numerical convergence.

6.3 STEADY-STATE CALIBRATION

As presented in Table 6.1, 62 targets were used to compare groundwater elevations under wet conditions and 60 targets were used to compare groundwater elevations under dry conditions. As described in Section 2.3, the target wells are divided into shallow, intermediate, and deep elevation horizons based on the screened well depths.

Of the twelve groundwater extraction wells currently operational at the Site, there were only nine extraction wells (see Figures 1.2 and 5.7) withdrawing groundwater in February 2012 (i.e. under wet conditions) and all extraction wells were shut down during the August 2012 monitoring event (i.e., under dry conditions). Since individual extraction well rates were not measured during the quarterly monitoring events, exact extraction rates for each well could not accurately be assigned in the model. As described in Section 5.2, drain cells were assigned in the model to represent groundwater extraction from the groundwater flow system. Table 5.1 presents the drain stage elevation applied in the groundwater flow model under wet conditions.

Figure 6.1 shows model Cross-Sections through the middle of the Site area in the west to east and north to south directions. Figure 6.1 displays the dominant soil type in each zone, represented as green (bedding material for utilities), magenta (surficial fill), dark blue (native wetland organic clayey silt), red (deep silty sand regional aquifer), and yellow (interlayering of native wetland organic clayey silt with deep silty sand aquifer material). Following the methods described in Section 5.1, effective hydraulic conductivity values were calculated for cells consisting of more than one geological material including cells consisting of the following:

- Combinations of bedding materials and surficial fill
- Interlayering of native wetland organic clayey silt and deep silty sand aquifer materials

During the calibration process, a hydraulic conductivity of 28.3 ft/day was applied to represent the poorly-graded gravel with sand material for both recovery trenches, R-1 and R-2. This hydraulic conductivity was applied in the effective hydraulic conductivity calculations discussed in Section 5.1 to obtain effective hydraulic conductivities for model cells representing trenches R-1 and R-2.

Utilities within the Site vicinity were also assumed to contain the same material type as the trenches R-1 and R-2 and were assigned hydraulic conductivities of 28.3 ft/day to be used in the model cell effective hydraulic conductivity calculations described in Section 5.1. The horizontal hydraulic conductivity values applied in the calibrated model are summarized as follows:

- Surficial Fill Material: 0.31 ft/day (1.11×10^{-4} centimeters per second (cm/s))
- Native wetland organic clayey silt: 0.08 ft/day (2.82×10^{-5} cm/s)
- Deep silty sand regional aquifer: 5.15 ft/day (1.82×10^{-3} cm/s)
- Interlayering of native wetland organic clayey silt and deep silty sand aquifer material: 0.71 ft/day - 5.1 ft/day (2.5×10^{-4} cm/s - 1.8×10^{-3} cm/s)
- Combinations of bedding material and surficial fill: 22.7 ft/day - 49.8 ft/day (8.0×10^{-3} cm/s - 1.8×10^{-2} cm/s)

A horizontal to vertical hydraulic conductivity anisotropy ratio was applied to each soil type as follows:

- Sandy silt with intermixed gravel (Fill): 92.5
- Native wetland organic clayey silt: 15
- Regional aquifer silty sand: 2.4

The calibrated hydraulic conductivity values are consistent with the hydraulic conductivity values estimated from the slug test, pumping test, and laboratory test results (see Table 2.2). As expected by the nature of the materials, the bedding materials and deep silty sand aquifer are the most permeable while the native wetland organic clayey silt and surficial fill material are the less permeable.

As described in Section 6.2, recharge zones were assigned based on the hydrogeological conditions within the study area, such as increased recharge through precipitation infiltration under wet conditions in the berm-enclosed Tank Farm. As illustrated in Figure 5.8, two recharge zones were assigned, under wet condtions, to the top of the model domain boundary. For the February and August 2012 wet and dry condition models the regional recharge rate was assigned a value of 11.13 in/yr for both models (28% of annual precipitation). To represent the wet condition in the model, the berm-enclosed Tank Farm area was assigned a higher recharge rate of 12.71 in/yr (32% of annual precipitation).

The constant head boundary for the Green River boundary was uniformly adjusted so that the gradient identified in Section 5.2 (see Figure 5.6) would remain constant and that the downgradient surface water elevation would match the average surface water elevations observed at USGS gauge station 12113350 (see Figure 2.12) during the time frames of the wet and dry conditions, February and August, 2012, respectively. The average surface water elevation for Green River for the wet condition at USGS gauge station 12113350 was calculated to be 10.39 ft AMSL between February 18, 2012 and February 22, 2012. The average surface water elevation for Green River for the dry condition at USGS gauge station 12113350 was calculated to be 7.04 ft AMSL between August 20, 2012 and August 24, 2012.

The river package used to model Springbrook Creek in the groundwater flow model also retained the gradient identified in Section 5.2 but the surface water elevation was adjusted based on USGS gauge station 12113346 (see Figure 2.12). The average surface water elevation for Springbrook Creek for the wet condition at USGS gauge station 12113346 was calculated to be 18.11 ft AMSL between February 18, 2012 and February 22, 2012. The average surface water elevation for Green River for the dry condition at USGS gauge station 12113350 was calculated to be 17.51 ft AMSL between August 20, 2012 and August 24, 2012.

During model calibration it was determined that the groundwater elevations simulated for the Site were relatively insensitive to the constant heads assigned to the north and south model domain boundaries. As such, constant heads along the north and south boundaries were assigned geospacially variable gradients (see Figure 5.6) to match northwest groundwater flow directions and the constant head values were held fixed between the wet and dry conditions. Since Springbrook Creek is the primary discharge location for surface water bodies both east and west of the Site, constant heads were assigned higher values along the boundary between the Green River and Springbrook Creek relative to the remaining southern boundary constant heads.

As discussed in Section 5.2, the drain boundary condition was applied in the model to represent the extraction wells under wet conditions (extraction wells were non-operational during the dry conditions), the storm water retention ponds, and the wetlands surrounding the Site. The drains representing the wetlands and storm water retention ponds were assigned consistent values for both the wet and dry flow model simulations. The calibrated wetland and stormwater retention pond drain stage elevations were assigned the following values:

- Wetlands: 11.5 ft AMSL

- On-Site Storm Water Retention Pond: 13 ft AMSL
- Off-Site Storm Water Retention Pond: 12 ft AMSL

The drain elevations assigned to represent remediation wells under wet conditions are listed in Table 5.1.

The general head boundary condition representing the exchange of groundwater within the deeper aquifer system includes consistent conductance terms for both the wet and dry calibrated models that were calculated based on cell size and calibrated hydraulic conductivities (as calculated per Equation 5.6). The wet condition general head boundary elevations were assigned based on an estimated head elevation under the berm-enclosed Tank Farm area of approximately 12.8 ft AMSL and a gradient consistent with the gradient presented on Figure 5.9. For dry condition simulations, the general head boundary elevations were decreased uniformly by 2.1 ft.

Table 6.2 and Table 6.3 present the calibration targets and residuals for the February 2012 wet condition and the August 2012 dry condition model calibrations, respectively.

Figure 6.2 presents a scatter plot of the observed versus simulated groundwater elevations and residual statistics for the February 2012 wet condition model calibration. The wet condition calibrated model provides a residual mean of 0.05 ft, an absolute residual mean of 0.48 ft, a residual sum of squares of 35.12 square feet (ft^2), and a residual standard deviation of 0.75 ft. The residual standard deviation is 13 percent of the head range in the February 2012 measured groundwater elevations. Spitz and Moreno (1996) suggest that the residual standard deviation should normally be less than about 10 percent of the observed head range. However, the range of heads observed at the Site is as small as only 5.68 ft, confounding efforts to get a smaller value for the percentage of standard deviation over the observed head range. Since other statistic errors, such as the residual mean, the absolute residual mean, the standard deviation, and the residual sum of squares, are all reasonably small, the model calibration results are generally acceptable.

The scatter plot of the simulated versus observed groundwater elevations presented on Figures 6.2 includes a line of exact match between the simulated and observed groundwater elevations. The plotted points appearing above the match line over-predict the observed groundwater elevation (and have a negative residual). The plotted points appearing below the exact match line under-predict the observed groundwater elevation (and have a positive residual). A reasonable distribution of the residual points

on Figure 6.2 occurs above and below the match line over the full range of the measured groundwater elevations throughout the model domain, which further supports that the calibrated wet condition model provides a reasonable match to the observed February 2012 groundwater flow conditions.

Figure 6.3, 6.4, and 6.5 provide a comparison of observed and simulated groundwater elevations in the shallow, intermediate, and deep target elevation zones, respectively. The residuals are colored based on whether the value is positive (red, indicating that the observed groundwater elevation is under-predicted) or negative (blue, indicating that the observed groundwater elevation is over-predicted). In general, Figures 6.3 through 6.5 demonstrate that the positive and negative residual values are reasonably distributed throughout the model domain and that focused areas of either positive or negative residuals are limited. In addition, the absolute residual values are generally less than 0.5 ft demonstrating that the calibrated model provides a reasonable representation of the observed groundwater elevations at the Site.

Figure 6.6 presents a scatter plot of the observed versus simulated groundwater elevations and residual statistics for the August 2012 dry condition model calibration. The dry condition calibrated model provides a residual mean of 0.06 ft, an absolute residual mean of 0.35 ft, a residual sum of squares of 19.08 ft^2, and a residual standard deviation of 0.56 ft. The residual standard deviation is 12 percent of the head range in the August 2012 measured groundwater elevations. A reasonable distribution of the residual points on Figure 6.6 occurs above and below the match line over the full range of the measured groundwater elevations throughout the model domain, which further supports that the calibrated dry condition model provides a reasonable match to the observed August 2012 groundwater flow conditions.

The volumetric water budget for the wet and dry condition calibrated models was examined. A discrepancy of zero percent occurs in the budget between the simulated inflows and outflows for both models, demonstrating that a good numerical convergence was achieved throughout the model domain.

7.0 REFERENCES

Acton Mickelson Environmental, 2007. Trench 2 Investigation Report, November 5.

Arnold, J.G., R.S. Muttiah, R. Srinivasan, and P.M. Allen, 2000. Regional Estimation of Base Flow and Groundwater Recharge in the Upper Mississippi River Basin. Journal of Hydrology, 227, pp 21-40.

BP, 1991. Renton Terminal Hydrocarbon Recovery Project, July 1.

City of Renton, 2006. Springbrook Creek Wetland and Habitat Mitigation Bank, Mitigation Bank Instrument, August, 8.

C Tech, 2007. MVS (Mining Visualization System)/EVS (Environmental Visualization System), Version 8.54, Kaneohe, Hawaii.

Freeze, R.A., and J.A. Cherry, 1979. Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Golden Software, 2008. Surfer 8.02 User's Guide, Golden, Colorado.

Harbaugh, A.W., R. Banta, M. Hill, and M.G. McDonald, 2000. MODFLOW 2000, The U.S. Geological Survey Modular Ground Water Model — User Guide To Modularization Concepts And The Ground Water Flow Process, United States Geological Survey Open File Report 00 92, Reston, Virginia.

Hill, M., 1990. Preconditioned Conjugate Gradient 2, A Computer Program for Solving Groundwater Flow Equations, U. S. Geological Survey.

Luzier, J.E., 1969. Geology and Ground-Water Resources of Southwestern King County, Washington.

McDonald, M.G. and A.W. Harbaugh, 1988. A Modular Three Dimensional Finite Difference Ground Water Flow Model, United States Geological Survey Techniques of Water Resources Investigations, Book 6, Chapter A1.

Mobil Oil Corporation, 1991. BP Terminal, Renton, Washington, May 14.

Mobil Oil Corporation, 1990. BP Renton Bulk Terminal, Renton, Washington, Suspected Product Release, September 21.

National Climatic Data Center, 2004. Climatography of the United States No. 20 1971-2000. Station: Kent, WA (http://hurricane.ncdc.noaa.gov/climatenormals/clim20/wa/454169.pdf)

Rumbaugh, J.O., 2005. Guide to Using Groundwater Vistas, Version 4.19, Environmental Simulations In, Herndon, Virginia.

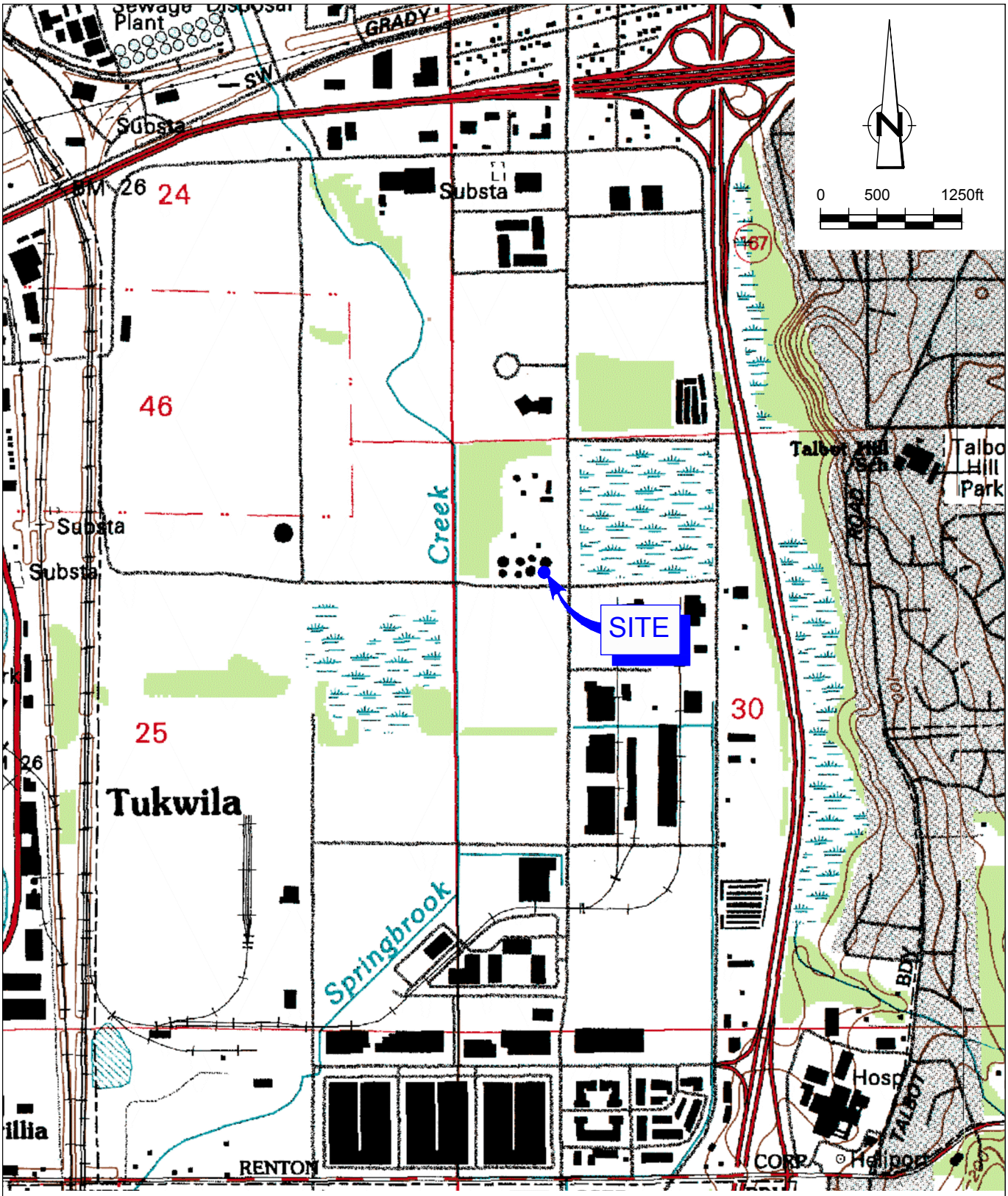
Rushton, K.R. and C. Ward, 1979. The Estimation of Groundwater Recharge. Journal of Hydrology, 41, pp. 345-361.

Spitz, K., and J. Moreno, 1996. A Practical Guide to Groundwater and Solute Transport Modeling, John Wiley & Sons, Inc.

USGS, 1995. Occurrence and Quality of Ground Water in Southwestern King County, Washington (http://pubs.usgs.gov/wri/1992/4098/report.pdf)

Watermark Numerical Computing, 2004. PEST, Model Independent Parameter Estimation, User Manual: 5th Edition, Watermark Numerical Computing, Brisbane, Australia, July.

Woodward-Clyde Consultants, March 21, 1989 (letter discussing Site release)



SOURCE: USGS QUADRANGLE MAP:
RENTON, WASHINGTON

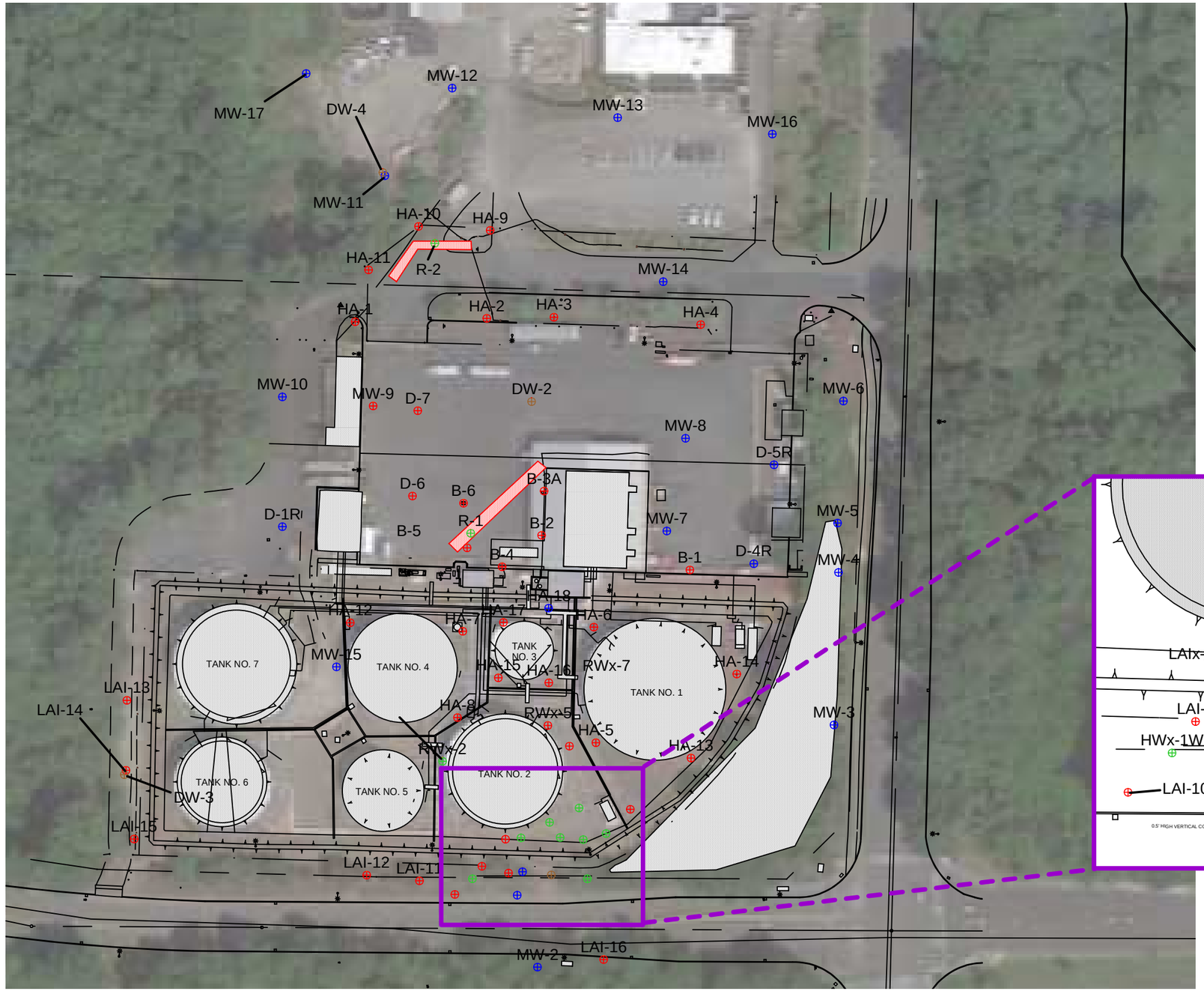
figure 1.1

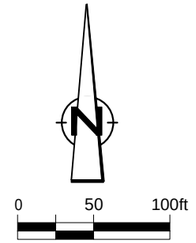
VICINITY MAP
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



WASHINGTON

70496-RI00(018)GN-WA001 DEC 3/2012





LEGEND

MW-11	MONITORING WELL ID
⊕	SHALLOW WELL LOCATION
⊕	INTERMEDIATE WELL LOCATION
⊕	DEEP WELL LOCATION
⊕	REMEDIATION WELL LOCATION
▭	EXTRACTION TRENCH

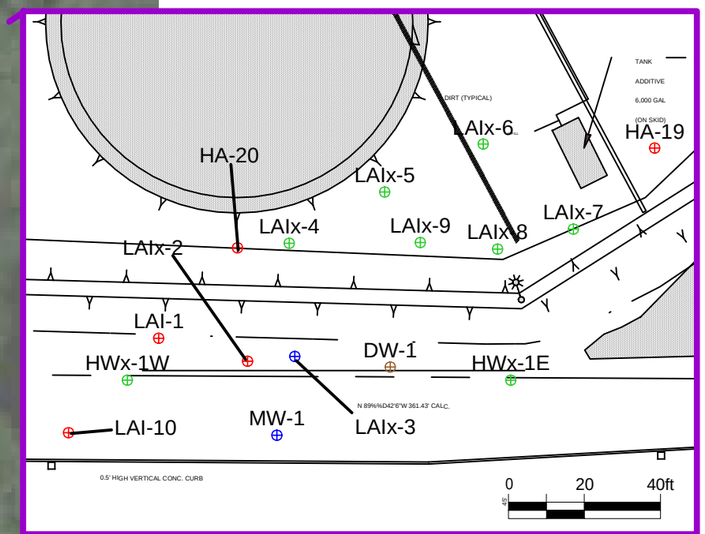
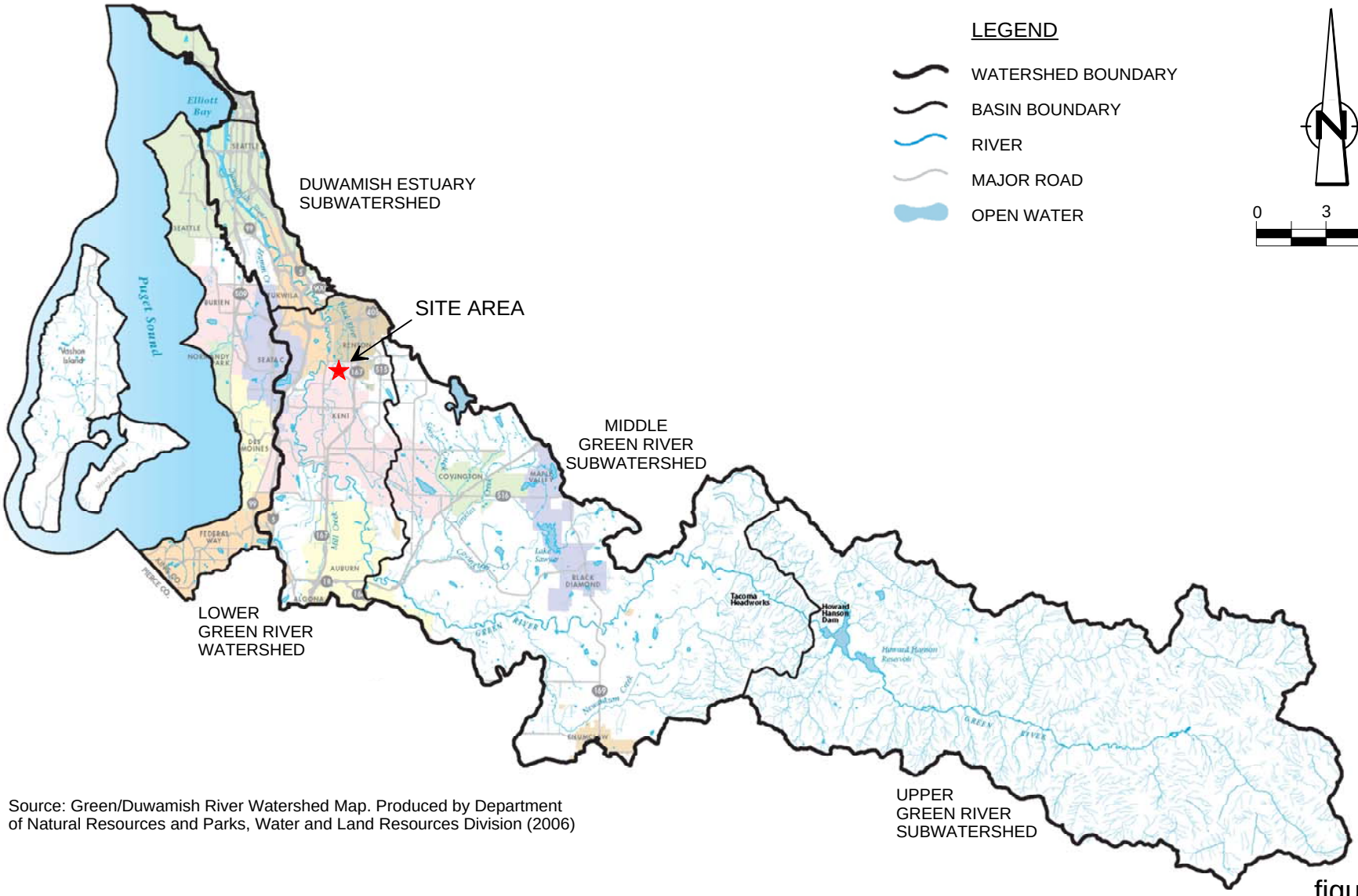


figure 1.2

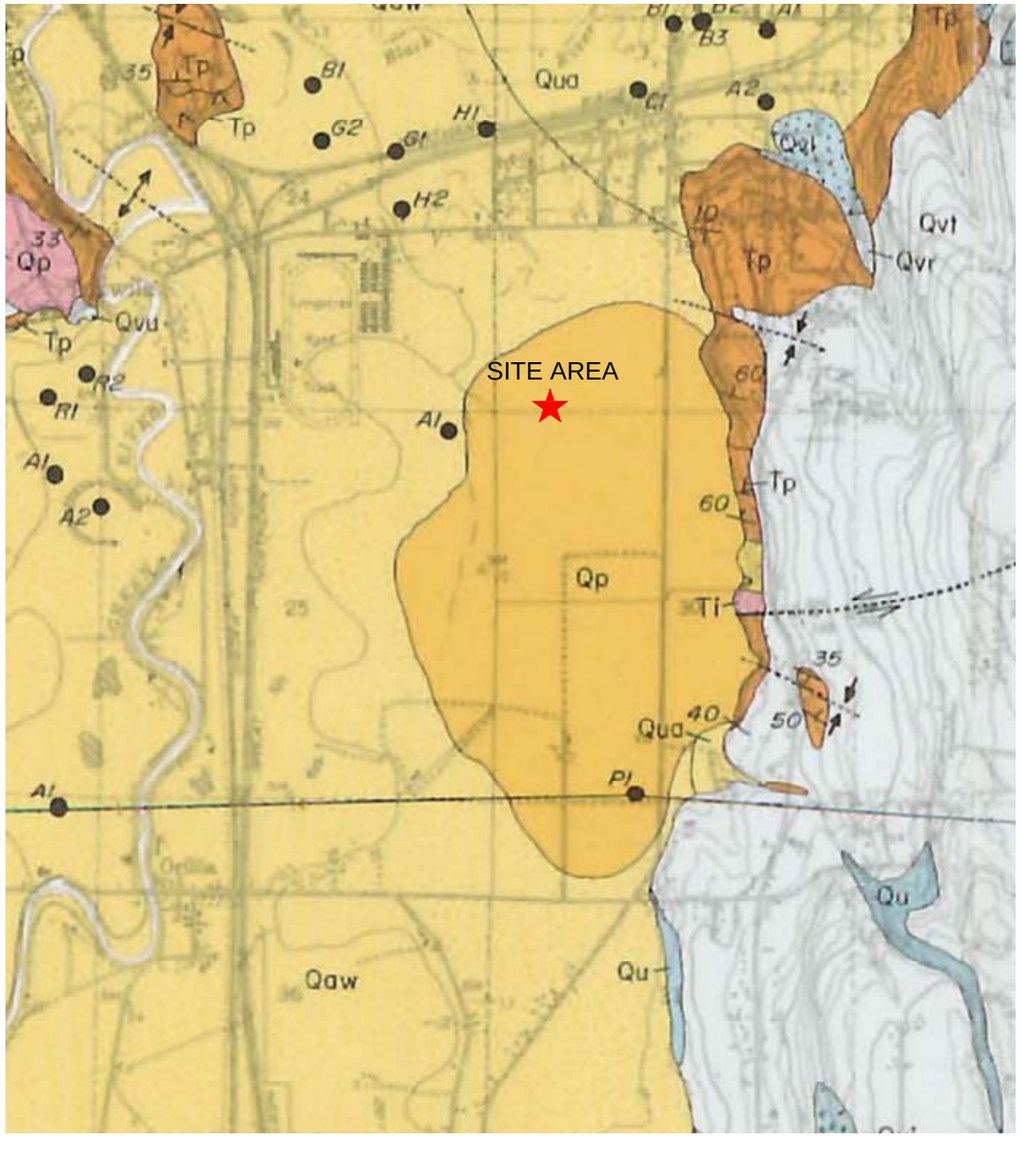
SITE PLAN
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

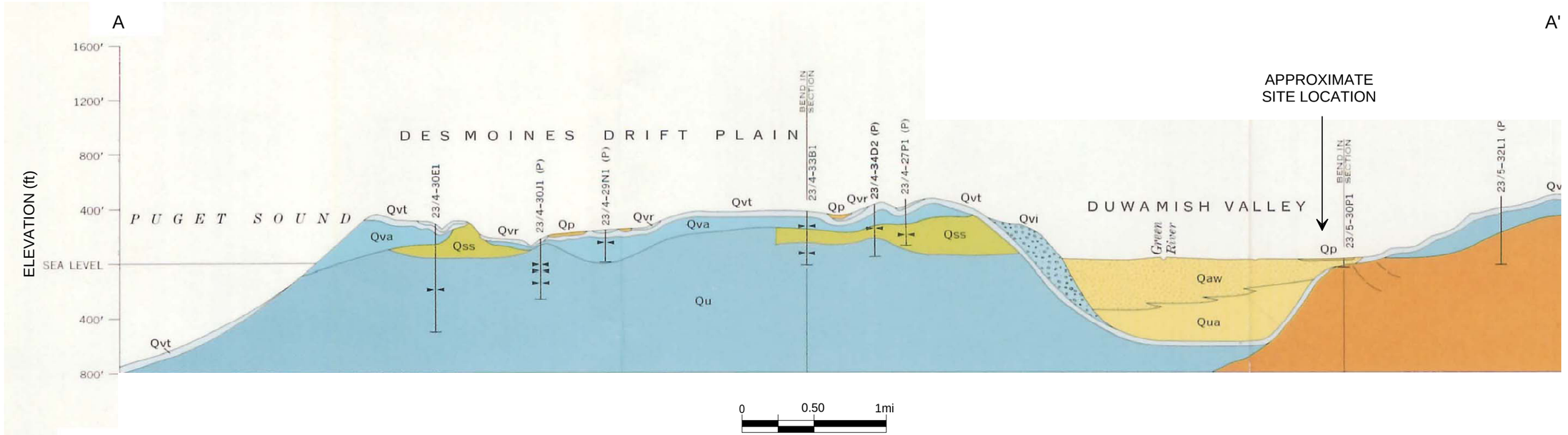


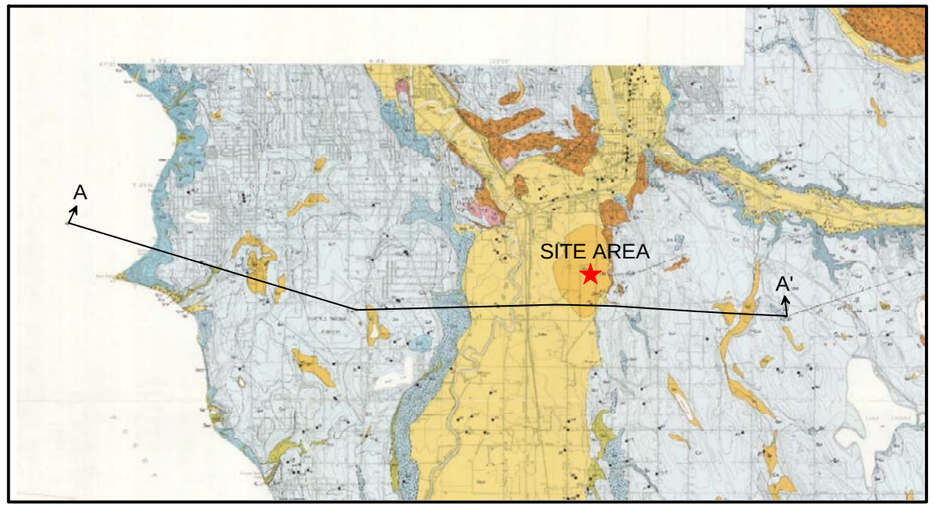
Source: Green/Duwamish River Watershed Map. Produced by Department of Natural Resources and Parks, Water and Land Resources Division (2006)

figure 2.1

GREEN/DUWAMISH RIVER WATERSHED
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington


SITE AREA
Qua
Qp
Tp
Qvt
Qvr
Qvu
Qaw
Qu
Ti
Qal
Tp
Tp
Tp
Tp
Tp
Tp
Qp
Qp
Qua
Qaw
Qu
Qu
Qvt
Qvr
Qal
Qvu
Qp
Tp
Tp
Tp
Tp
T





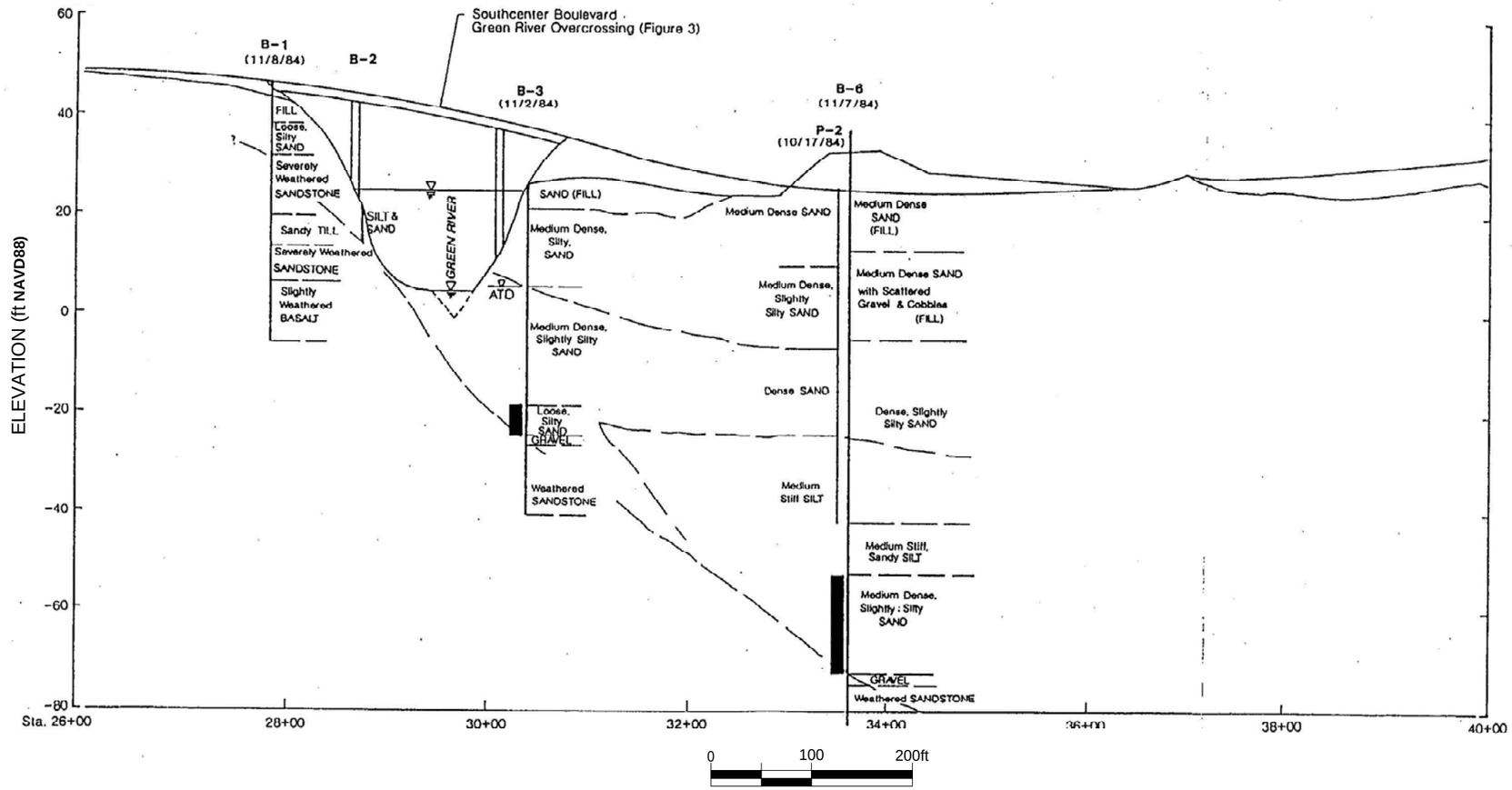
Source: Geology and Ground-water Resources of Southwestern King County, Washington - Water-Supply Bulletin No. 28. Produced by State of Washington Department of Water Resources (1969)

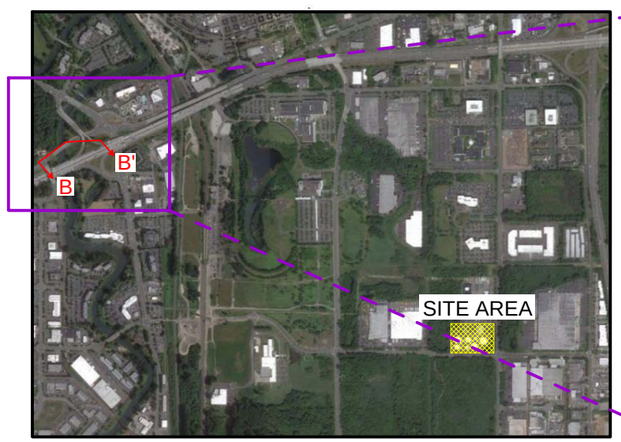
LEGEND

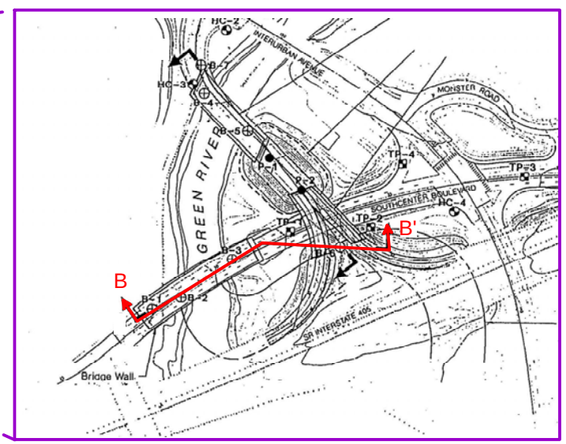
Qvt	TILL
Qva	ADVANCED OUTWASH
Qvr	RECESSIONAL OUTWASH
Qvi	ICE-CONTACT DEPOSITS
Qss	SALMON SPRING DRIFT
Qaw	ALLUVIUM OF THE WHITE RIVER
Qua	UNDIFFERENTIATED ALLUVIUM
Qp	PEAT AND SWAMP DEPOSITS
Tp	SANDSTONE

figure 2.3

REGIONAL GEOLOGIC CROSS-SECTION A-A'
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington







Source: Holocene Geologic History and Sedimentology of the Duwamish and Puyallup Valleys, Washington. Produced by Washington Department of Natural Resources Geology and Earth Resources Division (1997)

figure 2.4

REGIONAL GEOLOGIC CROSS-SECTION B-B'
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

LEGEND

–18– INTERPOLATED GROUND SURFACE ELEVATION CONTOUR (ft AMSL)

● WELL LOCATION

INTERPOLATED GROUND SURFACE ELEVATION (ft AMSL)

9 11 13 15 17 19 21 23 25 27 29

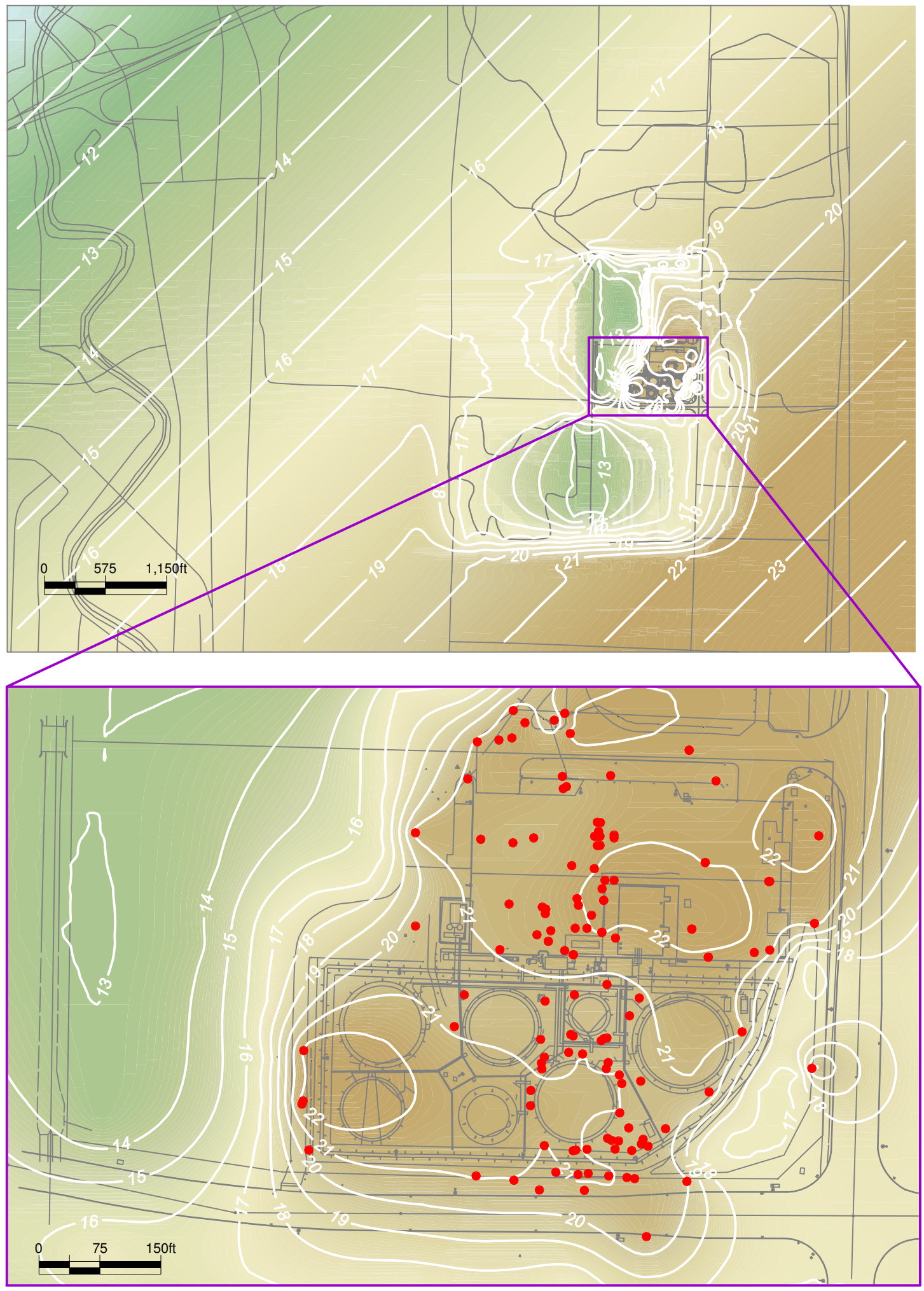
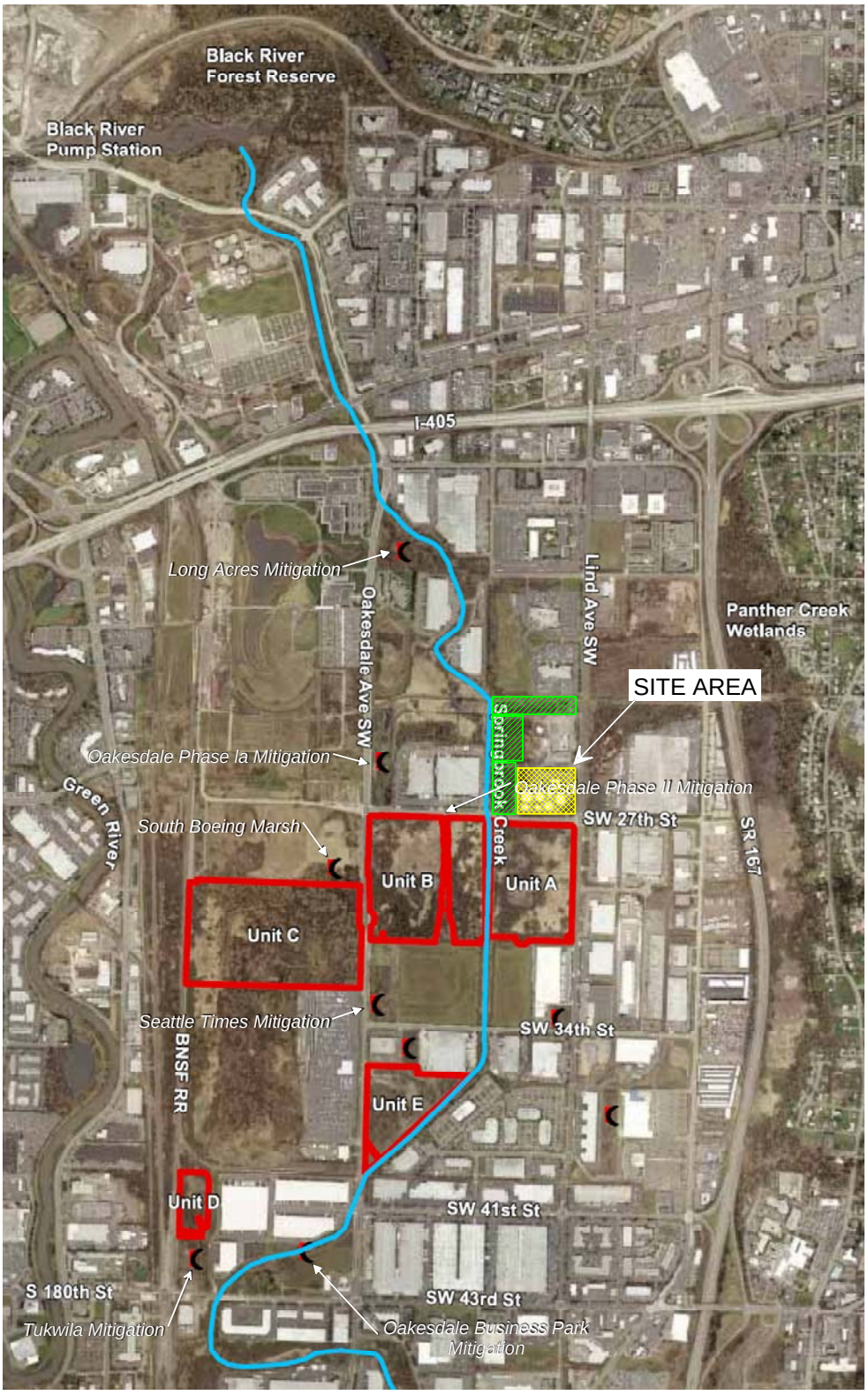
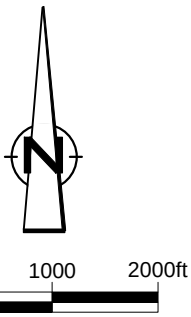


figure 2.5

GROUND SURFACE ELEVATIONS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
Renton, Washington







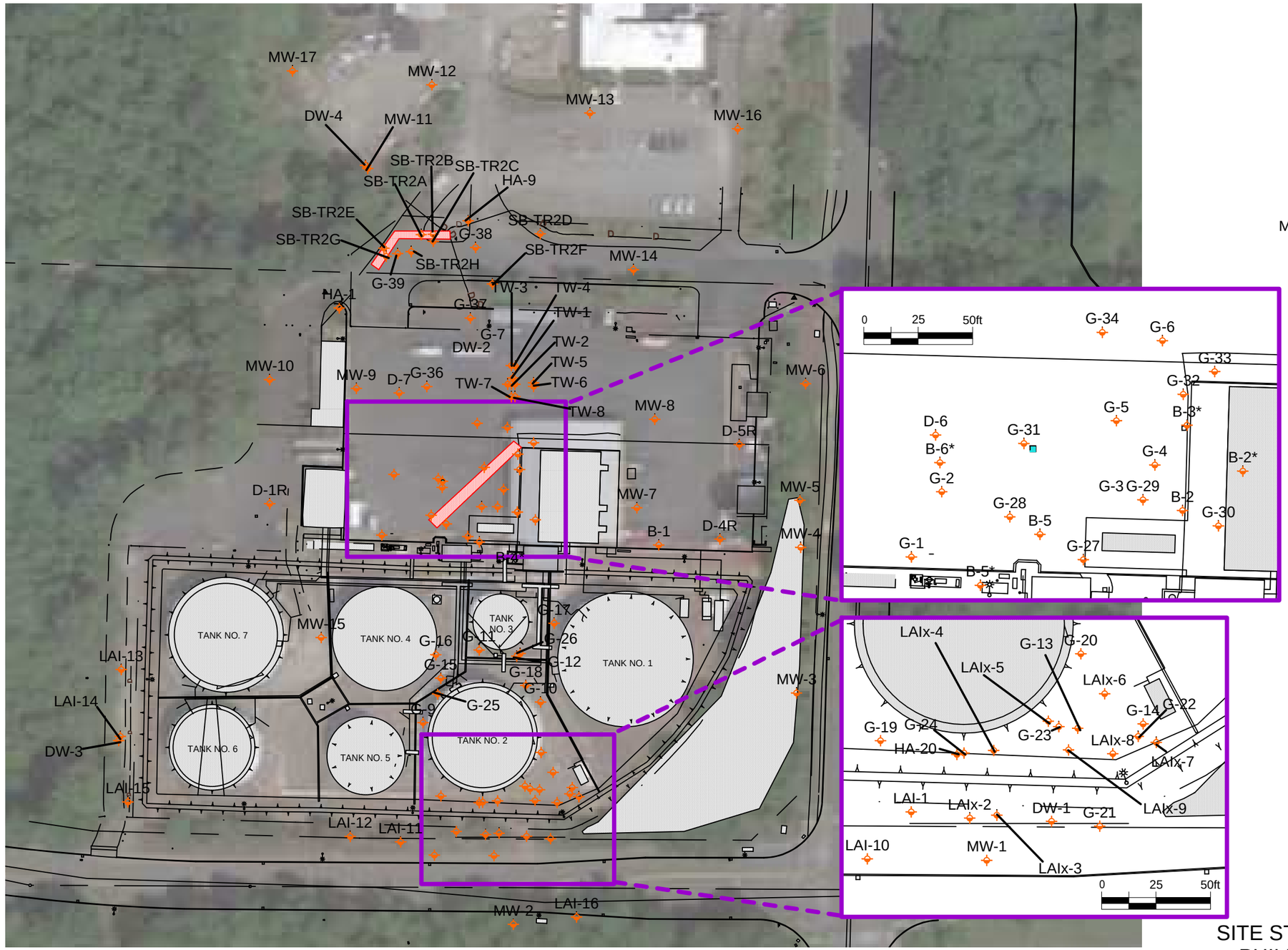
LEGEND

- WETLANDS
- CITY OF RENTON DESIGNATED WET-LAND AREAS AND MITIGATION SITES
- SPRINGBROOK CREEK
- CITY OF RENTON WETLAND MITIGATION UNIT

Source: Springbrook Creek Wetland and Habitat Mitigation Bank. Produced by Mitigation Bank Instrument (2006)

figure 2.6

WETLANDS SURROUNDING SITE AREA
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



N

0 50 100ft

LEGEND

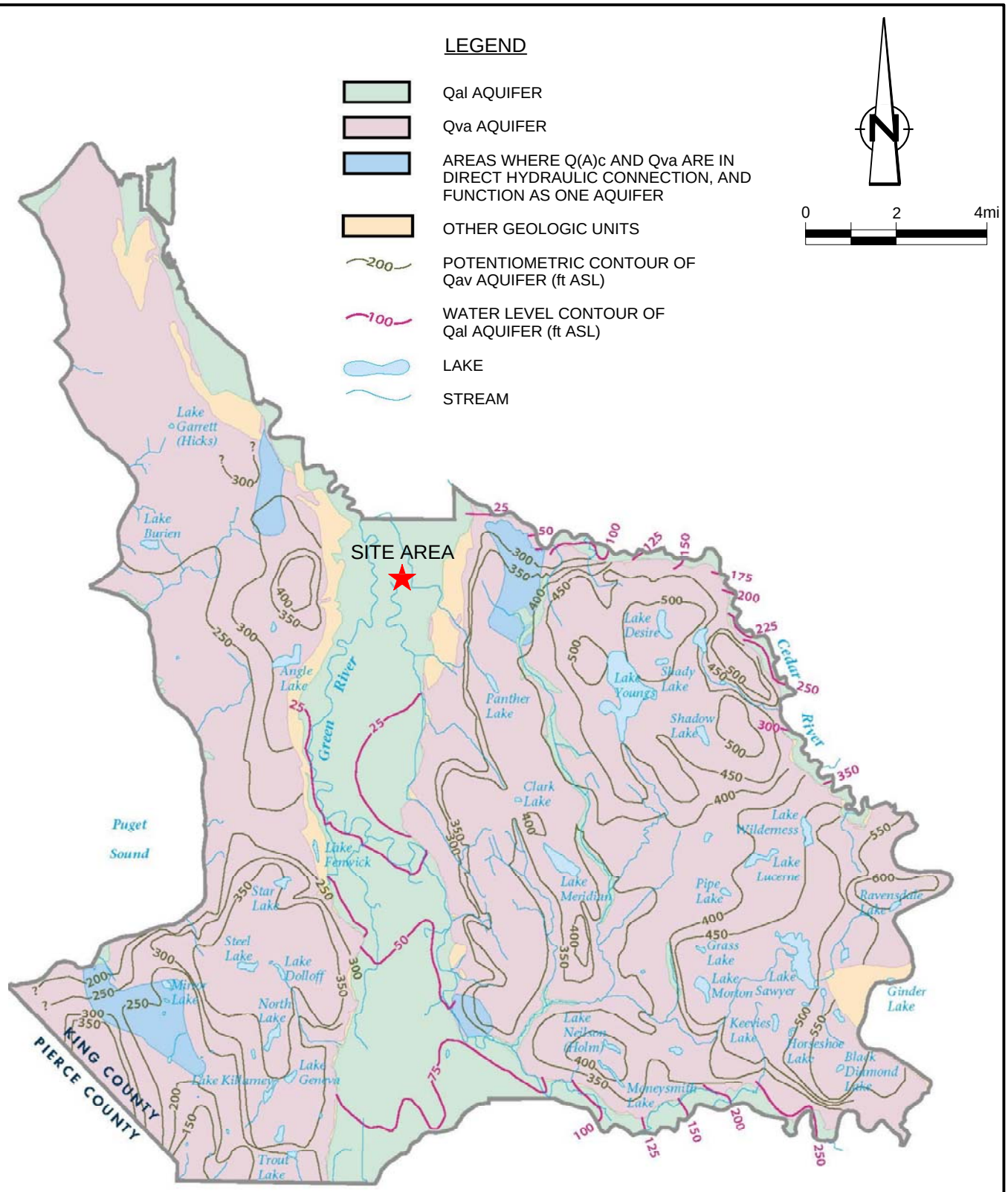
MW-10 LOCATION NAME

BORING LOCATIONS USED IN STRATIGRAPHIC INTERPRETATION

EXTRACTION TRENCH

figure 2.7

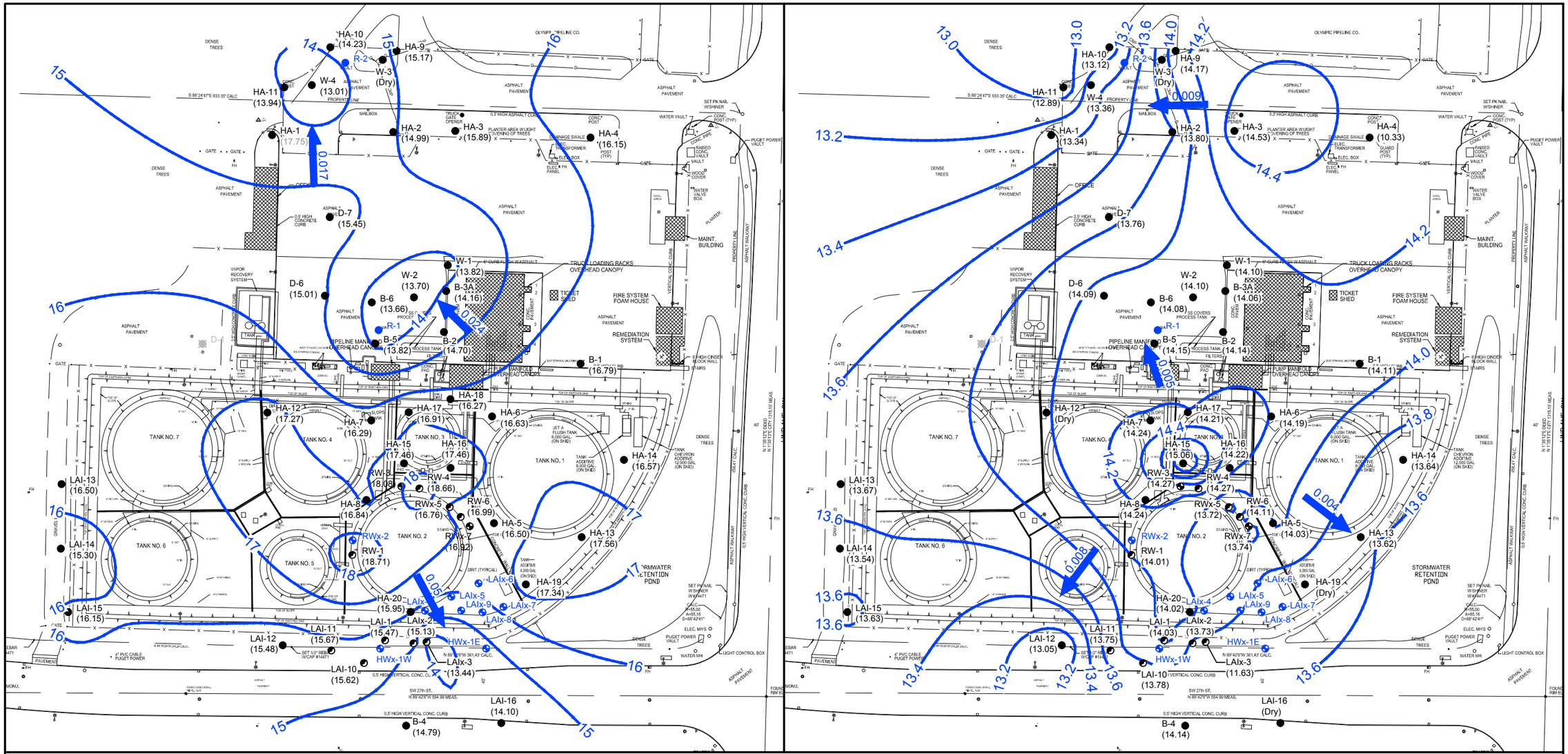
SITE STRATIGRAPHIC LOCATIONS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



Source: Potentiometric Surface in the Qva Aquifer and Water Levels in the Qal Aquifer - Sourth King County Groundwater Management Area. Produced by Department of Natural Resources, King County (2000)

figure 2.8

REGIONAL POTENTIOMETRIC SURFACE
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

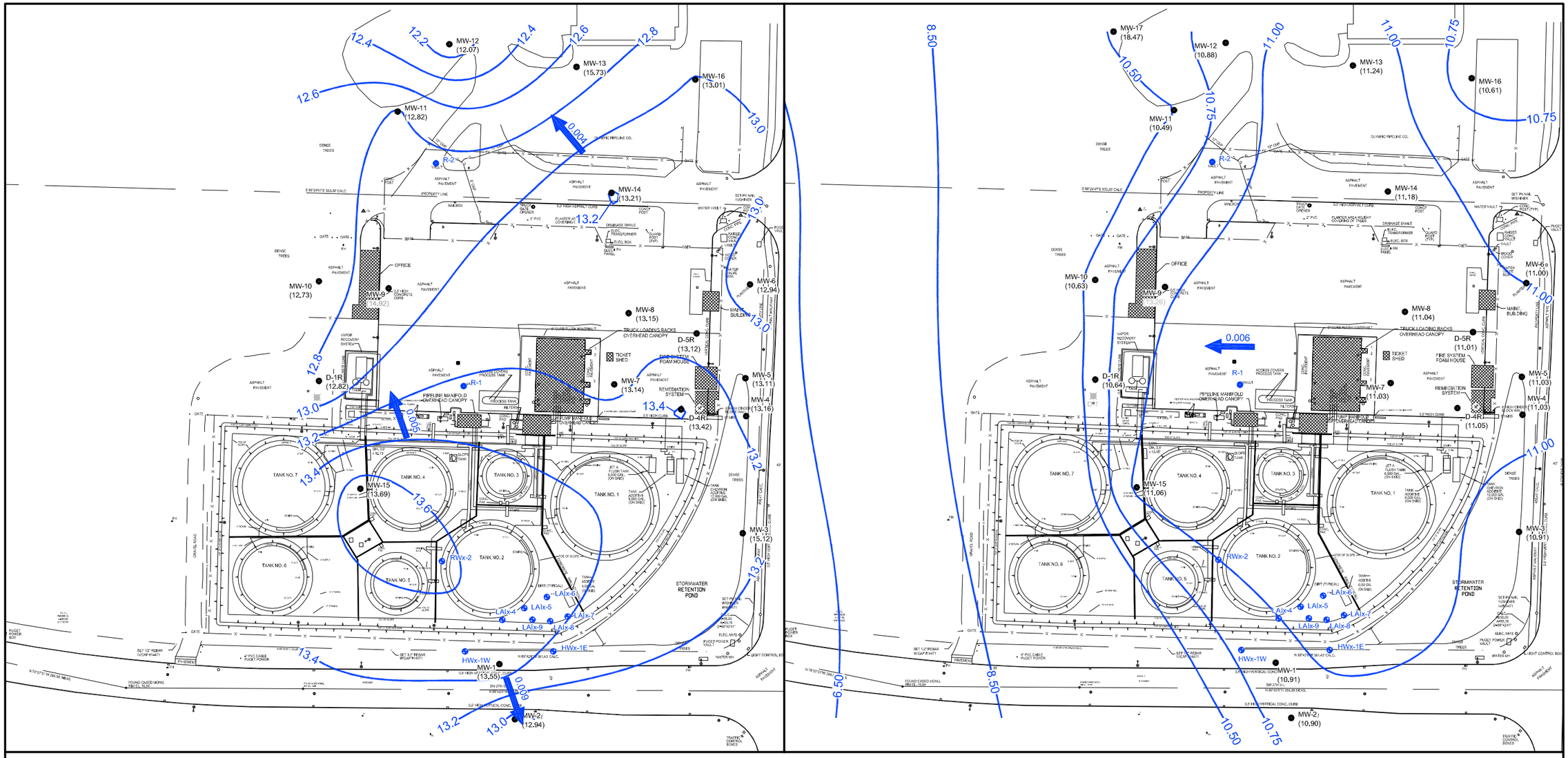


NOTES:
1. GROUNDWATER ELEVATIONS ARE IN FEET.
2. WELL HA-1 NOT USED IN CONTOURING.

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 2.9

SITE-SPECIFIC GROUNDWATER ELEVATIONS UNDER DRY AND WET CONDITIONS (SHALLOW)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- 15.5 — GROUNDWATER ELEVATION CONTOUR, DASHED WHERE INFERRED
- (15.68) GROUNDWATER ELEVATION
- 0.009 GROUNDWATER FLOW DIRECTION AND GRADIENT

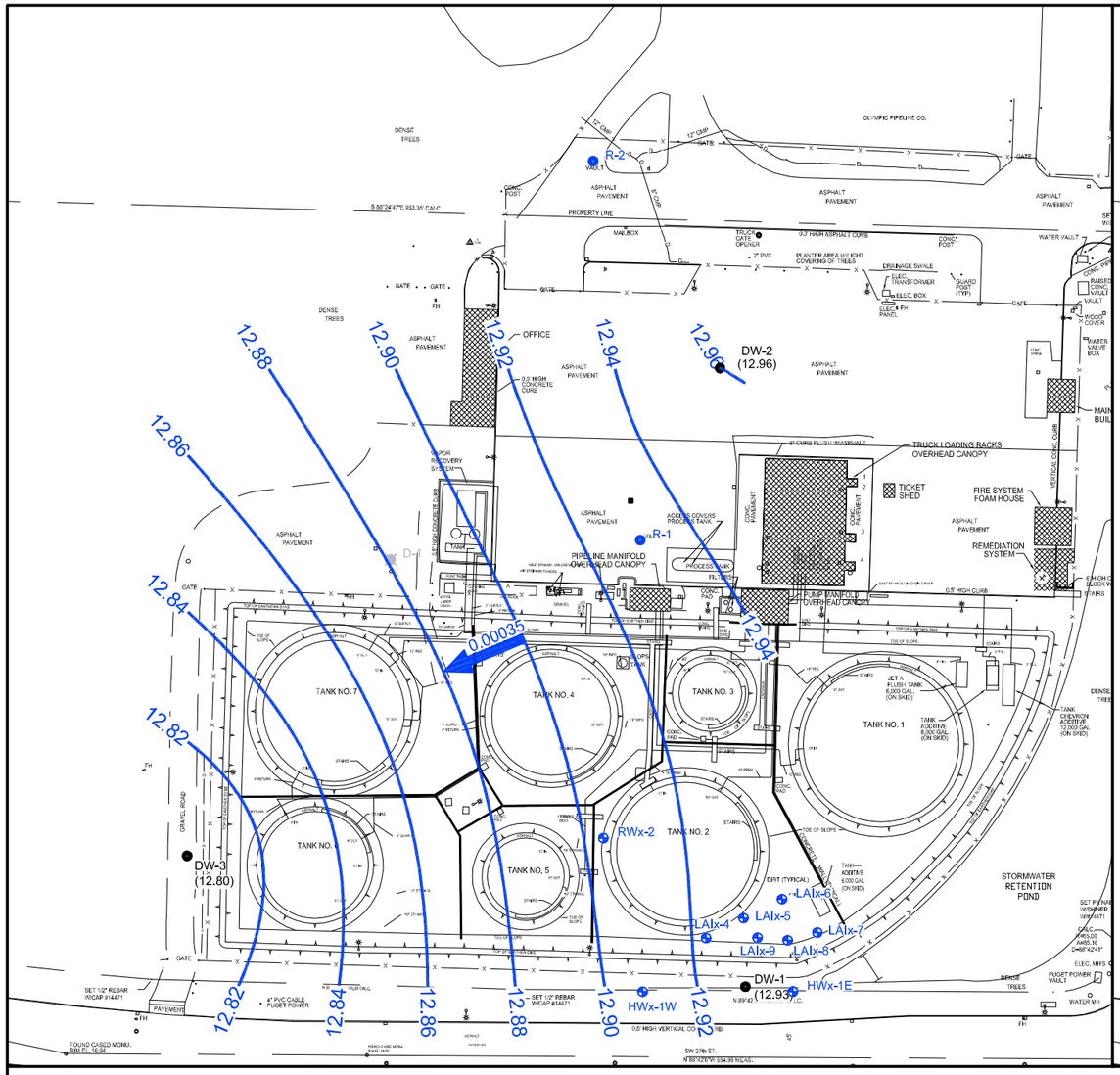
0 60 120ft

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

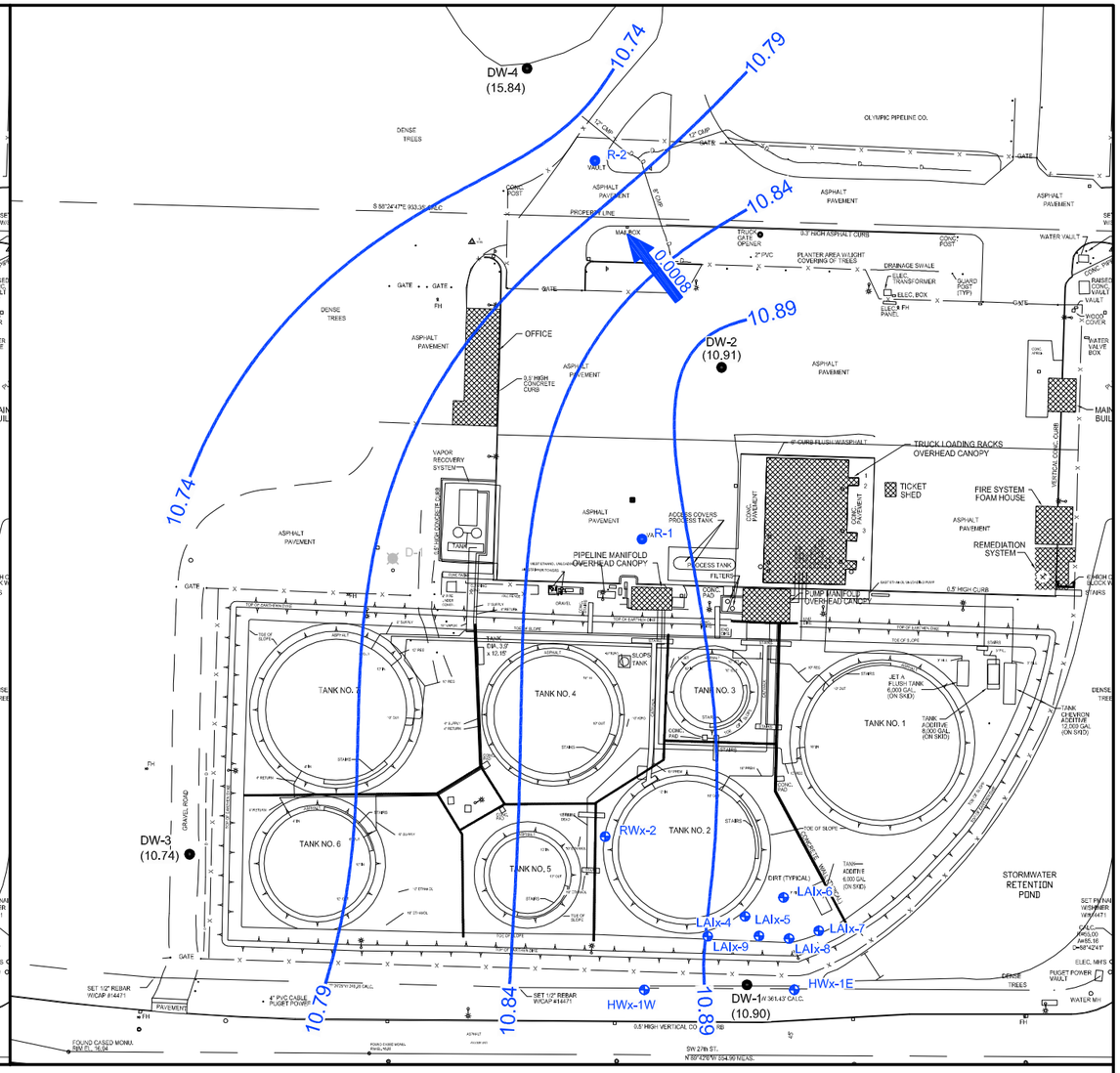
NOTES:
1. GROUNDWATER ELEVATIONS ARE IN FEET.

figure 2.10

SITE-SPECIFIC GROUNDWATER ELEVATIONS UNDER DRY AND WET CONDITIONS (INTERMEDIATE)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



WET (FEBRUARY 2012)



DRY (AUGUST/SEPTEMBER 2012)

0 50 100ft

LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- 15.5 — GROUNDWATER ELEVATION CONTOUR, DASHED WHERE INFERRED
- (15.68) GROUNDWATER ELEVATION
- 0.009 GROUNDWATER FLOW DIRECTION AND GRADIENT

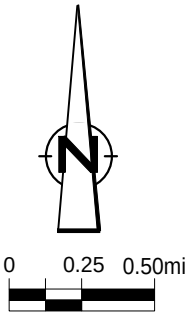
NOTES:
1. GROUNDWATER ELEVATIONS ARE IN FEET.
2. WELL HA-1 NOT USED IN CONTOURING.

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure 2.11

SITE-SPECIFIC GROUNDWATER ELEVATIONS UNDER DRY AND WET CONDITIONS (DEEP)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington





LEGEND

USGS 12113350 GREEN RIVER AT TUKWILA, WA

USGS STREAM GAUGE STATION INFORMATION

USGS STREAM GAUGE STATION LOCATION

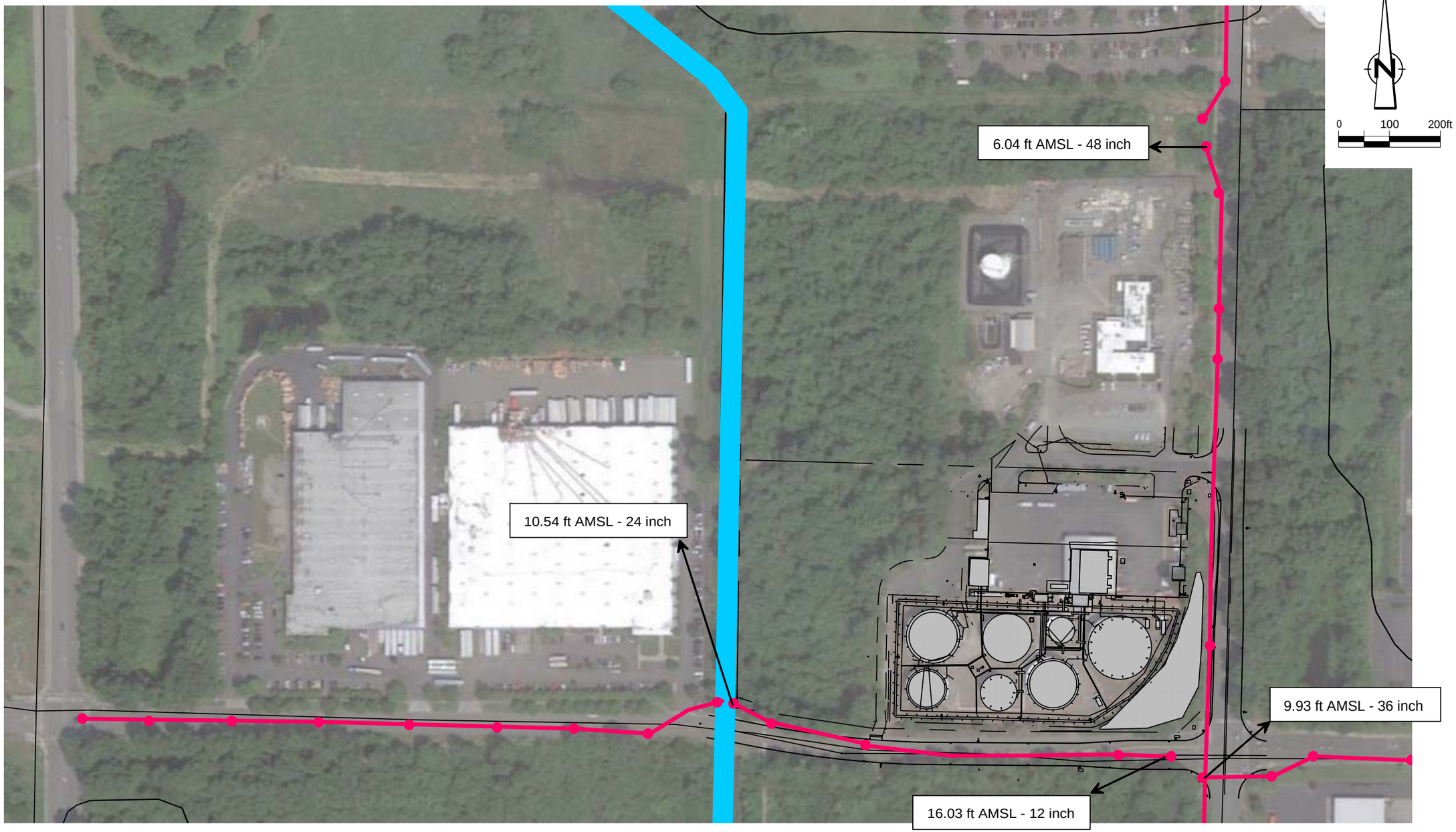
SPRINGBROOK CREEK

GREEN RIVER

Source: Map of real-time streamflow compared to historical streamflow for the day of the year (Washington).
Produced by U.S. Department of the Interior, U.S. Geological Survey (2013)

figure 2.12

USGS STREAM GAUGE STATION LOCATIONS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



LEGEND

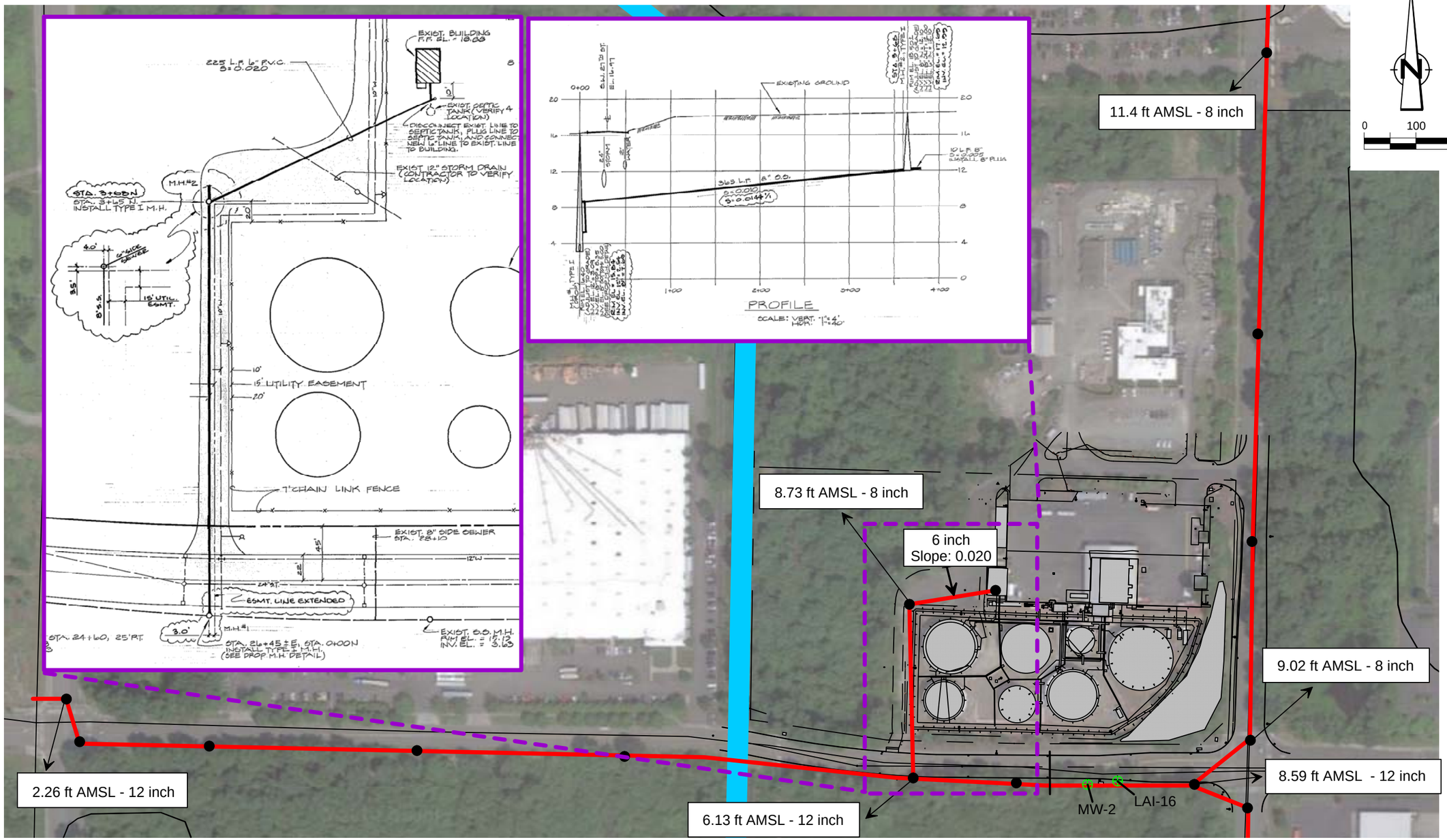
SPRINGBROOK CREEK

SANITARY SEWER

9.93 ft AMSL - 36 inch — PIPE INVERTS AND WIDTH

figure 2.13

SITE VICINITY UTILITIES - STORM SEWERS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



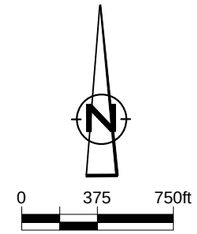
LEGEND

	SPRINGBROOK CREEK		AS-BUILT INFORMATION - SOURCE: RH2 ENGINEERING (1982)
	SANITARY SEWER	MW-2	MONITORING WELL ID
2.26 ft AMSL - 12 inch	PIPE INVERTS AND WIDTH	⊕	MONITORING WELL LOCATION

figure 2.14

SITE VICINITY UTILITIES - SANITARY SEWERS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington





LEGEND

- APPROXIMATE LIMITS OF SITE BOUNDARY
- MODEL DOMAIN
- INACTIVE MODEL DOMAIN AREA
- CONSTANT HEAD BOUNDARY CONDITION

figure 3.1

MODEL DOMAIN
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

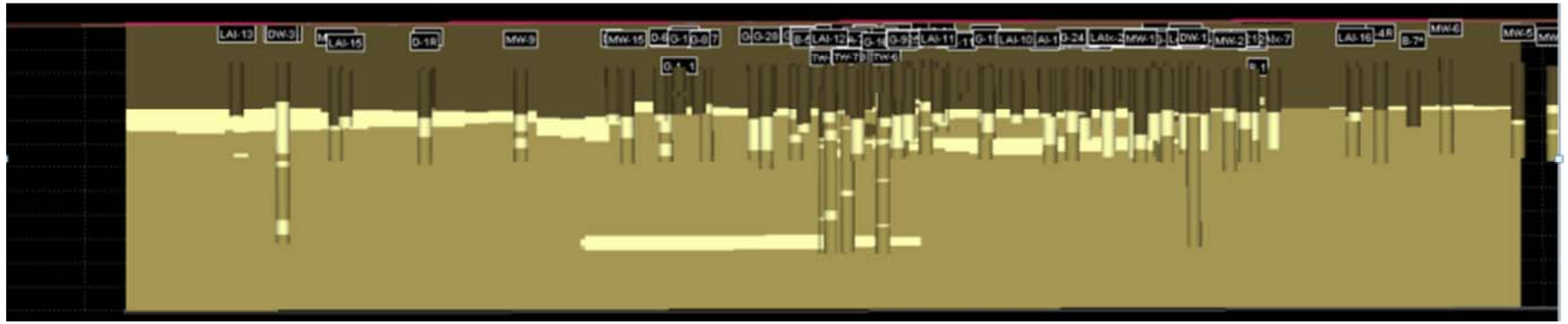
A
NORTH

A'
SOUTH



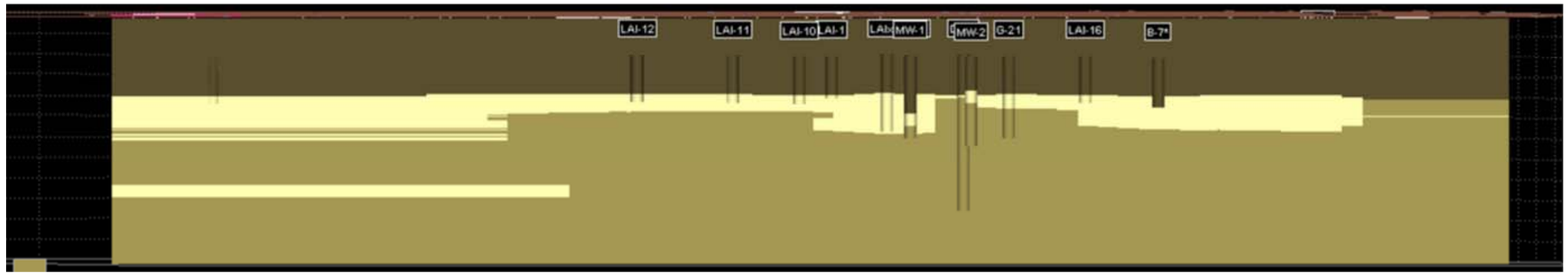
B
WEST

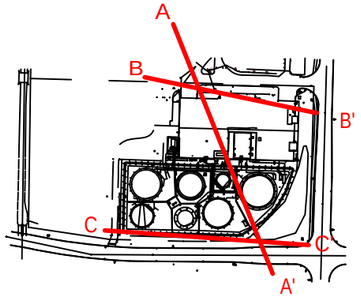
B'
EAST



C
WEST

C'
EAST





LEGEND

- SURFICIAL FILL
- NATIVE WETLAND CLAYEY SILT
- DEEP SITLY SAND AQUIFER
- LAI-12 STRATIGRAPHY NAME

figure 3.2

3D STRATIGRAPHY CROSS-SECTIONS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

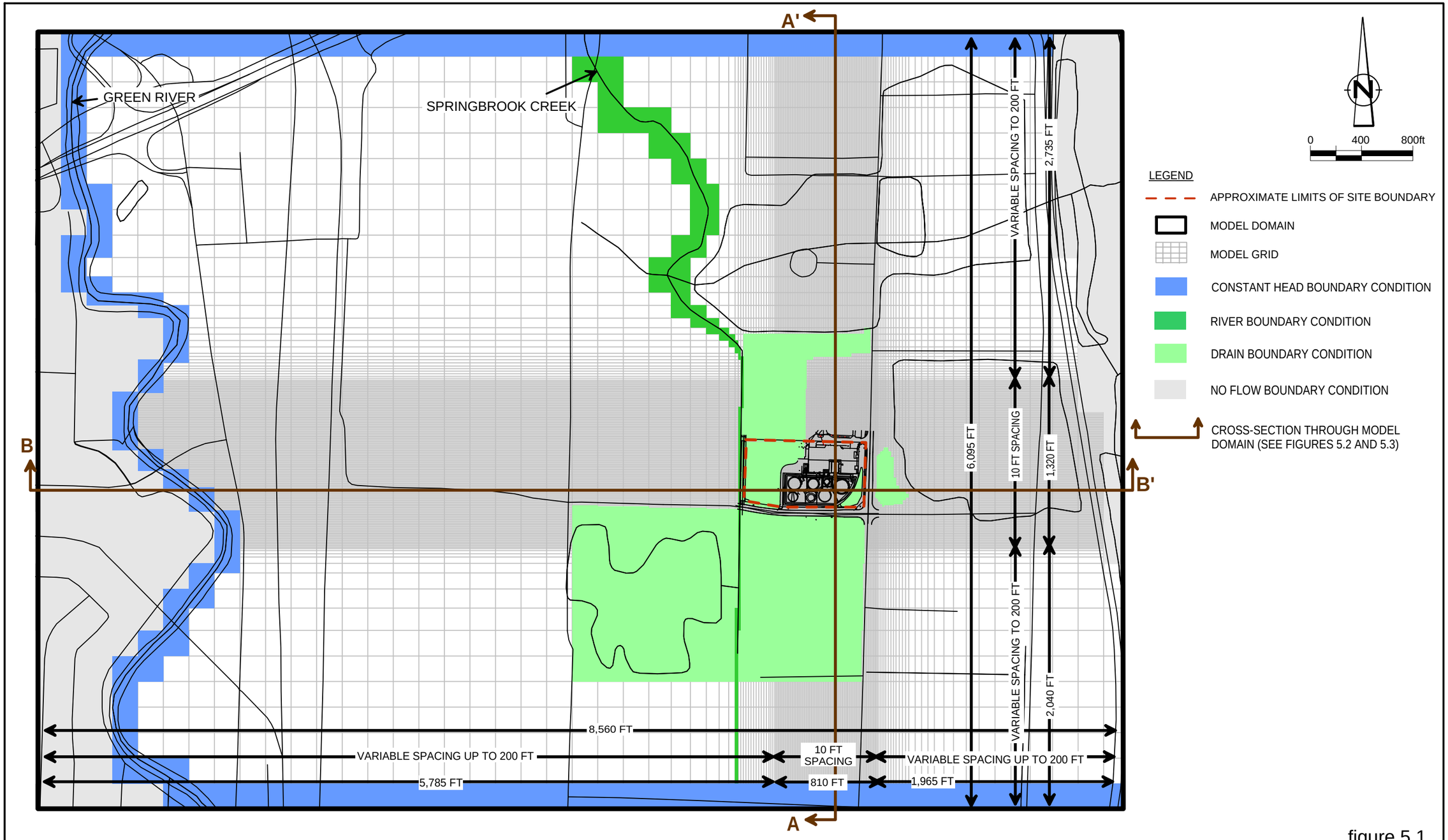


figure 5.1

HORIZONTAL DISCRETIZATION OF MODEL DOMAIN
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

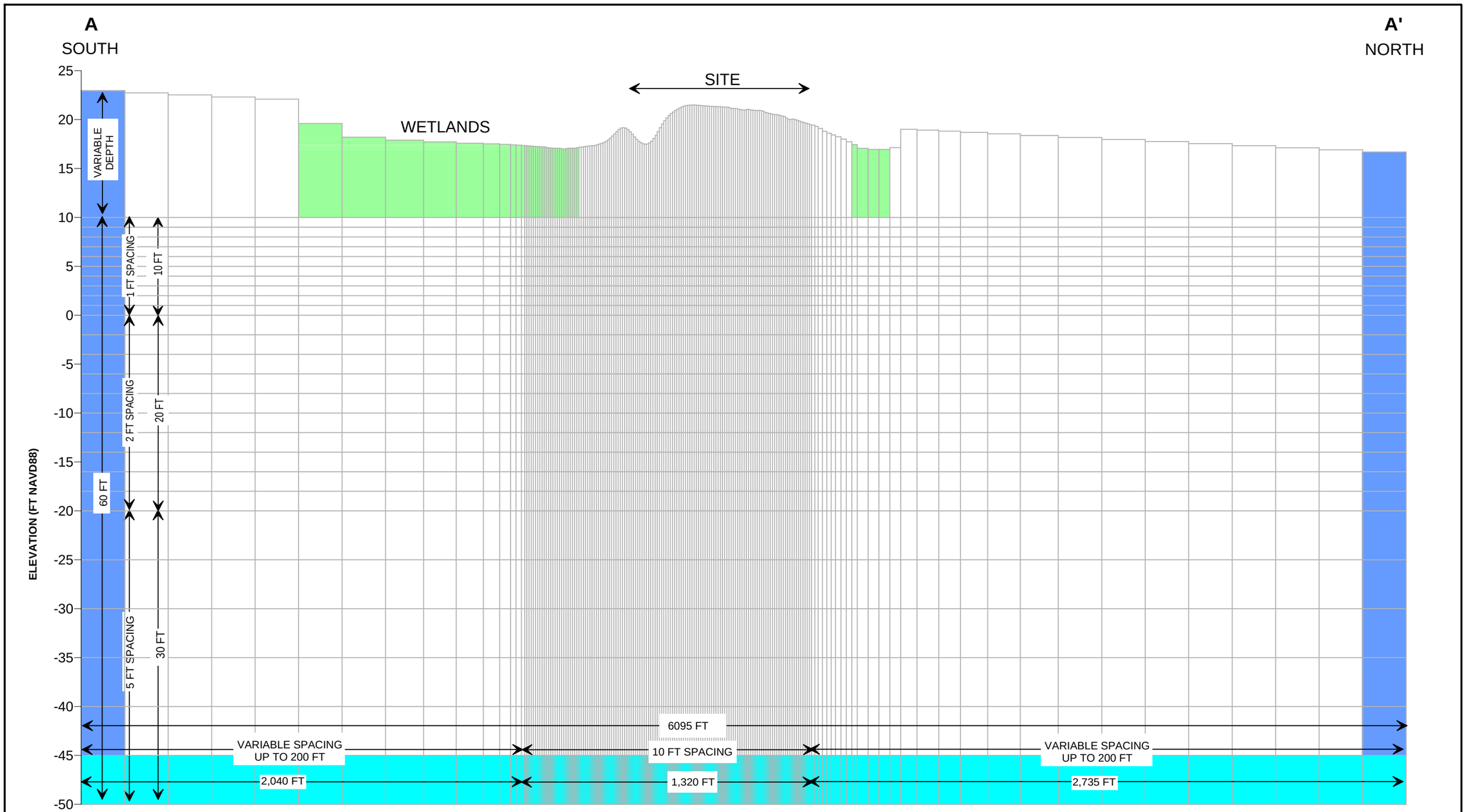
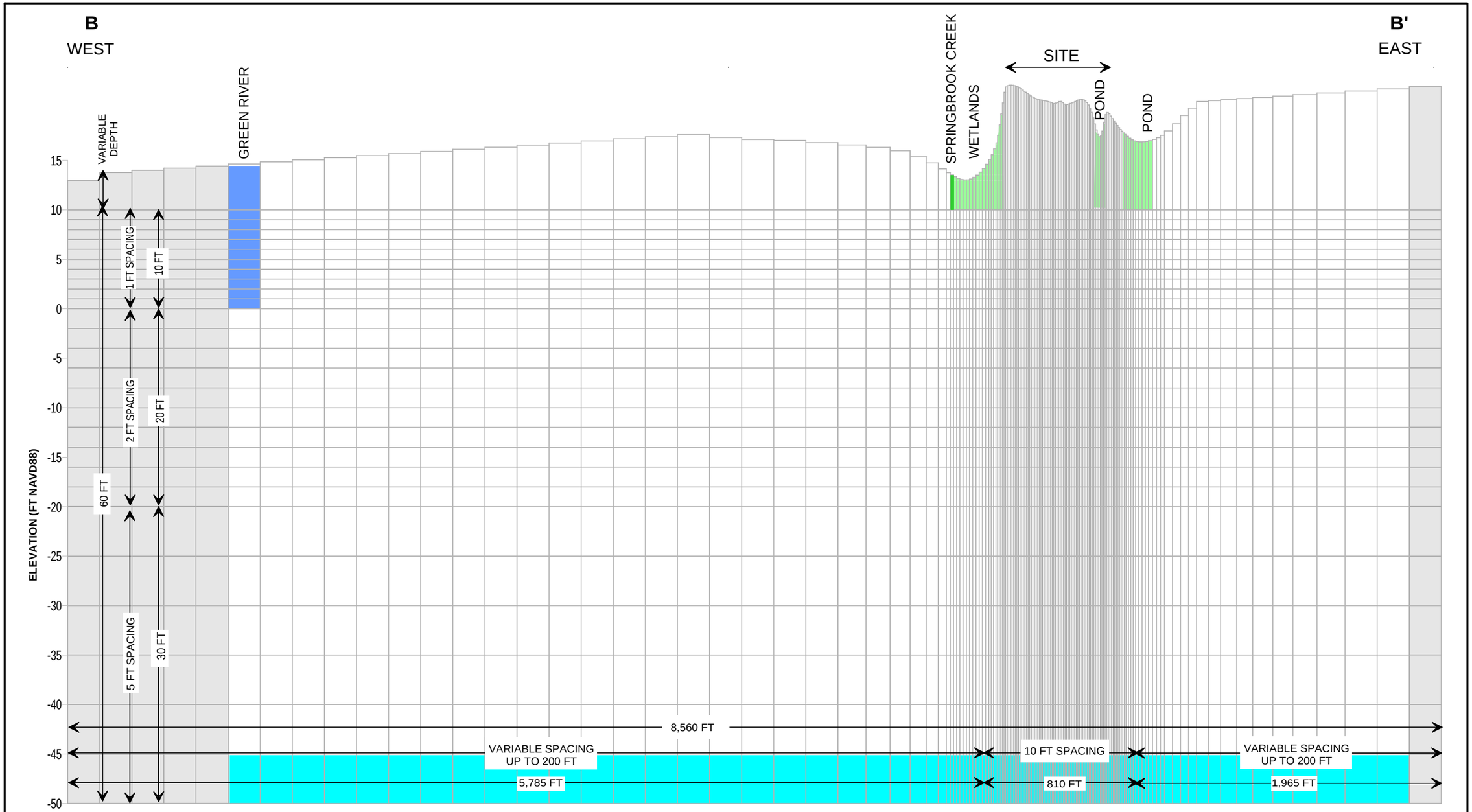


figure 5.2

VERTICAL DISCRETIZATION OF MODEL DOMAIN CROSS-SECTION A-A'
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

LEGEND

- MODEL DOMAIN
- MODEL GRID
- CONSTANT HEAD BOUNDARY CONDITION
- GENERAL HEAD BOUNDARY CONDITION
- DRAIN BOUNDARY CONDITION



LEGEND

MODEL DOMAIN

MODEL GRID

CONSTANT HEAD BOUNDARY CONDITION

GENERAL HEAD BOUNDARY CONDITION

DRAIN BOUNDARY CONDITION

RIVER BOUNDARY CONDITION

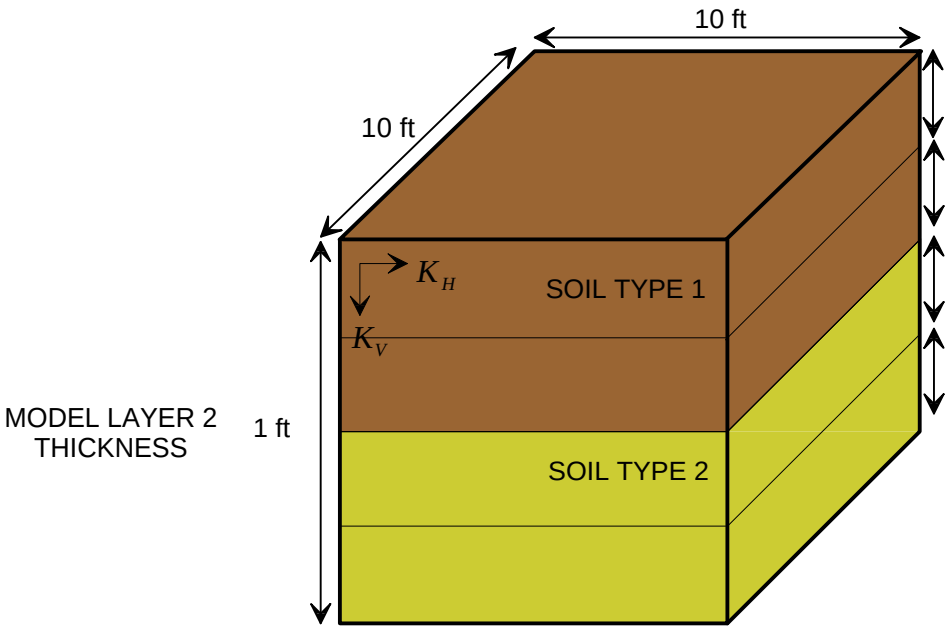
figure 5.3

VERTICAL DISCRETIZATION OF MODEL DOMAIN CROSS-SECTION B-B'
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON



figure 5.4

3D GEOLOGICAL MODEL LIMITS WITHIN MODEL DOMAIN
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON



KRIGING INTERPOLATION GRID, OR SOIL TYPE, LAYERS (0.25 FT THICK) WITHIN MODEL LAYER 2

EFFECTIVE HYDRAULIC CONDUCTIVITY EQUATIONS

PARALLEL FLOW

$$K_H^{eff} = \sum_{i=1}^{n} \frac{K_H^i d_i}{d} \qquad (A)$$

PERPENDICULAR FLOW

$$K_V^{eff} = \frac{d}{\sum_{i=1}^{n} \frac{d_i}{K_V^i}} \qquad (B)$$

WHERE:

K_H^{eff} = HORIZONTAL EFFECTIVE HYDRAULIC CONDUCTIVITY
K_V^{eff} = VERTICAL EFFECTIVE HYDRAULIC CONDUCTIVITY
d = TOTAL THICKNESS OF MODEL LAYER
d_i = GEOLOGICAL UNIT LAYER THICKNESS (i.e., 0.25 FT)
K_H^i = HORIZONTAL HYDRAULIC CONDUCTIVITY OF EVS CELL
K_V^i = VERTICAL HYDRAULIC CONDUCTIVITY OF EVS CELL
n = NUMBER OF 0.25-FT THICK GEOLOGICAL UNIT LAYERS IN THE MODEL CELL

NOTES:

1. DRAWING NOT TO SCALE

REFERENCES:

(A) FREEZE AND CHERRY, (1979; EQUATION 2.32)
(B) FREEZE AND CHERRY, (1979; EQUATION 2.31)

figure 5.5

SCHEMATIC OF EFFECTIVE HYDRAULIC CONDUCTIVITY CALCULATION
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

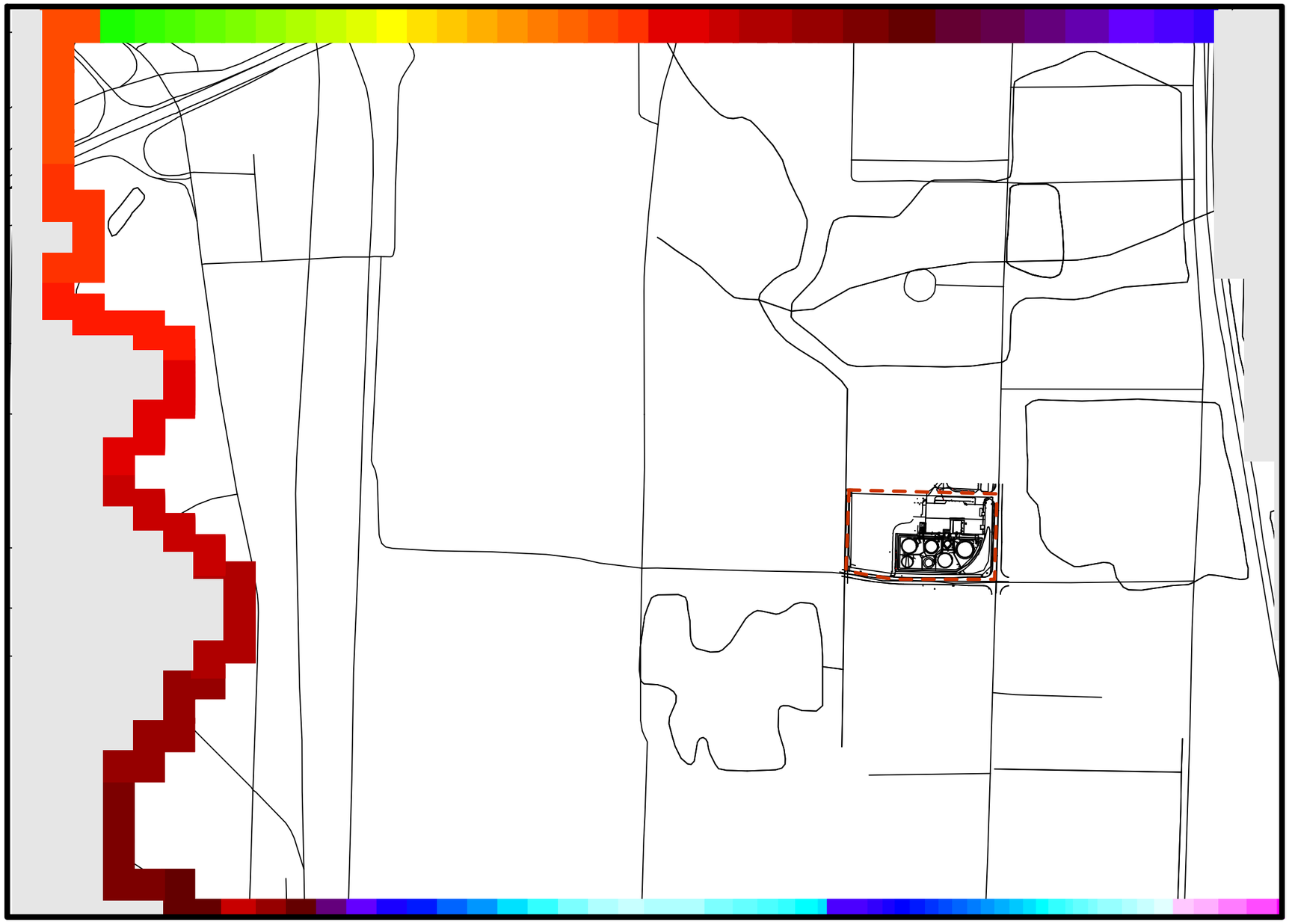


figure 5.6

CONSTANT HEAD BOUNDARY ASSIGNMENT
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

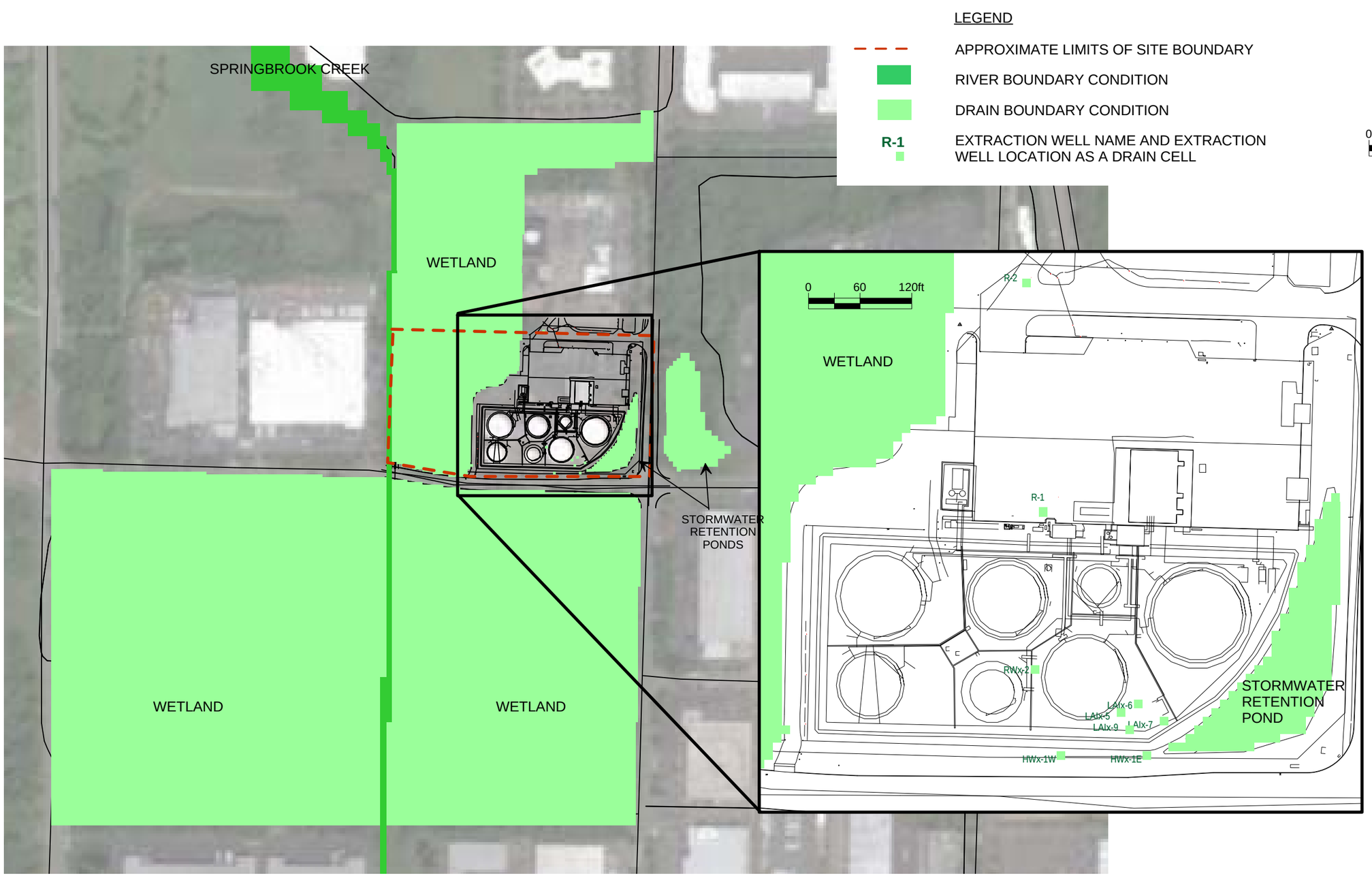


figure 5.7

DRAIN CELL DISTRIBUTION IN MODEL DOMAIN
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



0 375 750ft

LEGEND

APPROXIMATE LIMITS OF SITE BOUNDARY

MODEL DOMAIN

INACTIVE MODEL DOMAIN AREA

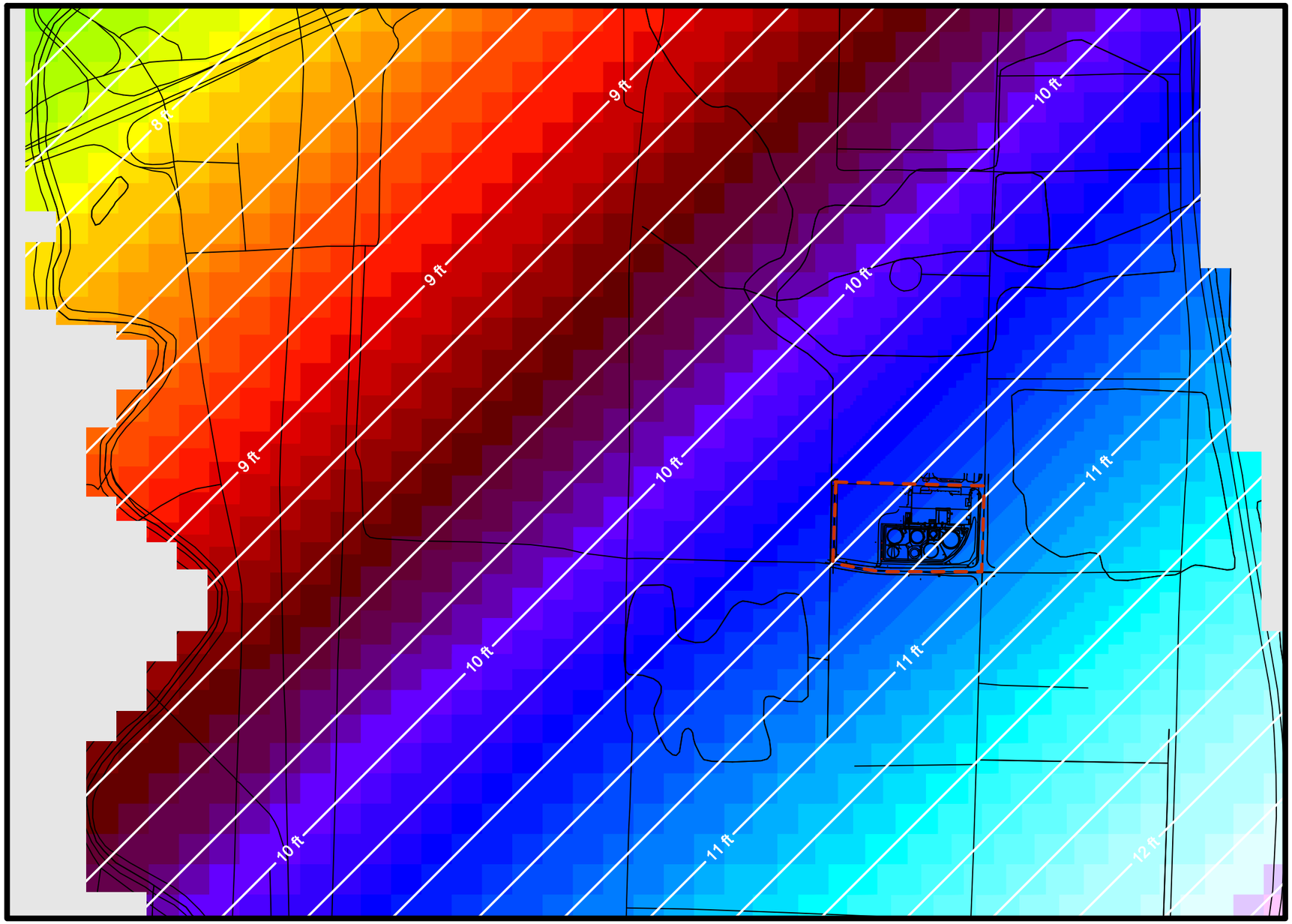
RECHARGE ZONES

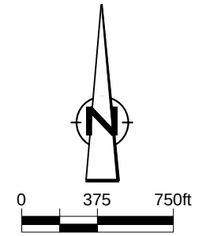
BERM-ENCLOSED TANK FARM (13 in/yr)

REGIONAL RECHARGE (11 in/yr)

figure 5.8

RECHARGE ZONES APPLIED IN THE WET CONDITIONS GROUNDWATER FLOW MODEL
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington





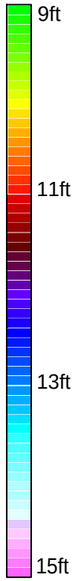
LEGEND

APPROXIMATE LIMITS OF SITE BOUNDARY

MODEL DOMAIN

INACTIVE MODEL DOMAIN AREA

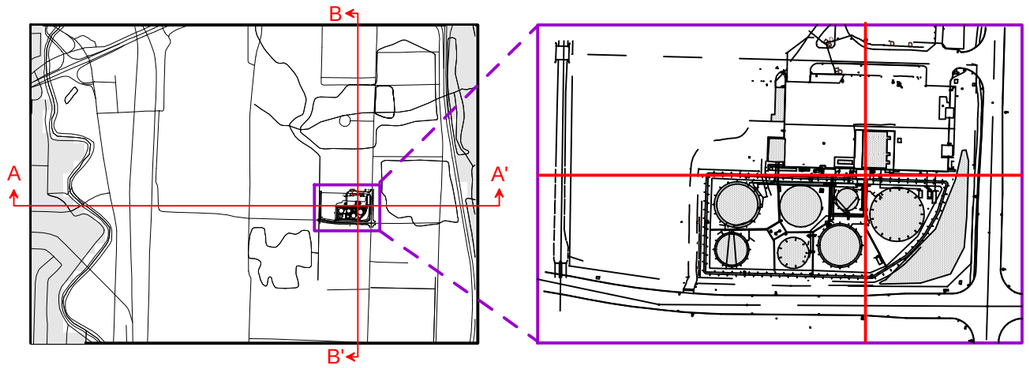
10 ft — GENERAL HEAD BOUNDARY POTENTIOMETRIC HEAD ELEVATION CONTOUR (ft AMSL)



GENERAL HEAD BOUNDARY POTENTIOMETRIC HEAD ELEVATION (ft AMSL)

figure 5.9

GENERAL HEAD BOUNDARY ASSIGNMENT
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

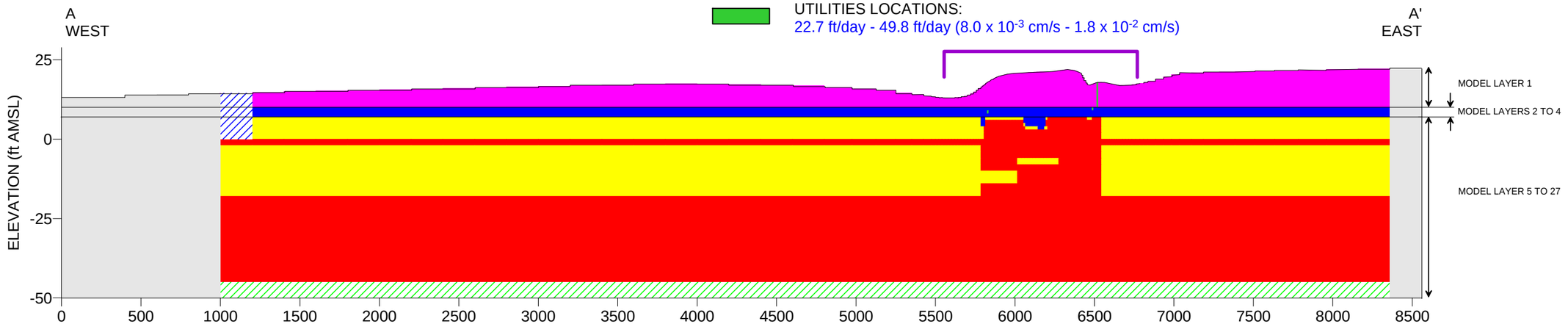


LEGEND

DOMINANT SOIL TYPE REPRESENTATION

- SURFICIAL FILL: 0.31 ft/day (1.1 x 10^{-4} cm/s)
- NATIVE WETLAND ORGANIC CLAYEY SILT: 0.08 ft/day (2.8 x 10^{-5} cm/s)
- DEEP SILTY SAND REGIONAL AQUIFER: 5.1 ft/day (1.8 x 10^{-3} cm/s)
- INTERLAYERING OF NATIVE WETLAND ORGANIC CLAYEY SILT WITH DEEP SILTY SAND AQUIFER: 0.71 ft/day - 5.1 ft/day (2.5 x 10^{-4} cm/s - 1.8 x 10^{-3} cm/s)
- UTILITIES LOCATIONS: 22.7 ft/day - 49.8 ft/day (8.0 x 10^{-3} cm/s - 1.8 x 10^{-2} cm/s)

- APPROXIMATE SITE LOCATION
- CONSTANT HEAD BOUNDARY CONDITION
- GENERAL HEAD BOUNDARY CONDITION
- NO-FLOW BOUNDARY CONDITION



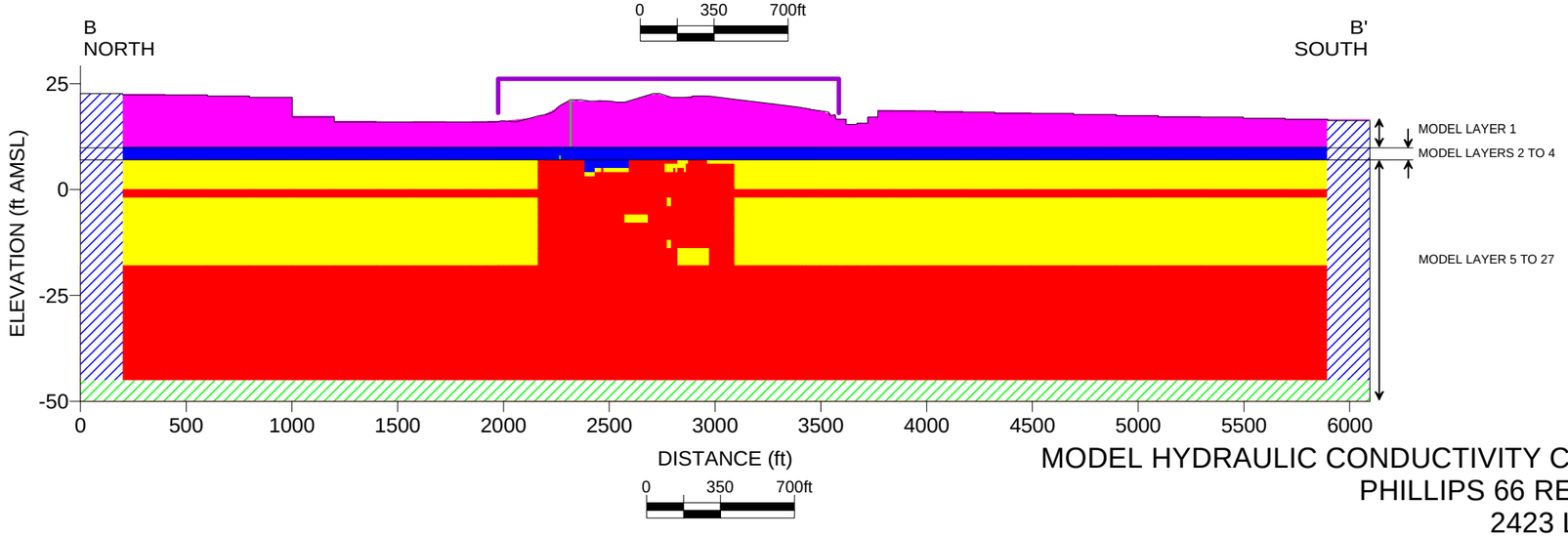
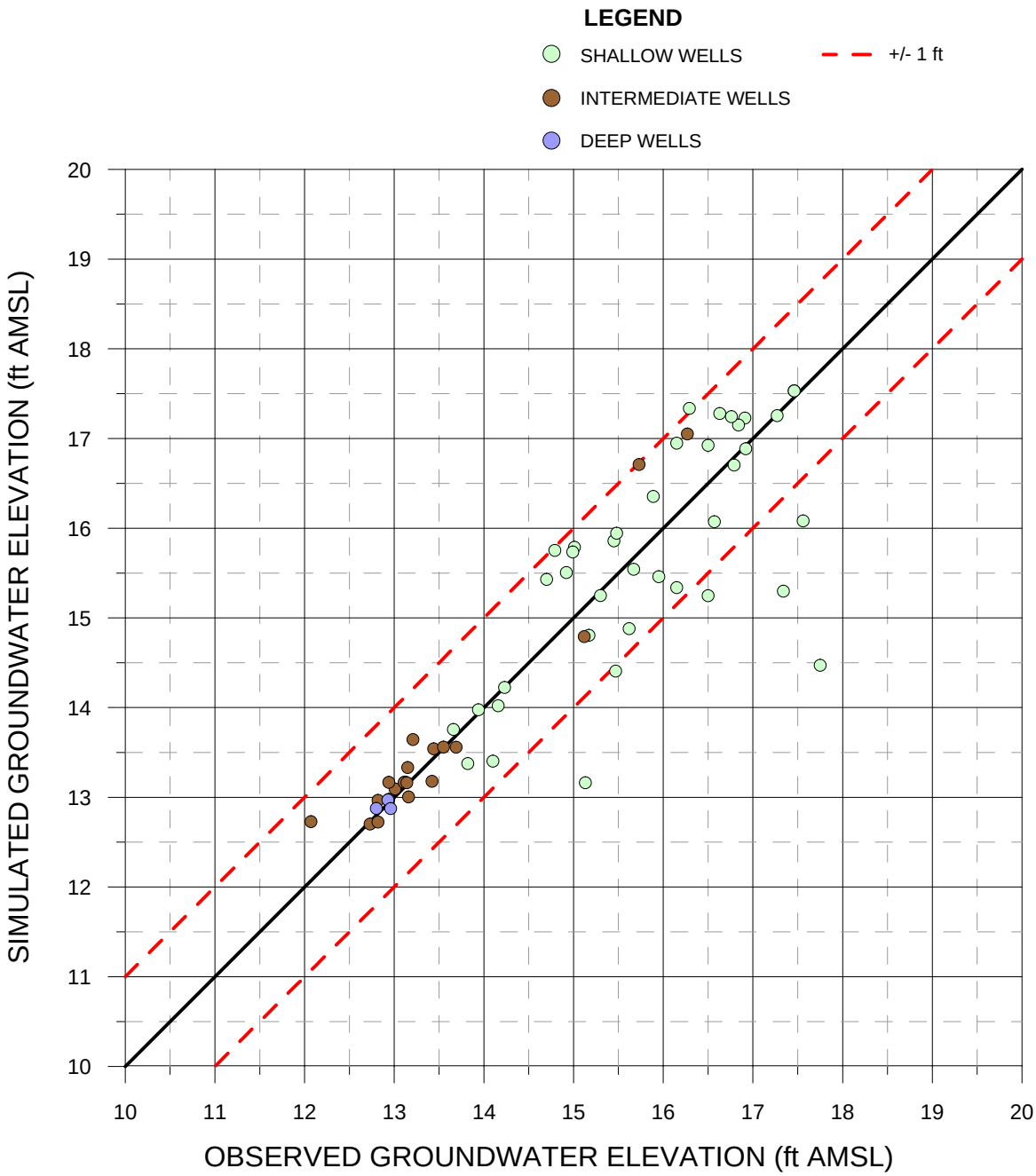


figure 6.1

MODEL HYDRAULIC CONDUCTIVITY CROSS-SECTIONS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

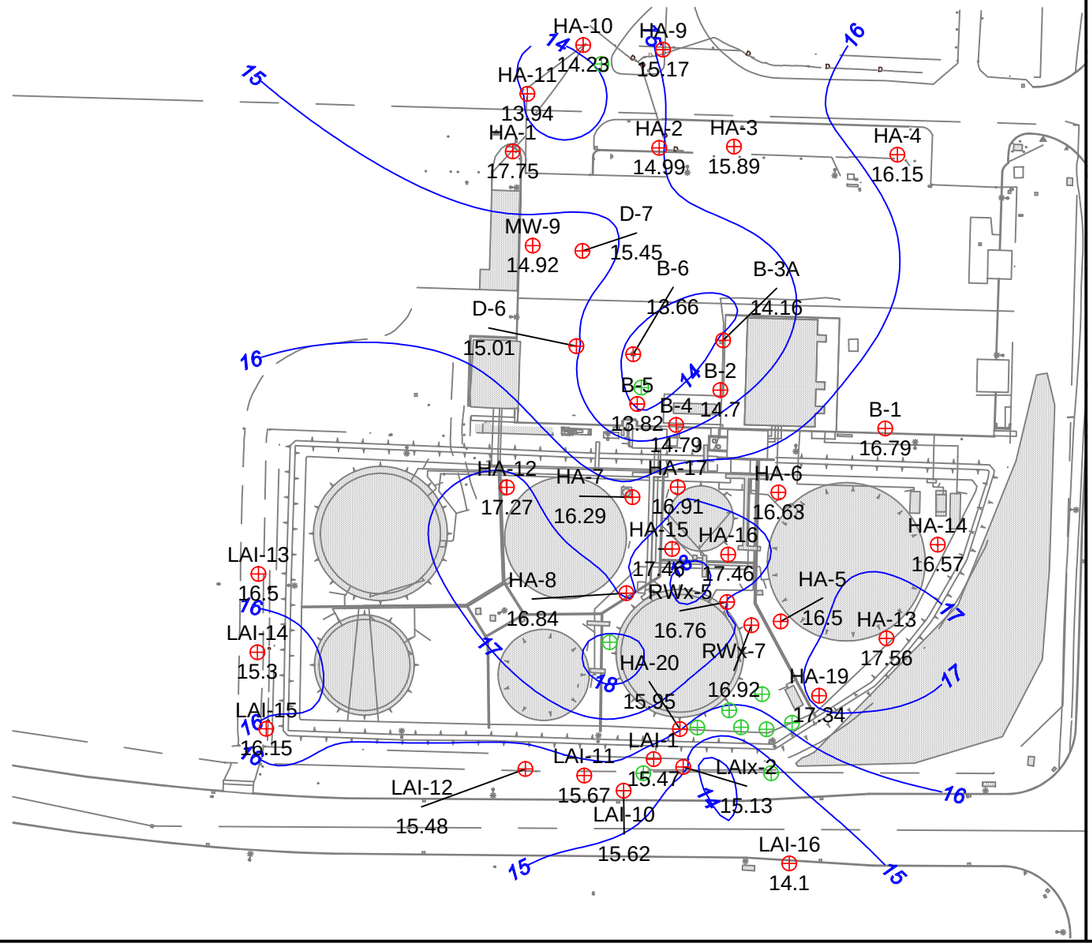


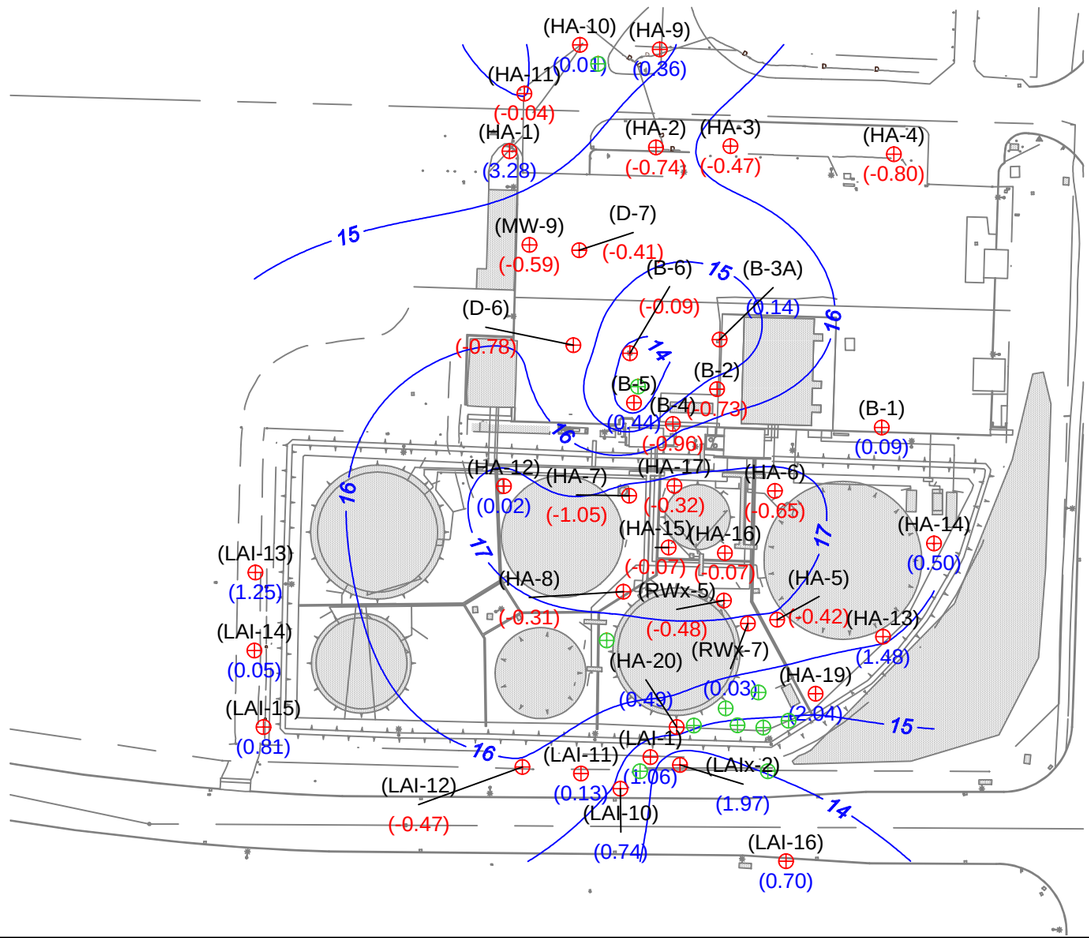
CALIBRATION STATISTICS

NUMBER OF OBSERVATIONS =	62
RESIDUAL MEAN (ft) =	0.05
ABSOLUTE RESIDUAL MEAN (ft) =	0.48
RESIDUAL STANDARD DEVIATION (ft) =	0.75
RESIDUAL SUM OF SQUARES (ft^2) =	35.12
MINIMUM RESIDUAL (ft) =	-1.05
MAXIMUM RESIDUAL (ft) =	3.28
OBSERVED HEAD RANGE (ft) =	5.68
STANDARD DEVIATION/HEAD RANGE =	0.13

figure 6.2

SCATTER PLOT OF SIMULATED VS. OBSERVED GROUNDWATER ELEVATIONS - WET CONDITIONS (FEBRUARY 2012)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington





OBSERVED (FEBRUARY 2012)

SIMULATED

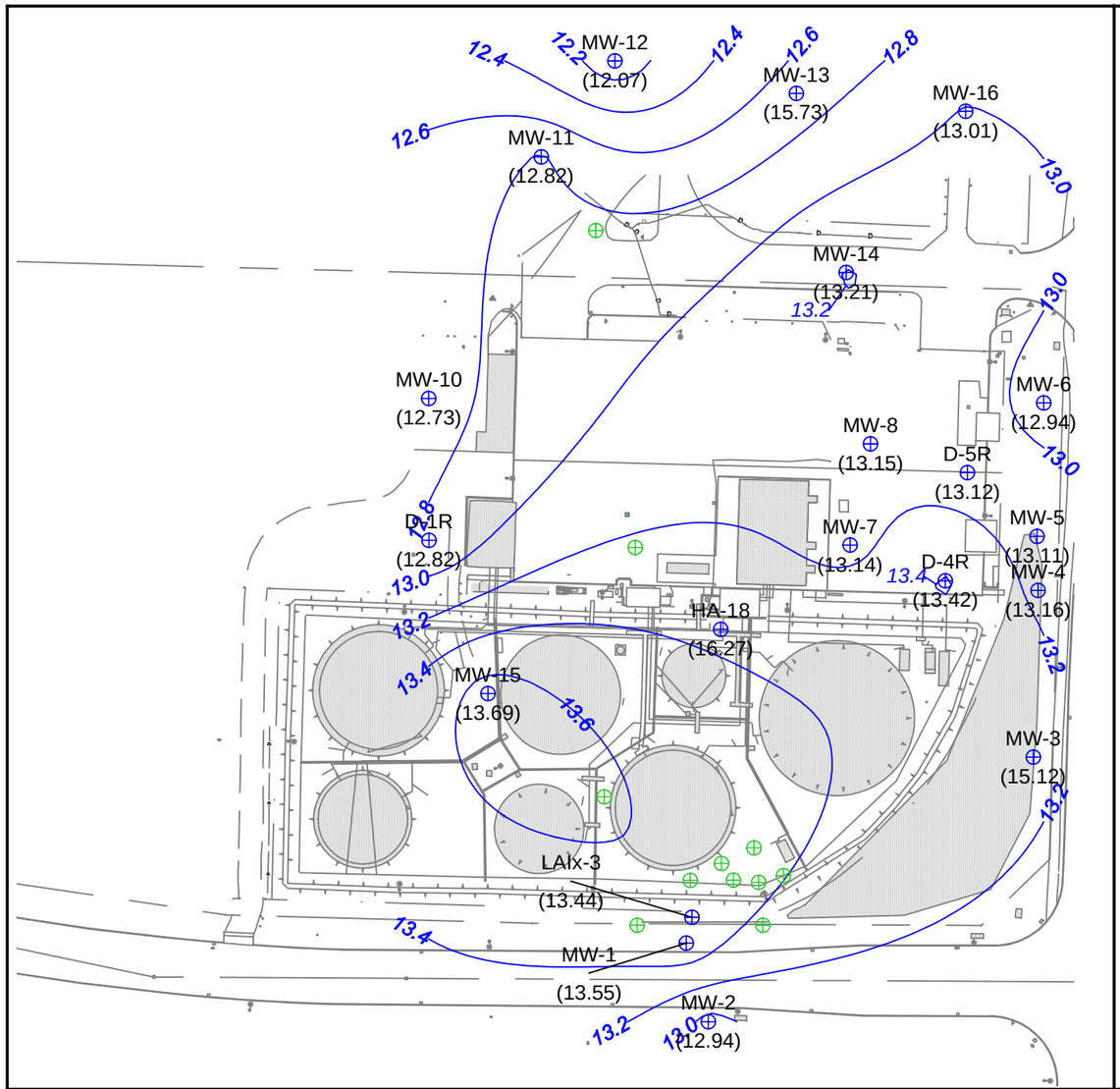
LEGEND

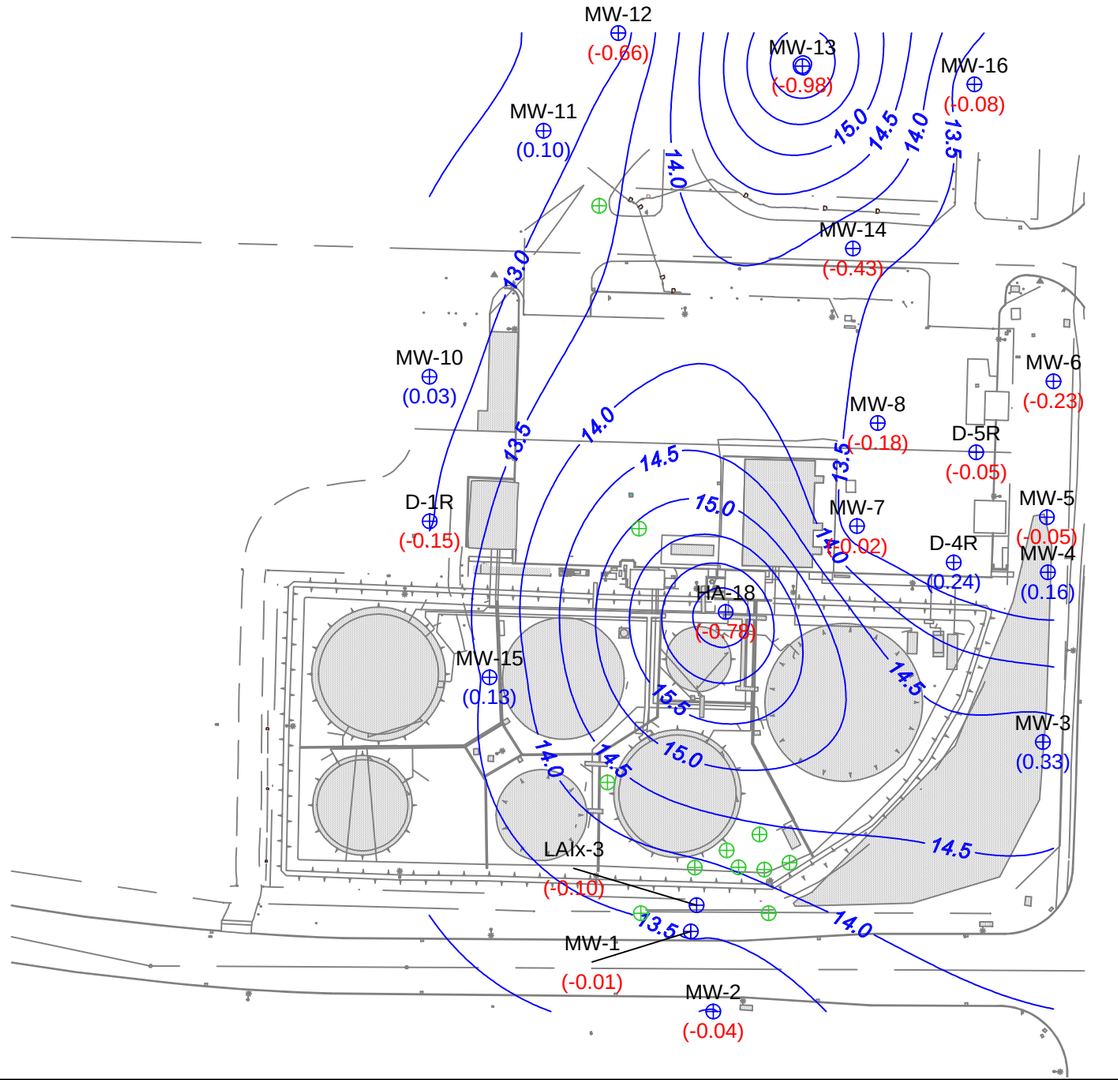
MW-10 ⊕	WELL ID	(-0.59)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - OVER-PREDICTION
(12.73)	GROUNDWATER ELEVATION (ft AMSL)	(0.74)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - UNDER-PREDICTION
—14.0—	GROUNDWATER ELEVATION CONTOUR (ft AMSL)		
⊕	REMEDIATION WELL LOCATION		

0 60 120ft

figure 6.3

CALIBRATED GROUNDWATER ELEVATION CONTOURS - WET CONDITIONS (FEBRUARY 2012) - SHALLOW
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington





OBSERVED (FEBRUARY 2012)

SIMULATED

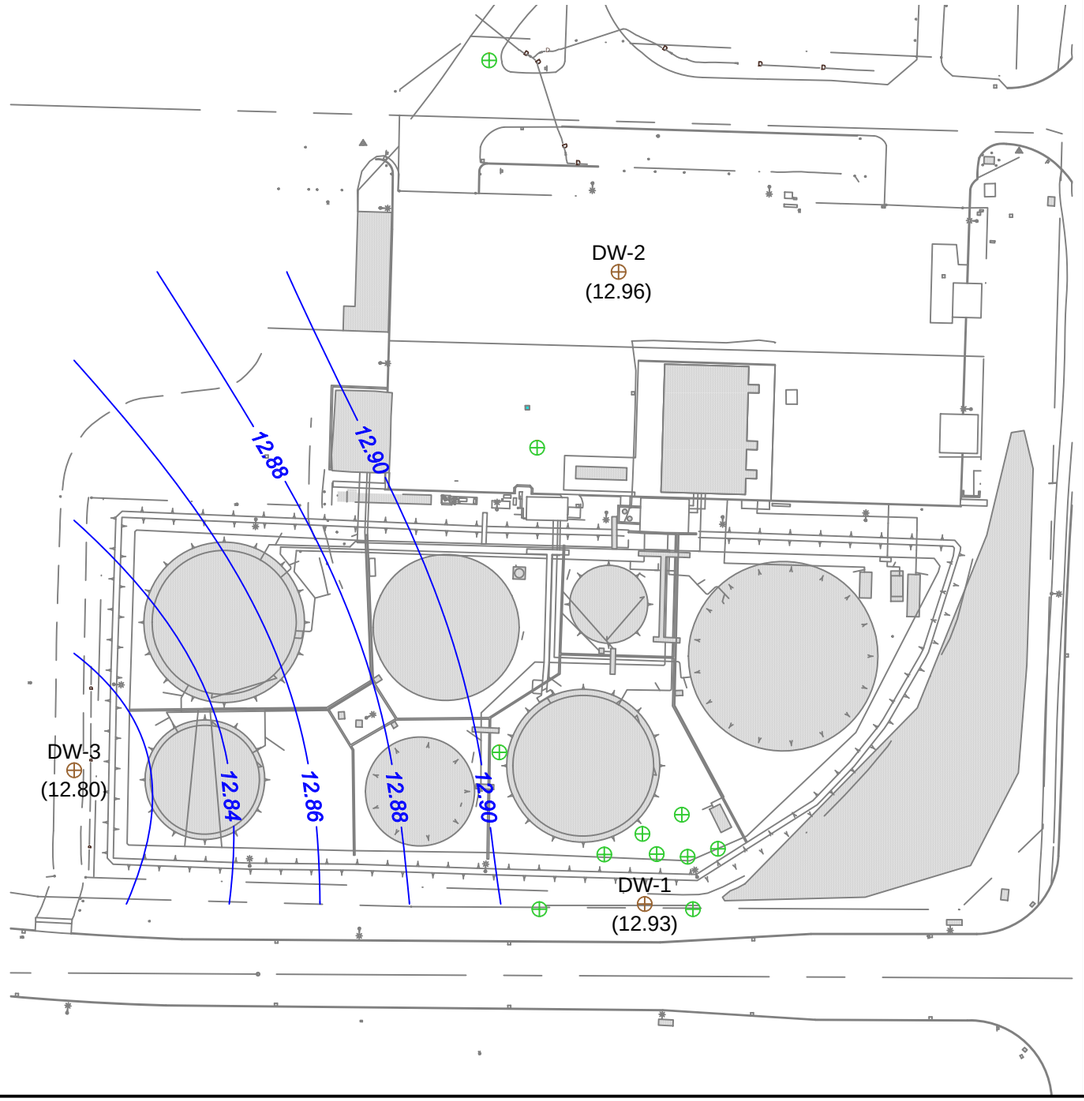
LEGEND

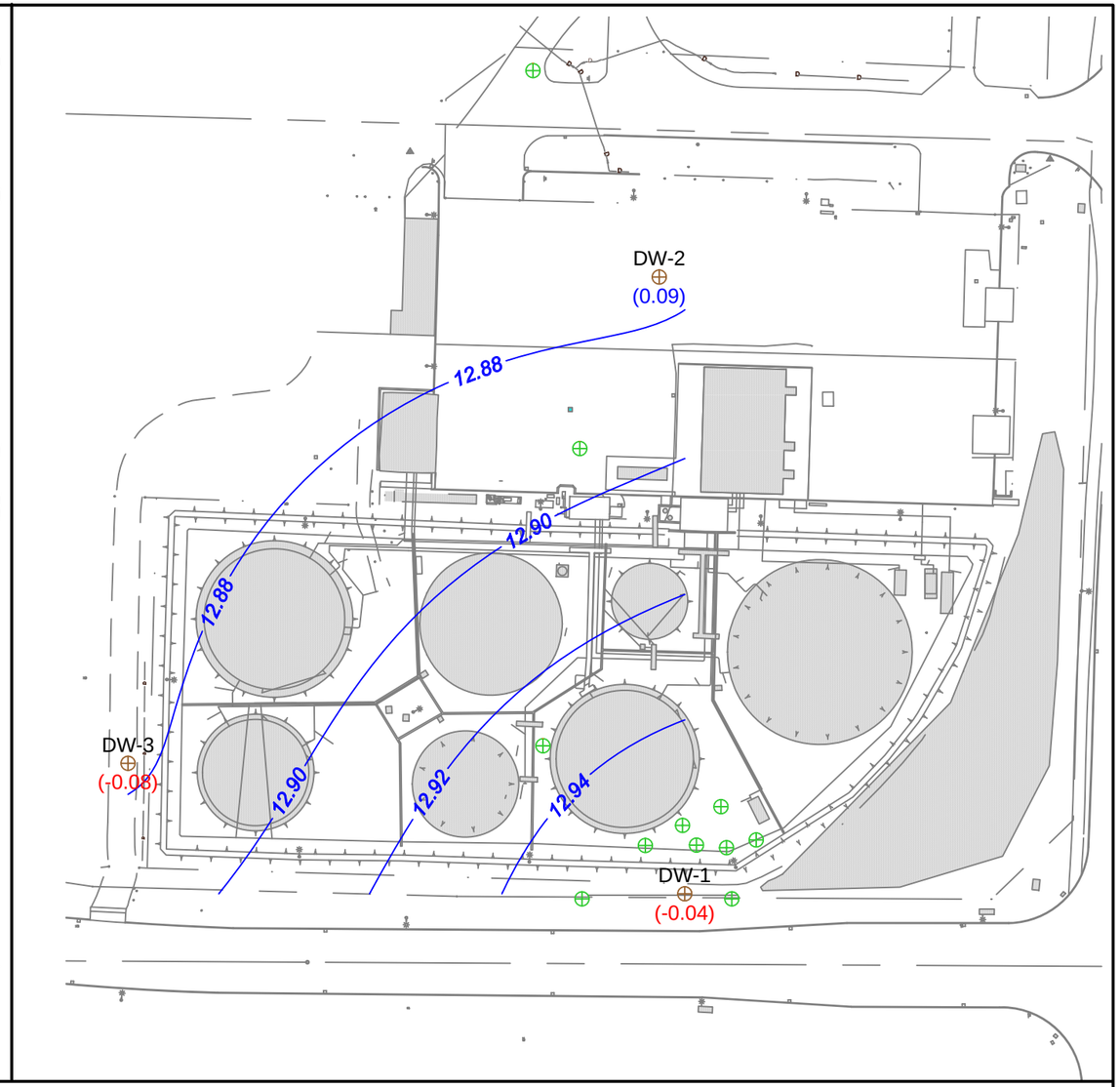
MW-10 ⊕	WELL ID	(-0.59)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - OVER-PREDICTION
(12.73)	GROUNDWATER ELEVATION (ft AMSL)	(0.74)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - UNDER-PREDICTION
—14.0—	GROUNDWATER ELEVATION CONTOUR (ft AMSL)		
⊕	REMEDIATION WELL LOCATION		

0 60 120ft

figure 6.4

CALIBRATED GROUNDWATER ELEVATION CONTOURS - WET CONDITIONS (FEBRUARY 2012) - INTERMEDIATE
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington





OBSERVED (FEBRUARY 2012)

SIMULATED

LEGEND

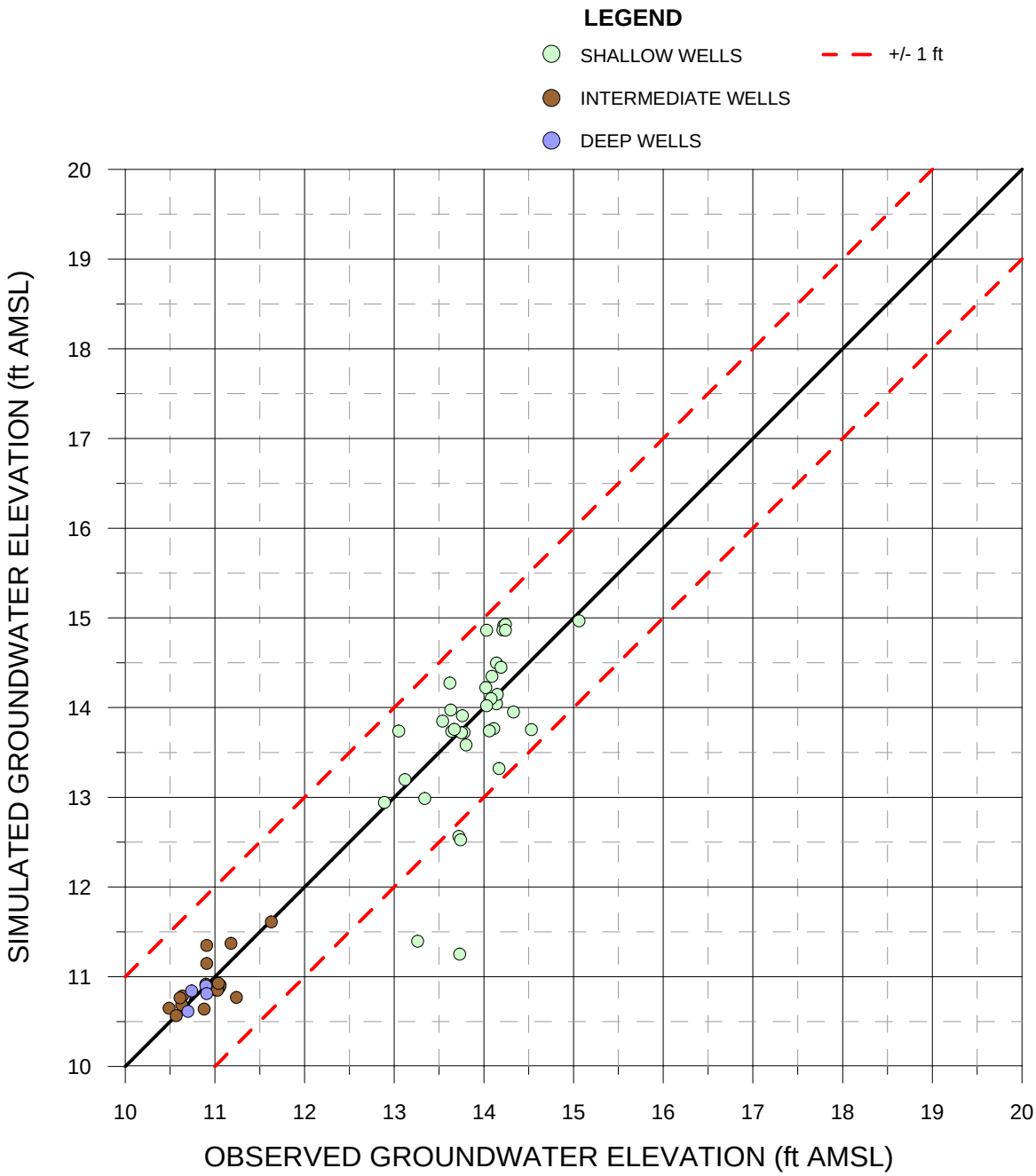
MW-10 ⊕	WELL ID
(12.73)	GROUNDWATER ELEVATION (ft AMSL)
—12.9—	GROUNDWATER ELEVATION CONTOUR (ft AMSL)
⊕	REMEDIATION WELL LOCATION
(-0.59)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - OVER-PREDICTION
(0.74)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - UNDER-PREDICTION

N

0 50 100ft

figure 6.5

CALIBRATED GROUNDWATER ELEVATION CONTOURS - WET CONDITIONS (FEBRUARY 2012) - DEEP
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



CALIBRATION STATISTICS

NUMBER OF OBSERVATIONS =	60
RESIDUAL MEAN (ft) =	0.06
ABSOLUTE RESIDUAL MEAN (ft) =	0.35
RESIDUAL STANDARD DEVIATION (ft) =	0.56
RESIDUAL SUM OF SQUARES (ft^2) =	19.08
MINIMUM RESIDUAL (ft) =	-0.83
MAXIMUM RESIDUAL (ft) =	2.48
OBSERVED HEAD RANGE (ft) =	4.57
STANDARD DEVIATION/HEAD RANGE =	0.12

figure 6.6

SCATTER PLOT OF SIMULATED VS. OBSERVED GROUNDWATER ELEVATIONS - DRY CONDITIONS (AUGUST 2012)
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

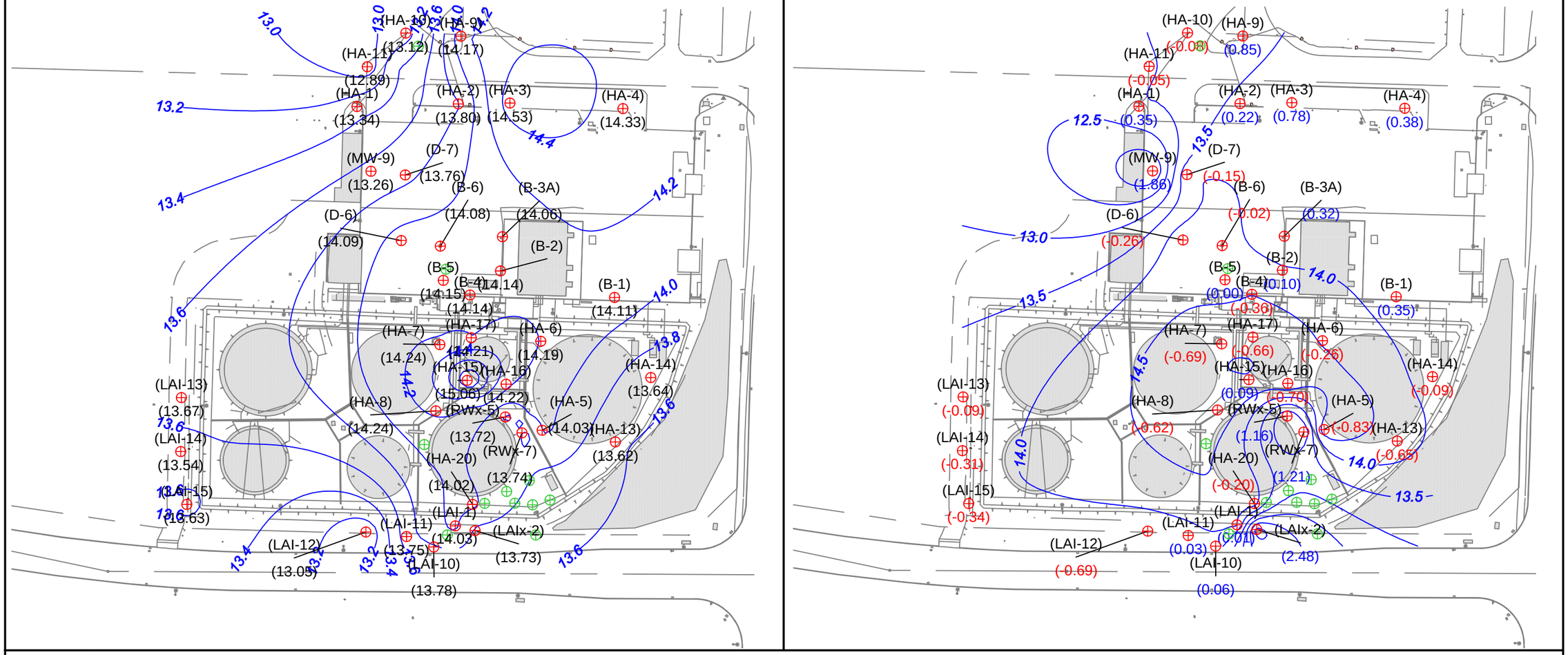
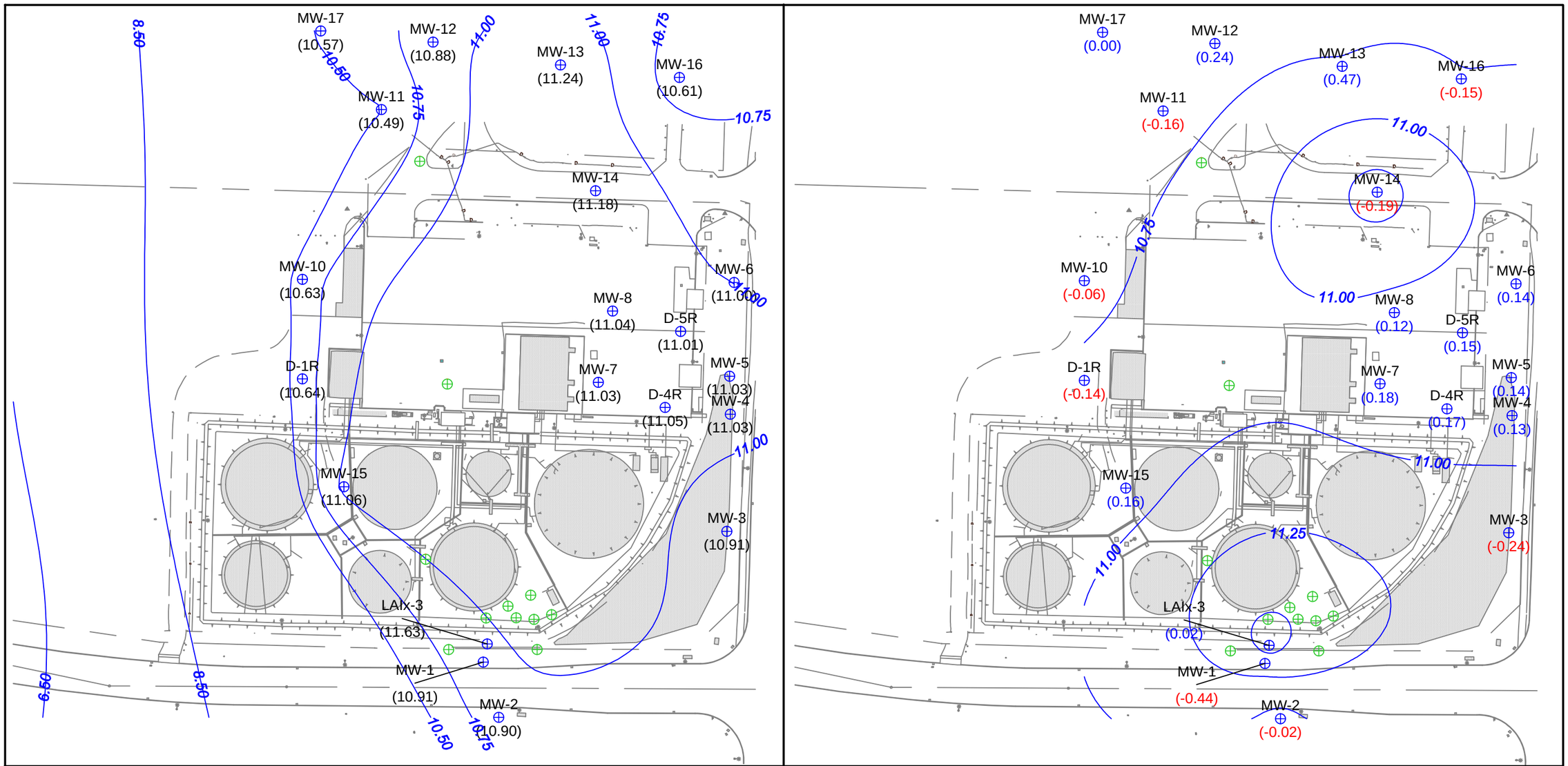


figure 6.7

CALIBRATED GROUNDWATER ELEVATION CONTOURS - DRY CONDITIONS (AUGUST 2012) - SHALLOW
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

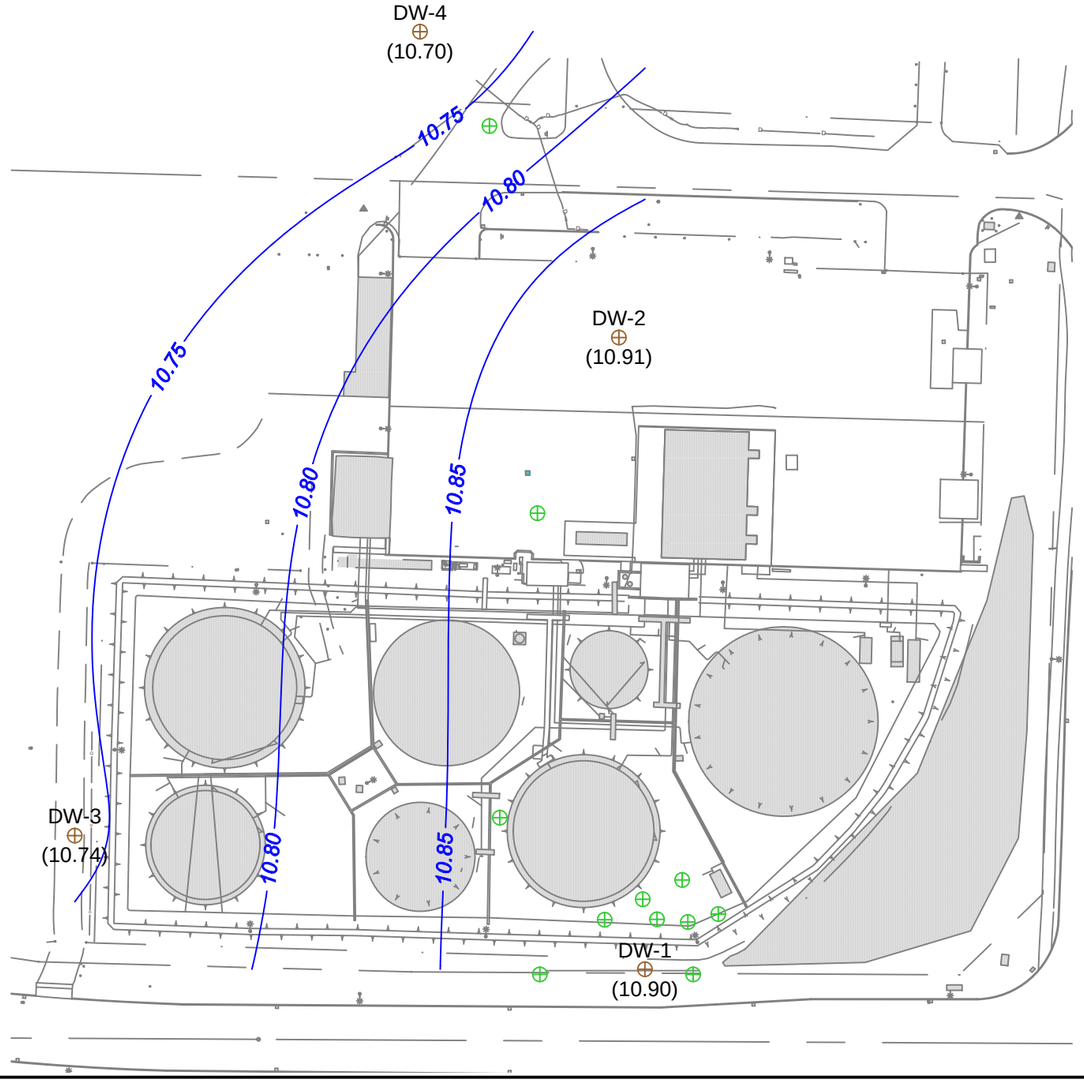


LEGEND

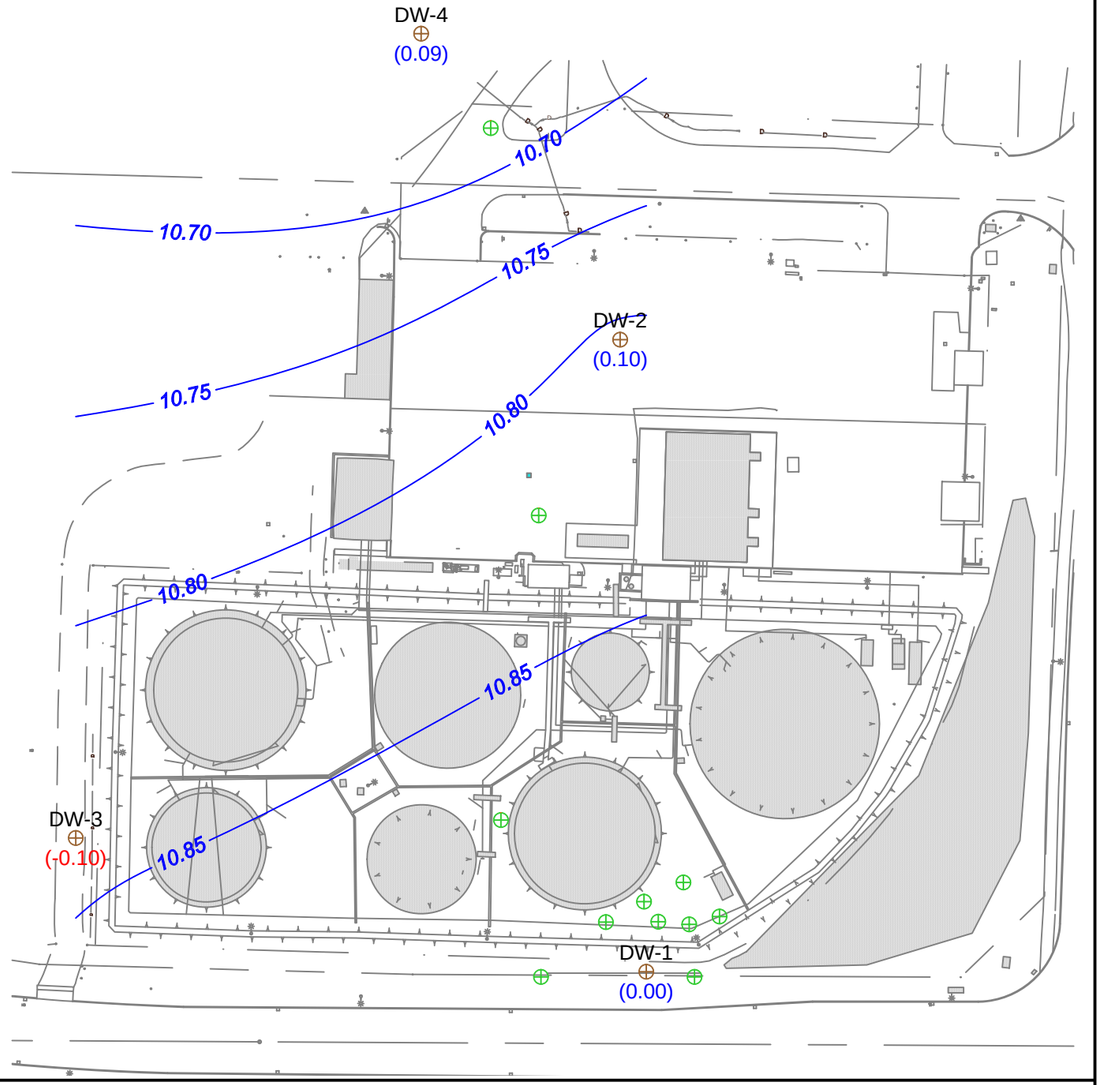
MW-10 ⊕	WELL ID
(12.73)	GROUNDWATER ELEVATION (ft AMSL)
—14.0—	GROUNDWATER ELEVATION CONTOUR (ft AMSL)
⊕	REMEDIATION WELL LOCATION
(-0.59)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - OVER-PREDICTION
(0.74)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - UNDER-PREDICTION

figure 6.8

CALIBRATED GROUNDWATER ELEVATION CONTOURS - DRY CONDITIONS (AUGUST 2012) - INTERMEDIATE
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington



OBSERVED (AUGUST/SEPTEMBER 2012)



SIMULATED

LEGEND

MW-10 ⊕	WELL ID
(12.73)	GROUNDWATER ELEVATION (ft AMSL)
—12.9—	GROUNDWATER ELEVATION CONTOUR (ft AMSL)
⊕	REMEDIATION WELL LOCATION
(-0.59)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - OVER-PREDICTION
(0.74)	CALIBRATION RESIDUAL (ft) (OBSERVED - SIMULATED GROUNDWATER ELEVATION) - UNDER-PREDICTION

N

0 50 100ft

figure 6.9

CALIBRATED GROUNDWATER ELEVATION CONTOURS - DRY CONDITIONS (AUGUST 2012) - DEEP
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

TABLE 2.1

INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3D INDICATOR KRIGING
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Location Name	*Ground Surface Elevation (ft AMSL)*	*Interpreted Soil Classification*	*Stratigraphic Pick Elevation (ft AMSL) Top*	*Bottom*
B-1	20.98	Fill - Gravelly Sand	20.98	14.38
		Native Wetland Material - Clayey Silt	14.38	12.88
B-2	21.82	Fill - Gravelly Sand	21.82	12.12
		Native Wetland Material - Clayey Silt	12.12	8.62
		Lower Native Silty Sand Aquifer	8.62	7.12
B-5	20.74	Fill - Gravelly Sand	20.74	9.07
		Native Wetland Material - Clayey Silt	9.07	7.32
D-1R	20.53	Fill - Gravelly Sand	20.53	10.53
		Native Wetland Material - Clayey Silt	10.53	6.53
		Lower Native Silty Sand Aquifer	6.53	0.53
D-4R	21.70	Fill - Gravelly Sand	21.70	11.70
		Lower Native Silty Sand Aquifer	11.70	0.20
D-5R	21.75	Fill - Gravelly Sand	21.75	10.25
		Native Wetland Material - Clayey Silt	10.25	9.25
		Lower Native Silty Sand Aquifer	9.25	1.75
D-6	21.19	Fill - Gravelly Sand	21.19	11.19
		Native Wetland Material - Clayey Silt	11.19	9.69
D-7	21.02	Fill - Gravelly Sand	21.02	11.02
		Native Wetland Material - Clayey Silt	11.02	9.52
HA-1	21.18	Fill - Gravelly Sand	21.18	12.43
		Native Wetland Material - Clayey Silt	12.43	9.43
HA-9	21.86	Fill - Gravelly Sand	21.86	12.11
		Native Wetland Material - Clayey Silt	12.11	10.11
HA-20	21.10	Fill - Gravelly Sand	21.10	11.60
		Native Wetland Material - Clayey Silt	11.60	11.10
LAI-1	20.82	Fill - Gravelly Sand	20.82	11.32
		Native Wetland Material - Clayey Silt	11.32	10.32
LAI-10	20.67	Fill - Gravelly Sand	20.67	11.17
		Native Wetland Material - Clayey Silt	11.17	9.17
LAI-11	20.99	Fill - Gravelly Sand	20.99	11.49
		Native Wetland Material - Clayey Silt	11.49	9.49
LAI-12	21.08	Fill - Gravelly Sand	21.08	11.58
		Native Wetland Material - Clayey Silt	11.58	9.58
LAI-13	22.36	Fill - Gravelly Sand	22.36	11.36
		Native Wetland Material - Clayey Silt	11.36	10.86
LAI-14	22.34	Fill - Gravelly Sand	22.34	12.84
		Native Wetland Material - Clayey Silt	12.84	10.84
LAI-15	20.47	Fill - Gravelly Sand	20.47	10.97
		Native Wetland Material - Clayey Silt	10.97	8.97
LAI-16	20.92	Fill - Gravelly Sand	20.92	11.42
		Native Wetland Material - Clayey Silt	11.42	9.42
MW-1	20.79	Fill - Gravelly Sand	20.79	6.79
		Native Wetland Material - Clayey Silt	6.79	3.79
		Lower Native Silty Sand Aquifer	3.79	0.79

TABLE 2.1

INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3-D INDICATOR KRIGING
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Location Name	*Ground Surface Elevation (ft AMSL)*	*Interpreted Soil Classification*	*Stratigraphic Pick Elevation (ft AMSL)* *Top*	*Bottom*
MW-2	20.51	Fill - Gravelly Sand	20.51	12.51
		Native Wetland Material - Clayey Silt	12.51	9.51
		Lower Native Silty Sand Aquifer	9.51	-0.99
MW-3	21.47	Fill - Gravelly Sand	21.47	10.47
		Native Wetland Material - Clayey Silt	10.47	9.47
		Lower Native Silty Sand Aquifer	9.47	5.97
		Native Wetland Material - Clayey Silt	5.97	4.97
		Lower Native Silty Sand Aquifer	4.97	1.47
MW-4	20.72	Fill - Gravelly Sand	20.72	12.72
		Native Wetland Material - Clayey Silt	12.72	10.72
		Lower Native Silty Sand Aquifer	10.72	7.22
		Native Wetland Material - Clayey Silt	7.22	6.72
		Lower Native Silty Sand Aquifer	6.72	0.72
MW-5	21.50	Fill - Gravelly Sand	21.50	9.50
		Native Wetland Material - Clayey Silt	9.50	8.50
		Lower Native Silty Sand Aquifer	8.50	1.50
MW-6	22.48	Fill - Gravelly Sand	22.48	12.48
		Native Wetland Material - Clayey Silt	12.48	11.48
		Lower Native Silty Sand Aquifer	11.48	2.48
MW-7	21.86	Fill - Gravelly Sand	21.86	12.36
		Native Wetland Material - Clayey Silt	12.36	11.36
		Lower Native Silty Sand Aquifer	11.36	8.86
		Native Wetland Material - Clayey Silt	8.86	7.86
		Lower Native Silty Sand Aquifer	7.86	2.36
MW-8	21.98	Fill - Gravelly Sand	21.98	8.48
		Native Wetland Material - Clayey Silt	8.48	6.48
		Lower Native Silty Sand Aquifer	6.48	1.98
MW-9	20.72	Fill - Gravelly Sand	20.72	11.22
		Native Wetland Material - Clayey Silt	11.22	7.72
		Lower Native Silty Sand Aquifer	7.72	6.22
		Native Wetland Material - Clayey Silt	6.22	4.22
		Lower Native Silty Sand Aquifer	4.22	1.22
MW-10	21.43	Fill - Gravelly Sand	21.43	8.93
		Native Wetland Material - Clayey Silt	8.93	7.93
		Lower Native Silty Sand Aquifer	7.93	1.43
MW-11	17.14	Fill - Gravelly Sand	17.14	9.64
		Native Wetland Material - Clayey Silt	9.64	7.64
		Lower Native Silty Sand Aquifer	7.64	-2.86
MW-12	15.03	Fill - Gravelly Sand	15.03	11.53
		Native Wetland Material - Clayey Silt	11.53	10.03
		Lower Native Silty Sand Aquifer	10.03	8.03
		Native Wetland Material - Clayey Silt	8.03	7.53
		Lower Native Silty Sand Aquifer	7.53	0.03
MW-13	16.72	Fill - Gravelly Sand	16.72	13.22
		Native Wetland Material - Clayey Silt	13.22	12.22
		Lower Native Silty Sand Aquifer	12.22	8.22

TABLE 2.1

INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3-D INDICATOR KRIGING
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Location Name	*Ground Surface Elevation (ft AMSL)*	*Interpreted Soil Classification*	*Stratigraphic Pick Elevation (ft AMSL)*	
			Top	*Bottom*
		Native Wetland Material - Clayey Silt	8.22	6.82
		Lower Native Silty Sand Aquifer	6.82	1.72
MW-14	21.40	Fill - Gravelly Sand	21.40	11.90
		Native Wetland Material - Clayey Silt	11.90	9.90
		Lower Native Silty Sand Aquifer	9.90	5.90
		Native Wetland Material - Clayey Silt	5.90	4.40
MW-15	20.84	Fill - Gravelly Sand	20.84	10.84
		Native Wetland Material - Clayey Silt	10.84	6.34
		Lower Native Silty Sand Aquifer	6.34	0.84
MW-16	16.60	Fill - Gravelly Sand	16.60	15.10
		Native Wetland Material - Clayey Silt	15.10	12.10
		Lower Native Silty Sand Aquifer	12.10	8.60
		Native Wetland Material - Clayey Silt	8.60	7.60
		Lower Native Silty Sand Aquifer	7.60	1.60
MW-17	8.82	Fill - Gravelly Sand	8.82	8.32
		Native Wetland Material - Clayey Silt	8.32	6.32
		Lower Native Silty Sand Aquifer	6.32	-13.18
		Native Wetland Material - Clayey Silt	-13.18	-13.68
		Lower Native Silty Sand Aquifer	-13.68	-26.18
DW-1	21.12	Fill - Gravelly Sand	21.12	11.12
		Native Wetland Material - Clayey Silt	11.12	10.62
		Lower Native Silty Sand Aquifer	10.62	-16.88
DW-2	21.68	Fill - Gravelly Sand	21.68	12.68
		Native Wetland Material - Clayey Silt	12.68	11.18
		Lower Native Silty Sand Aquifer	11.18	7.68
		Native Wetland Material - Clayey Silt	7.68	5.68
		Lower Native Silty Sand Aquifer	5.68	-9.32
		Native Wetland Material - Clayey Silt	-9.32	-11.32
		Lower Native Silty Sand Aquifer	-11.32	-18.32
DW-3	22.30	Fill - Gravelly Sand	22.30	14.30
		Native Wetland Material - Clayey Silt	14.30	3.30
		Lower Native Silty Sand Aquifer	3.30	1.80
		Native Wetland Material - Clayey Silt	1.80	0.30
		Lower Native Silty Sand Aquifer	0.30	-10.70
		Native Wetland Material - Clayey Silt	-10.70	-13.70
		Lower Native Silty Sand Aquifer	-13.70	-15.70
DW-4	12.24	Fill - Gravelly Sand	12.24	11.24
		Native Wetland Material - Clayey Silt	11.24	7.24
		Lower Native Silty Sand Aquifer	7.24	3.24
		Native Wetland Material - Clayey Silt	3.24	2.24
		Lower Native Silty Sand Aquifer	2.24	-22.76
TW-1	11.71	Native Wetland Material - Clayey Silt	11.71	11.21
		Lower Native Silty Sand Aquifer	11.21	5.71
		Native Wetland Material - Clayey Silt	5.71	5.21
		Lower Native Silty Sand Aquifer	5.21	3.71
		Native Wetland Material - Clayey Silt	3.71	2.21
		Lower Native Silty Sand Aquifer	2.21	-18.29

TABLE 2.1

INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3-D INDICATOR KRIGING
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Location Name	*Ground Surface Elevation (ft AMSL)*	*Interpreted Soil Classification*	*Stratigraphic Pick Elevation (ft AMSL) Top*	*Bottom*
TW-2	16.72	Fill - Gravelly Sand	16.72	12.72
		Native Wetland Material - Clayey Silt	12.72	11.72
TW-3	16.62	Fill - Gravelly Sand	16.62	6.12
		Native Wetland Material - Clayey Silt	6.12	5.62
		Lower Native Silty Sand Aquifer	5.62	4.62
		Native Wetland Material - Clayey Silt	4.62	4.02
		Lower Native Silty Sand Aquifer	4.02	-10.88
		Native Wetland Material - Clayey Silt	-10.88	-11.38
		Lower Native Silty Sand Aquifer	-11.38	-14.38
		Native Wetland Material - Clayey Silt	-14.38	-17.38
		Lower Native Silty Sand Aquifer	-17.38	-18.38
TW-4	16.66	Fill - Gravelly Sand	16.66	14.16
		Native Wetland Material - Clayey Silt	14.16	12.16
		Lower Native Silty Sand Aquifer	12.16	11.66
TW-5	16.75	Fill - Gravelly Sand	16.75	15.75
		Native Wetland Material - Clayey Silt	15.75	11.75
		Lower Native Silty Sand Aquifer	11.75	5.75
		Native Wetland Material - Clayey Silt	5.75	4.75
		Lower Native Silty Sand Aquifer	4.75	-2.75
		Native Wetland Material - Clayey Silt	-2.75	-3.25
		Lower Native Silty Sand Aquifer	-3.25	-12.25
		Native Wetland Material - Clayey Silt	-12.25	-12.75
		Lower Native Silty Sand Aquifer	-12.75	-18.25
TW-6	16.80	Fill - Gravelly Sand	16.80	12.80
		Native Wetland Material - Clayey Silt	12.80	11.80
TW-7	16.83	Fill - Gravelly Sand	16.83	15.33
		Native Wetland Material - Clayey Silt	15.33	14.33
		Lower Native Silty Sand Aquifer	14.33	13.08
		Native Wetland Material - Clayey Silt	13.08	10.83
		Lower Native Silty Sand Aquifer	10.83	8.33
		Native Wetland Material - Clayey Silt	8.33	7.83
		Lower Native Silty Sand Aquifer	7.83	-5.17
		Native Wetland Material - Clayey Silt	-5.17	-6.17
		Lower Native Silty Sand Aquifer	-6.17	-18.17
TW-8	16.85	Fill - Gravelly Sand	16.85	15.85
		Native Wetland Material - Clayey Silt	15.85	11.85
B-2*	22.12	Fill - Gravelly Sand	22.12	12.12
		Native Wetland Material - Clayey Silt	12.12	9.12
B-3*	22.25	Fill - Gravelly Sand	22.25	14.25
		Native Wetland Material - Clayey Silt	14.25	13.25
B-4*	21.39	Fill - Gravelly Sand	21.39	10.39
		Native Wetland Material - Clayey Silt	10.39	8.39
B-5*	21.32	Fill - Gravelly Sand	21.32	12.32
B-6*	21.41	Fill - Gravelly Sand	21.41	8.41
		Native Wetland Material - Clayey Silt	8.41	1.91
		Lower Native Silty Sand Aquifer	1.91	-0.59

TABLE 2.1

INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3-D INDICATOR KRIGING
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Location Name	*Ground Surface Elevation (ft AMSL)*	*Interpreted Soil Classification*	*Stratigraphic Pick Elevation (ft AMSL) Top*	*Bottom*
G-1	21.07	Fill - Gravelly Sand	21.07	16.07
		Not logged	16.07	15.07
		Fill - Gravelly Sand	15.07	11.07
G-2	21.45	Fill - Gravelly Sand	21.45	11.45
G-3	21.82	Fill - Gravelly Sand	21.82	11.82
G-4	22.05	Fill - Gravelly Sand	22.05	12.05
G-5	21.98	Fill - Gravelly Sand	21.98	11.98
G-6	21.94	Fill - Gravelly Sand	21.94	11.94
G-7	21.64	Fill - Gravelly Sand	21.64	11.64
G-9	20.82	Fill - Gravelly Sand	20.82	14.32
G-10	20.56	Fill - Gravelly Sand	20.56	14.06
G-11	20.25	Fill - Gravelly Sand	20.25	15.75
G-12	20.14	Fill - Gravelly Sand	20.14	15.64
G-13	20.41	Fill - Gravelly Sand	20.41	12.91
G-14	20.13	Fill - Gravelly Sand	20.13	16.63
G-15	20.22	Fill - Gravelly Sand	20.22	14.22
G-16	20.31	Fill - Gravelly Sand	20.31	15.81
G-17	20.19	Fill - Gravelly Sand	20.19	15.69
G-18	20.57	Fill - Gravelly Sand	20.57	10.17
		Native Wetland Material - Clayey Silt	10.17	5.57
G-19	20.96	Fill - Gravelly Sand	20.96	11.36
		Native Wetland Material - Clayey Silt	11.36	7.36
		Lower Native Silty Sand Aquifer	7.36	5.96
G-20	21.02	Fill - Gravelly Sand	21.02	9.82
		Native Wetland Material - Clayey Silt	9.82	4.82
		Lower Native Silty Sand Aquifer	4.82	1.02
G-21	20.79	Fill - Gravelly Sand	20.79	11.39
		Native Wetland Material - Clayey Silt	11.39	7.99
		Lower Native Silty Sand Aquifer	7.99	0.79
G-22	20.63	Fill - Gravelly Sand	20.63	11.43
		Native Wetland Material - Clayey Silt	11.43	5.63
		Lower Native Silty Sand Aquifer	5.63	0.63
G-23	20.72	Fill - Gravelly Sand	20.72	11.92
		Native Wetland Material - Clayey Silt	11.92	6.52
		Lower Native Silty Sand Aquifer	6.52	0.72
G-24	21.24	Fill - Gravelly Sand	21.24	11.64
		Native Wetland Material - Clayey Silt	11.64	7.24
		Lower Native Silty Sand Aquifer	7.24	1.24
G-25	20.82	Fill - Gravelly Sand	20.82	11.02
		Native Wetland Material - Clayey Silt	11.02	5.82
G-26	20.41	Fill - Gravelly Sand	20.41	10.41

TABLE 2.1

INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3-D INDICATOR KRIGING
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Location Name	*Ground Surface Elevation (ft AMSL)*	*Interpreted Soil Classification*	*Stratigraphic Pick Elevation (ft AMSL)* *Top*	*Bottom*
		Native Wetland Material - Clayey Silt	10.41	4.61
		Lower Native Silty Sand Aquifer	4.61	0.41
G-27	21.38	Fill - Gravelly Sand	21.38	10.18
		Native Wetland Material - Clayey Silt	10.18	2.98
		Lower Native Silty Sand Aquifer	2.98	1.38
G-28	21.36	Fill - Gravelly Sand	21.36	10.56
		Native Wetland Material - Clayey Silt	10.56	3.56
		Lower Native Silty Sand Aquifer	3.56	1.36
G-29	21.94	Fill - Gravelly Sand	21.94	11.14
		Native Wetland Material - Clayey Silt	11.14	3.94
		Lower Native Silty Sand Aquifer	3.94	1.94
G-30	21.69	Fill - Gravelly Sand	21.69	12.09
		Native Wetland Material - Clayey Silt	12.09	9.29
		Lower Native Silty Sand Aquifer	9.29	1.69
G-31	21.44	Fill - Gravelly Sand	21.44	10.04
		Native Wetland Material - Clayey Silt	10.04	3.64
		Lower Native Silty Sand Aquifer	3.64	1.44
G-32	22.41	Fill - Gravelly Sand	22.41	13.81
		Native Wetland Material - Clayey Silt	13.81	11.01
		Lower Native Silty Sand Aquifer	11.01	2.41
G-33	22.46	Fill - Gravelly Sand	22.46	13.66
		Native Wetland Material - Clayey Silt	13.66	11.66
		Lower Native Silty Sand Aquifer	11.66	8.46
		Native Wetland Material - Clayey Silt	8.46	7.66
		Lower Native Silty Sand Aquifer	7.66	2.46
G-34	21.55	Fill - Gravelly Sand	21.55	12.15
		Native Wetland Material - Clayey Silt	12.15	9.95
		Lower Native Silty Sand Aquifer	9.95	6.75
		Native Wetland Material - Clayey Silt	6.75	5.15
		Lower Native Silty Sand Aquifer	5.15	1.55
G-36	21.00	Fill - Gravelly Sand	21.00	11.00
		Native Wetland Material - Clayey Silt	11.00	7.40
		Lower Native Silty Sand Aquifer	7.40	5.00
		Native Wetland Material - Clayey Silt	5.00	2.40
		Lower Native Silty Sand Aquifer	2.40	1.00
G-37	20.90	Fill - Gravelly Sand	20.90	13.30
		Native Wetland Material - Clayey Silt	13.30	11.10
		Lower Native Silty Sand Aquifer	11.10	0.90
G-38	22.11	Fill - Gravelly Sand	22.11	14.11
		Native Wetland Material - Clayey Silt	14.11	12.11
		Lower Native Silty Sand Aquifer	12.11	2.11
G-39	21.85	Fill - Gravelly Sand	21.85	12.85
		Native Wetland Material - Clayey Silt	12.85	9.85
		Lower Native Silty Sand Aquifer	9.85	1.85
SB-TR2A	16.82	Fill - Gravelly Sand	16.82	11.12
		Native Wetland Material - Clayey Silt	11.12	8.82

TABLE 2.1

INTERPRETED STRATIGRAPHIC BORING MATERIALS AND ELEVATIONS APPLIED IN 3-D INDICATOR KRIGING
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Location Name	*Ground Surface Elevation (ft AMSL)*	*Interpreted Soil Classification*	*Stratigraphic Pick Elevation (ft AMSL) Top*	*Bottom*
SB-TR2B	16.47	Fill - Gravelly Sand	16.47	11.17
		Native Wetland Material - Clayey Silt	11.17	8.47
SB-TR2C	16.61	Fill - Gravelly Sand	16.61	10.91
		Native Wetland Material - Clayey Silt	10.91	8.61
		Lower Native Silty Sand Aquifer	8.61	6.81
		Native Wetland Material - Clayey Silt	6.81	5.61
SB-TR2D	18.55	Fill - Gravelly Sand	18.55	12.55
		Native Wetland Material - Clayey Silt	12.55	11.55
		Lower Native Silty Sand Aquifer	11.55	9.55
SB-TR2E	18.71	Fill - Gravelly Sand	18.71	11.71
		Native Wetland Material - Clayey Silt	11.71	9.21
		Lower Native Silty Sand Aquifer	9.21	8.51
		Native Wetland Material - Clayey Silt	8.51	8.01
		Lower Native Silty Sand Aquifer	8.01	5.71
SB-TR2F	19.30	Fill - Gravelly Sand	19.30	12.30
		Native Wetland Material - Clayey Silt	12.30	10.80
		Lower Native Silty Sand Aquifer	10.80	9.80
SB-TR2G	16.65	Fill - Gravelly Sand	16.65	11.65
		Native Wetland Material - Clayey Silt	11.65	9.65
SB-TR2H	16.98	Fill - Gravelly Sand	16.98	9.98
		Native Wetland Material - Clayey Silt	9.98	6.28
		Lower Native Silty Sand Aquifer	6.28	5.98
LAIx-2	21.18	Fill - Gravelly Sand	21.18	11.68
		Native Wetland Material - Clayey Silt	11.68	2.18
LAIx-3	21.08	Fill - Gravelly Sand	21.08	11.58
		Native Wetland Material - Clayey Silt	11.58	2.08
LAIx-4	20.92	Fill - Gravelly Sand	20.92	11.42
		Native Wetland Material - Clayey Silt	11.42	3.92
LAIx-5	20.64	Fill - Gravelly Sand	20.64	11.14
		Native Wetland Material - Clayey Silt	11.14	5.64
LAIx-6	20.55	Fill - Gravelly Sand	20.55	11.05
		Native Wetland Material - Clayey Silt	11.05	3.55
LAIx-7	20.76	Fill - Gravelly Sand	20.76	11.26
		Native Wetland Material - Clayey Silt	11.26	3.76
LAIx-8	20.81	Fill - Gravelly Sand	20.81	11.31
		Native Wetland Material - Clayey Silt	11.31	3.81
LAIx-9	20.74	Fill - Gravelly Sand	20.74	11.24
		Native Wetland Material - Clayey Silt	11.24	3.74

TABLE 2.2

SUMMARY OF HYDRAULIC CONDUCTIVITY VALUES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Monitoring Well	*Ground Surface Elevation (ft AMSL)*	*Screen Depth from Ground Surface*		*Screen Elevation*		*Screen Length (ft)*	*Hydraulic Conductivity (cm/s)*	*Geometric Mean Hydraulic Gradient Per Well*		*Stratigraphic Unit*
		Top (ft)	*Bottom (ft)*	*Top (ft AMSL)*	*Bottom (ft AMSL)*			*(cm/s)*	*(ft/day)*	
Source: Pumping Tests										
DW-2	21.68	20	30	1.68	-8.32	10	4.58E-03 1.11E-03	2.25E-03	6.38	Lower Native Silty Sand Aquifer
TW-3	21.62	20	30	1.62	-8.38	10	3.45E-03 1.67E-03	2.40E-03	6.81	Lower Native Silty Sand Aquifer
TW-5	21.75	20	30	1.75	-8.25	10	3.45E-03 1.72E-03	2.43E-03	6.90	Lower Native Silty Sand Aquifer
TW-7	21.83	20	30	1.83	-8.17	10	3.25E-03 1.25E-03	2.02E-03	5.72	Lower Native Silty Sand Aquifer
Source: Slug Tests										
MW-1	20.79	5	20	15.79	0.79	15	2.06E-05 1.30E-05 1.68E-05	1.65E-05	0.047	Screen spans all 3 soil types
MW-2	20.51	5	20	15.51	0.51	15	2.78E-03 1.72E-03 2.14E-03 2.50E-03 1.21E-03 3.18E-03	2.15E-03	6.10	Screen spans all 3 soil types
MW-3	21.47	5	20	16.47	1.47	15	7.04E-04 6.35E-04 5.73E-04 6.29E-04 5.34E-04 4.24E-04	5.76E-04	1.63	Screen spans all 3 soil types
MW-4	20.72	5	20	15.72	0.72	15	2.83E-04 2.39E-04 2.78E-04 1.90E-04 2.21E-04 2.27E-04	2.37E-04	0.67	Screen spans all 3 soil types
MW-5	21.50	5	20	16.50	1.50	15	3.76E-04 3.06E-04 3.21E-04 3.90E-04 3.36E-04 3.62E-04	3.47E-04	0.98	Screen spans all 3 soil types
MW-6	22.48	5	20	17.48	2.48	15	8.70E-04 7.81E-04 7.41E-04 1.34E-03 1.01E-03	9.42E-04	2.67	Screen spans all 3 soil types

TABLE 2.2

SUMMARY OF HYDRAULIC CONDUCTIVITY VALUES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Monitoring Well	*Ground Surface Elevation (ft AMSL)*	*Screen Depth from Ground Surface*		*Screen Elevation*		*Screen Length (ft)*	*Hydraulic Conductivity (cm/s)*	*Geometric Mean Hydraulic Gradient Per Well*		*Stratigraphic Unit*
		Top (ft)	*Bottom (ft)*	*Top (ft AMSL)*	*Bottom (ft AMSL)*			*(cm/s)*	*(ft/day)*	
							1.03E-03			
MW-7	22.36	5	20	17.36	2.36	15	2.48E-04 2.86E-04 2.99E-04 2.04E-04 2.89E-04 2.93E-04	2.68E-04	0.76	Screen spans all 3 soil types
MW-8	21.98	5	20	16.98	1.98	15	5.90E-04 6.16E-04 6.69E-04 7.83E-04 7.75E-04 8.51E-04	7.08E-04	2.01	Screen spans all 3 soil types
MW-9	21.22	5	20	16.22	1.22	15	8.83E-05 8.18E-05 3.98E-05 3.74E-05	5.72E-05	0.16	Screen spans all 3 soil types
MW-10	21.43	5	20	16.43	1.43	15	3.78E-04 3.85E-04 3.87E-04 4.07E-04 4.07E-04 4.03E-04	3.94E-04	1.12	Screen spans all 3 soil types
MW-11	17.14	5	20	12.14	-2.86	15	1.59E-03 1.56E-03 1.48E-03 1.78E-03 1.77E-03 1.73E-03	1.65E-03	4.66	Screen spans all 3 soil types
MW-12	20.03	5	20	15.03	0.03	15	1.05E-03 1.04E-03 1.02E-03 1.23E-03 1.32E-03 1.36E-03	1.16E-03	3.29	Screen spans all 3 soil types
MW-13	21.72	5	20	16.72	1.72	15	1.98E-04 1.60E-04 1.07E-04 1.02E-04 6.02E-05 1.01E-04	1.13E-04	0.32	Screen spans all 3 soil types
MW-14	21.90	5	20	16.90	1.90	15	3.91E-04 3.32E-04	4.09E-04	1.16	Screen spans all 3 soil types

TABLE 2.2

SUMMARY OF HYDRAULIC CONDUCTIVITY VALUES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Monitoring Well	*Ground Surface Elevation (ft AMSL)*	*Screen Depth from Ground Surface*		*Screen Elevation*		*Screen Length (ft)*	*Hydraulic Conductivity (cm/s)*	*Geometric Mean Hydraulic Gradient Per Well*		*Stratigraphic Unit*
		Top (ft)	*Bottom (ft)*	*Top (ft AMSL)*	*Bottom (ft AMSL)*			*(cm/s)*	*(ft/day)*	
							3.86E-04 5.98E-04 4.12E-04 3.81E-04			
MW-15	20.84	5	20	15.84	0.84	15	3.49E-04 3.25E-04 3.39E-04 3.95E-04 3.78E-04 3.99E-04	3.63E-04	1.03	Screen spans all 3 soil types
MW-16	21.60	5	20	16.60	1.60	15	3.90E-03 1.92E-03 2.68E-03 1.57E-03 1.46E-03 1.47E-03	2.02E-03	5.72	Screen spans all 3 soil types
D-1R	20.53	5	20	15.53	0.53	15	5.41E-04 4.11E-04 4.14E-04 3.66E-04 4.36E-04 3.63E-04	4.18E-04	1.18	Screen spans all 3 soil types
D-4R	21.70	5	20	16.70	1.70	15	2.33E-04 2.86E-04 2.06E-04 3.18E-04 3.51E-04 3.96E-04	2.91E-04	0.82	Fill - Gravelly Silty Sand
D-5R	21.75	4.5	19.5	17.25	2.25	15	1.60E-03 1.80E-03 1.56E-03 1.83E-03 1.86E-03 1.87E-03	1.75E-03	4.96	Screen spans all 3 soil types
DW-1	21.12	20	30	1.12	-8.88	10	1.69E-02 2.43E-02 2.43E-02 2.13E-02 3.00E-02 2.58E-02	2.34E-02	66.34	Lower Native Silty Sand Aquifer
DW-2	21.68	20	30	1.68	-8.32	10	2.87E-04 2.82E-04 2.58E-04	2.77E-04	0.79	Lower Native Silty Sand Aquifer

TABLE 2.2

SUMMARY OF HYDRAULIC CONDUCTIVITY VALUES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Monitoring Well	*Ground Surface Elevation (ft AMSL)*	*Screen Depth from Ground Surface*		*Screen Elevation*		*Screen Length (ft)*	*Hydraulic Conductivity (cm/s)*	*Geometric Mean Hydraulic Gradient Per Well*		*Stratigraphic Unit*
		Top (ft)	*Bottom (ft)*	*Top (ft AMSL)*	*Bottom (ft AMSL)*			*(cm/s)*	*(ft/day)*	
							2.78E-04			
							2.87E-04			
							2.73E-04			
DW-3	22.30	20	30	2.30	-7.70	10	3.17E-03	3.22E-03	9.13	Lower Native Silty Sand Aquifer
							3.09E-03			
							3.13E-03			
							3.46E-03			
							3.26E-03			
							3.23E-03			
B-2	22.12	2	12	20.12	10.12	10	6.30E-05	6.35E-05	0.18	Fill - Gravelly Silty Sand
							8.74E-05			
							6.16E-05			
							4.81E-05			
B-5	21.32	2	12	19.32	9.32	10	1.30E-04	1.61E-04	0.46	Fill - Gravelly Silty Sand
							1.71E-04			
							1.11E-04			
							2.69E-04			
							1.91E-04			
							1.38E-04			
B-6	21.41	2	12	19.41	9.41	10	9.09E-05	7.45E-05	0.21	Fill - Gravelly Silty Sand
							5.33E-05			
							8.72E-05			
							7.11E-05			
							7.94E-05			
							7.20E-05			
HA-1	21.18	3.5	8.5	17.68	12.68	5	2.48E-04	1.71E-04	0.48	Fill - Gravelly Silty Sand
							1.66E-04			
							1.37E-04			
							1.46E-04			
							1.82E-04			
							1.65E-04			
HA-16	20.53	3.5	8.5	17.03	12.03	5	2.89E-05	1.98E-05	0.06	Fill - Gravelly Silty Sand
							2.26E-05			
							1.89E-05			
							1.63E-05			
							1.69E-05			
							1.78E-05			
LAIx-2	21.18	13.5	19	7.68	2.18	6	1.10E-04	8.22E-05	0.23	Log Not Available
							8.69E-05			
							8.76E-05			
							6.43E-05			
							7.67E-05			
							7.43E-05			

TABLE 2.2

SUMMARY OF HYDRAULIC CONDUCTIVITY VALUES
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SOUTHWEST
RENTON, WASHINGTON

Monitoring Well	*Ground Surface Elevation (ft AMSL)*	*Screen Depth from Ground Surface*		*Screen Elevation*		*Screen Length (ft)*	*Hydraulic Conductivity (cm/s)*	*Geometric Mean Hydraulic Gradient Per Well*		*Stratigraphic Unit*
		Top (ft)	*Bottom (ft)*	*Top (ft AMSL)*	*Bottom (ft AMSL)*			*(cm/s)*	*(ft/day)*	
LAI-10	20.67	3	10	17.67	10.67	7	4.05E-04 4.32E-05 7.22E-05 1.67E-04 2.20E-04 1.56E-04	1.39E-04	0.39	Fill - Gravelly Silty Sand
RWx-5	20.96	3	17	17.96	3.96	14	1.27E-04 2.58E-04 2.94E-04 6.81E-04 4.77E-04 5.54E-04	3.47E-04	0.98	Log Not Available
Source: Soil Sample Analysis (LIF Investigation) [(1)]										
G-18	20.57	8.5		12.07		-	2.36E-05	2.36E-05	0.067	Fill - Gravelly Silty Sand
G-19	20.96	10.75	13	10.21	7.96	2	6.50E-06	6.50E-06	0.018	Native Wetland Material - Clayey Silt
G-25	20.82	12	14	8.82	6.82	2	1.02E-05	1.02E-05	0.029	Native Wetland Material - Clayey Silt
G-30	21.69	9.5	12	12.19	9.69	3	6.73E-06	6.73E-06	0.019	Native Wetland Material - Clayey Silt
G-42	21.90	11.5		10.40		-	1.01E-03	1.01E-03	2.863	Lower Native Silty Sand Aquifer

HYDRAULIC CONDUCTIVITY SUMMARY

Material Type	**Geometric Mean (cm/sec)**	**Geometric Mean (ft/day)**	**Min (cm/s)**	**Min(ft/day)**	**Max (cm/s)**	**Max(ft/day)**
Fill - Gravelly Silty Sand	8.39E-05	0.24	1.98E-05	0.06	2.91E-04	0.82
Native Wetland Material - Clayey Silt	7.64E-06	0.02	6.50E-06	0.018	1.02E-05	0.029
Lower Native Silty Sand Aquifer	2.21E-03	6.25	2.77E-04	0.79	2.34E-02	66.34

Notes:

(1) Screen depth and elevation are representative of soil sample top and bottom depths and not well screen depth

TABLE 5.1

SUMMARY OF REMDIATION WELL PARAMETERS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Well	*Ground Surface Elevation (ft AMSL)*	*Top of Screen Depth (ft bgs)*	*Top of Screen Elevation (ft AMSL)*	*Bottom of Screen Depth (ft bgs)*	*Bottom of Screen Elevation (ft AMSL)*	*Water Intake Elevation (ft AMSL)*	*Drain Stage Elevations Used in Groundwater Flow Model (ft AMSL)* [1]
R-1	21.35	No Well Completion Log available				12.78	9.33
R-2	21.80	No Well Completion Log available				9.33	12.78
LAIx-5	20.64	3.00	17.64	15.00	5.64	8.72	11.14[2]
LAIx-6	20.55	3.00	17.55	17.00	3.55	6.63	11.05[2]
LAIx-7	20.76	3.00	17.76	17.00	3.76	6.84	11.26[2]
LAIx-9	20.74	3.00	17.74	17.00	3.74	6.82	11.24[2]
RWx-2	21.28	3.00	18.28	17.00	4.28	7.36	11.0[3]
HWx-1E	21.01	3.00	18.01	18.60	2.41	5.49	11.0[3]
HWx-1W	21.14	3.00	18.14	19.00	2.14	5.22	11.0[3]

Notes:

(1) Drain stage elevations were set to the top of the observed native wetland clayey silt surface or well water intake elevations, whichever was greater in elevation due to the native wetland clayey silt not being a water bearing stratigraphical unit and to avoid convergence issues from dry model cells in low hydraulic conductivity units.

(2) Observed top elevation of native wetland clay silt surface according to stratigraphic log.

(3) Assumed top elevation of native wetland clayey silt surface based on surrounding well locations. Logs did not document soil types.

TABLE 6.1

FEBRUARY AND AUGUST 2012 CALIBRATION TARGETS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

	Groundwater Elevation (ft NAVD)		*Screen Elevation (ft NAVD88)*		*Feb 2012 Targets*	*Aug 2012 Targets*
Well ID	*Feb 2012*	*Aug 2012*	*Start*	*End*	*Elevation* [1]	*Elevation* [1]
B-1	16.79	14.11	19.88	13.38	15.09	13.75
B-2	14.70	14.14	20.12	10.12	12.41	12.13
B-3A	14.16	14.06	17.25	12.25	13.21	13.16
B-4	14.79	14.14	19.39	9.39	12.09	11.77
B-5	13.82	14.15	19.32	9.32	11.57	11.74
B-6	13.66	14.08	19.41	9.41	11.54	11.75
D-6	15.01	14.09	-	11.19 (2)	13.10	12.64
D-7	15.45	13.76	-	11.02 (2)	13.24	12.39
HA-1	17.75	13.34	17.68	12.68	15.18	13.01
HA-10	14.23	13.12	17.48	12.48	13.36	12.80
HA-11	13.94	12.89	17.24	12.24	13.09	12.57
HA-12	17.27	NA	-	10.48 (3)	13.88	NA
HA-13	17.56	13.62	-	10.74 (3)	14.15	12.18
HA-14	16.57	13.64	-	11.13 (3)	13.85	12.39
HA-15	17.46	15.06	17.74	13.74	15.60	14.40
HA-16	17.46	14.22	17.03	12.03	14.53	13.13
HA-17	16.91	14.21	16.78	13.78	15.28	14.00
HA-19	17.34	NA	-	10.61 (3)	13.98	NA
HA-2	14.99	13.80	16.46	17.96	16.48	15.88
HA-20	15.95	14.02	16.6	11.6	13.78	12.81
HA-3	15.89	14.53	19.56	14.56	15.23	14.55
HA-4	16.15	14.33	18.53	13.03	14.59	13.68
HA-5	16.5	14.03	16.2	11.2	13.70	12.62
HA-6	16.63	14.19	16.32	11.32	13.82	12.76
HA-7	16.29	14.24	16.3	11.3	13.80	12.77
HA-8	16.84	14.24	16.43	11.43	13.93	12.84
HA-9	15.17	14.17	17.36	12.36	13.77	13.27
LAI-1	15.47	14.03	16.32	11.32	13.40	12.68
LAI-10	15.62	13.78	17.67	10.67	13.15	12.23
LAI-11	15.67	13.75	17.99	10.99	13.33	12.37
LAI-12	15.48	13.05	-	11.58 (2)	13.53	12.32
LAI-13	16.5	13.67	-	11.36 (2)	13.93	12.52
LAI-14	15.30	13.54	-	12.84 (2)	14.07	13.19
LAI-15	16.15	13.63	-	10.97 (2)	13.56	12.30
LAI-16	14.10	NA	-	11.42 (2)	12.76	NA
LAIx-2	15.13	13.73	7.68	2.18	4.93	4.93
MW-9	14.92	13.26	16.22	1.22	8.07	7.24
RWx-5	16.76	13.72	17.96	3.96	10.36	8.84
RWx-7	16.92	13.74	17.97	3.97	10.45	8.86
D-1R	12.82	10.64	15.53	0.53	6.68	5.59
D-4R	13.42	11.05	16.7	1.7	7.56	6.38
D-5R	13.12	11.01	17.25	2.25	7.69	6.63

TABLE 6.1

FEBRUARY AND AUGUST 2012 CALIBRATION TARGETS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

	Groundwater Elevation (ft NAVD)		*Screen Elevation (ft NAVD88)*			
Well ID	*Feb 2012*	*Aug 2012*	*Start*	*End*	*Feb 2012 Targets Elevation* [(1)]	*Aug 2012 Targets Elevation* [(1)]
HA-18	16.27	NA	16.22	13.22	14.72	NA
LAIx-3	13.44	11.63	17.58	2.08	7.76	6.86
MW-1	13.55	10.91	15.79	0.79	7.17	5.85
MW-10	12.73	10.63	16.43	1.43	7.08	6.03
MW-11	12.82	10.49	12.14	-2.86	4.64	3.82
MW-12	12.07	10.88	15.03	0.03	6.05	5.46
MW-13	15.73	11.24	16.72	1.72	8.73	6.48
MW-14	13.21	11.18	16.9	1.9	7.56	6.54
MW-15	13.69	11.06	15.84	0.84	7.27	5.95
MW-16	13.01	10.61	16.6	1.6	7.31	6.11
MW-17	NA	10.57	8.82	-6.18	NA	1.32
MW-2	12.94	10.90	15.51	0.51	6.73	5.71
MW-3	15.12	10.91	16.47	1.47	8.30	6.19
MW-4	13.16	11.03	15.72	0.72	6.94	5.88
MW-5	13.11	11.03	16.5	1.5	7.31	6.27
MW-6	12.94	11.00	17.48	2.48	7.71	6.74
MW-7	13.14	11.03	17.36	2.36	7.75	6.70
MW-8	13.15	11.04	16.98	1.98	7.57	6.51
DW-1	12.93	10.90	1.12	-8.88	-3.88	-3.88
DW-2	12.96	10.91	1.68	-8.32	-3.32	-3.32
DW-3	12.80	10.74	2.3	-7.7	-2.7	-2.7
DW-4	NA	10.70	-2.76	-22.76	NA	-12.76

Notes:

(1) If groundwater elevation is above start of well screen elevation then target elevation is calculated as the midpoint between the top and bottom well screen elevation. If the groundwater elevation is below the top of well screen elevation then the target elevation is calculated as the midpoint between the measured groundwater elevation and the well screen bottom elevation.

(2) Well completion log is not available. Wells have been identified to be screened within the shallow fill material and draw water from the shallow groundwater unit. Therefore, top of clayey silt surface used as bottom of screen elevation.

(3) Well completion log is not available. In general hand augured wells were dug down to 10 feet below ground surface. Screen bottom elevation is based on 10 feet being subtracted from the ground surface elevation.

NA Groundwater elevation was not recorded for monitoring event.

TABLE 6.2

FEBRUARY 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Monitoring Well	*Zone*	*Target Elevation (ft AMSL)*	*Model Layer*	*Groundwater Elevation*		*Residual* [(1)] *(ft)*
				Observed (ft AMSL)	*Simulated (ft AMSL)*	
B-1	Shallow	15.09	1	16.79	16.70	0.09
B-2	Shallow	12.41	1	14.70	15.43	-0.73
B-3A	Shallow	13.21	1	14.16	14.02	0.14
B-4	Shallow	12.09	1	14.79	15.75	-0.96
B-5	Shallow	11.57	1	13.82	13.38	0.44
B-6	Shallow	11.54	1	13.66	13.75	-0.09
D-6	Shallow	13.10	1	15.01	15.79	-0.78
D-7	Shallow	13.24	1	15.45	15.86	-0.41
HA-1	Shallow	15.18	1	17.75	14.47	3.28
HA-10	Shallow	13.36	1	14.23	14.22	0.01
HA-11	Shallow	13.09	1	13.94	13.98	-0.04
HA-12	Shallow	13.88	1	17.27	17.25	0.02
HA-13	Shallow	14.15	1	17.56	16.08	1.48
HA-14	Shallow	13.85	1	16.57	16.07	0.50
HA-15	Shallow	15.60	1	17.46	17.53	-0.07
HA-16	Shallow	14.53	1	17.46	17.53	-0.07
HA-17	Shallow	15.28	1	16.91	17.23	-0.32
HA-19	Shallow	13.98	1	17.34	15.30	2.04
HA-2	Shallow	16.48	1	14.99	15.73	-0.74
HA-20	Shallow	13.78	1	15.95	15.46	0.49
HA-3	Shallow	15.23	1	15.89	16.36	-0.47
HA-4	Shallow	14.59	1	16.15	16.95	-0.80
HA-5	Shallow	13.70	1	16.50	16.92	-0.42
HA-6	Shallow	13.82	1	16.63	17.28	-0.65
HA-7	Shallow	13.80	1	16.29	17.34	-1.05
HA-8	Shallow	13.93	1	16.84	17.15	-0.31
HA-9	Shallow	13.77	1	15.17	14.81	0.36
LAI-1	Shallow	13.40	1	15.47	14.41	1.06
LAI-10	Shallow	13.15	1	15.62	14.88	0.74
LAI-11	Shallow	13.33	1	15.67	15.54	0.13
LAI-12	Shallow	13.53	1	15.48	15.95	-0.47
LAI-13	Shallow	13.93	1	16.50	15.25	1.25
LAI-14	Shallow	14.07	1	15.30	15.25	0.05
LAI-15	Shallow	13.56	1	16.15	15.34	0.81
LAI-16	Shallow	12.76	1	14.10	13.40	0.70
LAIx-2	Shallow	4.93	7	15.13	13.16	1.97
MW-9	Shallow	8.07	1	14.92	15.51	-0.59
RWx-5	Shallow	10.36	1	16.76	17.24	-0.48
RWx-7	Shallow	10.45	1	16.92	16.89	0.03
D-1R	Intermediate	6.68	5	12.82	12.97	-0.15
D-4R	Intermediate	7.56	4	13.42	13.18	0.24
D-5R	Intermediate	7.69	4	13.12	13.17	-0.05
HA-18	Intermediate	14.72	1	16.27	17.05	-0.78
LAIx-3	Intermediate	7.76	4	13.44	13.54	-0.10
MW-1	Intermediate	7.17	4	13.55	13.56	-0.01
MW-10	Intermediate	7.08	4	12.73	12.70	0.03

TABLE 6.2

FEBRUARY 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Monitoring Well	*Zone*	*Target Elevation (ft AMSL)*	*Model Layer*	*Groundwater Elevation*		*Residual* [(1)] *(ft)*
				Observed (ft AMSL)	*Simulated (ft AMSL)*	
MW-11	Intermediate	4.64	7	12.82	12.72	0.10
MW-12	Intermediate	6.05	5	12.07	12.73	-0.66
MW-13	Intermediate	8.73	1	15.73	16.71	-0.98
MW-14	Intermediate	7.56	4	13.21	13.64	-0.43
MW-15	Intermediate	7.27	4	13.69	13.56	0.13
MW-16	Intermediate	7.31	4	13.01	13.09	-0.08
MW-2	Intermediate	6.73	5	12.94	12.98	-0.04
MW-3	Intermediate	8.30	1	15.12	14.79	0.33
MW-4	Intermediate	6.94	5	13.16	13.00	0.16
MW-5	Intermediate	7.31	4	13.11	13.16	-0.05
MW-6	Intermediate	7.71	4	12.94	13.17	-0.23
MW-7	Intermediate	7.75	4	13.14	13.16	-0.02
MW-8	Intermediate	7.57	4	13.15	13.33	-0.18
DW-1	Deep	-3.88	13	12.93	12.97	-0.04
DW-2	Deep	-3.32	13	12.96	12.87	0.09
DW-3	Deep	-2.70	13	12.80	12.88	-0.08

TABLE 6.2

FEBRUARY 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

RESIDUAL STATISTICS - ENTIRE MODEL

RESIDUAL MEAN (ft) =	0.05
RESIDUAL STANDARD DEVIATION (ft) =	0.75
RESIDUAL SUM OF SQUARES (ft^2) =	35.12
ABSOLUTE RESIDUAL MEAN (ft) =	0.48
MINIMUM RESIDUAL (ft) =	-1.05
MAXIMUM RESIDUAL (ft) =	3.28
OBSERVED HEAD RANGE (ft) =	5.68
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.13

RESIDUAL STATISTICS - (Shallow Zone)

RESIDUAL MEAN (ft) =	0.16
RESIDUAL STANDARD DEVIATION (ft) =	0.90
RESIDUAL SUM OF SQUARES (ft^2) =	32.57
ABSOLUTE RESIDUAL MEAN (ft) =	0.64
MINIMUM RESIDUAL (ft) =	-1.05
MAXIMUM RESIDUAL (ft) =	3.28
OBSERVED HEAD RANGE (ft) =	4.32
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.21

RESIDUAL STATISTICS - (Intermediate Zone)

RESIDUAL MEAN (ft) =	-0.14
RESIDUAL STANDARD DEVIATION (ft) =	0.33
RESIDUAL SUM OF SQUARES (ft^2) =	2.54
ABSOLUTE RESIDUAL MEAN (ft) =	0.24
MINIMUM RESIDUAL (ft) =	-0.98
MAXIMUM RESIDUAL (ft) =	0.33
OBSERVED HEAD RANGE (ft) =	1.31
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.25

RESIDUAL STATISTICS - (Deep Zone)

RESIDUAL MEAN (ft) =	-0.01
RESIDUAL STANDARD DEVIATION (ft) =	0.07
RESIDUAL SUM OF SQUARES (ft^2) =	0.01
ABSOLUTE RESIDUAL MEAN (ft) =	0.07
MINIMUM RESIDUAL (ft) =	-0.08
MAXIMUM RESIDUAL (ft) =	0.09
OBSERVED HEAD RANGE (ft) =	0.16
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.43

Note:
ft Feet.
ft^2 Square feet.
(1) Residual is equal to observed groundwater elevation minus the simulated hydraulic head.

TABLE 6.3

AUGUST 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Monitoring Well	*Zone*	*Target Elevation (ft AMSL)*	*Model Layer*	*Groundwater Elevation Observed (ft AMSL)*	*Groundwater Elevation Simulated (ft AMSL)*	*Residual* [(1)] *(ft)*
B-1	Shallow	13.75	1	14.11	13.76	0.35
B-2	Shallow	12.13	1	14.14	14.04	0.10
B-3A	Shallow	13.16	1	14.06	13.74	0.32
B-4	Shallow	11.77	1	14.14	14.50	-0.36
B-5	Shallow	11.74	1	14.15	14.15	0.00
B-6	Shallow	11.75	1	14.08	14.10	-0.02
D-6	Shallow	12.64	1	14.09	14.35	-0.26
D-7	Shallow	12.39	1	13.76	13.91	-0.15
HA-1	Shallow	13.01	1	13.34	12.99	0.35
HA-10	Shallow	12.80	1	13.12	13.20	-0.08
HA-11	Shallow	12.57	1	12.89	12.94	-0.05
HA-13	Shallow	12.18	1	13.62	14.27	-0.65
HA-14	Shallow	12.39	1	13.64	13.73	-0.09
HA-15	Shallow	14.40	1	15.06	14.97	0.09
HA-16	Shallow	13.13	1	14.22	14.92	-0.70
HA-17	Shallow	14.00	1	14.21	14.87	-0.66
HA-2	Shallow	15.88	1	13.80	13.58	0.22
HA-20	Shallow	12.81	1	14.02	14.22	-0.20
HA-3	Shallow	14.55	1	14.53	13.75	0.78
HA-4	Shallow	13.68	1	14.33	13.95	0.38
HA-5	Shallow	12.62	1	14.03	14.86	-0.83
HA-6	Shallow	12.76	1	14.19	14.45	-0.26
HA-7	Shallow	12.77	1	14.24	14.93	-0.69
HA-8	Shallow	12.84	1	14.24	14.86	-0.62
HA-9	Shallow	13.27	1	14.17	13.32	0.85
LAI-1	Shallow	12.68	1	14.03	14.02	0.01
LAI-10	Shallow	12.23	1	13.78	13.72	0.06
LAI-11	Shallow	12.37	1	13.75	13.72	0.03
LAI-12	Shallow	12.32	1	13.05	13.74	-0.69
LAI-13	Shallow	12.52	1	13.67	13.76	-0.09
LAI-14	Shallow	13.19	1	13.54	13.85	-0.31
LAI-15	Shallow	12.30	1	13.63	13.97	-0.34
LAIx-2	Shallow	4.93	7	13.73	11.25	2.48
MW-9	Shallow	7.24	4	13.26	11.40	1.86
RWx-5	Shallow	8.84	3	13.72	12.56	1.16
RWx-7	Shallow	8.86	3	13.74	12.53	1.21
D-1R	Intermediate	5.59	6	10.64	10.78	-0.14
D-4R	Intermediate	6.38	5	11.05	10.88	0.17
D-5R	Intermediate	6.63	5	11.01	10.86	0.15
LAIx-3	Intermediate	6.86	5	11.63	11.61	0.02
MW-1	Intermediate	5.85	6	10.91	11.35	-0.44
MW-10	Intermediate	6.03	5	10.63	10.69	-0.06
MW-11	Intermediate	3.82	8	10.49	10.65	-0.16
MW-12	Intermediate	5.46	6	10.88	10.64	0.24
MW-13	Intermediate	6.48	5	11.24	10.77	0.47
MW-14	Intermediate	6.54	5	11.18	11.37	-0.19

TABLE 6.3

AUGUST 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

Monitoring Well	*Zone*	*Target Elevation (ft AMSL)*	*Model Layer*	*Groundwater Elevation*		*Residual* [(1)] *(ft)*
				Observed (ft AMSL)	*Simulated (ft AMSL)*	
MW-15	Intermediate	5.95	6	11.06	10.90	0.16
MW-16	Intermediate	6.11	5	10.61	10.76	-0.15
MW-17	Intermediate	1.32	10	10.57	10.57	0.00
MW-2	Intermediate	5.71	6	10.90	10.92	-0.02
MW-3	Intermediate	6.19	5	10.91	11.15	-0.24
MW-4	Intermediate	5.88	6	11.03	10.90	0.13
MW-5	Intermediate	6.27	5	11.03	10.89	0.14
MW-6	Intermediate	6.74	5	11.00	10.86	0.14
MW-7	Intermediate	6.70	5	11.03	10.85	0.18
MW-8	Intermediate	6.51	5	11.04	10.92	0.12
DW-1	Deep	-3.88	13	10.90	10.90	0.00
DW-2	Deep	-3.32	13	10.91	10.81	0.10
DW-3	Deep	-2.70	13	10.74	10.84	-0.10
DW-4	Deep	-12.76	18	10.70	10.61	0.09

TABLE 6.3

AUGUST 2012 CALIBRATION TARGETS AND RESIDUAL STATISTICS
PHILLIPS 66 RENTON TERMINAL
RENTON, WASHINGTON

RESIDUAL STATISTICS - ENTIRE MODEL

RESIDUAL MEAN (ft) =	0.06
RESIDUAL STANDARD DEVIATION (ft) =	0.56
RESIDUAL SUM OF SQUARES (ft^2) =	19.08
ABSOLUTE RESIDUAL MEAN (ft) =	0.35
MINIMUM RESIDUAL (ft) =	-0.83
MAXIMUM RESIDUAL (ft) =	2.48
OBSERVED HEAD RANGE (ft) =	4.57
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.12

RESIDUAL STATISTICS - (Shallow Zone)

RESIDUAL MEAN (ft) =	0.09
RESIDUAL STANDARD DEVIATION (ft) =	0.71
RESIDUAL SUM OF SQUARES (ft^2) =	18.23
ABSOLUTE RESIDUAL MEAN (ft) =	0.48
MINIMUM RESIDUAL (ft) =	-0.83
MAXIMUM RESIDUAL (ft) =	2.48
OBSERVED HEAD RANGE (ft) =	3.31
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.21

RESIDUAL STATISTICS - (Intermediate Zone)

RESIDUAL MEAN (ft) =	0.03
RESIDUAL STANDARD DEVIATION (ft) =	0.20
RESIDUAL SUM OF SQUARES (ft^2) =	0.82
ABSOLUTE RESIDUAL MEAN (ft) =	0.17
MINIMUM RESIDUAL (ft) =	-0.44
MAXIMUM RESIDUAL (ft) =	0.47
OBSERVED HEAD RANGE (ft) =	0.91
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.22

RESIDUAL STATISTICS - (Deep Zone)

RESIDUAL MEAN (ft) =	0.02
RESIDUAL STANDARD DEVIATION (ft) =	0.08
RESIDUAL SUM OF SQUARES (ft^2) =	0.03
ABSOLUTE RESIDUAL MEAN (ft) =	0.07
MINIMUM RESIDUAL (ft) =	-0.10
MAXIMUM RESIDUAL (ft) =	0.10
OBSERVED HEAD RANGE (ft) =	0.20
RESIDUAL STANDARD DEVIATION/HEAD RANGE =	0.40

Note:
ft Feet.
ft^2 Square feet.
(1) Residual is equal to observed groundwater elevation minus the simulated hydraulic head.

APPENDIX N

DPE PILOT TEST FIELD FORMS

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name:	CRA Mgr: Ed Turner	Field Rep: P. Rasmussen ; K. Whittaker
Project Number: 070496	Date: 4/19/13	Site Address: 2423 Lind Avenue Renton, WA
General Tasks: Set up for DPE test		
Emergency Drill Conducted: Hospital route		
HASP Meeting Conducted (Y/N): Y	Equipment Checked (Y/N): Y	PID Calibrated (Y/N): NA

Time	Activity/Comments	SWA
0815	KW ; PR on site, discuss w/Matt Davis (MD) regarding Baker Tank specs and out of scope items	
	H:S mtg, sign in HASP (MS) (LB)	
0830	mtg on grnd w/matt smith ; Lee Brennan	
	total depth = ~18 ft. btoc	
1000	Baker tank lined up for monday delivery @ 700 AM	
	KW called ; left message for Ed	
1100	KW ; PR pulled pumps from LAIX 2-9, RWX-2, RWX-3	
1200	measured distances from extraction wells to observation wells, recorded on data sheet	
	KW received phone message from Ed Turner (PM) saying it's fine to order a Baker Tank	
1300	KW continued measuring distances, confirmed HW-W ; HW-E location, HW-N is not correct, amended map w/ All lateral line stickups, HW-N is ~10' NE of RW-4, there are no stickups between RW-4 & RW-3	
	KW took pictures of site, PR ~~went~~ off site to buy hoses	
1345	Depth to product in EX-1 = 7.77' btoc	
	Depth to water in EX-1 = 9.05' btoc	
	SPH Thickness = 1.28'	
	PR pumping SPH from EX-1 into drum ~~from~~	
	measured distances from EX-1 wells	
1630	KW ; PR off site, pumped ~25 gallons from EX-1	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
nspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name:	CRA Mgr: Ed Turner	Field Rep: K. Whittaker ; P. Kasmussen
Project Number: 070496	Date: 4/22/13	Site Address: 2423 Lind Avenue, Renton, WA
General Tasks: DPE Pilot test		
Emergency Drill Conducted: Hospital route		
HASP Meeting Conducted (Y/N): Y	Equipment Checked (Y/N): Y	PID Calibrated (Y/N):

Time	Activity/Comments	SWA
0640	KW on site	
0650	Sun belt Rentals on site, H:S mtg, dropped off ramps, generator, cable, PR on site	
0710	Sun belt off site	
0730	Bakercorp on site for tank delivery, H:S mtg	
0800	Call Matt Smith re: Newterra not being here yet, he will call/text over Bryce's phone #	
0830	Newterra dropped off SVE blower, Bakercorp off site, H:S mtg., begin measuring dtw and depth to product	
0930	H:S mtg w/ Gary Anderson Rev. PPE	
	product in TW-6 depth to product = 7.74' bTOC, dtw = 8.55' bTOC	
	SPH thickness = 0.81 feet in TW-6	
1015	continue setting up ramps, manifold, drill caps, measure SPH/dtw in monitoring wells	
1250	call to M. Smith, don't pump SPH from obs wells. use diaphragm pump to get product from EX-1, take sample, pull pneumatic pump	
1300	PR off site, Matt Davis on site (MD) H:S mtg.	
1400	PR on site, begin pumping SPH from EX-1	
	1.497 gal/ft x (18 - 7.91) = 15 gal need to pump before sampling	
	pumped ~0.5 drum full of SPH/water mix (16" high on drum, drum is 2' diameter (55 gallon DOT)	
1520	turned pump on, pump not working, full of sand	
1530	calibrate PID, heribd, begin step testing- troubleshooting totalizer, gauges, LEL, etc.	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
nspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

MM

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name:	CRA Mgr: Ed Turner	Field Rep: P. Rasmussen / L. Whitaker / M. Davis
Project Number: 070496	Date: 4/22/13	Site Address: 2423 Lind Avenue Renton, WA
General Tasks: DPE Pilot Test		
Emergency Drill Conducted: Hospital noise		
HASP Meeting Conducted (Y/N):	Equipment Checked (Y/N):	PID Calibrated (Y/N):

Time	Activity/Comments	SWA
12000	Called MS, discussed constant rate test ; keep @ 20.5 in Hg/	
	N. Hinsberger on site, begin constant rate test	
2045	- Went and System w/ MATE and took First SET OF constant	
	rate readings. Replaced batteries in Vilasicate.	
2215	- Collected EX-1 @ 22:15.	
2230	MATT DAVIS OFFSITE	
	04/23/13	
2:00	Collected EX-1 & EX-1M @ 2:00	
0600	MATE OFFSITE. MATT DAVIS ONSITE.	
0630	Paul RasMussen onsite. 0711: EX-1 DTW = 16.32' BTOC	
0700	Increased Vac to 25" Hg. Flow Rate Stayed steady ~75 scfm	
0	decreased Vac To 10" Hg. Flow rate decreased.	
0800	Increased Vac To 25" Hg. Started Second Blower.	
0930	Began Prepping to Move To RWX-2.	
1035	Collected EX-1 @ 1035 and EX-1M	
1315	K. Whittaker on site, discussed swing shift activities. H&S Mtg.	
1400	M. Davis off site, P. Rasmussen on site	
1530	Courier from Pace on site, took samples	
1600	took final data, called MS, confirmed completion	
1620	turned off pump & vac on EX-1, sampled through after tee 1/8" product	
	moving equipment, re-staging pump & system	
12000	plumbing RWX-2	
2130	N. Hinsberger : PE onsite, H&S Mtg	
2350	P. Rasmussen off site, troubleshooting Horiba, call MS,	
	take flow & conc. data, samples	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
Inspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name:	CRA Mgr: Ed Hiemer	Field Rep: N Hirsberger
Project Number: 070496	Date: 4/24/13	Site Address: 2423 Lind Avenue, Renton, WA
General Tasks: DPE Pilot test		
Emergency Drill Conducted: Hospital route		
HASP Meeting Conducted (Y/N):	Equipment Checked (Y/N):	PID Calibrated (Y/N):

Time	Activity/Comments	SWA
0800	called MS, agreed optimal performance on max vacuum, will leave there for remainder of test	
1145	GS Sample collected -> RWX-2	
1145	Continued monitoring observation wells	
0545	Matt Davis onsite	
615	Natl offices	
730	Paul Rasmussen onsite	
845	Generator stopped running. Appears to have run out of fuel. Fuel gage says full & called SunBelt. They are sending fuel service.	
900	Working on setup for next wells.	
1215	SunBelt onsite. Supplied generator w/ 25 gallons of fuel. Restarted generator. Fuel delivery arrived @ 1230-1330 to top off tank.	
1235	Fuel delivery onsite. Filled Generator	
1300	Shut down RWX-2 GW pump. DTW= 19.96' BTOC. collected RWX-2 GW sample @ 1300	
1330	K. Whittaker on site, this mtg. discussed activities running on HW-W	
1	began vac test on HW-W, took post-extract dtws in RWX-2 monitoring wells	
1475	switched vac to HW-N2 (western end), started vac, flooded unit, see map for locations	
1515	re-start test on HW-N2 (monitoring vac in RW-4, HW-N1, RWX-2, etc. see data sheet	
	Pace Courier picked up samples	
1530	HW-N2 pulled in water. Flooded Knockout tank; ~~Moved to HW-N1 by pulling vac on HW-N1~~	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
nspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name:	CRA Mgr: Ed Turner	Field Rep: K. Whittaker / N. Hinsberger
Project Number: 070496	Date: 4/24/13	Site Address: 2423 Lind Avenue, Renton, WA
General Tasks: DPE Pilot test		
Emergency Drill Conducted: Hospital		
HASP Meeting Conducted (Y/N):	Equipment Checked (Y/N):	PID Calibrated (Y/N):

Time	Activity/Comments	SWA
1545	cont. pulling on MW-NZ, no readings due to high amount of water in lines	
1600	totalizer initial 4477, began pumping RWX-5 when totalizer @ 454938, took water sample	
1635	began step testing RWX-5, adjusted to get to 100 in INC, M. Davis off site	
1800	P. Rasmussen OFF site	
1805/1815	pump not working, call to Paul, try to fix it, troubleshooting pump, P. Rasmussen back on site	
1925		
2030	pump running, P. Rasmussen off site, vac running, continue step testing	
2130	call w/ Matt Smith, decided to run @ optimal vacuum of maximum vacuum	
910	N. Hinspeger on-site	
930	Con't monitoring observation wells 04/25/13	
0800	Collected GS sample → RWX-5 → RWX-5M	
0700	K. Whittaker on site, OH&S mtg, sampled (air)	
0730	Turned off pump in RWX-5, sampled	
0745	P. Rasmussen on site, Sunbelt rentals on site, took air compressor	
0830	N. Hinsberger off site, call M. Smith: to do list — total depth RW-1, tag Baker tank, troubleshooting pump in LAIX-5, piping for discharge water line plugged	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
Inspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name: Pike Terminal	CRA Mgr: Ed Turner	Field Rep: K. Whittaker/P. Rasmussen
Project Number: 070496	Date: 4/25/13	Site Address: 2423 Lind Avenue, Renton, WA
General Tasks: DPE Pilot test		
Emergency Drill Conducted: Hospital route		
HASP Meeting Conducted (Y/N): Y	Equipment Checked (Y/N): Y	PID Calibrated (Y/N): Y

Time	Activity/Comments	SWA
1120	fixed new hosing, initial flow meter reading = 5649	
	pumped 13 gallons Flow = 5662 took sample	
1200	started vacuum on LAIX-5	
1415	called MSmith, verified completion of test on LAIX-5, took methane and final sample	
	Totalizer @ 5836 before extraction on LAIX-2	
	(TD=19.8 - DTW 4.66) x 0.67 = ~10 gallons	
1615	sampled LAIX-2, K	
1645	began vacuum extraction on LAIX-2, called MS to discuss step testing, verified no step test required, do mini step test	
1700	pulling ~~excessive~~ water up casing during step test, backed off vacuum to allow pump to de-water the well; vacuum @ 5 in Hg, MD working on getting sump pump running	
1730	P. Rasmussen off site, took readings	
1830	~~K. Whittaker~~ tried to step up vacy plumbed knockout to system	
1700	K. Whittaker off site	
1900	Took w/l in LAIX-2. Water was @ 5'. Pump is not cycling. Bypassed start/stop in case manual was stopped. Pump still not running. Pulled pump and manually cycled pump switch. Pump switch works properly.	
2145	Pump onsite to troubleshoot. Y strainer was plugged with gravel strainer. Pump is working.	
2200	Start Pumping well. Applied Vac of 5 in Hg. will step it up once water is drawn down.	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
Inspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name: P66 TERMINAL	CRA Mgr: Ed Turner	Field Rep: M. DAVIS / Nate H.
Project Number: 071496	Date: 4/25/13 – 4/26/13	Site Address:
General Tasks: DPE PILOT TEST		
Emergency Drill Conducted: HOSPITAL ROUTE		
HASP Meeting Conducted (Y/N):	Equipment Checked (Y/N):	PID Calibrated (Y/N):

Time	Activity/Comments	SWA
2300	Pump is continuing to cycle. Water is well above drop down. Disconnected Well cover and pump while pulling w/L. Water level was around 9' BTOC.	
	- Applied Vacuum for 5 min @ 5" Hg. Took water level was at 5' BTOC. Pump cannot pull enough water to draw well down. Pump was consistently drawing 3-4 GPM.	
	- Call Matt S. Decided to try Electric Pump	
2330	Pulled pump and plumbed in electric pump.	
0230	Tried Electric Pump. Pump kept tripping the GFCI on the Generator. Called Matt S. Decided to stop testing. Cleaned up.	
0100	Collected SAMPLE LA/X-2 GW Sample.	
0700	K. Whittaker on site, reviewed data from previous night DTP in Baker tank = 8.42' from top of tank DTW = 8.92' can see emulsified product in bottom of tank. petroleum odor vapor out top of tank tank is 10 ft tall, so there is ~1.5' of water/SPH height in tank - From sticker on tank, that means ~3,600 gallons, ~5" SPH = ~630 gal so ~2,360 gal H2O	
0900	called M. Smith, verified to clean up/demob	
0830	P. Rasmussen on site, walked to LA/X-2, inspected hoses, plumbing, pump, looked as though discharge line had been opened in attempt to unclog it. sand had been left on ground, if the ~1000 ft of hosing was full of sand, the pump (electric or pneumatic) won't be able pump more than 3 or 4 gpm. Also, wetland is SE of site, so even if there was no restriction on the pump, it's questionable if it would be possible to	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
Inspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

CRA

DAILY FIELD REPORT

Submit copy to Company Safety Officer

Project Name:	CRA Mgr: Ed Turner	Field Rep: K. Whittaker/M. Davis
Project Number: 070496	Date: 4/26/13	Site Address: 2423 Lind Avenue Renton, WA
General Tasks: DPE Pilot Test		
Emergency Drill Conducted: Hospital route		
HASP Meeting Conducted (Y/N):	Equipment Checked (Y/N):	PID Calibrated (Y/N):

Time	Activity/Comments	SWA
1215	P. Rasmussen off site	
	Newterra picked up SVE trailer	
1445	K Whittaker off site	

SWA Key:	1: SPSA/Task Change	2: Pedestrian in Proximity	3: Unauthorized Personnel	4: Review Work Process
nspection	6: Safety Orientation	7: Uncontrollable Factor	8: Minor First Aid	9: Major (explain in notes)

Hours _____ Miles _____ Other _____ Shared _____

DPE TEST INITIAL DATA FORM

CAD measurements

Site Address: 2423 Lind Avenue SW
Renton, WA
Project No. 070496

Date:
Technician:
Project Mgr: Ed Turner

Extraction Well	Distance to Observation Well from Extraction Well (ft)							
	P-1	P-2	TW-2	TW-4	TW-6	TW-8	MW-7	MW-8
EX-1	6.15	15.93	36.15	39.48	18.92	37.78	137.37	
Extraction Well	**Distance to Observation Well from Extraction Well (ft)**							
	RW-1	RW-5	RWX-7	LAIX-4	LAIX-5	HW-W	HW-N	
RWX-2	14.00	98.14	112.76	96.47	108.63			
Extraction Well	**Distance to Observation Well from Extraction Well (ft)**							
	RWX-2	RW-3	RW-4	RW-7	LAIX-5	LAIX-6	HW-N	HW-E
RWX-5	98.14	50.26	34.00	26.35	85.46	77.76		
Extraction Well	**Distance to Observation Well from Extraction Well (ft)**							
	RWX-2	LAIX-3	LAIX-4	LAIX-6	LAIX-7	LAIX-8	LAIX-9	HWX-1W
LAIX-5	108.63	49.45	28.52	28.90	50.77	33.35	16.27	84.16
Extraction Well	**Distance to Observation Well from Extraction Well (ft)**							
	LAIX-1	LAIX-3	LAIX-4	LAIX-9	HWX-1W	LAIX-5	LAIX-7	LAIX-10
LAIX-2	27.25	12.54	33.16	55.17	32.70	57.51	92.64	50.88

Extraction on EX-1:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	P-1	P-2	TW-2	TW-4	TW-6	TW-8	MW-7	MW-8	EX-1
Pre-extraction:									
Post-extraction:									

Extraction on RWX-2:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	RW-1	RW-5	RWx-7	LAIx-4	LAIx-5	HW-W	HW-N	RWX-2	
Pre-extraction:									
Post-extraction:									

Extraction on RWX-5:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	RWX-2	RW-3	RW-4	RW-7	LAIX-5	LAIX-6	HW-N	HW-E	RWX-5
Pre-extraction:									
Post-extraction:									

Extraction on LAIX-5:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	RWX-2	LAIX-3	LAIX-4	LAIX-6	LAIX-7	LAIX-8	LAIX-9	HWX-1W	LAIX-5
Pre-extraction:									
Post-extraction:									

Extraction on LAIX-2:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	LAIX-1	LAIX-3	LAIX-4	LAIX-9	HWX-1W	LAIX-5	LAIX-7	LAIX-10	LAIX-2
Pre-extraction:									
Post-extraction:									

* CAD denotes measurements taken from map due to physical obstacles

DPE TEST INITIAL DATA FORM

Site Address: 2423 Lind Avenue SW, Renton, WA
Project No. 070496
Date: 4/19/13
Technician: P Rasmussen : K. Whittaker
Project Mgr: Ed Turner

Extraction Well	Distance to Observation Well from Extraction Well (ft)							
	P-1	P-2	TW-2	TW-4	TW-6	TW-8	MW-7	MW-8
EX-1	4'7"	14'9"	37'6"	40'10"	20'1"	40'11"	CAD	96'7"
Extraction Well	RW-1	~~RW-5~~ RWX-5	RWX-7	LAIX-4	LAIX-5	HW-W	HW-N	
RWX-2	13'7"	108'6"	134'	CAD 94'	CAD 103'	25'	98'11"	
Extraction Well	RWX-2	RW-3	RW-4	~~RW-7~~ RWX-7	LAIX-5	LAIX-6	HW-N	HW-E
RWX-5	CAD 96'	50'3"	34'2"	26'2"	86'8"	77'6"	17'9"	43'9"
Extraction Well	RWX-2	LAIX-3	LAIX-4	LAIX-6	LAIX-7	LAIX-8	LAIX-9	HWX-1W
LAIX-5	~~CA~~ CAD 105'	CAD 50'	28'9"	26'7"	50'6"	33'2"	16'2"	CAD 82'
Extraction Well	LAIX-1	LAIX-3	LAIX-4	LAIX-9	HWX-1W	LAIX-5	LAIX-7	LAIX-10
LAIX-2			32' CAD	CAD 54'		CAD 55'	CAD 90'	

Extraction on EX-1:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	P-1	P-2	TW-2	TW-4	TW-6	TW-8	MW-7	MW-8	EX-1
Pre-extraction: 4/22/13	8.18 SPH 8.19 H_2O	8.18 SPH 8.86 H_2O	7.01 SPH 7.61 H_2O	7.91 H_2O	7.74 to product 8.55 to H_2O	7.85 H_2O	8.78 H_2O	8.51' H_2O	7.91 SPH 9.58 H_2O
Post-extraction: 4/22/13 17:30	10.05 SPH 10.07 H_2O	9.99 SPH 10.51 H_2O	7.21 SPH 7.61 H_2O	9.02	8.49	8.31	8.79	8.55	16.70 SPH 17.80 H_2O

Extraction on RWX-2:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	RW-1	~~RW-5~~ RWX-5	RWx-7	LAIx-4	LAIx-5	HW-W	HW-N	RWX-2	
Pre-extraction: 4/23/13 15:?	5.25	7.38	7.20	12.72	8.18	5.61 btoc	5.30	7.09	
Post-extraction: 4/24/13 14:20	6.21	7.86	7.41	11.95	8.26	7.85 post vac test	5.96	9.99	5.94 TD - dry in HW-N

From HW-N2 / From HW-N1

Extraction on RWX-5:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	RWX-2	RW-3	RW-4	~~RW-7~~ RWX-7	LAIX-5	LAIX-6	HW-N	HW-E	RWX-5
Pre-extraction: 4/24/13 14:20	9.49	6.29	6.09	7.41	8.26	8.05	5.96	5.72	7.86
Post-extraction: 4/24/13 0715	9.29	5.71	6.61	7.55	8.06	8.29	DRY	5.91	14.56

Extraction on LAIX-5:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	RWX-2	LAIX-3	LAIX-4	LAIX-6	LAIX-7	LAIX-8	LAIX-9	HWX-1W	LAIX-5
Pre-extraction: 4/24 0220	9.12	3.68	11.84	8.23	7.77	NM	9.28	3.46	8.22
Post-extraction: 4/25 1515	9.3	5.53	11.91	7.55	8.15	NM	9.36	3.33	17.35

WELL DAMAGED?

Extraction on LAIX-2:

Date/time	Static Depth to Water and SPH thickness (ft. bTOC or ft. SPH)								
	LAIX-1	LAIX-3	LAIX-4	LAIX-9	HWX-1W	LAIX-5	LAIX-7	LAIX-10	LAIX-2
extraction: 4/25 1515	4.10	5.53	11.91	9.36	3.33	17.35	8.15	3.72	7.66
Post-extraction: 4/26 930	4.60	5.90	12.00	9.42	3.75	9.28	8.32	3.72	0.01 product 7.62 sheen

HW-W TD = 8.5' btoc
HW-N TD = 5.40
RW-1 TD = 10.5 ft

070496-FIELD DATA SHEETS

DPE Test Initial Data

1 DPE STEP TEST SYSTEM DATA FORM

Site Address: 2423 Lind Avenue SW, Renton, WA
Project No. 070496
Date: 4/22/13
Technician: P. Rasmussen / K. Whitaker / M. Davis
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
	STEP TEST #1												
W*	4/22 17:00	3620	NM	94.5 in Hg	72.0	50.8	5320						4
	17:15	3620	NM	100.2 in WC	76.9	53.2	29000						NM
A	17:38	3620	9	8 in Hg	73.9	4231	35,000						NM
	STEP TEST #2												
	18:12	3620	16	195.0 in WC 15.5 in Hg	75.3	74.0	17,420						454.2 @ 1820
	18:31	3621	16.5	15.5 in Hg	65.2	75.8	27,000						791.5
A	18:42	3621	16	15.5	64.8	77.52	24,700						525.4
	STEP TEST #3												
	19:07	3621	21	20.5 in Hg	64.2	77	23,360						597
	19:22	3622	21	20.5	62.1	79	25,050						638.4
A	19:37	3622	23.5	23	59.2	80	25000						680.8

realized Pump was not pulling in much air from manifold

Flow rate (gpm)

NOTES:
Take water sample once required purge volume has been reached. Purge volume = (TD-DTW)(0.0873 ft2)*(7.481 gal/ft3)) = (TD-DTW)*(0.653gal/ft).
Check generator fuel level. Call for refill.
A= Air sample W= Water sample
Check observation well vacuums at beginning and end of each step test (and every 1 hour as necessary)
Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

EX DPE CONSTANT RATE SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 4/22/13 - 4/23/13
Technician: N. Hinspeter
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
	2048	3624	22	21	59.3	79	29000						765
A	21:34	3624	21	21	55.4	76	25000						863
	22:52	3626	21	21	53.6	77	24500						1000
	23:30	3626	21	21	51.5	75	26700						1053
4/23	00:30	3627	21	21	48.8	76	25500						1168
	1:30	3628	21	21	47.5	75	24000						1261
	2:30	3629	21	21	42.8	75	25800						1352
	3:30	3630	21	21	42.1	74	25000						1452
	4:30	3631	21	21	42.7	74	25900						1535
A	5:30	3632	21	21	42.0	75	26000						1632
	6:30	3633	21	20.5	44.1	75	—						1720
	8:10	3635	25	24.5	49.0	76	15,800						1904
	9:18	3636	25	24.5	54.8	74	27000						2017
	11:30	3638	25	24.5	68.4	74	30,000						2246

NOTES: 07/1: EX-1 DPE = 16.32" H2O

Check generator fuel level. Call for refill.

A= Air sample W= Water sample

Check observation well vacuums every 1 hour

Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

EX-1 DPE STEP TEST OBSERVATION WELL VACCUM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date:
Technician:
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing Vac (in WC) (EX-1)		Induced Vacuum P-1	P-2	TW-2	TW-4	TW-6	TW-8	MW-7	MW-8
STEP TEST #1	1729			VAC	4.4	0.29	0.1	0.0	0.1	0.3	0.0	0.0
(every 0.25 hrs)				VAC								
				VAC								
				VAC								
STEP TEST #2	1812			VAC	4.0	0.32	0.43	0.14	0.24	0	0.0	0.0
(every 0.25 hrs)	1831			VAC	4.8	0.32	0.50	0.14	0.24	0.0	0.0	0.0
	1842			VAC			0.60		0.25			
				VAC								
STEP TEST #3	1907			VAC	5.0	0.34	0.19	0.15	0.26	0.14	0.0	0.0
(every 0.25 hrs)	1922			VAC	5.0	0.40	0.68	0.16	0.25	0.15	0.0	0.0
	1937			VAC								
				VAC								
CONSTANT				VAC								
(every 1 hr)				VAC								
				VAC								
				VAC								

EX-1 DPE CONSTANT RATE SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 1/23/13
Technician: M. DAVIS
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
	1245	3639	25	29.5	75.6	75	26000						2400
	14:01	3642	25	25	78.6	73	29000						2595.6
	15:01	3642	25	25	90.5	75	33 000						2696.6
*	16:00	3643	25	25	91.6	75	31,300						2792.5
A													

NOTES:
Check generator fuel level. Call for refill.
A= Air sample W= Water sample
Check observation well vacuums every 1 hour
Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

* Sample @ 1605

EX-1 DPE CONSTANT RATE TEST OBSERVATION WELL VACUUM DATA FORM

Site Address: 2423 Lind Avenue, Renton, WA
Project No. 070496
Date: 04/22/13
Technician: N. Hirsperger
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing Vac (in WC) (EX-1)		Induced Vacuum P-1	P-2	TW-2	TW-4	TW-6	TW-8	MW-7	MW-8
CONSTANT	20:48			VAC	5.1	0.32	0.81	0.25	0.32	0.22	0.0	0.0
(every 1 hr)	21:34			VAC	4.9	0.30	0.79	0.21	0.28	0.17	0.0	0.0
	22:52			VAC	4.9	0.29	0.78	0.23	0.28	0.18	0.0	0.0
	23:30			VAC	5.0	0.36	0.78	0.24	0.28	0.17	0.0	0.0
	00:30			VAC	4.9	0.34	0.79	0.24	0.28	0.22	0.0	0.0
	1:30			VAC	4.9	0.34	0.78	0.25	0.29	0.20	0.0	0.0
	2:30			VAC	4.9	0.34	0.76	0.23	0.27	0.19	0.0	0.0
	3:30			VAC	4.8	0.32	0.73	0.21	0.27	0.17	0.0	0.0
	4:30			VAC	4.6	0.32	0.71	0.24	0.29	0.17	0.0	0.0
	5:30			VAC	4.4	0.32	0.70	0.24	0.30	0.18	0.0	0.0
	6:30			VAC	4.8	0.42*	0.72	0.25	0.23	0.17	0.0	0.15*
	8:10			VAC	5.0	0.5	0.9	0.30	0.35	0.20	0.0	0.0
	9:19			VAC	5.8	0.5	0.70	0.27	0.32	0.20	0.0	0.0
4-23-13	11:15			VAC	5.8	0.72	0.8	0.38	0.47	0.26	0.0	0.0
	12:45			VAC	5.9	0.60	0.7	0.27	0.36	0.19	0.0	0.0
	14:01			VAC	6.0	0.60	0.7	0.26	0.39	0.17	0.0	0.0
	15:01			VAC	5.8	0.60	0.6	0.23	0.32	0.16	0.0	0.0
	16:05			VAC	5.9	0.60	0.6	0.20		0.16	0.0	0.0
				VAC								
				VAC								
				VAC							

EX-1 DPE CONSTANT RATE TEST OBSERVATION WELL DEPTH TO WATER DATA FORM

SPH / DTW

Site Address: 2423 Lind Avenue, Renton, WA
Project No.: 070496
Date: 04/22/13 - 04/23/13
Technician: N. Hinspeter
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing DTW (fbg) (EX-1)		Depth to Water P-1	P-2	TW-2	TW-4	TW-6	TW-8	MW-7	MW-8
CONSTANT	1930			DTW	12.72/13.2	11.04/12.35	7.19/7.82	8.35/8.52	7.96/8.48	8.03/8.21		
(every 1-2 hrs)				DTW		11.00/12.44						
	2134			DTW	12.02/12.13	↓	7.21/7.81	8.51	8.84/8.96	8.31	8.97	8.69
				DTW								
	23:30			DTW	12.84/12.16	11.01/12.05	7.22/7.81	8.55	8.94	8.36	8.89	8.67
				DTW		10.98/12.02						
	1:30			DTW	11.91/12.02	↓	7.26/7.92	8.62	8.96	8.37	8.91	8.65
				DTW								
	03:30			DTW	11.82/11.91	10.99/11.95	7.27/7.81	8.71	8.98	8.36	8.91	8.67
				DTW								
	05:30			DTW	11.82/11.71	10.80/11.8	7.21/7.82	8.76	8.96	8.39	8.91	8.66
				DTW								
4/23/13	08:50			DTW	12.35/12.61	11.32/12.56	7.32/7.80	8.86/8.87	8.98/9.00	8.36/8.39	8.90	8.68
				DTW								
	11:15			DTW	12.31/12.59	11.31/12.55	7.35/7.81	8.95	8.99/9.02	8.36/8.37	8.86	8.66
				DTW								
	14:15			DTW	12.32/12.55	11.31/12.62	7.41/7.84	9.01/9.02	8.97	8.38/8.39	8.89	8.68
				DTW								
				DTW								
				DTW							

RWX-2

X-2 DPE STEP TEST SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 4/23/13 – 4/24/13
Technician:
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
	Initial Flow = 2739												
	STEP TEST #1												
W*	23:00	3645	10	7.5	53.7	85	50						2815
	23:45	3645	10	8.5	+9	85	43						2925
A													
	* tried to troubleshoot, need work order for DP station												
	STEP TEST #2												
	00:00	3645	14.5	15	46	96	35*						NM
	00:15	3645	14.5	14*	+7	100	32						NM
A													
	STEP TEST #3												
	00:30	3645	24	23	46	110	25						2977
	00:45	3646	24	23	+5	110	23						3001
A													

NOTES:

Take water sample once required purge volume has been reached. Purge volume = (TD-DTW)(0.0873 ft2)*(7.481 gal/ft3)) = (TD-DTW)*(0.653gal/ft).

Check generator fuel level. Call for refill.

A= Air sample W= Water sample

Check observation well vacuums at beginning and end of each step test (and every 1 hour as necessary)

Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

RWX-2

RW-2 DPE CONSTANT RATE SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 04/24/13
Technician: NH
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
	145	3647	24	23	44.0	110	51					0.0	3215
A	245	3648	24	23	41.4	110	45					0.0	3342
	345	3649	24	23	39.9	110	50					0.0	3500
	445	3650	24	23	37.5	110	40					0.0	3661
	545	3651	24	23	35.8	108	42					0.0	3803
	645	3652	24	23	42.4	112	33*	32.5 @ wellhead				0.0	4027
	745	3653	24	23	53.7	111	32.3					0.0	4126
A													

NOTES:
Check generator fuel level. Call for refill.
A= Air sample W= Water sample
Check observation well vacuums every 1 hour
Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

RWX-2 DPE STEP TEST OBSERVATION WELL DEPTH TO WATER DATA FORM

Site Address: 2423 Lind Avenue, Renton, WA
Project No. 070496
Date: 04/24/13
Technician: NH
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing DTW (fbg) (RWX-2)		Depth to Water RW-1	RW-5	RWX-7	LAIX-4	LAIX-5	HW-W	HW-N
STEP TEST #1				DTW							
(every 1-2 hrs)				DTW							
				DTW							
				DTW							
STEP TEST #2				DTW							
(every 1-2 hrs)				DTW							
				DTW							
				DTW							
STEP TEST #3				DTW							
(every 1-2 hrs)				DTW							
				DTW							
				DTW							
CONSTANT	1:45	3647	23	DTW	6.08	[illegible] 7.74	7.34	12.02	8.21	6.09	DRY
(every 1-2 hrs)				DTW							
				DTW							
	3:45	3649	23	DTW	6.15	7.77	7.38	12.02	8.21	6.17	DRY
				DTW							
	5:45	3651	23	DTW	6.15	7.81	7.40	12.04	8.21	6.27	DRY
	745	3653	23	DTW	6.19	7.86	7.42	12.02	8.24	6.33	DRY
				DTW							
				DTW							
				DTW						

RWX-2 DPE STEP TEST OBSERVATION WELL VACCUM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 07/24/13
Technician: NH
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing Vac (in WC) (RWX-2)		Induced Vacuum RW-1	RW-5	RWX-7	LAIX-4	LAIX-5	HW-W	HW-N
STEP TEST #1				VAC							
(every 0.25 hrs)				VAC							
				VAC							
				VAC							
STEP TEST #2				VAC							
(every 0.25 hrs)				VAC							
				VAC							
				VAC							
STEP TEST #3				VAC							
(every 0.25 hrs)				VAC							
				VAC							
				VAC							
CONSTANT	145	3647	23	VAC	2.5	0	0	0	0	0	0
(every 1 hr)	245	3648	23	VAC	2.9	0	0	0	0	0	0.13
	345	3649	23	VAC	3.1	0	0	0	0	0	0.13
	445	3650	23	VAC	3.2	0	0	0	0	0	0.13
	545	3651	23	VAC	3.4	0	0.02	0	0	0	0.13
	645	3652	23	VAC	3.6	0	0	0	0	0	0
	745	3653	23	VAC	4.5	0	0	0	0	0	0
				VAC							
				VAC							
				VAC						

HW-W/HW-N#2

~~RWX-2~~ DPE CONSTANT RATE TEST OBSERVATION WELL VACUUM DATA FORM

Site Address: 2423 Lind Avenue, Renton, WA
Date: 4/24/13
Technician:
Project No. 070496
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing Vac (in WC) ~~HW-W~~ (~~RWX-2~~)		Induced Vacuum RW-1	RW-5	RWX-7	LAIX-4	LAIX-5	~~HW-W~~ RWX-2	HW-N
CONSTANT	1400		22	VAC	0	0	0	0	0.22	0	0
(every 1 hr)				VAC							
				VAC							
				VAC							
				VAC							
			HW-W/2	VAC	RW-4	HW-N#1	RWX-5	RWX-7	RWX-2	LAIX-5	~~LAIX-4~~
HW-N#2	1510		14 in Hg	VAC	11 in Hg	10 in Hg	0.02 in WC	0.0	0.0	0.5	0.0
				VAC							
				VAC							
				VAC						

EX . DPE CONSTANT RATE SYSTEM DATA FORM

HAW - W/HW-NW2

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date:
Technician:
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
4-24-13	~~1330~~ 1330	3655	23	22.5 ~~22~~	81	104	5						
	1410	3656	25.5	22.5	72	110	2						
	1440	3656	25	22.5	79	109	9						
HW-NW2	1510	no	data	available	since	all	water						
A													
A													

NOTES:
Check generator fuel level. Call for refill.
A= Air sample W= Water sample
Check observation well vacuums every 1 hour
Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

RWX-5

X-5 DPE STEP TEST SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 4/29/13
Technician: E. Whitaker
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
STEP TEST #1													
W*	~~1440~~ 1630	3658	13		96	125						0.0	
	1700	3658	10	7.9	85	82	25						4398
A	1715	3658	10	7.9	82	79	27						4415
	1730	3659	10	8	76	80	19						4429
STEP TEST #2													
	1800	3659	15	13	73	110	15					0.1	4512
	2030	3661	15	13	57	111	21						4484
A	2045	3662	15	13	58	113	23						4500
STEP TEST #3													
	2100	3662	24	22	57	123	20					0.0	4530
	2115	3662	24	22.5	57	121	19						4561
A													

NOTES:
Take water sample once required purge volume has been reached. Purge volume = (TD-DTW)(0.0873 ft2)*(7.481 gal/ft3)) = (TD-DTW)*(0.653gal/ft).
Check generator fuel level. Call for refill.
A= Air sample W= Water sample
Check observation well vacuums at beginning and end of each step test (and every 1 hour as necessary)
Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

RWX-5

RW-5 DPE CONSTANT RATE SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 04/24/13 - 04/25/13
Technician: NJ
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
	10:30	3663	24	22	54.8	120	36					0.0	4671
A	11:30	3664	24	22	54.5	117	30					0.0	4767
	12:30	3665	24	22	49.8	116	9					0.0	4871
	1:30	3666	24	22	46.6	115	12					0.0	4978
	02:30	3667	24	22	45.9	121	15					0.0	5075
	03:30	3668	24	22	44.8	126	17					0.0	5171
	04:30	3669	24	22	42.1	120	14					0.0	5260
	05:30	3670	24	22	40.9	111	21					0.0	5387
	06:15	3671	24	22	40.1	119	13					0.0	5442
	7:13	3672	24	22	41.1	124	9					0.0	5543

NOTES:
Check generator fuel level. Call for refill.
A= Air sample W= Water sample
Check observation well vacuums every 1 hour
Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

RWX-5 DPE STEP TEST OBSERVATION WELL VACCUM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 4/24/13
Technician:
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing Vac (in WC) (RWX-5)		Induced Vacuum RWX-2	RW-3	RW-4	RW-7	LAIX-5	LAIX-6	HW-N 2	HW-E
STEP TEST #1	1700			VAC	0.0	0.0	0.0	0.8	0.62	0.0	0.0	0.0
(every 0.25 hrs)	1715			VAC	0.0	0.0	0.0	0.6	0.59	0.0	0.0	~~0.0~~ 0.01
	1730	AM		VAC			~~0.0~~					
				VAC								
STEP TEST #2	1800			VAC	0.0	0.0	0.0	0.8	0.46	0.0	0.0	0.03
(every 0.25 hrs)	2030			VAC	0.0	0.0	0.0	1.2	0.38	0.0	0.0	0.25
	2045			VAC	0.0	0.0	0.0	1.0	0.32	0.0	0.0	0.20
				VAC								
STEP TEST #3	2160			VAC	0.0	0.0	0.0	1.5	0.24	0.0	0.0	0.23
(every 0.25 hrs)	2115			VAC	0.0	0.0	0.0	1.5	0.29	0.0	0.0	0.22
				VAC								
				VAC								
CONSTANT				VAC								
(every 1 hr)				VAC								
				VAC								
				VAC								

RWX-5 DPE CONSTANT RATE TEST OBSERVATION WELL VACUUM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 04/24/13 - 04/25/13
Technician: NH
Project Mgr: Ed Turner

Date/ Time (min)	Hour Meter (hrs)	Casing Vac (in WC) (RWX-5)		Induced Vacuum RWX-2	RW-3	RW-4	RW-7	LAIX-5	LAIX-6	HW-N	HW-E
CONSTANT			VAC								
(every 1 hr) ~~10:30~~	3663	22	VAC	0	0	0	1.3	0.22	0	0	0.16
2230			VAC								
2330 ~~11:30~~	3664	22	VAC	0	0	0	1.5	0.23	0	0	0.38
			VAC								
00:30	3665	22	VAC	0	0	0	1.6	0.21	0	0	0.38
			VAC								
01:30	3666	22	VAC	0	0	0	1.8	0.20	0	0	0.41
			VAC								
02:30	3667	22	VAC	0	0	0	2.0	0.19	0	0	0.42
			VAC								
03:30	3668	22	VAC	0	0	0	2.0	0.17	0	0	0.43
			VAC								
4:30	3669	22	VAC	0	0	0	2.2	0.14	0	0	0.44
			VAC								
5:30	3670	22	VAC	0	0	0	2.3	0.10	0	0	0.45
			VAC								
6:30	3671	22	VAC	0	0.1	0	2.3	0.10	0.05	0	0.44
			VAC								
7:00	3672	22	VAC	0	0.1	0	2.5	0.10	0.15	0	0.45
			VAC								
			VAC								
			VAC							

RWX-5 DPE STEP TEST OBSERVATION WELL DEPTH TO WATER DATA FORM

Site Address: 2423 Lind Avenue, Renton, WA
Project No. 070496
Date: 04/24/13 - 04/25/13
Technician: NN
Project Mgr: Ed Turner

SPH/DTW

	Date/ Time (min)	Hour Meter (hrs)	Casing DTW (fbg) (RWx-5)		Depth to Water RWX-2	RW-3	RW-4	RW-7	LAIX-5	LAIX-6	HW-N	HW-E
STEP TEST #1				DTW								
(every 1-2 hrs)				DTW								
				DTW								
				DTW								
STEP TEST #2				DTW								
(every 1-2 hrs)				DTW								
				DTW								
				DTW								
STEP TEST #3				DTW								
(every 1-2 hrs)				DTW								
				DTW								
				DTW	Btoc			Btoc				Btoc
CONSTANT 2230 (every 1-2 hrs)				DTW								
	~~10:30~~	3663	22	DTW	9.12	5.96	6.83	7.53	8.22	8.23	DRY	5.92
0030	~~7:30~~	3665	22	DTW	9.12	5.93	6.83	7.53	8.22/8.22	8.23	DRY	5.94
				DTW								
				DTW								
	02:30	3667	22	DTW	9.12	5.92	6.82	7.53	8.22	8.26	DRY	5.94
				DTW								
				DTW				7.53	8.23	8.26	DRY	5.94
	04:30	3669	22	DTW	9.14	5.91	6.81	↓	↓	↓	↓	↓
				DTW								
	6:05	3671	22	DTW	9.14	5.89	6.81	7.53	8.24	8.26	DRY	5.94
				DTW								
				DTW								
				DTW							

~~LAIX-5~~

LEL / PID

~~LA...2~~ DPE CONSTANT RATE SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA

Date: 4/25/13

Technician: K Whittaker / P. Rasmussen

Project No. 070496

Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
	4/25 1215	3677	19.5	17	83	123	15						5727
A	1245	3677	24.5	17	82	126	290						5748
	1330	3678	24.5	23	90	119	200 / 390						5774
	1400	3679	25	23	83	117	74 / 175						5797
				5836 - final totalizer post									
							LAIX-5 extract						

NOTES:

Check generator fuel level. Call for refill.

A= Air sample W= Water sample

Check observation well vacuums every 1 hour

Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

LAIX-5 DPE STEP TEST OBSERVATION WELL VACCUM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date:
Technician:
Project Mgr: Ed Turner

4/25

	Date/ Time (min)	Hour Meter (hrs)	Casing Vac (in WC) (LAIX-2)		~~BWX-2~~ ~~LAIX-1~~ BWX-2	LAIX-3	LAIX-4	LAIX-9	HWX-1W	~~LAIX-5~~	LAIX-7	~~LAIX-10~~
					Induced Vacuum (in WC)			meter error				
STEP TEST #1	1215		17	VAC	0.02	~~NM~~ 0.0	1.3	0.0	~~NM~~ 0.0	7.5	0.0	~~NM~~ 6.0
(every 0.25 hrs)	1330		22	VAC	0.01	0.0	1.0	20.0	0.0	8.3	0.0	10.0
				VAC								
				VAC								
STEP TEST #2				VAC								
(every 0.25 hrs)				VAC								
				VAC								
				VAC								
STEP TEST #3				VAC								
(every 0.25 hrs)				VAC								
				VAC								
				VAC								
CONSTANT				VAC								
(every 1 hr)				VAC								
				VAC								
				VAC								

LAIX-5 DPE CONSTANT RATE TEST OBSERVATION WELL DEPTH TO WATER DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date:
Technician:
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing DTW (tbg) (LAIX-5)		Depth to Water							
					RWX-2	LAIX-3	LAIX-4	LAIX-6	LAIX-7	LAIX-8	LAIX-9	HWX-1W
CONSTANT	4/25/13 1330			DTW	9.25	NM	11.84	7.75	8.37	NM	9.49	NM
(every 1-2 hrs)				DTW								
				DTW								
				DTW								

LAIX-2

~~X-2~~ DPE STEP TEST SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 4/25/13
Technician: Matt Nevis
Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)
mini step per conversation w/M. Smith													
STEP TEST #1													
W*	~~1630~~ 1649	~~3682~~		11		111							
	1649			12		115							
A	1656			13		125							
	1658			14		Line	filled	w/water					
STEP TEST #2													
A													
STEP TEST #3													
A													

NOTES:

Take water sample once required purge volume has been reached. Purge volume = (TD-DTW)(0.0873 ft2)*(7.481 gal/ft3)) = (TD-DTW)*(0.653gal/ft).

Check generator fuel level. Call for refill.

A= Air sample W= Water sample

Check observation well vacuums at beginning and end of each step test (and every 1 hour as necessary)

Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

LAIX-2

LA...-2 DPE CONSTANT RATE SYSTEM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA

Date: 4/25/13

Technician:

Project No. 070496

Project Mgr: Ed Turner

Sample	Date/ Time (min)	Hour Meter (hrs)	Blower Vac (in. Hg)	Well Casing Vac (in Hg)	Well (Inf-1) Temp (Deg F)	Well (Inf-1) Flow (cfm)	Well (Inf-1) Vapor Conc (ppmv)	Inf-2 Vac (in Hg)	Inf-2 Temp (Deg F)	Inf-2 Flow (cfm)	Inf-2 Vapor Conc (ppmv)	Breathe Zone Vapor Conc. (ppmv)	Flow Totalizer (gallons)	Flow rate
	1730	3682	9	5	94	96	65						5868	
A	1900												5895	0.3 gpm
	2230	3687	10	5	59.6	87	22						5971	0.5 gpm

NOTES:

Check generator fuel level. Call for refill.

A= Air sample W= Water sample

Check observation well vacuums every 1 hour

Check water levels in observation wells every 1-2 hours (remove cap on the well after the vacuum reading has been taken)

LAIX-2 DPE CONSTANT RATE TEST OBSERVATION WELL DEPTH TO WATER DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 4/25/13
Technician:
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing DTW (fbg) (LAIX-2)		Depth to Water							
					LAIX-1	LAIX-3	LAIX-4	LAIX-9	HWX-1W	LAIX-5	LAIX-7	LAIX-10
CONSTANT	1720			DTW	4.51	5.83			3.59	5.62		3.73
(every 1-2 hrs)	1900			DTW	4.71	5.65			3.82			3.76
				DTW								
				DTW								
				DTW							

LAIX-2 DPE CONSTANT RATE TEST OBSERVATION WELL VACUUM DATA FORM

Site Address: 2423 Lind Avenue
Renton, WA
Project No. 070496

Date: 4/25/13
Technician:
Project Mgr: Ed Turner

	Date/ Time (min)	Hour Meter (hrs)	Casing DTW (tbg) (LAIX-2)		Induced Vacuum							
					LAIX-1	LAIX-3	LAIX-4	LAIX-9	HWX-1W	LAIX-5	LAIX-7	LAIX-10
CONSTANT				VAC	0.2	0.0	0.3	0.0	0.0	0.25	0.0	0.0
(every 1 hr)				VAC	0.0	0.0			0.3			0.0
				VAC								
				VAC								
				VAC							

United Rentals

800-UR-RENTS (800-877-3687)
unitedrentals.com

LOCATION #652
3400 LIND AVENUE
RENTON, WA 98057
425-656-5940 425-251-9041 FAX

RENTAL AGREEMENT

110492631

Customer Number	:	$# 1006873276
Agreement Date	:	4/19/13
Rental Out	:	4/19/13 4:30 PM
Scheduled In	:	4/20/13 4:30 PM
Job Location:		2423 LIND AVE SW RENTON WA
Job Number	:	
P.O. Number	:	070496
Ordered By	:	KELSEY/PS
Written By	:	UR652JVF
Salesperson	:	8168

Job Site

WHITTAKER, KELSEY
947 VENETO
IRVINE, CA 92614-5970

Office: 425-442-9662 **Job:** 425-442-9662

Customer

WHITTAKER, KELSEY
947 VENETO
IRVINE, CA 92614-5970

RENTAL ITEMS:

Qty	Equipment	Description	Minimum	Day	Week	4 Week	Estimated Amt.
10	553/3265	CHANNELIZER TUBE, 42" W/2-3" HI (CHLZR)		6.00	22.00	29.00	60.00

Rental Subtotal: 60.00

PAYMENT HISTORY

DATE	TYPE	REF #	AUTH #	TRANS TYPE	AMOUNT	APPLIED
4/19/13	VISA	**7223	02832B	CHARGED		120.00

Agreement Subtotal:	60.00
Tax:	4.80
Estimated Total:	64.80
Deposit:	120.00

COMMENTS/NOTES:

Amount refunded to customer: 55.20

A CLEANING CHARGE WILL APPLY TO EQUIPMENT RETURNED WITH EXCESSIVE DIRT, CONCRETE, AND/OR PAINT. CUSTOMER IS RESPONSIBLE FOR ALL DAMAGE INCLUDING TIRES. THERE WILL BE AN ADDITIONAL CHARGE FOR MISSING KEYS. A FUEL CHARGE WILL BE APPLIED TO ALL UNITS NOT RETURNED FULL OF FUEL

* * * * * * * * * * * *

* **ENVIRONMENTAL CHARGE:** The items indicated above are subject to an environmental charge which is designed to recover United's direct and indirect expenses for the handling, managing and disposing of waste products, hazardous related administrative costs. This is not a government-mandated charge. **FUEL:** Fuel charges do not include federal, state, or local excise taxes.

OPTIONAL RENTAL PROTECTION PLAN

THE RENTAL PROTECTION PLAN IS NOT INSURANCE! Upon accepting the optional Rental Protection Plan, Customer agrees to pay a charge equal to 14% of the rental charges on Equipment Customer wants covered by the Rental Protection Plan. In return, as set forth in Addendum 1 to the Rental Agreement, United agrees to waive certain claims for accidental damage to or theft of such covered Equipment occurring during normal and careful use. Customer remains liable for all other damages as set forth in the conditions found in Addendum 1 to the Rental Agreement.

NOTICE FOR RENTAL OF A MOTOR VEHICLE: THIS CONTRACT OFFERS, FOR AN ADDITIONAL CHARGE, A DAMAGE WAIVER TO LIMIT YOUR FINANCIAL RESPONSIBILITY FOR DAMAGE TO OR THEFT OF THE MOTOR VEHICLE. BEFORE DECIDING WHETHER TO PURCHASE THE DAMAGE WAIVER, YOU MAY WISH TO DETERMINE WHETHER YOUR OWN INSURANCE AFFORDS YOU COVERAGE. THE PURCHASE OF THIS DAMAGE WAIVER IS NOT MANDATORY AND MAY BE WAIVED OR DECLINED.

READ BEFORE SIGNING: By signing below, Customer (x) Agrees to the terms and conditions contained in this rental agreement; (x) Agrees that the equipment is in the condition as stated on the condition report(s); (x) Agrees to the terms and conditions of the Optional Rental Protection Plan, if applicable; and (x) Authorizes United to charge Customer s credit card listed above or on file, if applicable. Customer also acknowledges that it is fully familiar with the operation and use of the equipment and has received (a) the equipment in good working order; (b) all safety bulletins; (c) all operator manuals; and (d) all manufacturer s tabulated data for the for the protective system equipment listed above.

X

CUSTOMER SIGNATURE DATE | CUSTOMER NAME PRINTED | UNITED RENTALS REPRESENTATIVE/DELIVERED BY DATE

A LARGER FONT COPY OF THE TERMS AND CONDITIONS IS AVAILABLE UPON REQUEST.

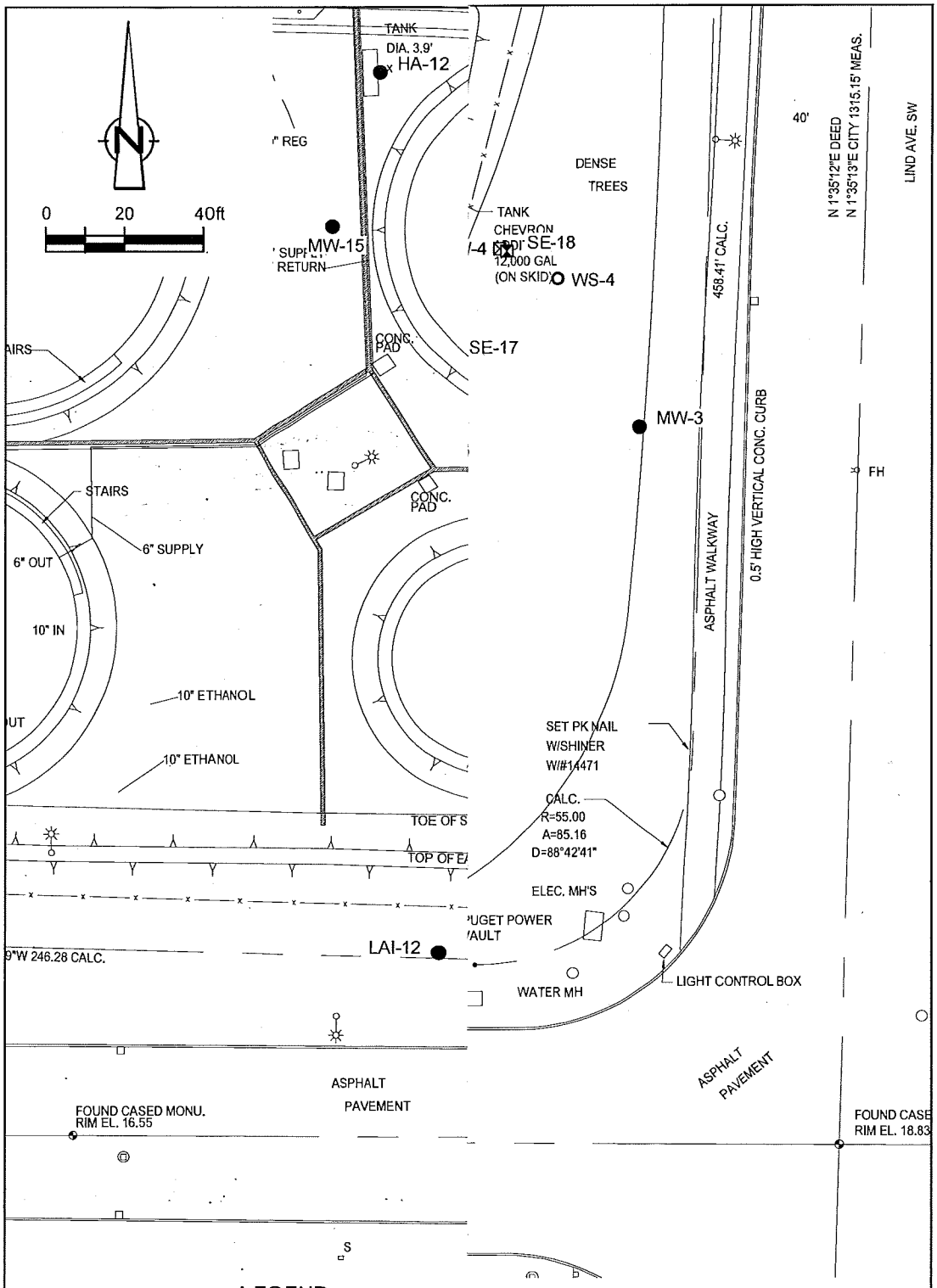
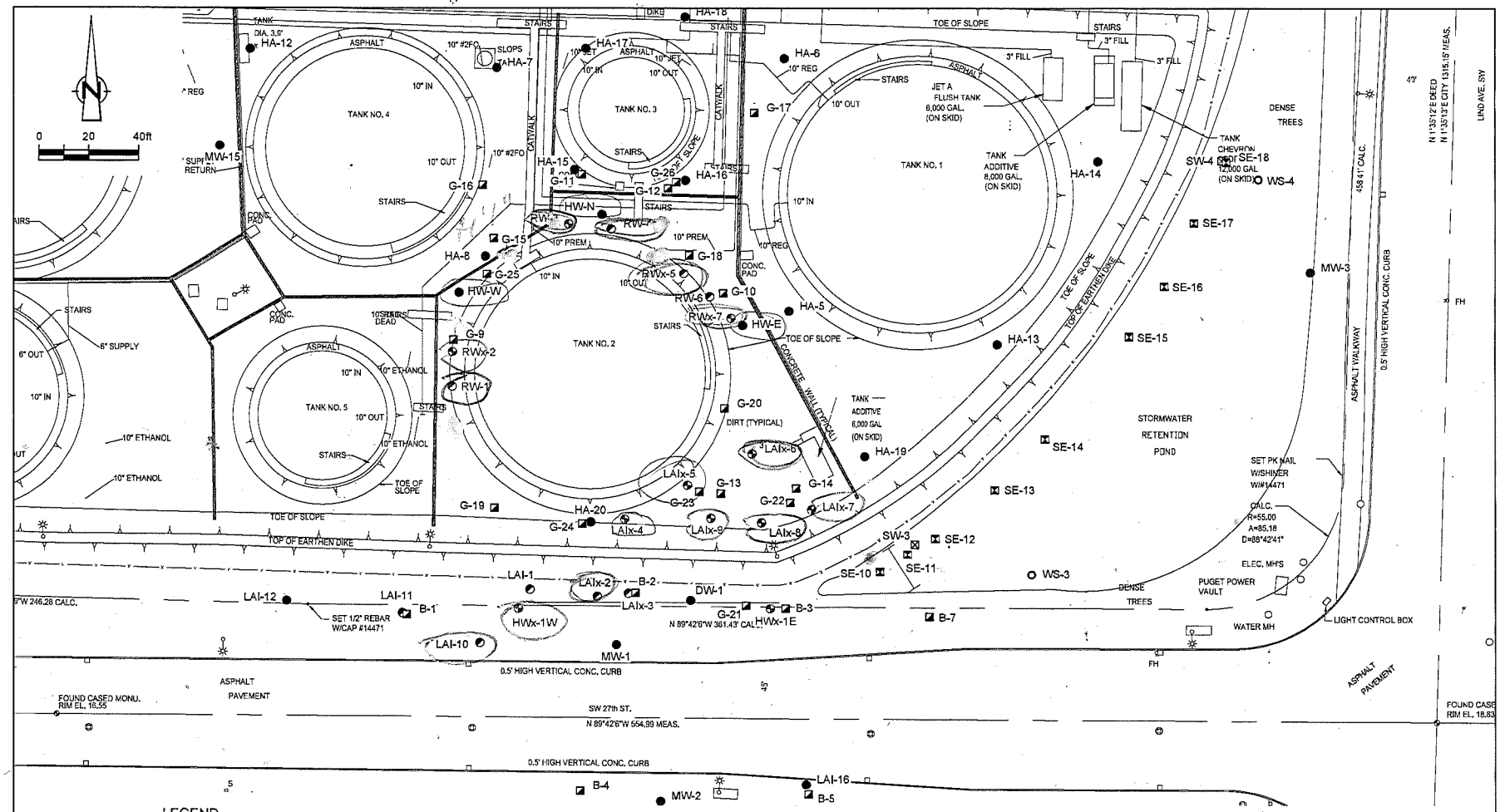


figure X

RING AND WELL LOCATIONS
LLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

70496-RI00(PRES002)GN-WA002 APR 10/2013



LEGEND

- MONITORING WELL
- ABANDONDED OR DESTROYED MONITORING WELL LOCATION
- 4" DIAMETER VERTICAL RECOVERY WELL (ACTIVELY PUMPING)
- 4" DIAMETER VERTICAL RECOVERY WELL (INACTIVE- NOT PUMPING)
- REMEDIATION WELL LOCATION
- SURFACE WATER SAMPLE LOCATION
- EXCAVATION SAMPLE LOCATION
- SEDIMENT SAMPLE LOCATION
- STAFF GAUGE LOCATION
- SOIL BORING LOCATION

SOURCE: STATEWIDE LAND SURVEYING INC., DATED 1/26/12.

figure X

SITE PLAN WITH SOIL BORING AND WELL LOCATIONS
PHILLIPS 66 RENTON TERMINAL
2423 LIND AVENUE SW
Renton, Washington

70496-RI00(PRES002)GN-WA002 APR 10/2013

CONESTOGA-ROVERS & ASSOCIATES

CHAIN OF CUSTODY RECORD

COC NO.: 37461

PAGE ___ OF ___

Address: _____

Phone: _____ Fax: _____

(See Reverse Side for Instructions)

Project No/ Phase/Task Code: 070496	**Laboratory Name:** Pace Analytical	**Lab Location:**	**SSOW ID:**
Project Name:	**Lab Contact:** Jenni Gross	**Lab Quote No:**	**Cooler No:**
Project Location: 2923 Lind Avenue, Renton, WA			**Carrier:**
Chemistry Contact:			**Airbill No:**
Sampler(s): K Whitaker			**Date Shipped:**

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Sample Type: Matrix Code (see back of COC)	Sample Type: Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Analysis Requested: TPHg (NWTP-HCID)	TPHd (NWTP-HCID)	1,2-D (NWTP HCID)	MTBE (8260B)	BTEX (8021B)	MS/MSD Request	Comments/ Special Instructions:
1	RWX-5	4/24/13	1625	WG			8								X	X	X	X	X		
2	~~DUPLICATE~~ RWX-5	4/25/13	0730	WG			8								X	X	X	X	X		
3	LAIX-5	4/25/13	1140	WG			8								X	X	X	X	X		
4	LAIX-5	4/25/13	1415	WG			8								X	X	X	X	X		
5																					
6																					
7																					
8																					
9			4																		
10																					
11																					
12																					
13																					
14																					
15																					

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers:

All Samples in Cooler must be on COC

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1. Kelly R Whitaker	CRA	4/24/13		1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

CONESTOGA-ROVERS & ASSOCIATES

CHAIN OF CUSTODY RECORD

COC NO.: 37459

PAGE 1 OF 1

Address: _____

Phone: _____ Fax: _____

(See Reverse Side for Instructions)

Project No/ Phase/Task Code: 070496	**Laboratory Name:** Face Analytical	**Lab Location:**	**SSOW ID:**
Project Name:	**Lab Contact:** Jenni Gross	**Lab Quote No:**	**Cooler No:**
Project Location: 2423 Lind Avenue, Renton, WA			**Carrier:**
Chemistry Contact:			**Airbill No:**
Sampler(s): P Rasmussen / K Whittaker / N. Hinst w ger			**Date Shipped:**

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd//yy)	Time (hh:mm)	Sample Type: Matrix Code (see back of COC)	Sample Type: Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Analysis Requested: TPHg (NWTPH-Gx)	TPHd (NWTPH-Dx)	TPHlo (NWTPH-Dx)	MTBE (8260B)	BTEX (8260B)	MS/MSD Request	Comments/ Special Instructions:
1	EX-1	4/23/13	1620	GW	G		8								X	X	X	X	X		
2	RWX-2	4/23/13	2215	WG	G		8								X	X	X	X	X		
3	RWX-2	4/24/13	1300	GW	G		8								X	X	X	X	X		
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers:

All Samples in Cooler must be on COC

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.	CRA	4/24/13	1445	1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

CONESTOGA-ROVERS & ASSOCIATES

CHAIN OF CUSTODY RECORD

Address: _____

Phone: _____ Fax: _____

COC NO.: 37458

PAGE 1 OF 1

(See Reverse Side for Instructions)

Project No/ Phase/Task Code: 0704196	**Laboratory Name:** TACE	**Lab Location:** Seattle	**SSOW ID:**
Project Name:	**Lab Contact:** Jenni Gross	**Lab Quote No:**	**Cooler No:**
Project Location: 4422 2nd Avenue, Kent, WA			**Carrier:**
Chemistry Contact:			**Airbill No:**
Sampler(s): M Lavoie, Yoshiko & Wilke			**Date Shipped:**

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd//yy)	Time (hh:mm)	Sample Type: Matrix Code (see back of COC)	Sample Type: Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	HCl	HNO_3	H_2SO_4	NaOH	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Analysis Requested: TPHg (NWTPH-Gx)	BTEX (EPA 8021B)	MTBE (EPA 8021B)	MS/MSD Request	Comments/ Special Instructions:
1	F-1-1	4/23/13	405	GW									X2		X	X	X		
2	KWX-2 Step 1	4/23/13	1135 PM	GW									2		X	X	X		
3	KWX-2 Step 2	4/24/13	215	GW									2		X	X	X		
4	RWX-2 Step 3	4/24/13	1245	GW									2		X	X	X		
5	RWX-2	4/24/13	145	GW									2		X	X	X		
6	HW-W	4/24/13	1440	GW									2		X	X	X		
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☒ 2 Week ☐ Other:

Total Number of Containers: 12

All Samples in Cooler must be on COC

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.	CRA	4/24/13	1445	1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

CONESTOGA-ROVERS & ASSOCIATES

CHAIN OF CUSTODY RECORD

COC NO.: 37460

PAGE ___ OF ___

(See Reverse Side for Instructions)

Address: _____

Phone: _____ Fax: _____

Project No/ Phase/Task Code: 0704916	**Laboratory Name:** Para Analytical	**Lab Location:**	**SSOW ID:**
Project Name:	**Lab Contact:** Jenni Gross	**Lab Quote No:**	**Cooler No:**
Project Location: 2423 Lind Avenue, Renton, WA			**Carrier:**
Chemistry Contact:			**Airbill No:**
Sampler(s): K. Whittaker			**Date Shipped:**

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Sample Type: Matrix Code (see back of COC)	Sample Type: Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	HCl	HNO_3	H_2SO_4	NaOH	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other: Tedlar	Total Containers/Sample	Analysis Requested: TPHg (TO-3)	BTEX (TO-3)	MTBE (TO-3)	methane (TO-12)	MS/MSD Request	Comments/ Special Instructions:
1	RWX-5 Step 1	4/24/13	1900	GS									2		X	X	X			
2	RWX-5 Step 2	4/24/13	2100	GS									2		X	X	X			
3	RWX-5 Step 3	4/24/13	2130	GS									2		X	X	X			
4	RWX-5	04/25/13	02:00	GS									2		X	X	X			
5	RWX-5M	04/25/13	02:00	GS									2					X		
6	RWX-5	4/25/13	07:00	GS									2		X	X	X			
7	LMX-5	4/25/13	225	GS									2		X	X	X			
8	LMX-5M	4/25/13	1430	GS									2		X			X		
9	LMX-5	4/25/13	1430	GS									2		X	X	X			
10																				
11																				
12																				
13																				
14																				
15																				

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers:

All Samples in Cooler must be on COC

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1. [signature]	CRA	4/24/13		1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

RENTAL ORDER

Paco Ventures LLC
250 S. Webster St
SEATTLE, WA 98108
United States of America
Phone No.: 206-762-3550
Fax No.: 206-763-4232

Order Number: **RO-10280**
Order Date: 04/19/13
Customer PO: **VISA**
Page: 1

Billing Address:

CRA Enviromental
Paul Rasmussen
20818 44th West
Suite 190
LYNNWOOD, WA 98036

Shipping Address:

CRA Enviromental
Paul Rasmussen 707.974.6644
2423 Lynden Ave SW
RENTON, WA 98055

Items Rented

Item / Description	Quantity	Rental Term	From / Thru	Unit Price	Currency US $ if Blank
3090.02.005 **Wilden Champ 1-1/2" Plastic Pump 3/4" hoseb**	1 Each	Indef.	04/19/13	234.00 per 4 Week	
Rental Rates: *per 4 Week* 234.00 *per Week* 78.00 *per Day* 26.00					
Item Shipped: 181342					
3010.02.005 **Air Comp-Low Pressure-185 CFM**	1 Each	Indef.	04/19/13	660.00 per 4 Week	
Rental Rates: *per 4 Week* 660.00 *per Week* 220.00 *per Day* 73.00					
Item Shipped: 041811					

Paco Reference Information:

Customer ID: C41660
Salesperson
Terms: Payable on Receipt
Ship Via

Insurance / Sales Tax

Ins Cert. Required Yes
Ins Expiration Date
Insurance Policy No.

I hereby agree to the terms and conditions of this rental agreement including the terms and conditions listed on the last page of this agreement:

This agreement consists of the pages above and the terms and conditions on the final page. Together they constitute the entire agreement of the parties relating to the rental and or sale of equipment, parts or services described herein.

This rental agreement supersedes all other purchase orders or terms and conditions contained in any of the customer's agreements or forms.

Signature / Date

Print Name

SUNBELT RENTALS

PC#: 348
2257 LINCOLN AVE
TACOMA, WA 98421-3409
253-922-6995

SUNBELT RENTALS, INC.

Salesman: 34805 POWTER, ANTHONY (348
Typed By: MHUGHES

Job Site:
CONOCO PHILLIPS
2423 LIND AVE SW
RENTON, WA 98057-3345

C#: 716-297-6150 J#: 253-507-6217

Customer: 2201515
CONESTOGA-ROVERS & ASSOCIATES
2055 NIAGARA FALLS BLVD #3
NIAGARA FALLS, NY 14304

RENTAL OUT

Contract #.. 39572338
Contract dt. 4/19/13
Date out.... 4/22/13 8:00 AM
Est return.. 4/27/13 4:00 PM
Job Loc..... 2423 LIND AVE SW, RENTON
Job No..... 1 - CONOCO PHILLIPS
P.O. #..... 40-40577586
Ordered By.. SMITH, MATT
NET DUE UPON RECEIPT

QTY	EQUIPMENT #	Min	Day	Week	4 Week	Amount
30.00	CABLE RAMPS	17.00	17.00	42.00	105.00	

SALES ITEMS:

Qty	Item number	Unit	Price	Amount
1	DLPKSRCHG TRANSPORTATION SURCHARGE	EA	22.050	22.05
1	ENVIRONMENTAL ENVIRONMENTAL	EA		
	DELIVERY CHARGE			105.00
	PICKUP CHARGE			105.00

Rate your rental experience www.sunbeltrentals.com/survey

IF THE EQUIPMENT DOES NOT WORK PROPERLY, NOTIFY THE OFFICE AT ONCE

MULTIPLE SHIFTS OR OVERTIME RATES MAY APPLY

CUSTOMER IS RESPONSIBLE FOR REFUELING, DAMAGES AND REPAIRS

1. The total charges are an estimate based on the estimated rental period provided by Customer.
2. Customer assumes all risks associated with the Equipment during the Rental Period, including injury and damage to persons, property and the Equipment.
3. Customer is responsible for and shall only permit properly trained, authorized individuals, who are not impaired (under the influence of drugs or alcohol), to use the Equipment.
4. If the Equipment does not operate properly, is not suitable for Customer's intended use, does not have operating and safety instructions or Customer has any questions regarding use of the Equipment, Customer shall not use the Equipment and shall contact Sunbelt immediately.
5. Misuse of the Equipment or using damaged or malfunctioning Equipment may result in serious bodily injury or death.
6. Customer has received, read, understands and agrees to the estimated charges herein and all the terms and conditions of this Contract, including the Release and Indemnification provision in Section 7. and the Environmental Fee in Section 14, which can also be found at www.sunbeltrentals.com/rentalcontract. *Delivery/Pickup Surcharge fee explanation is available at www.sunbeltrentals.com/surcharge
7. Customer must contact Sunbelt to request pickup of Equipment, retain the Pick Up Number given by Sunbelt and will be responsible for Equipment until actually retrieved by Sunbelt.
8. For operations in California: Customer is renting equipment registered under the California Air Resources Board (CARB) Portable Equipment Registration Program (PERP). The operator of the Equipment is subject to the requirements of the PERP regulation and local Air Pollution Control District rules. Under the PERP Regulation, the Customer is required to keep a copy of the rental agreement and CARB registration certificate, including operating conditions and notification requirements, with the Equipment at all times. Customer must also complete the log provided with the Equipment as required by PERP and returning the log with the Equipment (see www.arb.ca.gov/portable/portable.htm). By signing this Contract, the Customer acknowledges receipt of these documents.

Customer is declining Rental Protection Plan _____ (Customer Initials)

Customer Signature | Date | Name Printed | Delivered By | Date

SUNBELT RENTALS

PC#: 327
20215 84TH AVE S
KENT, WA 98032-1204
253-872-0799

SUNBELT RENTALS, INC.

Salesman: 32705 BISHOP,MICHAEL (327)
Typed By: MSPORDER

Job Site:
CONOCO PHILLIPS
2423 LIND AVE
RENTON, WA 98057 3345

C#: 613-498-1876 J#: 613-498-1876

Customer: 546604
MAPLE LEAF ENVIRONMENTAL EQUIP
P.O. BOX 1517
BROCKVILLE, ON K6V

RENTAL OUT

Contract #.. 39579263
Contract dt. 4/19/13
Date out.... 4/22/13 7:00 AM
Est return.. 4/26/13 7:00 AM
Job Loc..... 2423 LIND AVE, WA
Job No..... RENTON WA
P.O. #..... 201891-002
Ordered By.. WOOD, EMILY
NET DUE UPON RECEIPT

QTY	EQUIPMENT #	Min	Day	Week	4 Week	Amount
1.00	56KW DIESEL GENERATOR	260.00	260.00	650.00	1950.00	
	116852 Make: MQ POWER Model: DCA-70SSIU2 Ser #: 4GNFU12266B019335					
	MQ POWER,DCA-70SSIU2,56KW DIESEL GENERATOR					
	HR OUT: 1.000					
	MUST BE 2-5/16 BALL					
	TOW VEHICLE MUST BE RATED FOR 8,000 LBS					
1.00	MISCELLANEOUS	8.00	8.00	20.00	50.00	
	NEW PAIR OF WHEEL CHOCKS					
4.00	2/0 FEMALE PIG TAIL	6.00	6.00	16.00	48.00	
4.00	2/0 MALE PIG TAIL	6.00	6.00	17.00	51.00	
4.00	4/0 CAMLOCK CABLE 50'	13.00	13.00	32.00	93.00	
	Must be 25' long					
	*** EQP MSG ***					
	8 Hrs/Day 40 Hrs/Wk = 1.0x Rate					
	9-16 Hrs/Day 41-80 Hrs/Wk = 1.5x Rate					
	17+ Hrs/Day 81+ Hrs/Wk = 2.0x Rate					

COPY

SALES ITEMS:

Qty	Item number	Unit	Price

Rate your rental experience www.sunbeltrentals.com/survey

IF THE EQUIPMENT DOES NOT WORK PROPERLY, NOTIFY THE OFFICE AT ONCE | MULTIPLE SHIFTS OR OVERTIME RATES MAY APPLY | CUSTOMER IS RESPONSIBLE FOR REFUELING, DAMAGES AND REPAIRS

1. The total charges are an estimate based on the estimated rental period provided by Customer.
2. Customer assumes all risks associated with the Equipment during the Rental Period, including injury and damage to persons, property and the Equipment.
3. Customer is responsible for and shall only permit properly trained, authorized individuals, who are not impaired (under the influence of drugs or alcohol), to use the Equipment.
4. If the Equipment does not operate properly, is not suitable for Customer's intended use, does not have operating and safety instructions or Customer has any questions regarding use of the Equipment, Customer shall not use the Equipment and shall contact Sunbelt immediately.
5. Misuse of the Equipment or using damaged or malfunctioning Equipment may result in serious bodily injury or death.
6. Customer has received, read, understands and agrees to the estimated charges herein and all the terms and conditions of this Contract, including the Release and Indemnification provision in Section 7. and the Environmental Fee in Section 14, which can also be found at www.sunbeltrentals.com/rentalcontract. *Delivery/Pickup Surcharge fee explanation is available at www.sunbeltrentals.com/surcharge
7. Customer must contact Sunbelt to request pickup of Equipment, retain the Pick Up Number given by Sunbelt and will be responsible for Equipment until actually retrieved by Sunbelt.
8. For operations in California: Customer is renting equipment registered under the California Air Resources Board (CARB) Portable Equipment Registration Program (PERP). The operator of the Equipment is subject to the requirements of the PERP regulation and local Air Pollution Control District rules. Under the PERP Regulation, the Customer is required to keep a copy of the rental agreement and CARB registration certificate, including operating conditions and notification requirements, with the Equipment at all times. Customer must also complete the log provided with the Equipment as

Customer is declining Rental Protection Plan _____ (Customer Initials)

Continued on the next page...

Delivered By: Date: Rec'd By: Returned By: Date:

SUNBELT RENTALS

PC#: 327
20215 84TH AVE S
KENT, WA 98032-1204
253-872-0799

SUNBELT RENTALS, INC.

Salesman: 32705 BISHOP,MICHAEL (327)
Typed By: MSPORDER

Job Site:
CONOCO PHILLIPS
2423 LIND AVE
RENTON, WA 98057 3345

C#: 613-498-1876 J#: 613-498-1876

Customer: 546604
MAPLE LEAF ENVIRONMENTAL EQUIP
P.O. BOX 1517
BROCKVILLE, ON K6V

RENTAL OUT

Contract #.. 39579263
Contract dt. 4/19/13
Date out.... 4/22/13 7:00 AM
Est return.. 4/26/13 7:00 AM
Job Loc..... 2423 LIND AVE, WA
Job No..... RENTON WA
P.O. #..... 201891-002
Ordered By.. WOOD, EMILY
NET DUE UPON RECEIPT

QTY	EQUIPMENT #	Min	Day	Week	4 Week	Amount
SALES ITEMS:						
Qty	Item number	Unit	Price			
1	DLPKSRCHG TRANSPORTATION SURCHARGE	EA	13.650			13.65
1	ENVIRONMENTAL ENVIRONMENTAL	EA				
	DELIVERY CHARGE					65.00
	PICKUP CHARGE					65.00

COPY

Rate your rental experience www.sunbeltrentals.com/survey

IF THE EQUIPMENT DOES NOT WORK PROPERLY, NOTIFY THE OFFICE AT ONCE | MULTIPLE SHIFTS OR OVERTIME RATES MAY APPLY | CUSTOMER IS RESPONSIBLE FOR REFUELING, DAMAGES AND REPAIRS

1. The total charges are an estimate based on the estimated rental period provided by Customer.
2. Customer assumes all risks associated with the Equipment during the Rental Period, including injury and damage to persons, property and the Equipment.
3. Customer is responsible for and shall only permit properly trained, authorized individuals, who are not impaired (under the influence of drugs or alcohol), to use the Equipment.
4. If the Equipment does not operate properly, is not suitable for Customer's intended use, does not have operating and safety instructions or Customer has any questions regarding use of the Equipment, Customer shall not use the Equipment and shall contact Sunbelt immediately.
5. Misuse of the Equipment or using damaged or malfunctioning Equipment may result in serious bodily injury or death.
6. Customer has received, read, understands and agrees to the estimated charges herein and all the terms and conditions of this Contract, including the Release and Indemnification provision in Section 7. and the Environmental Fee in Section 14, which can also be found at www.sunbeltrentals.com/rentalcontract. *Delivery/Pickup Surcharge fee explanation is available at www.sunbeltrentals.com/surcharge
7. Customer must contact Sunbelt to request pickup of Equipment, retain the Pick Up Number given by Sunbelt and will be responsible for Equipment until actually retrieved by Sunbelt.
8. For operations in California: Customer is renting equipment registered under the California Air Resources Board (CARB) Portable Equipment Registration Program (PERP). The operator of the Equipment is subject to the requirements of the PERP regulation and local Air Pollution Control District rules. Under the PERP Regulation, the Customer is required to keep a copy of the rental agreement and CARB registration certificate, including operating conditions and notification requirements, with the Equipment at all times. Customer must also complete the log provided with the Equipment as required by PERP and returning the log with the Equipment (see www.arb.ca.gov/portable/portable.htm). By signing this Contract, the Customer acknowledges receipt of these documents.

Customer is declining Rental Protection Plan _____ (Customer Initials)

Customer Signature | Date | Name Printed | Delivered By | Date

BAKERCORP™

9715 24TH PLACE W..
EVERETT, WA 98204

PHN# 425-347-8811 FAX# 425-347-0369

Nick

Remit to:
BAKERCORP
PO Box 843596
LOS ANGELES, CA 90084-3596

Job Site:
CONESTOGA ROVERS & ASSOCIATES
PHILLIP 66 TERMINAL LINE AVE
RENTON, WA 98058

C#: 972-331-8500 J#: 972-331-8500

RESERVATION

Contract #.. 517156
Contract dt. 4/19/13

Start date.. 4/22/13
Job Loc..... PHILLIP 66 TERMINAL LINE AVE, R
Job No..... 11- CONESTOGA ROVERS
P.O. #..... *TO FOLLOW-TIM
Ordered By.. KELSEY WHITTAKER
Reference #.

Customer #: 16641
CONESTOGA ROVERS & ASSOCIATES
ATTN: ACCOUNTS PAYABLE
11004 EAST 51ST STREET
TULSA, OK 74146

Qty	Description
1	TANK 21K GAL FXDAXL VPR TIGHT LINED SM 1101200
1	BERM 10'X50' SAFEGUARD 1901150

SALES ITEMS:

Qty	Description	Unit
2.5	DELIVER STEEL TANK 9971010	HR
1	FUEL SURCHARGE 9999921	AT

POC: KELSEY 425-442-9662
CONTENTS: WATER WITH HYDROCARBONS CONTAM
INATION

PLEASE CALL FOR P/U AFTER EQUIPMENT HAS BEEN PROFESSIONALLY CLEANED. TRIPLE RINSING AND STEAM MAY BE REQUIRED, CALL WITH QUESTIONS. ADDITIONAL TRANS CHARGES MAY APPLY IF EQUIPMENT IS LEFT UNCLEAN AND WE ARE UNABLE TO PICK UP. THANK YOU!

DAMAGES /CLEANING Y / N _____ DELIVERY TIME AND/OR SET UP CHARGES: _____

READ BEFORE SIGNING: Reminder, rental rates, as presented above, do not include fuel or delivery charges. Such charges shall be shown on subsequent invoices. Customer agrees to rent the equipment described on the face of this Rental Agreement ("Agreement") pursuant to the terms and conditions set forth above and on the reverse side hereof, which customer acknowledges having read and understands. The term of this Agreement shall commence on the date shown on the face hereof and shall end upon the written or verbal notice of termination by either party to the other hereto. Such notice of termination shall be exclusive to customer's continued possession of equipment described herein and shall in no way relieve customer of liability to Baker for any/all obligations under this Agreement, including but not limited to: monies due, replacement costs for lost equipment and repair costs for damaged equipment. Upon installation by BakerCorp, customer acknowledges receipt and inspection of equipment rented pursuant to this Agreement and further acknowledges same to be in good condition and to be installed in accordance with customer's requirements. Further, the individual signing below, as or on behalf of the customer, agrees to all terms and conditions as presented on the face and reverse side hereof, acknowledges receipt of the equipment in good and working condition, is satisfied with its installation for the customer's intended use, is fully familiar with its operation, use and care, and is in receipt of a copy of the appropriate Safety Handout(s). Additionally, customer acknowledges receipt of a copy of the Air Resources Board Registration for each tank and/or pump subject to the Agreement (California only).

BY_____ TITLE _____ FOR _____
COMPANY NAME

PRINT NAME _____ DATE _____

SUNBELT RENTALS

PC#: 327
20215 84TH AVE S
KENT, WA 98032-1204
253-872-0799

SUNBELT RENTALS, INC.

Salesman: 32705 BISHOP,MICHAEL (327)
Typed By: DBABCOCK

Job Site:
CONOCO PHILLIPS
2423 LIND AVE SW
RENTON, WA 98057-3345

C#: 716-297-6150 J#: 253-507-6217

Customer: 2201515
CONESTOGA-ROVERS & ASSOCIATES
2055 NIAGARA FALLS BLVD #3
NIAGARA FALLS, NY 14304

RENTAL OUT

Contract #.. 39581933
Contract dt. 4/19/13
Date out.... 4/22/13 2:00 PM
Est return.. 4/25/13 2:00 PM
Job Loc..... 2423 LIND AVE SW, RENTON
Job No..... 1 - CONOCO PHILLIPS
P.O. #..... 40=40577558
Ordered By.. SMITH, MATT
NET DUE UPON RECEIPT

QTY	EQUIPMENT #	Min	Day	Week	4 Week	Amount
1.00	2000 WATT PORTABLE LIGHT CART 115V	55.00	55.00	150.00	395.00	
	500852 Make: CEP Model: 5322 Ser #: 13809					
	LIGHT CART 2000W,CEP,5322,ELEC					
	KELSEY - 425.442.9662					
1.00	4000 WATT DSL 6KW NARROW LIGHT TOWER	120.00	120.00	373.00	750.00	
	369639 Make: MAGNUM PRO Model: MLT3060 Ser #: 1108245					
	LIGHT TOWER 4000W,MAGNUM PRO,MLT3060,DSL					
	HR OUT: 957.900					

*** EQP MSG ***
The following shift rates will apply:
8 Hrs/Day 40 Hrs/Wk = 1.0 x Rate
9-16 Hrs/Day 41-80 Hrs/Wk = 1.5 x Rate
17+ Hrs/Day 81+ Hrs/Wk = 2.0 x Rate

SALES ITEMS:

Qty	Item number	Unit	Price	
1	DLPKSRCHG	EA	17.850	17.85
	TRANSPORTATION SURCHARGE			
1	ENVIRONMENTAL	EA		
	ENVIRONMENTAL			
	DELIVERY CHARGE			85.00

Rate your rental experience www.sunbeltrentals.com/survey

IF THE EQUIPMENT DOES NOT WORK PROPERLY, NOTIFY THE OFFICE AT ONCE | MULTIPLE SHIFTS OR OVERTIME RATES MAY APPLY | CUSTOMER IS RESPONSIBLE FOR REFUELING, DAMAGES AND REPAIRS

1. The total charges are an estimate based on the estimated rental period provided by Customer.
2. Customer assumes all risks associated with the Equipment during the Rental Period, including injury and damage to persons, property and the Equipment.
3. Customer is responsible for and shall only permit properly trained, authorized individuals, who are not impaired (under the influence of drugs or alcohol), to use the Equipment.
4. If the Equipment does not operate properly, is not suitable for Customer's intended use, does not have operating and safety instructions or Customer has any questions regarding use of the Equipment, Customer shall not use the Equipment and shall contact Sunbelt immediately.
5. Misuse of the Equipment or using damaged or malfunctioning Equipment may result in serious bodily injury or death.
6. Customer has received, read, understands and agrees to the estimated charges herein and all the terms and conditions of this Contract, including the Release and Indemnification provision in Section 7. and the Environmental Fee in Section 14, which can also be found at www.sunbeltrentals.com/rentalcontract. *Delivery/Pickup Surcharge fee explanation is available at www.sunbeltrentals.com/surcharge
7. Customer must contact Sunbelt to request pickup of Equipment, retain the Pick Up Number given by Sunbelt and will be responsible for Equipment until actually retrieved by Sunbelt.
8. For operations in California: Customer is renting equipment registered under the California Air Resources Board (CARB) Portable Equipment Registration Program (PERP). The operator of the Equipment is subject to the requirements of the PERP regulation and local Air Pollution Control District rules. Under the PERP Regulation, the Customer is required to keep a copy of the rental agreement and CARB registration certificate, including operating conditions and notification requirements, with the Equipment at all times. Customer must also complete the log provided with the Equipment as

Customer is declining Rental Protection Plan _____ (Customer Initials)

Continued on the next page...

SUNBELT RENTALS

PC#: 327
20215 84TH AVE S
KENT, WA 98032-1204
253-872-0799

SUNBELT RENTALS, INC.

Salesman: 32705 BISHOP,MICHAEL (327)
Typed By: DBABCOCK

Job Site:
CONOCO PHILLIPS
2423 LIND AVE SW
RENTON, WA 98057-3345

C#: 716-297-6150 J#: 253-507-6217

Customer: 2201515
CONESTOGA-ROVERS & ASSOCIATES
2055 NIAGARA FALLS BLVD #3
NIAGARA FALLS, NY 14304

RENTAL OUT

Contract #.. 39581933
Contract dt. 4/19/13
Date out.... 4/22/13 2:00 PM
Est return.. 4/25/13 2:00 PM
Job Loc..... 2423 LIND AVE SW, RENTON
Job No..... 1 - CONOCO PHILLIPS
P.O. #..... 40=40577558
Ordered By.. SMITH, MATT
NET DUE UPON RECEIPT

QTY	EQUIPMENT #	Min	Day	Week	4 Week	Amount
SALES ITEMS:						
Qty	Item number	Unit	Price			
	PICKUP CHARGE					85.00

Rate your rental experience www.sunbeltrentals.com/survey

IF THE EQUIPMENT DOES NOT WORK PROPERLY, NOTIFY THE OFFICE AT ONCE | MULTIPLE SHIFTS OR OVERTIME RATES MAY APPLY | CUSTOMER IS RESPONSIBLE FOR REFUELING, DAMAGES AND REPAIRS

1. The total charges are an estimate based on the estimated rental period provided by Customer.
2. Customer assumes all risks associated with the Equipment during the Rental Period, including injury and damage to persons, property and the Equipment.
3. Customer is responsible for and shall only permit properly trained, authorized individuals, who are not impaired (under the influence of drugs or alcohol), to use the Equipment.
4. If the Equipment does not operate properly, is not suitable for Customer's intended use, does not have operating and safety instructions or Customer has any questions regarding use of the Equipment, Customer shall not use the Equipment and shall contact Sunbelt immediately.
5. Misuse of the Equipment or using damaged or malfunctioning Equipment may result in serious bodily injury or death.
6. Customer has received, read, understands and agrees to the estimated charges herein and all the terms and conditions of this Contract, including the Release and Indemnification provision in Section 7. and the Environmental Fee in Section 14, which can also be found at www.sunbeltrentals.com/rentalcontract. *Delivery/Pickup Surcharge fee explanation is available at www.sunbeltrentals.com/surcharge
7. Customer must contact Sunbelt to request pickup of Equipment, retain the Pick Up Number given by Sunbelt and will be responsible for Equipment until actually retrieved by Sunbelt.
8. For operations in California: Customer is renting equipment registered under the California Air Resources Board (CARB) Portable Equipment Registration Program (PERP). The operator of the Equipment is subject to the requirements of the PERP regulation and local Air Pollution Control District rules. Under the PERP Regulation, the Customer is required to keep a copy of the rental agreement and CARB registration certificate, including operating conditions and notification requirements, with the Equipment at all times. Customer must also complete the log provided with the Equipment as required by PERP and returning the log with the Equipment (see www.arb.ca.gov/portable/portable.htm). By signing this Contract, the Customer acknowledges receipt of these documents.

Customer is declining Rental Protection Plan _____ (Customer Initials)

Customer Signature | Date | Name Printed | Delivered By | Date

PACKING LIST

SEAPORT PETROLEUM

7800 Detroit Ave SW
Seattle, WA 98106-3900
Hazardous Emerg
24 Hour Phone #
(206) 971-7999

Order Number: 0149062
Order Date: 4/23/2013
Salesperson: 0044
Customer Number: 02-0001810

Sold To:
Sunbelt Rentals
PO Box 410928
PO Required
CHARLOTTE, NC 28241

Ship To:
Maple Leaf/ConPhillips (PC327)
2423 Lind Avenue
**PO 4522761
PO Required
Renton, WA 98057

Confirm To:

Customer P.O.	Ship VIA	F.O.B.	Terms
4522761			Net 30 Days from Invoice Date

Item Number	Unit	Ordered	Shipped	Back Order	Price	Amount
DOFR 271000_DYED ULS DIESEL FEDERAL LUST TAX FEDERAL OIL SPILL TAX WA HAZARDOUS MATERIAL TAX FUEL SURCHARGE	GAL	80.00	17.1 Whse: 200	0.00		

COMPRESSOR

THIS PRODUCT IS DYED DIESEL FUEL
NON TAXABLE USE ONLY. PENALTY FOR TAXABLE USE.
OFF HIGHWAY/NOT LEGAL FOR MOTOR VEHICLE USE.

FILLED	DATE	DELIVER BY DATE
Dale	4-23-13	4/23/2013

ABOVE MERCHANDISE RECEIVED IN GOOD ORDER

SIGNED DATE

TANK GAUGE
B-4
AFTER

A FINANCE CHARGE OF UP TO 2% PER MONTH (24% PER ANUM) will be charged on past due accounts. Customer agrees to pay collection fees if required for collection and reasonable attorneys fees in the event of legal action.

Seaport is a wholly owned subsidiary of Christensen West LLC.

Receiving Report

Received From: CRA

Date Received: 4/25/13 **Time In:** _____ **Reference #:** RO-10280

Carrier: PAUL 707 974 6644

Qty.	Description	Serial Number	Hours	Fuel
1	2" PUMP	131342		
1	HOSE			
1	AIR COMP 185	041311		

Damage Inspection:

Front:

Back:

Left:

Right:

Tracks/Tires:

Additional Notes (Mirrors, doors, windows, etc..):

All returned rental equipment is subject to inspection.

Customer Signature: _____ **PACO Signature:** _____

Date/Time: 4-25-13 **Date/Time:** _____

PACO Ventures, LLC
Corporate Headquarters, Seattle, WA (800) 678-6379 • California (805) 746-6965 • Alberta, Canada (403) 264-9351
www.PacoEquip.com

HASP ACKNOWLEDGMENT SHEET

This is to certify that I have received a pre-entry briefing regarding this HASP (CRA Renton Terminal Site, and I understand its contents. My failure to follow and comply with the requirements contained in this plan may result in disciplinary action and/or termination.

Print Name	Signature	Date
Heather Bays	Heather Bays	2/20/12
Stephen Rasmussen	Stephen Ras	2/21/12
Diane Escobedo	Diane Escobedo	5/9/12
JAMEN CAUSEY		7-2-12
Luis Lopez	Luis Lopez	7/2/12
Tim Watson		7-10-12
Curtis Astrup		7-16-12
Shane Forrest		7-16-12
Will Armstrong		7-16-12
Eric Hyatt		7-23-12
Kyle Rysh		7-23-12
Mike Binelli		3/21/13
Chris Allen		April 4, 2013
Kelsey Whittaker		4/17/13
Paul Rasmussen		4-17-13
Paul Rasmussen		4-18-13 / 4-19-13
Nick Watkins		4/22/13

SEAPORT PETROLEUM

7800 Detroit Avenue SW
Seattle, WA 98106

206-971-7999 Fax: 206-971-7299

SOLD TO: SUNBELT

4522761 P66

Date 4-23-13

PRODUCT	QUANTITY	PRICE	AMOUNT
GASOLINE			
DIESEL FUEL RED	17.1		
HEATING OIL			

ACCOUNT NUMBER 00000000
DATE 4/23/13 TIME 15:12
TRUCK NUMBER ----- 530
DRIVER NUMBER --------
SALES NUMBER --- 43005
GALLONS START ------ .0
GALLONS FINISH ---- 17.1

APPENDIX O

LNAPL FORENSICS

CONESTOGA-ROVERS & ASSOCIATES

2055 Niagara Falls Blvd., Suite #3
Niagara Falls, New York 14304
Telephone: (716) 297-6150 Fax: (716) 297-2265
www.CRAworld.com

MEMORANDUM

Sent via email

TO:	Matthew B. Smith	REF. NO.:	070496
FROM:	Alan Weston/Sophia Dore/Donald Pope/adh/12	DATE:	June 26, 2013
CC:	Edwin Turner		
RE:	**Identification and Age Dating of Fuel in Groundwater P66 Renton Terminal, Renton, Washington**		

INTRODUCTION

Light non-aqueous phase liquid (LNAPL) was observed at the Phillips 66 (P66) Renton Terminal Site in Renton, Washington (Site). A sample of the LNAPL was collected and sent to Pace Analytical for forensic evaluation. The Conestoga-Rovers &Associates (CRA) Innovative Technology Group (ITG) was requested to review and interpret the forensic data to determine source and approximate age of the LNAPL. ITG applied environmental forensic techniques to determine the source and approximate age of a released fuel. This memo contains the results of the environmental forensic evaluation.

PETROLEUM HYDROCARBON FINGERPRINTING

The use of hydrocarbon fingerprinting has provided a means to identify the source of fuel contaminants in soil and groundwater. It can also be used to estimate the age of a fuel release in the environment. This process, also referred to as environmental forensics, can be very helpful in assigning cleanup costs to responsible parties. However, it is complex and is open to differing interpretations due to the high variability that is typical among individual samples from a site and among the petroleum products themselves.

Petroleum hydrocarbons are the main components of fuels derived from crude oil. The fuels include gasoline, diesel, kerosene, and fuel oil. The different fuels contain different fractions of crude oil. Crude oil is a mixture of paraffinic and aromatic hydrocarbons with a low percentage of sulfur and trace amounts of oxygen and nitrogen compounds. The paraffinic hydrocarbons are the most abundant compounds in crude oil. They include alkanes, which are saturated hydrocarbons with a straight carbon chain completely substituted with hydrocarbon atoms. The alkanes are typically very stable and unreactive as compared to their unsaturated counterparts. Crude oil contains C1-C50+ alkanes. Alkanes C1 – C4 exist as gases, while C5 – C17 are liquids; C18 and higher alkanes are solid at 20°C. Isoprenoids are branched chain paraffinic hydrocarbons that contain at least two methyl groups. Isoprenoids are often more volatile than the straight chain alkane compounds and make up significant portion of fuels. Aromatic compounds include single ring structures such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAH) such as naphthalene, phenanthrene, anthracene, fluorene, and pyrene. The BTEX are

the most abundant aromatic hydrocarbons in fuels, with small amounts of the PAH present, mostly the 2- and 3-ring species.

ANALYSIS OF FORENSIC SAMPLE DATA

Analytical Data

A sample was obtained from the Site and given the sample identification label of EX-1. The sample was received at Pace Analytical laboratory in Seattle, Washington on April 27, 2013. The sample was analyzed for PIANO compounds (Paraffins, Isoparaffins, Aromatics, Naphthenes, and Olefins), oxygenates, organic lead, and manganese. The sample was also analyzed by Gas Chromatography/Flame Ionization Detector (GC/FID) to determine the hydrocarbon fingerprint.

The results of these analyses are shown in Table 1. The sample contained BTEX compounds. Xylenes were present in the greatest proportion followed by toluene, ethylbenzene, and benzene. The results of the PIANO analysis showed that the distribution of these classes of compounds in the sample was 39.3 weight percent aromatics, 9.98 weight percent isoparaffins, 7.57 weight percent paraffins, 2.65 weight percent naphthenes, and 0.41 weight percent olefins.

Marker compounds that can assist in forensic analysis were also detected in the sample. These markers included octane, cyclohexane, isooctane, isopentane, methylcyclohexane, 3-methylhexane, 2-methylpentane, and 3-methylpentane. Octane was present at 0.42 weight percent, cyclohexane at 0.24 weight percent, isooctane at 1.41 weight percent, isopentane at 0.24 weight percent, methylcyclohexane at 0.38 weight percent, 3-methylhexane at 0.81 weight percent, 2-methylpentane at 0.58 weight percent, and 3-methylpentane at 0.47 weight percent.

The analysis also showed that oxygenates were not present above 0.01 weight percent in the sample. However, organic lead and manganese were detected in the sample. The total organic lead was present at 63.6 milligrams per kilogram (mg/kg) and the total organic manganese was present at 3.74 mg/kg.

Source Identification

The data described above was analyzed to determine whether the source of the hydrocarbons in the sample was gasoline. The PIANO composition and proportions of BTEX compounds were compared to the ranges determined experimentally for different gasoline samples by Kaplan et al. (1997). The ranges with the values for the current sample are shown on Figures 1 and 2. For the PIANO compound classes, the sample showed a similar distribution to the literature values with high aromatics and lower proportions of the other classes. In all cases, the values for the sample were close to or within the literature range. For the BTEX ratios, the ratios for the sample were within or close to the literature ranges, although the proportion of xylenes was higher relative to toluene than in the literature samples. Therefore, the source of the hydrocarbons was confirmed as gasoline.

The refining of gasoline also produces chemical markers in the gasoline. Fluid catalytic cracking (FCC) is used in gasoline production in most modern refineries (Stout et al. 2002). FCC produces olefins, which are typically not found in crude oil. Olefins were present in the sample, which suggested that the sample had been refined by FCC. Alkylation is another process in use at refineries to yield higher boiling, high octane number fuels. Isooctane is the primary goal of alkylation by more refiners. A ratio of isooctane to

methylcyclohexane of greater than 0.5 indicates that alkylation has been performed (Stout et al. 2002). The ratio of isooctane to methylcyclohexane in the sample was 3.71, which indicated that alkylation had been performed on the sample.

Based on the PIANO and BTEX proportions and the clear evidence of gasoline refining processes that was present in the sample, it was concluded that the sample was gasoline.

Age Dating

Age dating of gasoline can be performed by considering the degree of weathering (evaporation, water washing, and biodegradation) that has occurred in the sample. The ratios of marker compounds can also be used to estimate the age of the spill.

The extent of evaporation (weathering) can be determined by comparing the gas chromatogram obtained for the sample to published gas chromatograms. Schmidt et al. (2002) published a series of gas chromatograms, which are shown on Figure 3. The gas chromatogram for the sample is shown on Figure 4. The Schmidt figure shows that as weathering proceeds, concentrations of compounds that elute earlier than toluene become progressively lower and at 75 percent weathering are at very low levels. Also, the ratio of toluene to xylenes becomes progressively lower until at 75 percent weathering, the xylene peaks are larger than the toluene peak. The chromatogram for the sample from the Site had high concentrations of compounds that elute earlier than toluene, and the xylene peaks that were about the same size as the toluene peak. This suggested that the Site sample was between 0 percent and 15 percent weathered.

The extent of water washing can be assessed by comparing ratios of more soluble and less soluble compounds. Benzene is more soluble than cyclohexane. The ratio of benzene to cyclohexane in a water sample containing fresh gasoline is 19.3 (Kaplan et al. 1997). The ratio of benzene to cyclohexane in the Site sample was 2.5, indicating that a significant amount of benzene had been washed out of the sample. Similarly, the ratio of toluene to methylcyclohexane in the literature was 13.0, and the ratio in the Site sample was 9.71, indicating that toluene had been lost.

Although weathering and water washing had taken place in the Site sample indicating that it was not from a fresh gasoline spill, the results cannot be used to conclusively state that the spill was old. Gasoline evaporates, solubilizes, and biodegrades very readily in the environment. Given the right conditions, such as direct exposure to air and light, these changes can occur within a short time period such as a few months. However, based on the Site conditions, it is understood that the gasoline was dissolved in groundwater in soil that was not directly exposed to surface conditions. Therefore, evaporation should have occurred more slowly at a similar rate to the references used for the earlier comparisons and indicating that the spill occurred a few years before the sampling.

Gasoline age dating is often performed using additives such as lead, and oxygenates such as methyl tertiary butyl ether (MTBE) or ethanol. Total organic lead was detected at a concentration of 63.6 mg/kg. MTBE and other oxygenates as well as ethanol were also analyzed in the sample but were not detected. Organic lead compounds were added to gasoline as an anti-knocking agent beginning 1960. Lead additives were used in gasoline until 1985-1986, but the amount of the lead additives added to the gasoline was reduced beginning in 1980. Lead usage was banned in California in 1992 and the rest of the country in 1996. The presence of lead in the gasoline indicates that it was likely manufactured prior to 1986.

Indices have been published that are useful in estimating the age of a spill. Schmidt et al. (2002) used the ratio between toluene and octane and the natural log of the ratio between toluene and octane to estimate the age of a spill. Prior to 1994, the ratio of toluene to octane in gasoline was less than 10. After 1994, there was an abrupt jump in the ratio to 10 or higher. This change was due to the relative increase in aromatics and relative decrease in paraffins that occurred after the removal of lead from gasoline. These changes were necessary to maintain the anti-knock quality.

The toluene to octane ratio in the sample was 8.79. This ratio suggests that this gasoline was likely manufactured before 1994. The natural log of this ratio was 2.17. This ratio can be compared to a relationship described by Schmidt et al (2002). This comparison suggested that the gasoline was manufactured between 1985-1987.

SUMMARY

- The LNAPL sample was gasoline
- The gasoline refiner used FCC and alkylation in the production of the gasoline
- The presence of organic lead in the sample indicated that the gasoline was produced before 1986
- Based on the toluene to octane ratios, the gasoline was manufactured before 1994, likely between 1985 and 1987

CONCLUSION

Based on the analysis performed, the sample is consistent with gasoline manufactured between 1985-1986.

REFERENCES

Kaplan, I.R., Galperin, Y., Lu, S-T, and Lee, R-P. (1997) Forensic environmental geochemistry: differentiation of fuel-types, their sources and release time. Organic Geochemistry. 27 (5/6): 289-317

Murphy, B. (2007) Age-dating gasoline spills when information is limited. Environmental Forensics. 8:199-204

Oudijk, G. (2005) Fingerprinting and age-dating of gasoline releases - a case study. Environmental Forensics. 6: 91-99

Schmidt, G.W., Beckmann, D.D., and Torkelson, B.E. (2002) A technique for estimating the age of regular/mid-grade gasolines released to the subsurface since the early 1970s. Environmental Forensics. 3: 145-162

Stout, S.A., Uhler, AZ.D., McCarthy, K.J. and Emsbo-Mattingly, S. (2002) Chemical fingerprinting of hydrocarbons. An introduction to environmental forensics. 137-260. San Diego, California: Academic Press

Figure 1. PIANO Analysis Range for Gasoline

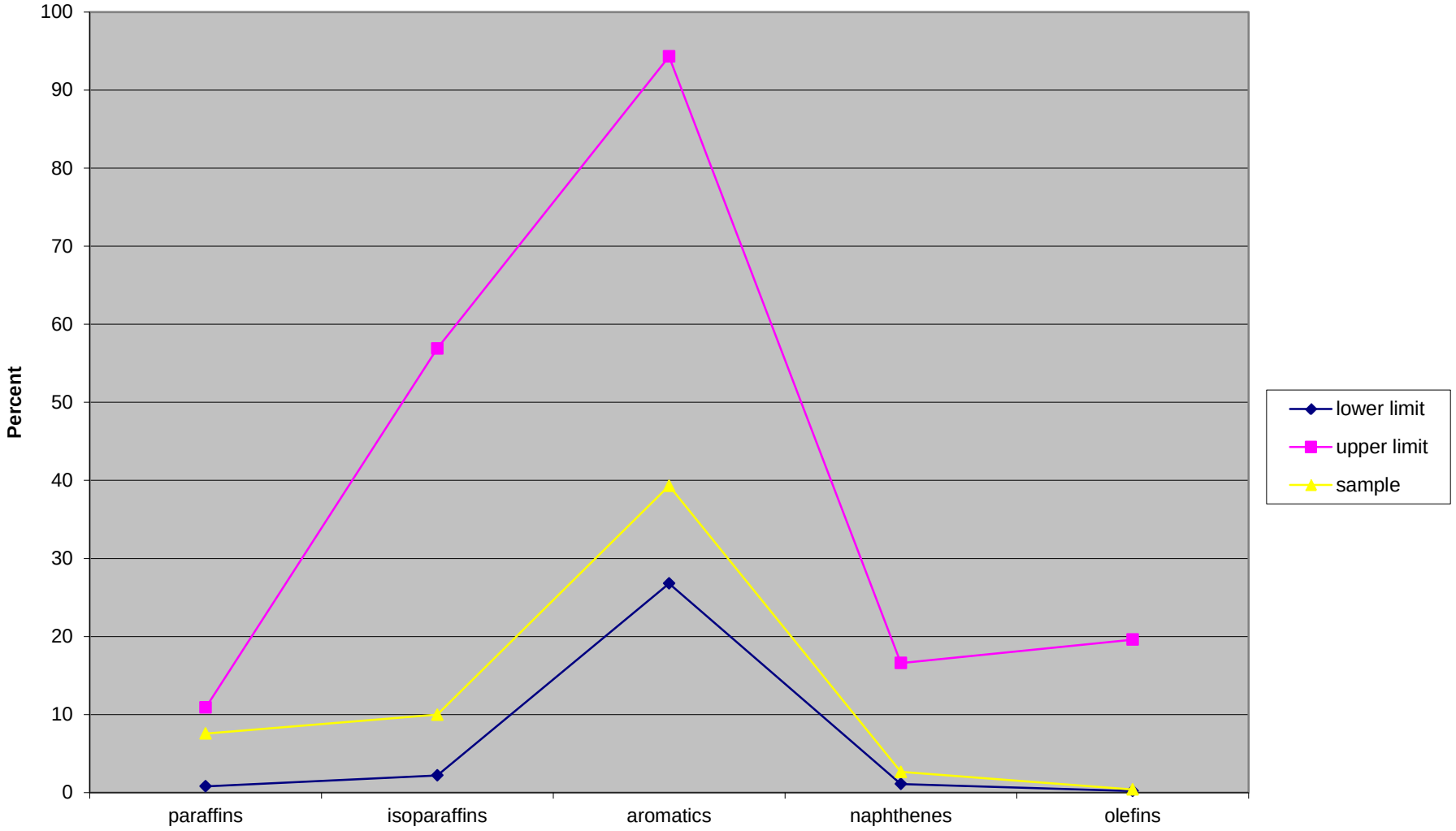
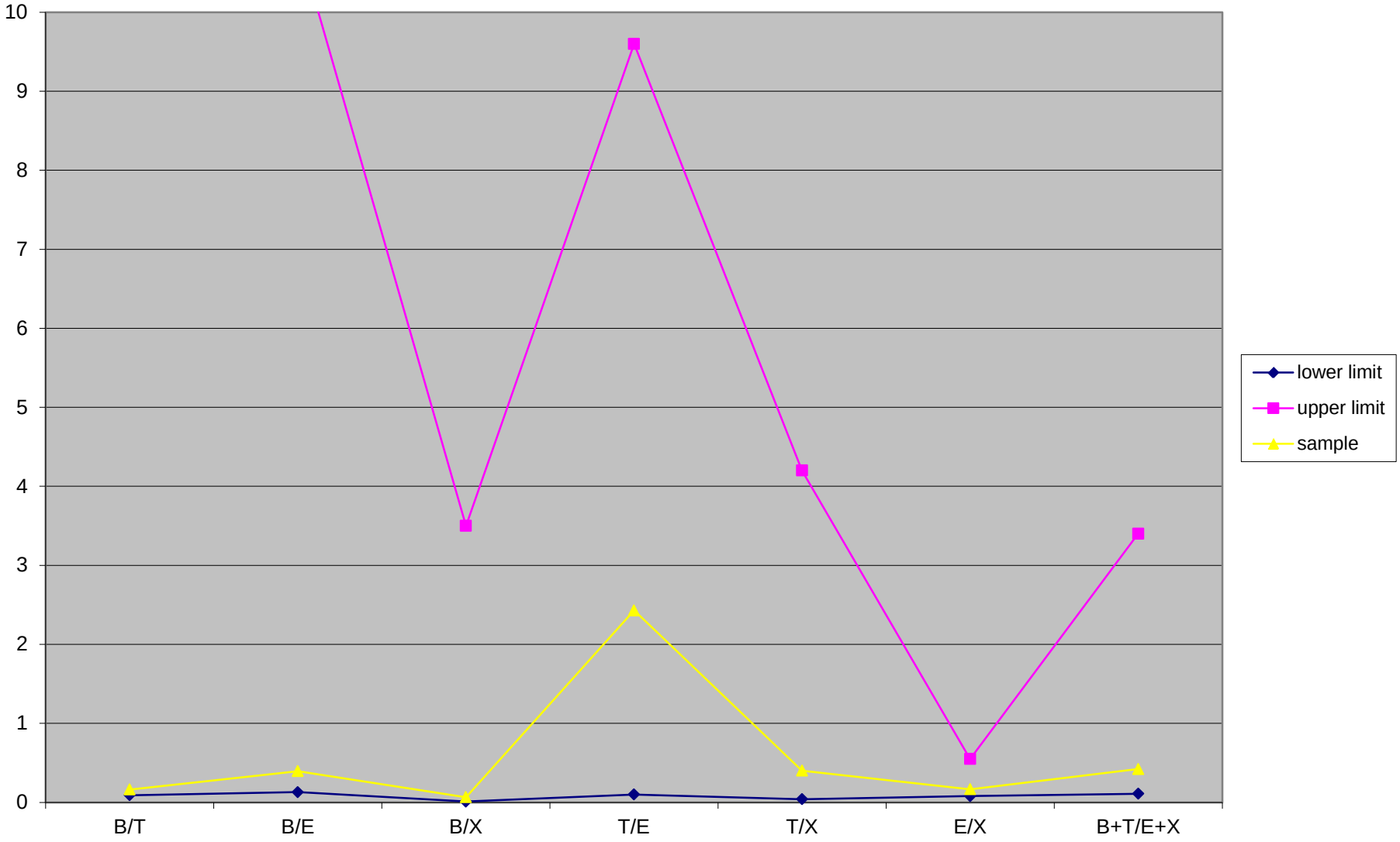


Figure 2. BTEX Ratio Ranges for Gasoline



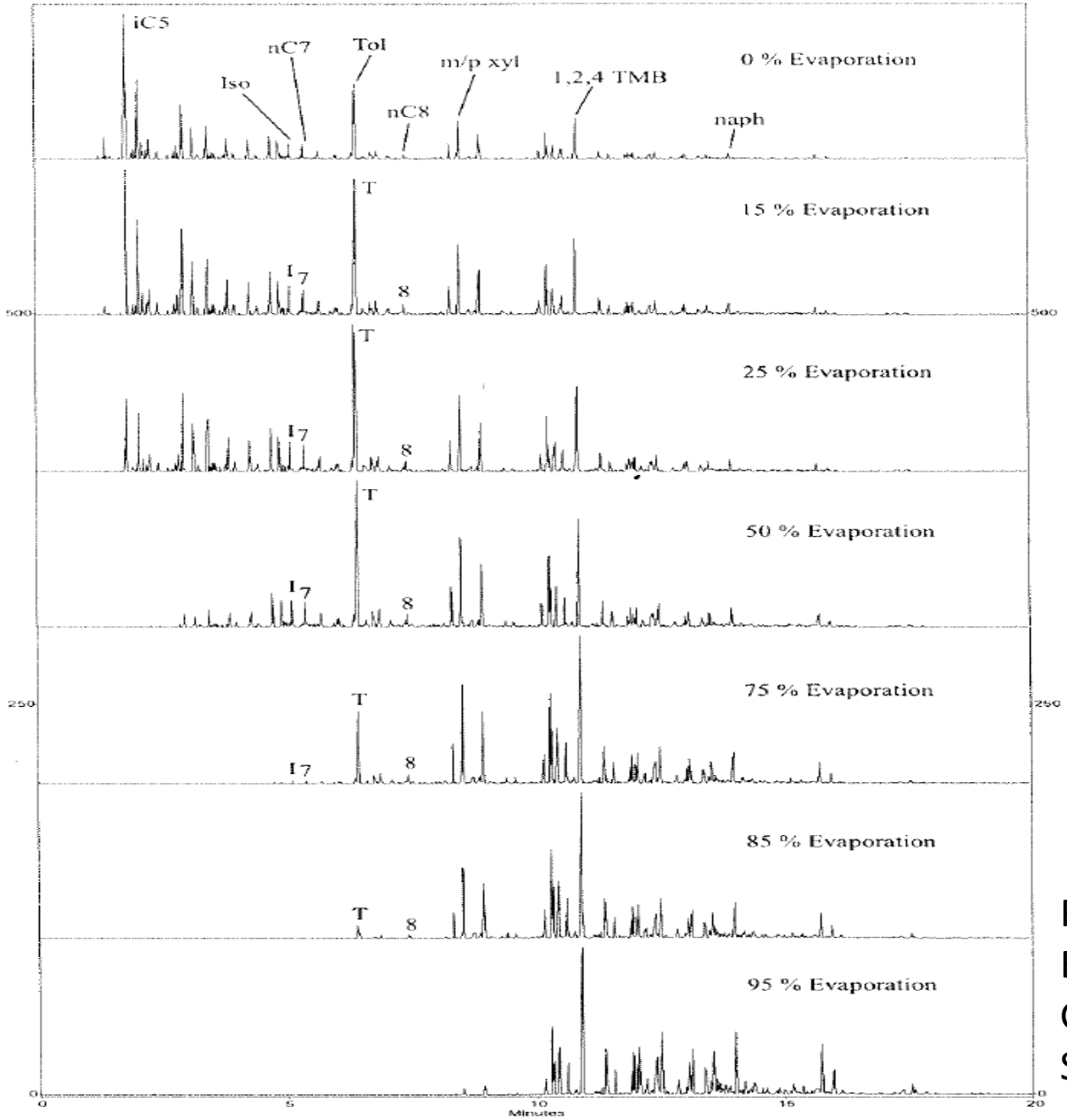


Figure 3.
Extent of Gasoline Weathering
Gas Chromatograms
Schmidt et al. (2002)

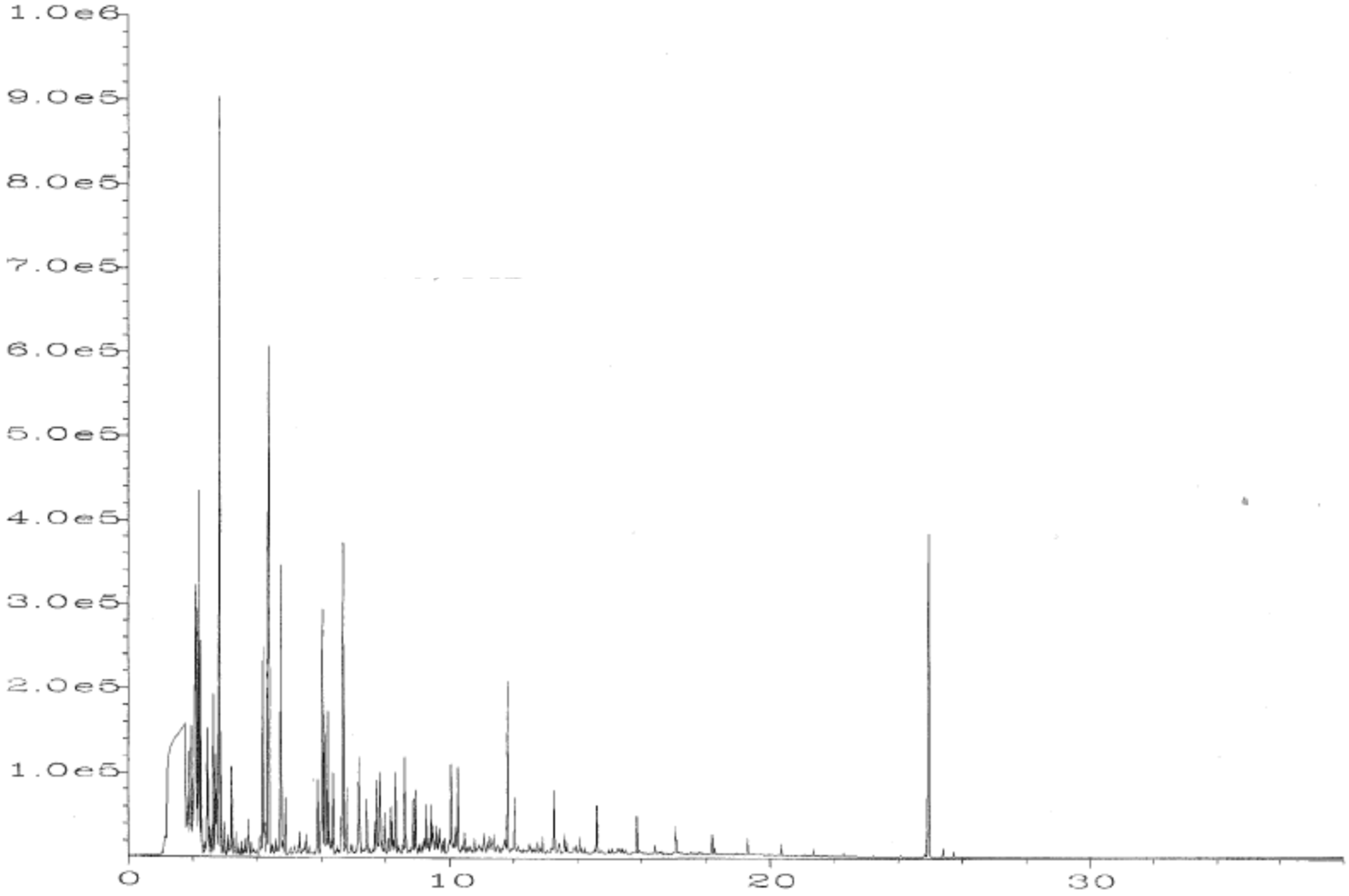
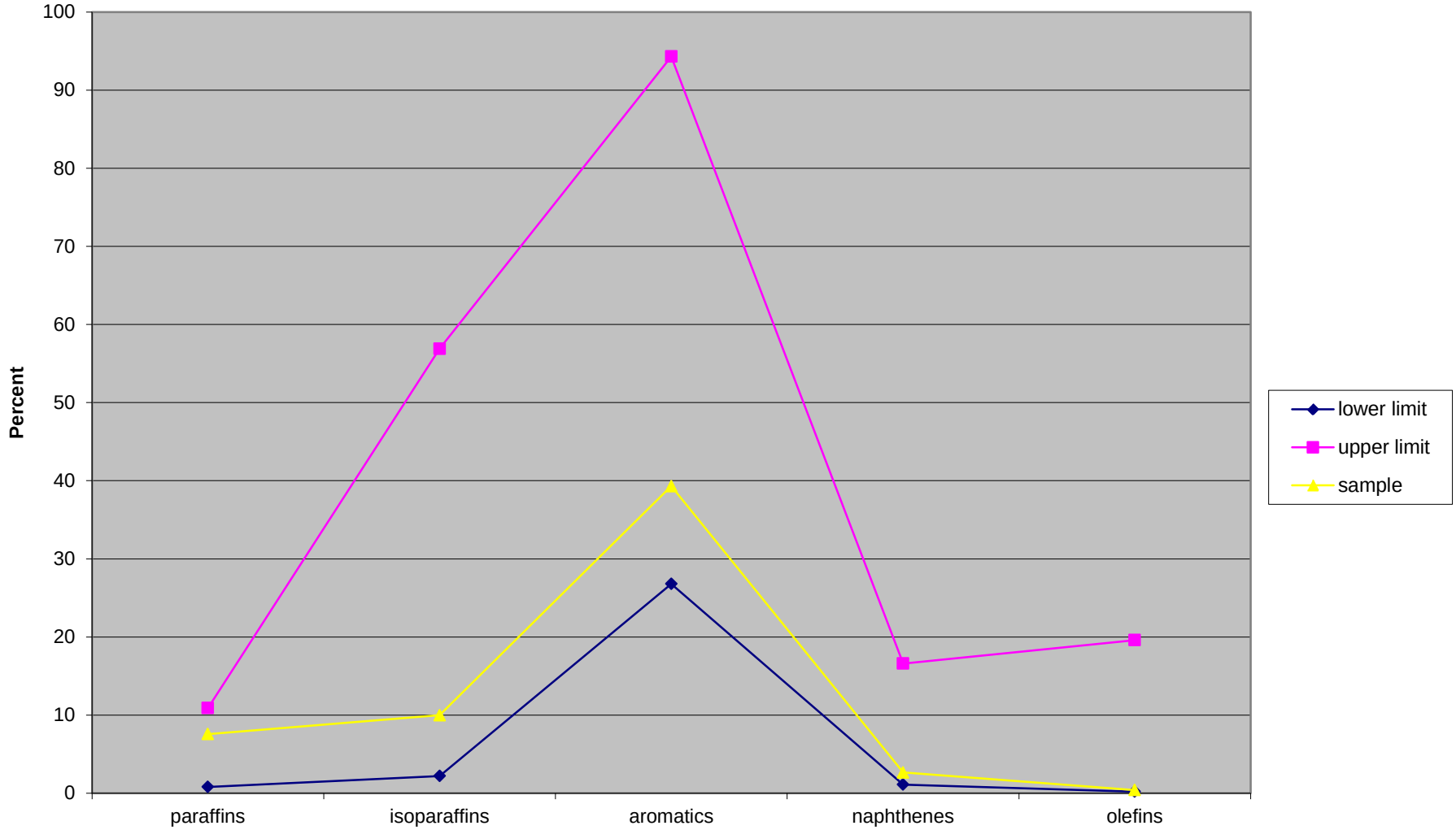


Figure 4.
Sample Gas Chromatogram
P66 Renton Terminal
Renton, Washington

Figure 1. PIANO Analysis Range for Gasoline



Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

May 10, 2013

Edwin Turner
CRA_Conoco Phillips
20818 44th Ave. W
Lynnwood, WA 98036

RE: Project: 070496-2RI00-****
Pace Project No.: 10226803

Dear Edwin Turner:
Enclosed are the analytical results for sample(s) received by the laboratory on April 27, 2013. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Some analyses have been subcontracted outside of the Pace Network. The subcontracted laboratory report has been attached.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jennifer Gross

jennifer.gross@pacelabs.com
Project Manager

Enclosures

cc: Yu Chen, CRA_Conoco Phillips
Jeffrey Cloud, Conestoga-Rovers Association
Matt Davis, CRA_Conoco Phillips

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 070496-2RI00-****
Pace Project No.: 10226803

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: Pace
Florida/NELAP Certification #: E87605
Georgia Certification #: 959
Hawaii Certification #Pace
Idaho Certification #: MN00064
Illinois Certification #: 200011
Kansas Certification #: E-10167
Louisiana Certification #: 03086
Louisiana Certification #: LA080009
Maine Certification #: 2007029
Maryland Certification #: 322
Michigan DEQ Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT CERT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Dakota Certification #: R-036
North Dakota Certification #: R-036A
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Tennessee Certification #: 02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia/DCLS Certification #: 002521
Virginia/VELAP Certification #: 460163
Washington Certification #: C754
West Virginia Certification #: 382
Wisconsin Certification #: 999407970

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 070496-2RI00-****
Pace Project No.: 10226803

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10226803001	**LAIX-2**	Water	04/25/13 16:15	04/27/13 08:40
10226803002	**LAIX-2**	Water	04/26/13 01:00	04/27/13 08:40
10226803003	**EX-1**	Water	04/26/13 11:00	04/27/13 08:40

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 070496-2RI00-****
Pace Project No.: 10226803

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10226803001	**LAIX-2**	NWTPH-Dx	JRH	4	PASI-M
		NWTPH-Gx/8021	DJT	2	PASI-M
		EPA 8260	EB2	8	PASI-M
10226803002	**LAIX-2**	NWTPH-Dx	JRH	4	PASI-M
		NWTPH-Gx/8021	DJT	2	PASI-M
		EPA 8260	EB2	8	PASI-M

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 070496-2RI00-****
Pace Project No.: 10226803

Sample: LAIX-2 **Lab ID: 10226803001** Collected: 04/25/13 16:15 Received: 04/27/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS LV	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	**1.6**	mg/L	0.20	1	05/01/13 07:23	05/05/13 17:29	68334-30-5	
Motor Oil Range	**1.7**	mg/L	0.20	1	05/01/13 07:23	05/05/13 17:29		
Surrogates								
o-Terphenyl (S)	89	%	30-125	1	05/01/13 07:23	05/05/13 17:29	84-15-1	
n-Triacontane (S)	100	%	30-125	1	05/01/13 07:23	05/05/13 17:29	638-68-6	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx/8021							
TPH as Gas	**13100**	ug/L	1000	10		05/09/13 01:03		
Surrogates								
a,a,a-Trifluorotoluene (S)	88	%	75-125	10		05/09/13 01:03	98-08-8	
8260 MSV UST	Analytical Method: EPA 8260							
Benzene	**334**	ug/L	10.0	10		05/01/13 20:27	71-43-2	
Ethylbenzene	**656**	ug/L	10.0	10		05/01/13 20:27	100-41-4	
Methyl-tert-butyl ether	**19.4**	ug/L	10.0	10		05/01/13 20:27	1634-04-4	
Toluene	**786**	ug/L	10.0	10		05/01/13 20:27	108-88-3	
Xylene (Total)	**3930**	ug/L	30.0	10		05/01/13 20:27	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	118	%	75-125	10		05/01/13 20:27	17060-07-0	
Toluene-d8 (S)	106	%	75-125	10		05/01/13 20:27	2037-26-5	
4-Bromofluorobenzene (S)	103	%	75-125	10		05/01/13 20:27	460-00-4	

Sample: LAIX-2 **Lab ID: 10226803002** Collected: 04/26/13 01:00 Received: 04/27/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS LV	Analytical Method: NWTPH-Dx Preparation Method: EPA 3510							
Diesel Fuel Range	**3.3**	mg/L	0.20	1	05/01/13 07:23	05/05/13 17:51	68334-30-5	
Motor Oil Range	ND	mg/L	0.20	1	05/01/13 07:23	05/05/13 17:51		
Surrogates								
o-Terphenyl (S)	90	%	30-125	1	05/01/13 07:23	05/05/13 17:51	84-15-1	
n-Triacontane (S)	108	%	30-125	1	05/01/13 07:23	05/05/13 17:51	638-68-6	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx/8021							
TPH as Gas	**22600**	ug/L	1000	10		05/09/13 01:23		
Surrogates								
a,a,a-Trifluorotoluene (S)	87	%	75-125	10		05/09/13 01:23	98-08-8	
8260 MSV UST	Analytical Method: EPA 8260							
Benzene	**2360**	ug/L	20.0	20		05/01/13 20:43	71-43-2	
Ethylbenzene	**1050**	ug/L	20.0	20		05/01/13 20:43	100-41-4	
Methyl-tert-butyl ether	ND	ug/L	20.0	20		05/01/13 20:43	1634-04-4	
Toluene	**1800**	ug/L	20.0	20		05/01/13 20:43	108-88-3	
Xylene (Total)	**3340**	ug/L	60.0	20		05/01/13 20:43	1330-20-7	
Surrogates								
1,2-Dichloroethane-d4 (S)	116	%	75-125	20		05/01/13 20:43	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 070496-2RI00-****
Pace Project No.: 10226803

Sample: LAIX-2 **Lab ID: 10226803002** Collected: 04/26/13 01:00 Received: 04/27/13 08:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV UST	Analytical Method: EPA 8260							
Surrogates								
Toluene-d8 (S)	106	%	75-125	20		05/01/13 20:43	2037-26-5	
4-Bromofluorobenzene (S)	102	%	75-125	20		05/01/13 20:43	460-00-4	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 070496-2RI00-****
Pace Project No.: 10226803

QC Batch: GCV/10703 Analysis Method: NWTPH-Gx/8021
QC Batch Method: NWTPH-Gx/8021 Analysis Description: NWTPH-Gx/8021B Water
Associated Lab Samples: 10226803001, 10226803002

METHOD BLANK: 1425316 Matrix: Water
Associated Lab Samples: 10226803001, 10226803002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
TPH as Gas	ug/L	ND	100	05/08/13 20:02	
a,a,a-Trifluorotoluene (S)	%	88	75-125	05/08/13 20:02	

LABORATORY CONTROL SAMPLE & LCSD: 1425317 1425318

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
TPH as Gas	ug/L	1000	1000	923	100	92	75-126	8	20	
a,a,a-Trifluorotoluene (S)	%				95	96	75-125			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1425319 1425320

Parameter	Units	10227101001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH as Gas	ug/L	ND	1000	1000	1000	1020	100	101	75-137	1	30	
a,a,a-Trifluorotoluene (S)	%						105	104	75-125			

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 070496-2RI00-****
Pace Project No.: 10226803

QC Batch: MSV/23513 Analysis Method: EPA 8260
QC Batch Method: EPA 8260 Analysis Description: 8260 MSV UST-WATER
Associated Lab Samples: 10226803001, 10226803002

METHOD BLANK: 1419535 Matrix: Water
Associated Lab Samples: 10226803001, 10226803002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/L	ND	1.0	05/01/13 18:10	
Ethylbenzene	ug/L	ND	1.0	05/01/13 18:10	
Methyl-tert-butyl ether	ug/L	ND	1.0	05/01/13 18:10	
Toluene	ug/L	ND	1.0	05/01/13 18:10	
Xylene (Total)	ug/L	ND	3.0	05/01/13 18:10	
1,2-Dichloroethane-d4 (S)	%	117	75-125	05/01/13 18:10	
4-Bromofluorobenzene (S)	%	106	75-125	05/01/13 18:10	
Toluene-d8 (S)	%	107	75-125	05/01/13 18:10	

LABORATORY CONTROL SAMPLE: 1419536

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	50	47.8	96	75-125	
Ethylbenzene	ug/L	50	49.5	99	75-125	
Methyl-tert-butyl ether	ug/L	50	53.2	106	74-126	
Toluene	ug/L	50	50.3	101	75-125	
Xylene (Total)	ug/L	150	149	99	75-125	
1,2-Dichloroethane-d4 (S)	%			112	75-125	
4-Bromofluorobenzene (S)	%			103	75-125	
Toluene-d8 (S)	%			105	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1419537 1419538

Parameter	Units	10226648008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Benzene	ug/L	1.1	50	50	48.7	47.6	95	93	70-135	2	30	
Ethylbenzene	ug/L	ND	50	50	50.0	49.1	100	98	75-125	2	30	
Methyl-tert-butyl ether	ug/L	ND	50	50	52.2	51.6	104	102	70-132	1	30	
Toluene	ug/L	ND	50	50	50.6	49.2	101	98	75-125	3	30	
Xylene (Total)	ug/L	ND	150	150	150	147	100	98	75-125	3	30	
1,2-Dichloroethane-d4 (S)	%						109	107	75-125			
4-Bromofluorobenzene (S)	%						100	103	75-125			
Toluene-d8 (S)	%						104	104	75-125			

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 070496-2RI00-****
Pace Project No.: 10226803

QC Batch: OEXT/21512 Analysis Method: NWTPH-Dx
QC Batch Method: EPA 3510 Analysis Description: NWTPH-Dx GCS LV
Associated Lab Samples: 10226803001, 10226803002

METHOD BLANK: 1420096 Matrix: Water
Associated Lab Samples: 10226803001, 10226803002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Diesel Fuel Range	mg/L	ND	0.20	05/05/13 14:52	
Motor Oil Range	mg/L	ND	0.20	05/05/13 14:52	
n-Triacontane (S)	%	101	30-125	05/05/13 14:52	
o-Terphenyl (S)	%	95	30-125	05/05/13 14:52	

LABORATORY CONTROL SAMPLE & LCSD: 1420097 1420098

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Diesel Fuel Range	mg/L	1	0.94	1.0	94	101	50-150	8	20	
Motor Oil Range	mg/L	1	1.0	1.1	102	110	50-150	7	20	
n-Triacontane (S)	%				96	100	30-125			
o-Terphenyl (S)	%				98	101	30-125			

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: 070496-2RI00-****
Pace Project No.: 10226803

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M Pace Analytical Services - Minneapolis

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 070496-2RI00-****
Pace Project No.: 10226803

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10226803001	**LAIX-2**	EPA 3510	OEXT/21512	NWTPH-Dx	GCSV/11246
10226803002	**LAIX-2**	EPA 3510	OEXT/21512	NWTPH-Dx	GCSV/11246
10226803001	**LAIX-2**	NWTPH-Gx/8021	GCV/10703		
10226803002	**LAIX-2**	NWTPH-Gx/8021	GCV/10703		
10226803001	**LAIX-2**	EPA 8260	MSV/23513		
10226803002	**LAIX-2**	EPA 8260	MSV/23513		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
e-mail: fbi@isomedia.com

May 7, 2013

Jennifer Gross
Pace Analytical Seattle
940 South Harvey
Seattle, WA 98108

Dear Ms. Gross:

Included are the results from the testing of material submitted on April 30, 2013 from the 10226803, F&BI 304549 project. The product sample submitted for forensic evaluation arrived in good condition. Upon arrival, the sample EX-1 was placed in a refrigerator maintained at 4°C until removed for sample processing.

The sample EX-1 was diluted and analyzed using a gas chromatograph with a flame ionization detector (GC/FID). The data generated yielded information on the boiling range and general chemical composition of the material present. The GC/FID traces are enclosed. A GC/FID trace of a standard consisting of normal alkanes is also provided for reference purposes.

Please contact us if additional consultation is needed by our firm in the interpretation of the analytical results provided. We appreciate this opportunity to be of service to you and hope you will call if you should have any questions. We will hold your samples for 30 days before disposal unless directed otherwise.

Sincerely,

FRIEDMAN & BRUYA, INC.



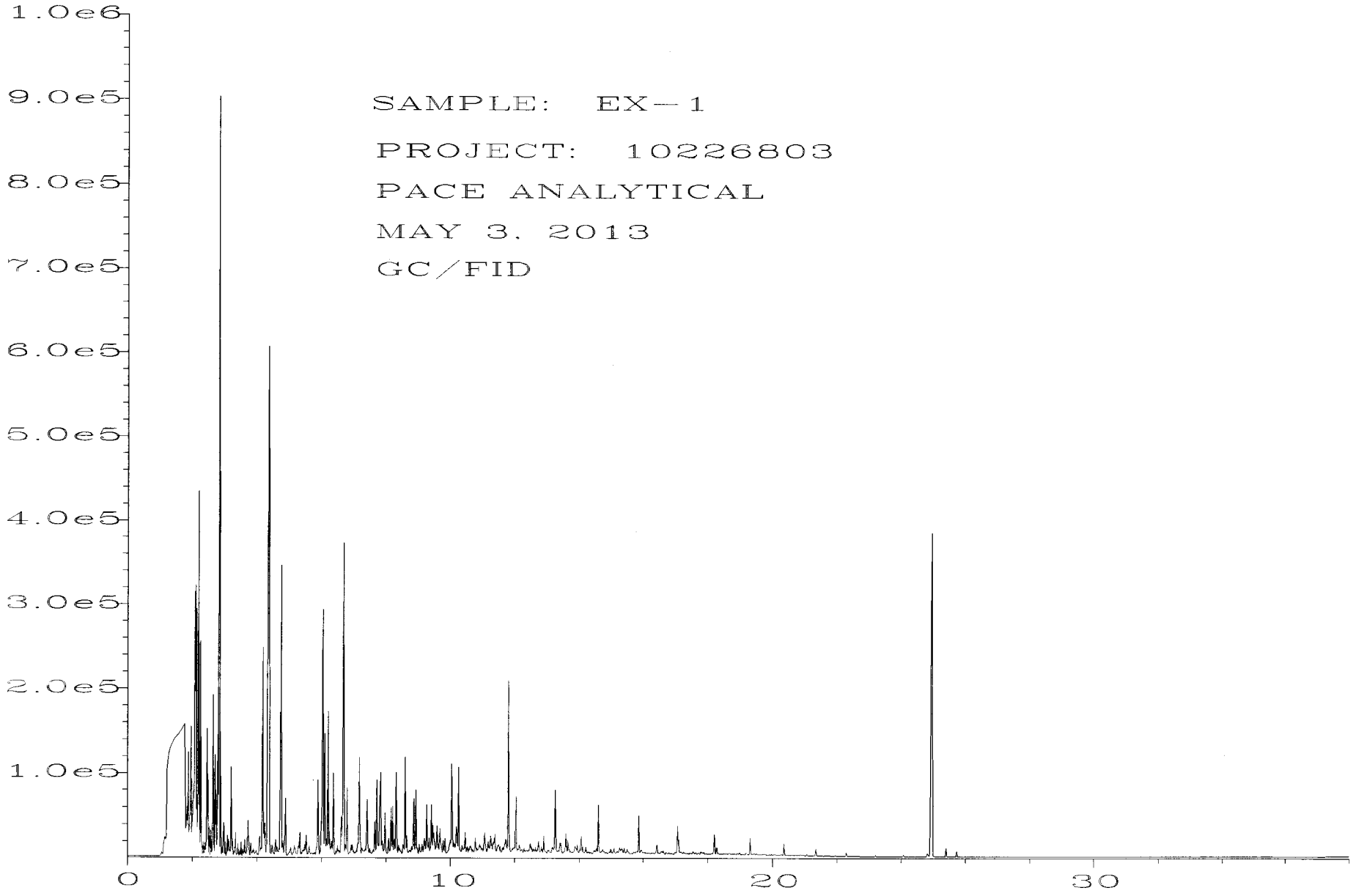
Michele Costales Poquiz
Chemist

Enclosures
mcp/KJ
c: jennifer.gross@pacelabs.com
NAA0507R.DOC

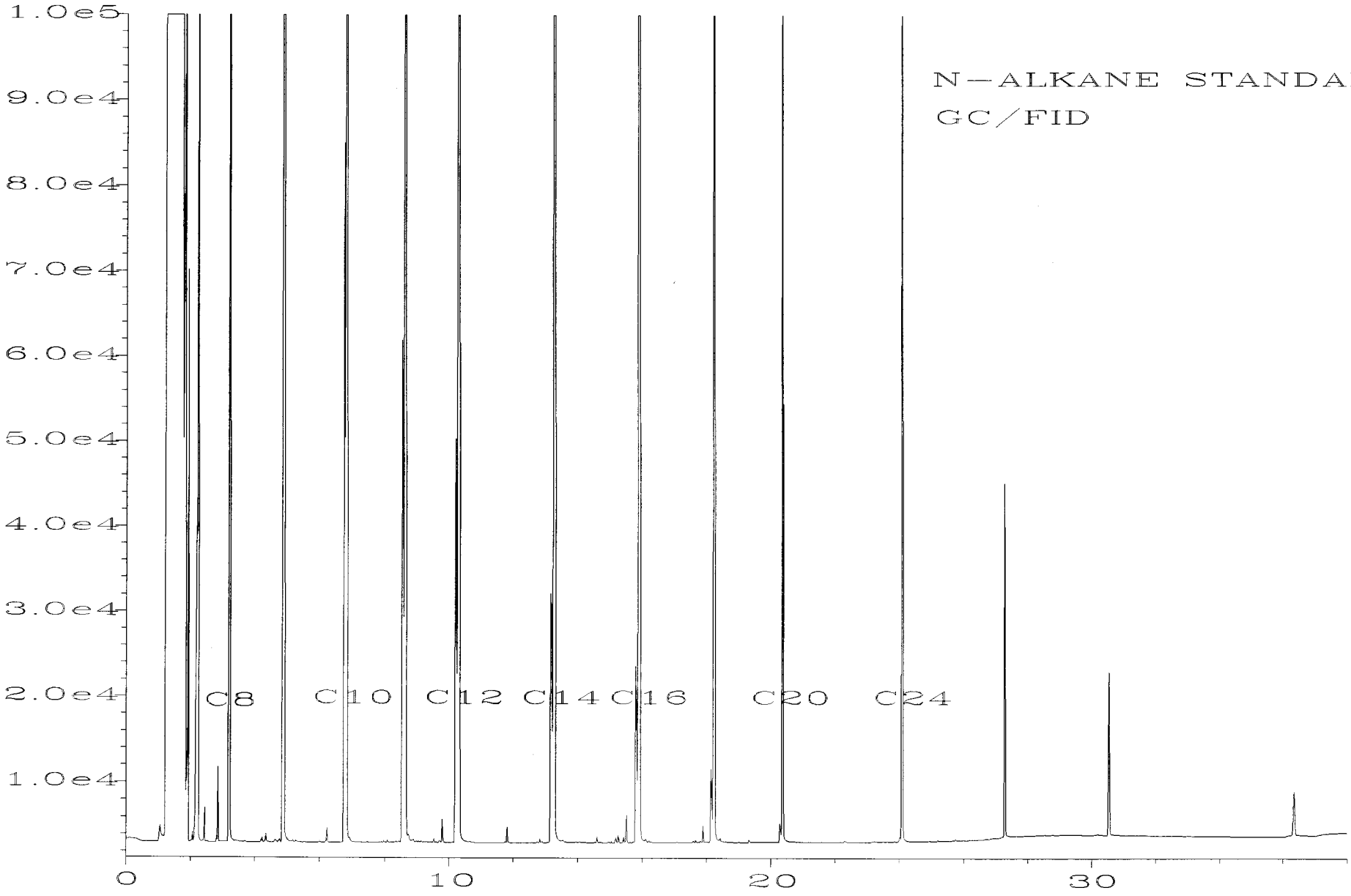
Date of Report: 05/07/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: 05/03/13
Date Analyzed: 05/03/13

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR FORENSIC EVALUATION BY CAPILLARY GAS CHROMATOGRAPHY USING A FLAME IONIZATION DETECTOR (FID)

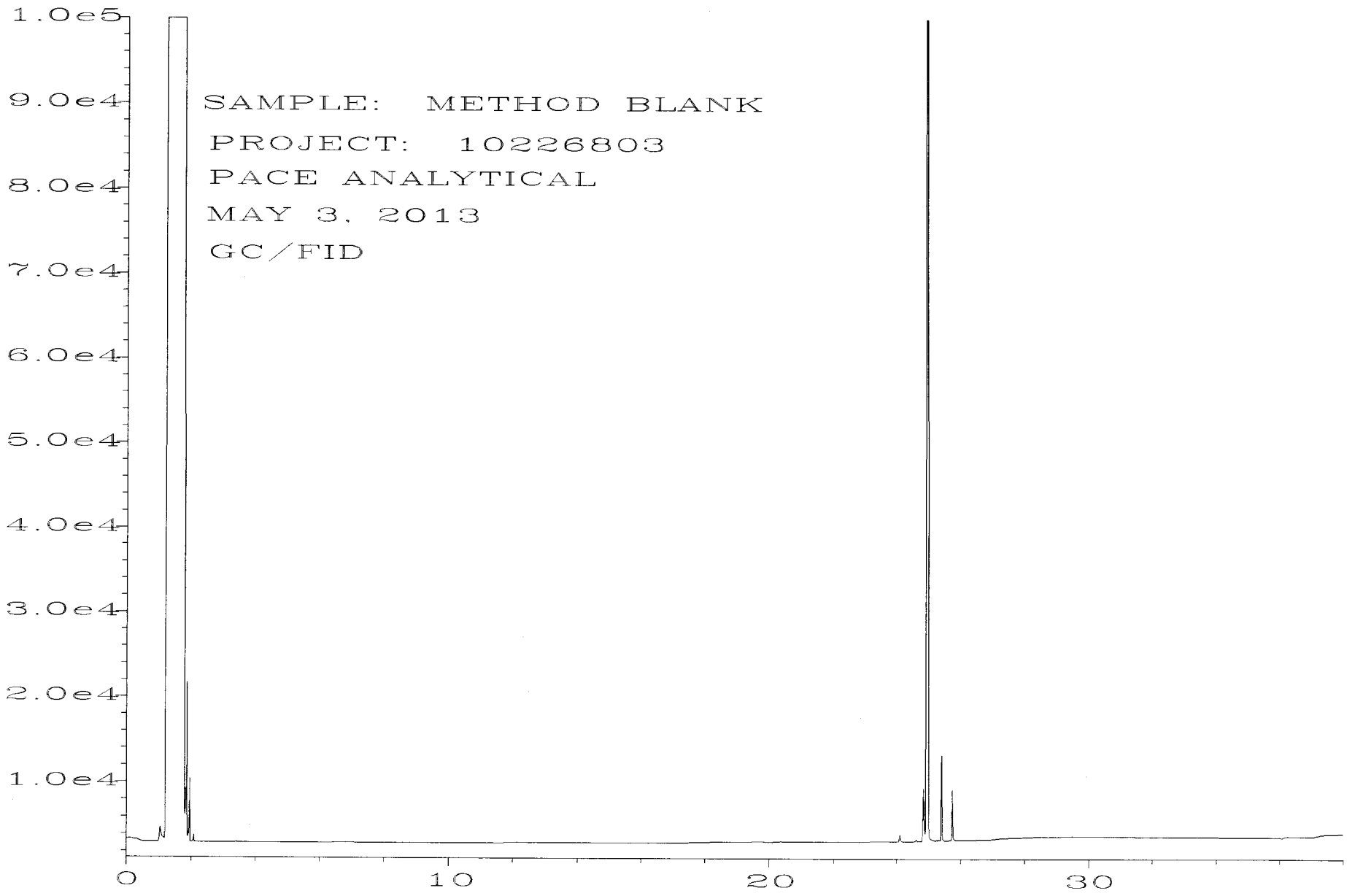
Sample ID	GC Characterization
EX-1	The GC trace using the flame ionization detector (FID) showed the presence of low to medium boiling compounds. The patterns displayed by these peaks are indicative of a mixture of gasoline and a middle distillate such as diesel fuel. The low boiling compounds appear as a ragged pattern of peaks eluting from *n*-C_7 to *n*-C_{13} showing a maximum near *n*-C_8. This correlates with a temperature range of approximately 100°C to 240°C with a maximum near 130°C. Within this range, the GC/FID trace showed the presence of peaks, at varying levels, that are indicative of toluene, ethylbenzene, the xylenes, C3-benzenes, and methylnaphthalenes. These compounds are characteristic of the constituents commonly found in gasoline. The relative abundance of the volatile and semivolatile constituents present indicates that substantial degradation has not occurred to the gasoline. It should also be noted that a regular pattern of peaks is present above *n*-C_{13} on the GC/FID trace. This pattern of peaks is indicative of normal alkanes. The presence of these normal alkanes indicates that a low level of a middle distillate such as diesel fuel is also present in the sample. The large peak seen near 25 minutes on the GC/FID trace is pentacosane, added as a quality assurance check for this GC analysis.



Sig. 1 in C:\HPCHEM\5\DATA\05-03-13\004F0401.D



Sig. 1 in C:\HPCHEM\5\DATA\05—03—13\100F0201.D



Sig. 1 in C:\HPCHEM\5\DATA\05-03-13\002F0401.D

304549

MP 04-30-13 CO2

Chain of Custody

Pace Analytical
www.pacelabs.com

Workorder: 10226803 **Workorder Name:** 070496-2RM00-**** **Results Requested** 5/13/2013

Report / Invoice To	Subcontract To
Jennifer Gross Pace Analytical Seattle 940 South Harney Seattle, WA 98108 Phone (206)767-5060 Email: jennifer.gross@pacelabs.com	Friedman + Bruya 3012 16TH ave West P.O. _____ Seattle, Wa 98119 206.285.8282 duplicate

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: GC/FID Fingerprint	LAB USE ONLY
1	EX-1	4/26/2013 11:00	10226803003	Water	I	X	01
2							
3							
4							
5							

Transfers	Released By	Date/Time	Received By	Date/Time
1	Joey Sparks Pace MN	4-29-13 3:45	[illegible]	04/30/13 10:20
2				
3				

Comments

Cooler Temperature on Receipt ____ °C | Custody Seal Y or N | Received on Ice Y or N | Samples Intact Y or N

Samples received at 2 °C

CRA Chain Of Custody Record

10226803

LAB (LOCATION)
- ☐ CALSCIENCE (_____)
- ☐ SPL (_____)
- ☐ XENCO (_____)
- ☐ TEST AMERICA (_____)
- ☑ OTHER (Pace analytical)

Please Check Appropriate Box:
- ☐ ENV. SERVICES
- ☐ MOTIVA RETAIL
- ☐ SHELL RETAIL
- ☐ MOTIVA SD&CH
- ☑ CONSULTANT
- ☐ LUBES
- ☐ SHELL PIPELINE
- ☐ OTHER _____

Print Bill To Contact Name: Edwin Turner

INCIDENT # (ENV SERVICES): ☐ CHECK IF NO INCIDENT # APPLIES

DATE: _____

PAGE: 1 of 1

PO #: 0 7 0 4 9 6

SAP #:

SAMPLING COMPANY: Conestoga-Rovers & Associates	LOG CODE: CRAW	SITE ADDRESS: Street and City: 2423 Lind Avenue, Renton	State: WA
ADDRESS: 20818 44th Avenue W. Suite 180, Lynnwood, WA		EDF DELIVERABLE TO (Name, Company, Office Location): Edwin Turner	PHONE NO.: 425-563-6519
PROJECT CONTACT (Hardcopy or PDF Report to): Matt Davis		E-MAIL: cturner@craworld.com	CONSULTANT PROJECT NO.: 070496-2RM00-****
TELEPHONE: (253)507-6217	FAX:	E-MAIL: mdavis@craworld.com	SAMPLER NAME(S) (Print): P. Rasmussen / K. Whittaker

LAB USE ONLY

TURNAROUND TIME (CALENDAR DAYS):
- ☑ STANDARD (14 DAY)
- ☐ 5 DAYS
- ☐ 3 DAYS
- ☐ 2 DAYS
- ☐ 24 HOURS
- ☐ RESULTS NEEDED ON WEEKEND

- ☐ LA - RWQCB REPORT FORMAT
- ☐ UST AGENCY:

SPECIAL INSTRUCTIONS OR NOTES:
cc reports to: mbsmith@craworld.com, kwhittaker@craworld.com

- ☐ SHELL CONTRACT RATE APPLIES
- ☐ STATE REIMBURSEMENT RATE APPLIES
- ☐ EDD NOT NEEDED
- ☑ RECEIPT VERIFICATION REQUESTED

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	PRESERVATIVE HCL	HNO3	H2SO4	NONE	OTHER	NO. OF CONT.	TPHg (NWTPH-GX)	TPHd (NWTPH-DX)	TPHo (NWTPH-OX)	MTBE (8260B)	BTEX (8260B)	SPH fingerprint	TEMPERATURE ON RECEIPT C° / Container PID Readings or Laboratory Notes
	LAIX-2	4/25	9:15 PM	Water	X					8	X	X	X	X	X		VOAs 001
	LAIX-2	4/26	07:00	Water	X					8	X	X	X	✓	✓		Please run the 5 oxys 002
	EX-1	4/26	11:00	SPH	½			X		1						X	while running BTEX 003
																	through Method 8260B

Relinquished by: Matt Davis — Date: 4-27-13 — Time: 08:40

Received by: PACE — Date: 4/27/13 — Time: 1410

T= 9.4°C

Temp* 3.1

05/2/08 Revision

Pace Analytical	Document Name: Sample Condition Upon Receipt Form	Document Re... 012
	Document No.: F-MN-L-213-rev.06	Issuing Auth... Pace Minnesota Qu... ffice

Sample Condition Upon Receipt

Client Name: Project #: WO#: 10226803

Courier: ☐Fed Ex ☐UPS ☐USPS ☐Client ☐Commercial ☐Pace ☐Other:

Tracking Number: 5289 3246 6740

Custody Seal on Cooler/Box Present? ☒Yes ☐No Seals Intact? ☒Yes ☐No Optional: Proj... e: ...ame:

Packing Material: ☒Bubble Wrap ☒Bubble Bags ☐None ☐Other: Temp ... ☒Yes ☐No

Thermom. Used: ☐B88A912167504 ☐80512447 ☒72337080 Type of Ice: ☒Wet ☐Blue ☐None ☐Sa... ...oling ... has begun

Cooler Temp Read (°C): 3.8 Cooler Temp Corrected (°C): 4.4 Biological Tissue Frozen? ...es ...o

Temp should be above freezing to 6°C Correction Factor: Add 0.6 Date and Initials of Person Examini... 4... JZK

Comme...

Chain of Custody Present?	☒Yes	☐No	☐N/A	1.
Chain of Custody Filled Out?	☒Yes	☐No	☐N/A	2.
Chain of Custody Relinquished?	☒Yes	☐No	☐N/A	3.
Sampler Name and/or Signature on COC?	☒Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time?	☒Yes	☐No	☐N/A	5.
Short Hold Time Analysis (<72 hr)?	☐Yes	☒No	☐N/A	6.
Rush Turn Around Time Requested?	☐Yes	☒No	☐N/A	7.
Sufficient Volume?	☒Yes	☐No	☐N/A	8.
Correct Containers Used?	☒Yes	☐No	☐N/A	9.
-Pace Containers Used?	☒Yes	☐No	☐N/A	
Containers Intact?	☒Yes	☐No	☐N/A	10.
Filtered Volume Received for Dissolved Tests?	☐Yes	☐No	☒N/A	11.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: WT / SPH	☒Yes	☐No	☐N/A	12.
All containers needing acid/base preservation have been checked? Noncompliances are noted in 13.	☐Yes	☐No	☒N/A	13. ☐HNO_3 ☐... ☐HCl Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH>12) Exceptions: VOA, Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes	☐No	☒N/A	Lot ... ded e: Initial when completed:
	☒Yes	☐No		
Headspace in VOA Vials (>6mm)?	☐Yes	☒No	☐N/A	14.
Trip Blank Present?	☐Yes	☒No	☐N/A	15.
Trip Blank Custody Seals Present?	☐Yes	☐No	☒N/A	
Pace Trip Blank Lot # (If purchased):				

CLIENT NOTIFICATION/RESOLUTION Field Da... ☐Yes

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: ENN Date: 4/29/13

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North ... Certificat... (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Kurt Johnson, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

June 17, 2013

Jennifer Gross
Pace Analytical Seattle
940 South Harvey
Seattle, WA 98108

Dear Ms. Gross:

Included are the results from the additional testing of material submitted on April 30, 2013 from the 10226803, F&BI 304549 project. There are 11 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michele Costales Poquiz
Chemist

Enclosures
c: jennifer.gross@pacelabs.com
NAA0617R.DOC

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: N/A
Date Analyzed: 06/06/13

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 304549-01
Client ID EX-1

Compound	Weight Percent
Propane	<0.01
Methanol	<0.01
Isobutane	<0.01
2-Methyl-1-propene	<0.01
Ethanol	<0.01
n-Butane	0.02
t-2-Butene	<0.01
c-2-Butene	<0.01
Isopropanol	<0.01
3-Methyl-1-butene	<0.01
Isopentane	0.24
tert-Butanol	<0.01
1-Pentene	0.01
2-Methyl-1-butene	0.01
n-Propanol	<0.01
n-Pentane	0.20
t-2-Pentene	0.02
c-2-Pentene	0.01
2-Methyl-2-butene	0.04
MTBE	<0.01
sec-Butanol	<0.01
4-Methyl-1-pentene	<0.01
Isobutanol	<0.01
2,3-Dimethylbutane	0.15
Cyclopentane	0.12
2-Methylpentane	0.58
DIPE	<0.01
3-Methylpentane	0.47
1-Hexene	<0.01
ETBE	<0.01
n-Hexane	0.66

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: N/A
Date Analyzed: 06/06/13

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 304549-01
Client ID EX-1

Compound	Weight Percent
t-2-Hexene	0.03
2-Methyl-1-pentene	0.02
2-Methyl-2-pentene	0.03
c-2-Hexene	0.02
2,2-Dimethylpentane	0.04
2,4-Dimethylpentane	0.28
Methylcyclopentane	0.56
2,2,3-Trimethylbutane	0.01
Benzene	0.60
1-Methylcyclopentene	0.08
TAME	<0.01
3,3-Dimethylpentane	0.06
Cyclohexane	0.24
2-Methylhexane	0.66
2,3-Dimethylpentane	0.87
1,1-Dimethylcyclopentane	0.04
3-Methylhexane	0.81
c-1,3-Dimethylcyclopentane	0.19
3-Ethylpentane	0.07
Isooctane	1.41
t-1,2-Dimethylcyclopentane	0.19
1-Heptene	0.01
n-Heptane	0.63
t-3-Heptene	0.02
c-3-Heptene	0.01
t-2-Heptene	<0.01
c-2-Heptene	0.01
2,2-Dimethylhexane	0.03
2,5-Dimethylhexane	0.18
Methylcyclohexane	0.38
2,4-Dimethylhexane	0.26

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: N/A
Date Analyzed: 06/06/13

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 304549-01
Client ID EX-1

Compound	Weight Percent
Ethylcyclopentane	0.14
t-1,c-2,4-Trimethylcyclopentane	0.14
t-1,c-2,3-Trimethylcyclopentane	0.11
2,3,4-Trimethylpentane	0.54
Toluene	3.69
2,3-Dimethylhexane	0.67
2-Methylheptane	0.45
3-Methylheptane	0.56
4-Methylheptane	0.20
3-Ethylhexane	0.10
1-Octene	<0.01
1,2,3-Trimethylcyclopentane	0.03
t-1,2-Dimethylcyclohexane	0.17
n-Octane	0.42
1-Ethyl-1-methylcyclopentane	0.08
c-2-Octene	0.02
c-1,2-Dimethylcyclohexane	0.06
Isopropylcyclopentane	0.02
2,5-Dimethylheptane	0.12
3,5-Dimethylheptane	0.04
n-Propylcyclopentane	0.04
Ethylbenzene	1.52
2,3-Dimethylheptane	0.07
3,4-Dimethylheptane	0.03
2-Methyloctane	0.19
m-Xylene	4.78
p-Xylene	1.92
3-Methyloctane	0.39
1-Nonene	<0.01
3,3-Diethylpentane	<0.01
t-3-Nonene	0.03

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: N/A
Date Analyzed: 06/06/13

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 304549-01
Client ID EX-1

Compound	Weight Percent
c3-Nonene	0.02
o-Xylene	2.47
n-Nonane	0.38
Isobutylcyclopentane	0.10
t-2-Nonene	0.01
c-2-Nonene	<0.01
Isopropylbenzene	0.20
3,3-Dimethyloctane	0.05
n-Butylcyclopentane	0.04
n-Propylbenzene	0.62
2,3-Dimethyloctane	0.05
1-Methyl-3-ethylbenzene	2.60
1-Methyl-4-ethylbenzene	1.12
2-Methylnonane	0.17
3-Ethyloctane	0.05
3-Methylnonane	0.19
1,3,5-Trimethylbenzene	1.32
1-Methyl-2-ethylbenzene	0.94
1,2,4-Trimethylbenzene	3.73
tert-Butylbenzene	<0.01
n-Decane	0.73
Isobutylbenzene	0.11
Isopropylcyclohexane	<0.01
sec-Butylbenzene	0.10
1-Methyl-3-isopropylbenzene	0.18
Isobutylcyclohexane	<0.01
1-Methyl-4-isopropylbenzene	0.10
1,2,3-Trimethylbenzene	0.94
Indan	0.43
1-Methyl-3-n-propylbenzene	0.84
1-Methyl-4-n-propylbenzene	0.38

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: N/A
Date Analyzed: 06/06/13

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 304549-01
Client ID EX-1

Compound	Weight Percent
n-Butylbenzene	0.39
1,3-Dimethyl-5-ethylbenzene	1.33
1,2-Diethylbenzene	0.15
1-Methyl-2-n-propylbenzene	0.44
1,4-Dimethyl-2-ethylbenzene	0.80
1,2-Dimethyl-4-ethylbenzene	1.29
1,3-Dimethyl-2-ethylbenzene	1.33
1,2-Dimethyl-3-ethylbenzene	0.24
n-Undecane	1.59
1,2,4,5-Tetramethylbenzene	0.49
2-Methylbutylbenzene	0.02
n-Pentylbenzene	0.11
Methylindan	0.54
1-tert-Butyl-3,5-dimethylbenzene	<0.01
1-tert-Butyl-4-ethylbenzene	<0.01
n-Dodecane	0.72
1,3,5-Triethylbenzene	<0.01
1,2,4-Triethylbenzene	<0.01
Naphthalene	1.18
n-Hexylbenzene	0.10
2-Methylnaphthalene	1.50
n-Tridecane	1.00
1-Methylnaphthalene	0.79
n-Tetradecane	0.61
n-Pentadecane	0.62

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: N/A
Date Analyzed: 06/06/13

RESULTS FROM THE ANALYSIS OF THE PRODUCT SAMPLE FOR PARAFFINS, ISOPARAFFINS, OLEFINS, NAPHTHENES, AND AROMATICS
Results Reported as % by Weight

Laboratory ID 304549-01
Client ID EX-1

PIANO SUMMARY	Weight
Compound	Percent
Total Identified Compounds	59.90
Oxygenated Compounds	0.00
Hydrocarbon Compounds	59.90
Unidentified Compounds	40.10
Total	100

	Paraffins	Isoparaffins	Aromatics	Naphthenes	Olefins	Total
C3	<0.01					<0.01
C4	0.02	<0.01			<0.01	0.02
C5	0.20	0.24		0.12	0.10	0.65
C6	0.66	1.19	0.60	0.80	0.18	3.43
C7	0.63	2.81	3.69	0.95	0.05	8.12
C8	0.42	4.40	10.70	0.65	0.02	16.18
C9	0.38	0.84	11.89	0.13	0.06	13.31
C10	0.73	0.51	9.90	<0.01		11.14
C11	1.59		2.41			4.00
C12	0.72		0.10			0.83
C13	1.00					1.00
C14	0.61					0.61
C15	0.62					0.62
Total	7.57	9.98	39.30	2.65	0.41	59.90

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549
Date Extracted: 06/11/13
Date Analyzed: 06/11/13

RESULTS FROM THE ANALYSIS OF PRODUCT SAMPLES FOR ORGANIC LEAD SPECIATION AND MANGANESE BY METHOD 8082 MODIFIED

Sample ID Laboratory ID	TML	TMEL	DMDEL	MTEL	TEL	MMT	Surrogate (% Rec.) (Limit 50-150)
EX-1 304549-01	D	D	D	D	D	D	96
Method Blank	ND	ND	ND	ND	ND	ND	100

D Detected above 0.5 mg/kg (ppm)
ND Non-Detect above 0.5 mg/kg (ppm)

TML Tetramethyl Lead
TMEL Trimethylethyl Lead
DMDEL Dimethyldiethyl Lead
MTEL Methyltriethyl Lead
TEL Tetraethyl Lead
MMT Methylcyclopentadienyl Manganese Tricarbonyl

Analysis For Total Organic Lead and Manganese By EPA Method 200.8

Client ID:	EX-1	Client:	Pace Analytical Seattle
Date Received:	04/30/13	Project:	10226803, F&BI 304549
Date Extracted:	06/13/13	Lab ID:	304549-01
Date Analyzed:	06/13/13	Data File:	304549-01.032
Matrix:	Product	Instrument:	ICPMS1
Units:	mg/kg (ppm)	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Organic Lead	63.6
Organic Manganese	3.74

Analysis For Total Organic Lead and Manganese By EPA Method 200.8

Client ID:	Method Blank	Client:	Pace Analytical Seattle
Date Received:	NA	Project:	10226803, F&BI 304549
Date Extracted:	06/13/13	Lab ID:	I3-343 mb
Date Analyzed:	06/13/13	Data File:	I3-343 mb.029
Matrix:	Product	Instrument:	ICPMS1
Units:	mg/kg (ppm)	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Organic Lead	<1
Organic Manganese	<1

Date of Report: 06/17/13
Date Received: 04/30/13
Project: 10226803, F&BI 304549

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/PRODUCT SAMPLES FOR ORGANIC LEAD AND MANGANESE USING EPA METHOD 200.8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Organic Lead	mg/kg (ppm)	50	110	116	70-130	5
Organic Manganese	mg/kg (ppm)	12.5	83	92	70-130	10

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

A1 – More than one compound of similar molecule structure was identified with equal probability.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for this range fell outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte indicated may be due to carryover from previous sample injections.

d - The sample was diluted. Detection limits may be raised due to dilution.

ds - The sample was diluted. Detection limits are raised due to dilution and surrogate recoveries may not be meaningful.

dv - Insufficient sample was available to achieve normal reporting limits and limits are raised accordingly.

fb - Analyte present in the blank and the sample.

fc – The compound is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. The variability is attributed to sample inhomogeneity.

ht - Analysis performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of normal control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

j – The result is below normal reporting limits. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

jr - The rpd result in laboratory control sample associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the compound indicated is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc – The sample was received in a container not approved by the method. The value reported should be considered an estimate.

pr – The sample was received with incorrect preservation. The value reported should be considered an estimate.

ve - Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

304549

MP 04-30-13 CO2

Chain of Custody

Pace Analytical
www.pacelabs.com

Workorder: 10226803 **Workorder Name:** 070496-2RM00-**** **Results Requested** 5/13/2013

Report / Invoice To	Subcontract To
Jennifer Gross Pace Analytical Seattle 940 South Harney Seattle, WA 98108 Phone (206)767-5060 Email: jennifer.gross@pacelabs.com	Friedman + Bruya 3012 16TH ave West P.O. _____ Seattle, Wa 98119 206.285.8282

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: GC/FID Fingerprint	PIANO	ECD org. Pb	ICP org. Pb	LAB USE ONLY
1	EX-1	4/26/2013 11:00	10226803003	Water	—	X	✓	✓	✓	01
2										
3										
4										
5										

Transfers	Released By	Date/Time	Received By	Date/Time
1	Bray Sparks Pace MN	4-29-13 3:45	[signature]	04/30/13 10:20
2				
3				

Comments: √=added per KJ's conversation w/client 5/4/13

Cooler Temperature on Receipt _____ °C | Custody Seal Y or N | Received on Ice Y or N | Samples Intact Y or N

Samples received at 2 °C

APPENDIX P

TERRESTRIAL ECOLOGICAL EVALUATION FORMS

Washington State Department of Ecology
Toxics Cleanup Program

Terrestrial Ecological Evaluation Process- Simplified Evaluation

Documentation Form

Criteria # (Concern)	Criteria	Response (Circle One)
1 (exposure)	Is the total area of soil contamination at the site less than or equal to 350 square feet	**Yes (End TEE) / No**
2 (exposure)	Does land use at the site and surrounding area make substantial wildlife exposure unlikely based on completion of Table 749-1?	**Yes (End TEE) / No**
3 (pathway)	Is there a potential exposure pathway from soil contamination to soil biota, plants, or wildlife?	**Yes / No (End TEE)**
4 (contaminant)	Are the hazardous substances at your site listed in Table 749-2 and is (or will) their location in the soil at your site be at a depth not exceeding the point of compliance, and at concentrations that do not exceed the values provided in Table 749-2.	**Yes (End TEE) / No** **Note: You must perform bioassays for contaminants at your site if no table value is provided.**
5 (contaminant)	Will hazardous substances listed in Table 749-2 be present in the soil at your site within 6 feet of the ground surface at concentrations likely to be toxic, or with the potential to bioaccumulate, based on bioassays using methods approved by the department.	**Yes / No (End TEE)**

[Exclusions Main] [TEE Definitions] [Simplified or Site-Specific?] [Simplified Ecological Evaluation] [Site-Specific Ecological Evaluation] [WAC 173-340-7493] [Index of Tables]

[TEE Home]

Table 749-1

Simplified Terrestrial Ecological Evaluation-Exposure Analysis Procedure

Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest 1/2 acre (1/4 acre if the area is less than 0.5 acre).	
1) From the table below, find the number of points corresponding to the area and enter this number in the field to the right.	
Area (acres) / Points 0.25 or less / 4 0.5 / 5 1.0 / 6 1.5 / 7 2.0 / 8 2.5 / 9 3.0 / 10 3.5 / 11 4.0 or more / 12	**12**
2) Is this an industrial or commercial property? If yes, enter a score of 3. If no, enter a score of 1	**3**
3)[a] Enter a score in the box to the right for the habitat quality of the site, using the following rating system[b]. High=1, Intermediate=2, Low=3	**1**
4) Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2.[c]	**1**
5) Are there any of the following soil contaminants present: Chlorinated dioxins/furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.	**4**
6) Add the numbers in the boxes on lines 2-5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified evaluation may be ended.	**9**

Notes for Table 749-1

[a] It is expected that this habitat evaluation will be undertaken by an experienced field biologist. If this is not the case, enter a conservative score of (1) for questions 3 and 4.

[b] **Habitat rating system.** Rate the quality of the habitat as high, intermediate or low based on your professional judgment as a field biologist. The following are suggested factors to consider in making this evaluation:

> **Low:** Early successional vegetative stands; vegetation predominantly noxious, nonnative, exotic plant species or weeds. Areas severely disturbed by human activity, including intensively cultivated croplands. Areas isolated from other habitat used by wildlife.

High: Area is ecologically significant for one or more of the following reasons: Late-successional native plant communities present; relatively high species diversity; used by an uncommon or rare species; priority habitat (as defined by the Washington Department of fish and Wildlife); part of a larger area of habitat where size or fragmentation may be important for the retention of some species.

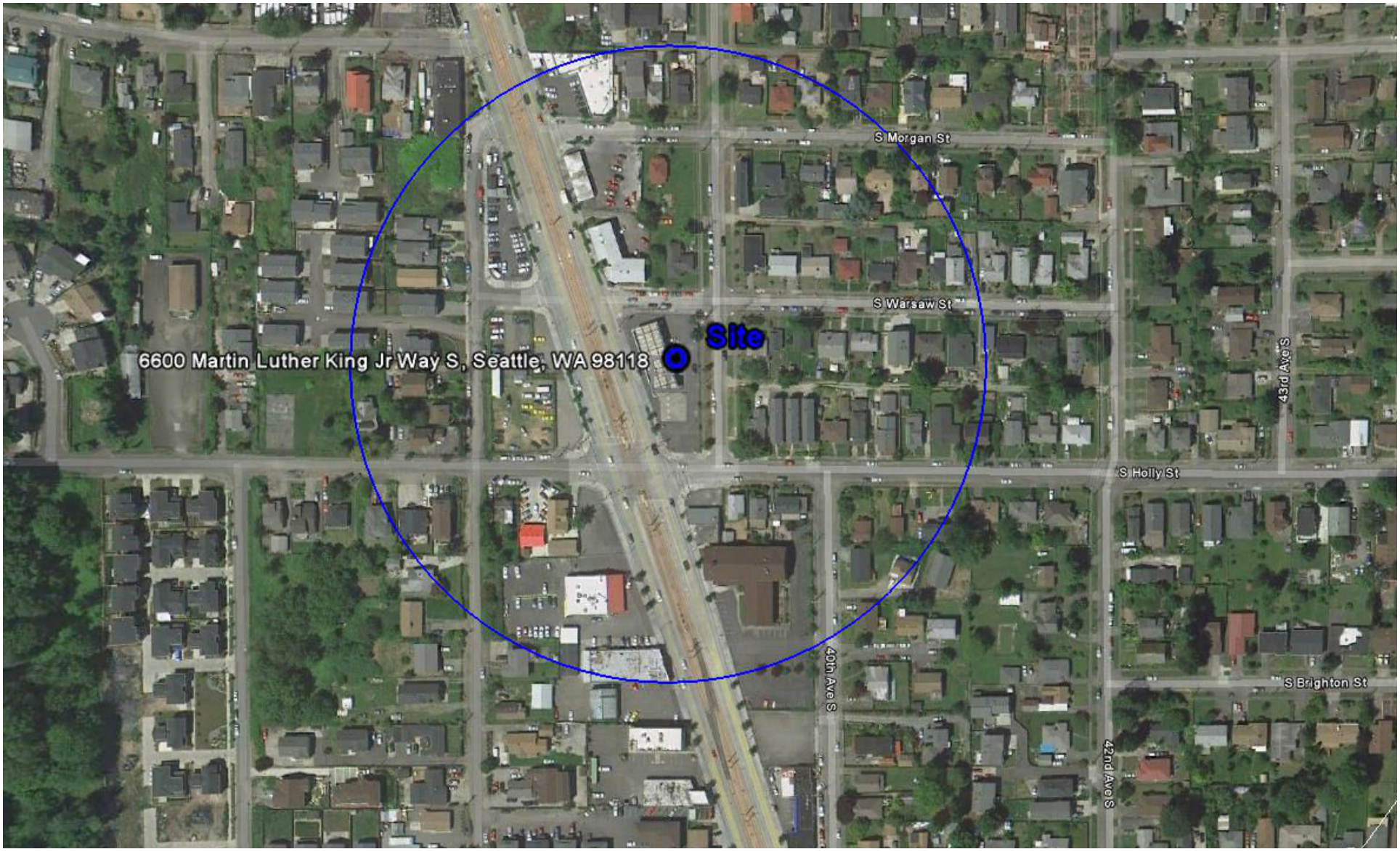
Intermediate: Area does not rate as either high or low.

[c] Indicate "yes" if the area attracts wildlife or is likely to do so. Examples: Birds frequently visit the area to feed; evidence of high use b mammals (tracks, scat, etc.); habitat "island" in an industrial area; unusual features of an area that make it important for feeding animals; heavy use during seasonal migrations.

[Area Calculation Aid] [Aerial Photo with Area Designations] [TEE Table 749-1] [Index of Tables]

[Exclusions Main] [TEE Definitions] [Simplified or Site-Specific?] [Simplified Ecological Evaluation] [Site-Specific Ecological Evaluation] [WAC 173-340-7493]

[TEE Home]


S Morgan St
S Warsaw St
Site
6600 Martin Luther King Jr Way S, Seattle, WA 98118
43rd Ave S
S Holly St
40th Ave S
S Brighton St
42nd Ave S